

**UTILIZATION AND ASSOCIATED FACTORS OF EARLY INFANT DIAGNOSIS OF
HIV INFECTION IN WEST OROMIA REGION, ETHIOPIA**



**By
Getahun Bayou (BSc)**

**A THESIS SUBMITTED TO DEPARTMENT OF EPIDEMIOLOGY AND
BIostatISTICS, COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCES,
JIMMA UNIVERSITY; IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
MASTER OF PUBLIC HEALTH**

**JUNE, 2014
JIMMA, ETHIOPIA**

JIMMA UNIVERSITY
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Advisors:

- 1. Mr. Tariku Dejene (BSc, MSc)**
- 2. Mr. Lamessa Dube (BSc, MPH)**

Abstract

Background: Human immunodeficiency virus infection follows a more aggressive course among infants and children than among adults. Early infant HIV infection diagnosis is a virological detection of HIV infection in infants and young children.

Objective: To assess utilization and associated factors of early infant diagnosis of HIV infection among HIV exposed infants and young children in Western Oromia Region, Ethiopia.

Methods: Institutional based cross-sectional study was conducted at 4 weeks to 18 months age infants and young children born to known women living with HIV / Acquired Immune Deficiency Syndrome (AIDS) from March 01, 2014 to April 30, 2014. Three hundred forty nine 4 weeks to 18 months age HIV exposed infants and young children, and mother pairs enrolled in Anti Retroviral Treatment (ART) and/or Prevention of Mother to Child Transmission (PMTCT) clinics of 27 health facilities in the West Oromia region were recruited. Study health facilities were selected purposively based on their HIV exposed infants enrollment status and all infants and mother pairs with complete records in the aforementioned facilities were included in the study. A developed checklist was used to collect information about mothers and infants from follow-up registers and cards. Analysis for predictors was done using bivariate and multivariate logistic regression where p value of <0.05 was considered as statistically significant.

Results: The proportion of HIV testing among HIV-exposed infants and young children was 83.7%, with the median age testing of 6 weeks. Caretaker residence [AOR= 2.92, 95% CI (1.15-7.40)], number of live children a mother has [AOR= 3.37, 95% CI (1.38-8.22)], mother HIV sero-status disclosure [AOR= 3.29 95% CI (1.05-10.29)], presence of mother support group at health facility [AOR= 6.55, 95% CI (2.88 – 14.90)], and early age enrollment of infant to care [AOR= 4.52, 95% CI (2.00-10.27)] were independent significant predictor for testing of HIV-exposed infants and young children.

Conclusions and Recommendations: Utilization of early infant diagnosis of HIV infection was relatively high in studied health facilities of Western Oromia Region. The Ministry of Health should strengthen the current health system to ensure uninterrupted supply chain of Dry Blood Spot (DBS) kits, Di ribonucleic Acid/Polymerase Chain Reaction (DNA- PCR) reagents, job aides and proper service documentation. Also, efforts should be directed to the community to raise awareness of early HIV testing during pregnancy, appropriate initiation of PMTCT intervention and earlier age enrollment of HIV-exposed infants to care.

Acknowledgement

I would like to extend my sincere acknowledgments to my advisors Mr. Tariku Dejene and Mr. Lamessa Dube, for their unreserved guidance and comments from the stage of the research proposal up to thesis write-up.

I would also like to thank zonal health offices (East Wollega, Horo Guduru Wollega, West Wollega and Kelem Wollega Zonal health offices), Woreda Health Offices and Health facility managers who facilitated conditions to conduct this assessment.

My special gratitude also goes to the teaching and supporting staff of the Department of Epidemiology and Biostatistics, Jimma University for their support in providing different literature.

Finally, I would like to thank data collectors, the supervisors and study subjects for their invaluable input to this thesis work.

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List of Abbreviations

AIDS- Acquired Immune Deficiency Syndrome
ART- Anti Retroviral Treatment
ARV- Anti Retro Viral
AZT- Azidothymidine
CD4- Cluster Differentiation Cell
CDC- Center for Disease Control
DBS- Dry Blood Spot
DNA/PCR- Di ribonucleic Acid/Polymerase Chain Reaction
EDHS- Ethiopian Demographic and Health Survey
EHNRI- Ethiopian Health and Nutrition Research Institute
EID- Early Infant Diagnosis
FMOH- Federal Ministry of Health
HC- Health Center
HCW- Health Care Workers
HEI- HIV Exposed Infant
HIV- Human Immune Virus
Hosp.- Hospital
HSDP- Health Sector Development Programme
IMNCI- Integrated Management of Newborn and Child Illness
MTCT- Mother to Child Transmission
NVP- Nevrapin
PMTCT- Prevention of Mother to Child Transmission
RNA- Ribonucleic Acid
SPSS- Statistical Package for Social Science
UNAIDS- United Nation on HIV/AIDS Programme
UNICEF- United Nations Children's Fund
WHO- World Health Organization

CHAPTER ONE: INTRODUCTION

1.1. Background

Globally, an estimated 35.3 (32.2–38.8) million people were living with human immune deficiency virus/acquired immune deficiency syndrome(HIV/AIDS) in 2012, of which 3.3 million (3.0 million – 3.7 million) were children under 15 years. About 1.6 (1.4–1.9) million people died of AIDS-related illnesses in 2012; of these, about 210,000 were children (under 15 years) constituting 13.1% of HIV/AIDS deaths. Of the 2.3 million new HIV infections 11.3% occur in children less than 15 years of age. Generally, there were about 6,300 new HIV infections a day in 2012, about 95% are in low- and middle-income countries, about 700 are in children under 15 years of age [1].

Mother to child transmission (MTCT) contributes for about 90% of HIV infection in infants and young children. HIV infections in infants and young children occur during pregnancy, labor and delivery and postnatal through breast feeding. In breastfeeding populations 15-45% of infants born to HIV- infected mothers acquire HIV infection without any intervention [2, 3].

More than half of children with HIV/AIDS die before the age of 2 years as a result of opportunistic infections and undercurrent common diseases such as pneumonia, diarrhea, malnutrition and malaria, all of which are conditions targeted by integrated management of newborn and child illness (IMNCI) [1].

The sub-Saharan Africa is highly affected by HIV with an estimated 25 million people living with HIV/AIDS in representing 70.8% of global HIV/ AIDS burden and 75% HIV/AIDS deaths. Children (<15years) of sub-Saharan Africa are excessively affected by HIV/AIDS with an estimated 2.9 million, accounting for 87.9% of all children living with HIV and AIDS globally [1].

The Ethiopian national estimate for HIV positive pregnant women was 38,404 for the year 2012; and mother to child transmission of HIV is one of the sources noted for new HIV infection. Number of children under the age of 15 years living with HIV/AIDS is estimated to be about 170, 000 [1, 4].

According to Federal Ministry of health- Health sector development program IV (FMOH- HSDP IV) Annual Performance Report for 2011/12, the proportion of HIV-positive pregnant women who received anti retro viral (ARV) prophylaxis to reduce the risk of MTCT is at 25.5% during the fiscal year though only 16.7% of HIV exposed babies received ARV prophylaxis [5].

Prevention of mother to child transmission (PMTCT) of HIV is an intervention which provides mothers with counseling, antiretroviral (ARV) drugs and psychological support to help prevent the infants against HIV infection. The intervention aimed to ensure no baby is born with HIV infection by 2015. PMTCT services ensure primary prevention of HIV among women of reproductive age, appropriate counseling of HIV infected women to enable decision about their future reproduction in an attempt to prevent unintended pregnancies, ensure pregnant women receive HIV testing and access to ARV drugs for their health and prevention of infection to babies. PMTCT also provides HIV care, support and treatment to HIV-infected women and the families [1, 3].

Prevention of mother to child transmission service (PMTCT) has been implemented in Ethiopia since 2001. However mother to child transmission remained a challenge for the country due to low coverage of service, inadequate quality of available resources and slow scale up service problem [6].

The increasing efficacy and coverage of prevention of mother to child transmission (PMTCT) interventions mean that the majority of children born to HIV-infected mothers will be uninfected (with effective ARV/ART interventions exceeding 90%). Consequently, recognizing those with infection before they become unwell is only possible through routine diagnostic testing, ideally in services for PMTCT or maternal and child health [7].

Serological assays suitable for HIV antibody detection in adults cannot be reliably used for confirmatory diagnosis of HIV in infants as the interpretation of positive HIV antibody testing is complicated by the fact that maternal HIV antibody can persist for 18 months (although it usually clears by 9–12 months). Therefore, more suitable testing methods that depend on detection of HIV virus antigen (virological test (HIV DNA PCR, HIV RNA PCR) in infants blood are required for diagnosis [2, 7].

Early infant HIV diagnosis (EID) is a virological detection of HIV infection in infants and young children less than 18 months of age, and dry blood spots (DBS) is one of the samples taking technique. DBS is whole blood sample dried in a filter paper and sent to regional laboratories for DNA PCR test. Its advantage is that it requires very small amount of blood sample, less infectious (less biohazard), easy to store and transport the sample and has good sensitivity and specificity. EID service allows health-care providers to offer optimal care and treatment of HIV infected children, assists in decision-making on infant feeding, and avoids needless stress in mothers and families [2, 7].

World Health Organization (WHO) recommends that early infant HIV diagnosis will be performed at the age of 6 weeks or any time subsequently, initiated by the responsible health care providers as outlined in WHO guidance on provider initiated HIV testing [7].

Because of the high risk of death before the age of two years among HIV-infected infants, and given the increasing availability of pediatric antiretroviral treatment in many resource-limited settings, WHO recommends that national programmes should establish the capacity to provide early virological testing of infants for HIV. All infants who are exposed to HIV should be tested, even if their mothers received antiretroviral (ARVs) for PMTCT. Evidence has shown that HIV infection follows a more aggressive course among infants and children than among adults [2, 8].

Identification of all HIV exposed infants, initial Deoxyribonucleic acid polymerase chain reaction (DNA PCR) testing, follow up for results, growth monitoring and final HIV status determination after complete weaning would ensure proper utilization of EID for HIV to many HIV exposed infants and young children [2].

In Ethiopia DNA PCR for EID was introduced in 2006 in one central laboratory (EHNRI) and then expanded to six sites (Bahirdar, Hawassa, Adama, Mekele, Addis Ababa (Zewditu H), Dire Dawa) in 2008. From April 2006 to April 2008, a total of 2848 infants had been tested centrally at the Ethiopian Health and Nutrition Research Institute (EHNRI) in Addis Ababa, which was the only laboratory with the capability to perform EID; 546 (19.2%) of the samples were positive. By November 2010, EHNRI and the six laboratories had tested an additional 16 985 HIV-exposed infants, of which 1915 (11.3%) were positive [9].

1.2. Statement of the problem

Infants born to HIV positive pregnant women by definition are HIV exposed and these infants can be infected with HIV during pregnancy, labor or after birth through breast feeding. All HIV exposed infants (infected and non-infected) will be positive if tested by antibody tests during the first few months of life [2].

HIV infected infants and children have higher rate of HIV related morbidities and mortalities. About one third and half of HIV infected infants die before their first and second year of birth respectively, if not diagnosed and enrolled in to care. Thus, early identification of infants infected with HIV followed by prompt ART treatment and appropriate management can help reduce morbidity and mortality, and it is life saving as HIV progresses fast in pediatric age group [1, 2, 7].

HIV/AIDS treatment coverage in infants and younger children remain lower (about half lower) than that of adults' coverage. The failure to expand access in many settings to early infant diagnosis is an important reason explaining why HIV treatment coverage remains much lower for children than for adults [10].

Even though early infant diagnosis is expanding in many countries overall testing for infants remain low. Evidence shows in resources-limited setting EID services uptake have faced many challenges contributed by several factors. In 2012, in low and middle income countries only 39% of children born from known HIV positive women were estimated to access to HIV testing within the recommended 2 months of birth [10].

In Ethiopia, despite the availability of early HIV testing in infants and young children, utilization of early infant diagnosis of HIV infection has not been done consistently. As WHO-UNICEF report 2013, only an estimated 19% of infants born from women living with HIV/AIDS were tested for HIV in 2012. However, as reported by CDC-Ethiopia office report of 2012 45% of known HIV exposed infants were tested in DNA-PCR [10, 11].

Improper utilization of EID for HIV can be contributed by both psychosocial, socio demographic and health system factors which need to be addressed for proper and sustained EID service utilization. Thus this study is therefore aimed to assess utilization of early infant diagnosis service and factors which affect utilization of the service in West Oromia Region [12].

CHAPTER TWO: LITERATURE REVIEW

2.1. Mother to child transmission (MTCT) of HIV infection

An estimated 3.3 million children worldwide were living with HIV by the end of 2012, mostly had acquired through vertical transmission, and more than 90% of these children are in sub-Saharan region of Africa. The Ethiopian national prevalence of HIV positive pregnant women was 38,404 for the year 2012. The highest prevalence occurs among the age groups 30 - 34 years for females and 35 -39 years for males in both urban and rural populations. Mother to child transmission of HIV is one of the sources noted for new HIV infection [1, 2, 4, 13].

PMTCT provides HIV counseling and testing in pregnant women, ARV treatment, infant feeding counseling, and comprehensive treatment of HIV-infected women and their families, including follow up of infant for HIV testing at 4-6 weeks after delivery using virology tests. Implementation of HIV PMTCT in resource-constrained countries, including Ethiopia has been facing some potential problem, which are not limited to the shortage of human resource for health sector but also hindering the level of services to many sites as well as provisions of high quality PMTCT services [6].

2.2. Early Infant Diagnosis (EID) of HIV infection in infants and young children

Standard HIV antibody testing, which is done with adults and older children, cannot identify infected infants in their first year of life, as it also detects maternal HIV antibodies that are transferred to the baby during pregnancy (and subsequently decline slowly within the first year of life). Therefore, more demanding of testing methods that rely on detecting HIV virus, or virological tests (HIV DNA PCR, HIV RNA PCR), are required for diagnosing infants [9].

World Health Organization (WHO) recommended the immediate initiation of ART upon diagnosis of HIV infection in infants and young children, irrespective of the children's CD4+ T-lymphocyte counts. Therefore, early infant diagnosis by HIV DNA testing is necessary to make a definitive diagnosis in children less than 18 months, due to the persistence of maternal antibodies up until this age. The use of dried blood spots (DBS) has simplified sample collection as it is less invasive for infants, and facilitates storage and transportation to laboratories equipped to carry out DNA testing using polymerase chain reaction (PCR) testing [9].

Early identification of infants infected with HIV followed by prompt ART treatment can help reduce morbidity and mortality. The need for early initiation of treatment in infants infected with HIV was emphasized in a South African cohort study that showed that 55% and 85% of HIV-infected infants had their CD4 cell count reduced to less than 25% by three and six months after birth, respectively. Another study conducted in South Africa showed that EID and early initiation of antiretroviral therapy helped to reduce mortality by 76% and HIV progression by 75% [14].

2.3. Proportion of HIV testing in infants and young children

Children living with HIV/AIDS continue to experience persistent treatment gaps. In 2012, 647,000 children under 15 years of age were receiving antiretroviral treatment. HIV treatment coverage for children was 34% (31-39%); remained half of coverage for an adult which was 64% (61-69%) in 2012. The failure to expand access in many settings to early infant diagnosis is an important reason explaining why HIV treatment coverage remains much lower for children than for adults. Also, while early infant diagnosis is expanding in many countries overall testing for infants remain low. This is because in resources-limited setting EID services uptake has faced many challenges contributed by several factors. In 2012, in low and middle income countries only 39% of children born from known HIV positive women were estimated to access to HIV testing within the recommended 2 months of birth [10].

In Sub-Saharan Africa only four countries, Namibia, South Africa, Swaziland and Zambia, provide EID service to more than 50 % of infants and young children born to women living with HIV, and almost half of the priority countries had EID coverage of less than 20% as reported by UNAIDS [10].

A study conducted in Malawi by analysis of data from 2008 to 2010 indicates 71.6 % of HIV exposed infants were tested and 14.5% were positive. Also study conducted in Zambia from September 2007 to July 2010, 58.6% infants and young children born to women living with HIV were tested and 12.2% HIV positive. Another study conducted in Tanzania indicates that 87% of HIV exposed infants and young children were tested and 13% were HIV positive. The retrospective study conducted in Kenya, revealed that of 233 HIV-exposed infants enrolled in care, 156 (67%) were tested [12, 15, 16, 17].

A study conducted in Addis Ababa in 2011 also revealed that only 52% of infants were brought for early infant diagnosis at six weeks postpartum [18].

2.4. Socio-demographic factors and HIV testing in infants and young children

Early determination of HIV in infants and young children has been affected by the income of caregivers (cost of transportation), long distance from health facility, long waiting time, and unemployment [19, 20].

Number of child caregiver has also another factor affecting utilization of HIV testing of HIV exposed infants, as indicated in a study conducted in Tanzania [16].

There are very rare literatures concerning maternal/caregivers' knowledge and understanding about early infant diagnosis service. A Kenyan study explored the service providers and caregiver's knowledge, attitudes and perceptions revealed that out of ten caregivers interviewed nine of them said that they had not heard of early infant diagnosis before their children were coming from EID core. Also, most care givers and four of the six health providers interviewed not sure number, time and test to be done for infant HIV infection, despite having undergone PMTCT counseling. Also the study reported, some caregivers denied bringing their children by fear that the test is painful and large amount of blood will be drawn. As reported by a similar study conducted in South Africa, only few caregivers were sure of the appropriate time for infant diagnosis [19, 21].

A study conducted in Ethiopia, Addis Ababa revealed that age of parents, their education level, marital status, gender and the total number of children living with them are factors affecting the practice of HIV testing in infants and young children ($P < 0.05$) [22].

2.5. Psychosocial factors contributing to the HIV testing in infants and young children

Different studies reveal that there are different psychosocial factors affecting utilization of early infant diagnosis services. Non maternal caregivers and fear of stigma (e.g. Caregivers felt their children will be discriminated against in their various schools) were linked with under utilization of EID service. Poor disclosures of HIV sero-status among partners were also linked with utilization of EID service [1, 16, 19].

A study conducted in Kenya, state that some caregivers reported that they were being motivated by their partners and social support group to bring their infants to EID services, thus lack of social support is one psychosocial factor which can affect the utilization of EID services [19].

2.6. Health system factors and HIV testing in infants and young children

The health care system must provide the necessary support in the cascade of HIV early infant diagnosis. As reported by exploratory study done in Kenya, physical availability/accessibility of health facility, EID materials (DBS kit, reagent) and delayed availability of DNA-PCR results were factors affecting utilization of EID services [19]. Another study conducted in Tanzania shows evidence of early HIV diagnosis during pregnancy ($P<0.01$), presence of PMTCT prophylaxis ($P<0.05$), cotrimoxizazole prophylaxis for HIV exposed infants ($p<0.01$), and frequency of attending the clinic for HEI care ($p<0.05$) were significantly associated with utilization of EID [16].

SIGNIFICANCE OF THE STUDY

Decentralization of early infant diagnosis for HIV infection is new program incorporated in PMTCT service in Ethiopia. Currently the service is being decentralized to peripheral health facilities through transportation of blood samples by using DBS from health facilities to regional/testing laboratories, but there are only very limited studies concerning its level of utilization in our countries. Thus, no much was known regarding the level of early infant diagnosis, service utilization and its associated factors in the study area.

Therefore, this study was conducted to identify the proportion of utilization of HIV testing in infants and young children and associated factors associated with EID utilization.

The study results and recommendations will be shared at different levels of policy making and implementation to facilitate planning and implementation for proper utilization of EID services.

CONCEPTUAL FRAMEWORK OF THE STUDY

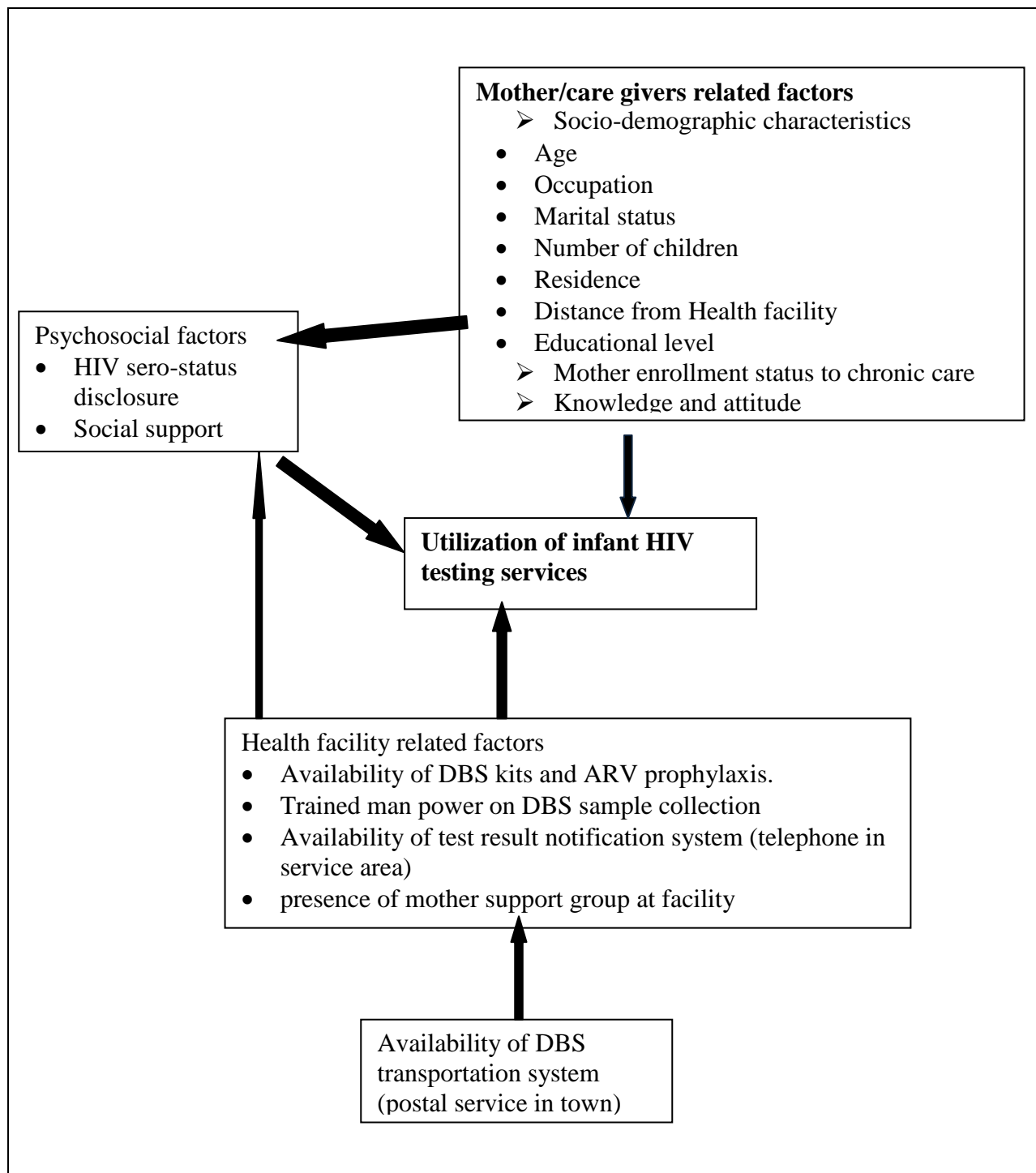


Fig 2.1: Factors affecting infants and young children, HIV testing services

CHAPTER THREE: OBJECTIVES OF THE STUDY

3.1. General objective

- To assess utilization and associated factors of early infant diagnosis (EID) among HIV-exposed infants and young children in Western Oromia Region of Ethiopia, 2014

3.2. Specific objectives

- To determine the proportion of HIV tested infants and young children among HIV-exposed infants/children in Western Oromia Region of Ethiopia.
- To assess factors affecting utilization of early infant diagnosis service of HIV infection in Western Oromia Region of Ethiopia.

CHAPTER FOUR: METHODS AND MATERIALS

4.1. Study area and period

The study was conducted at 27 health facilities (7 hospitals and 20 health centers) of four zones (East Wollega, Horo Guduru Wollega, West Wollega and Kelem Wollega zones) of West Oromia region Ethiopia, from March 01, 2014 to April 30, 2014.

The study area comprises four zones (East Wollega, Horo Guduru, West Wollega and Kelem Wollega) of Western Oromia Region which are located at Western part of Ethiopia. The area has a total population of about 4.67 million, with estimated 1:1 sex ratio.

Concerning health facility profile, in four zones of West Oromia Region, there is a total 9 hospitals, 164 health centers and 1 regional laboratory giving service to community of the region.

Currently a total of 67 health facilities (9 hospitals and 58 health centers) are enrolled for early infant diagnosis service (EID) for HIV exposed infants through dry blood spots (DBS) sample referral; and one referral regional laboratory performing DNA-PCR testing. The time for initiation of EID service varies among the health facilities. The service was started in 2006 at hospitals, in 2010 at some (37) health centers and expanded to the rest health centers in 2012. During the study period there were about 400 exposed infants age at birth to 18 months of age enrolled in the service in the study area.

4.2. Study Design

Institutional based cross sectional quantitative study, supplemented with a qualitative method was employed.

4.3. Source population

The source populations were HIV exposed infants and young children (children born from known HIV positive mothers) of age 4 weeks to 18 months in West Oromia Region.

4.4. Study population

The study populations were 4 weeks to 18 months aged HIV exposed infants and young children enrolled in ART and/or PMTC clinics at 27 health facilities (7 hospitals and 20 health centers) in four zones of West Oromia region during the study period.

4.5. Inclusion and exclusion criteria

4.5.1. Inclusion criteria

Quantitative data:

HIV exposed infants between 4 weeks to 18 months those registered either in ART and/or PMTCT clinics.

Qualitative Data:

Trained health service providers having direct involvement with the early infant diagnosis service with minimum of one year experience in the service area were included. Mothers of HIV exposed infants or young children who had been in chronic HIV care at least for three years.

4.5.2. Exclusion criteria

Mothers and infants with incomplete records and for whom follow-up cards not retrieved were excluded from quantitative study.

4.6. Sample size determination

The sample size was calculated using the formula for estimation of a single population proportion with the following assumption:

Since there was no similar study in my study area, proportion (p) 0.5 with 5% marginal error and 95% confidence level were considered to determine minimum sample size.

Sample size (n) calculation

$$n = \frac{(Z_{\alpha/2})^2 p(1-p)}{d^2}$$

$$n = \frac{(1.96)^2 * 0.5(1-0.5)}{0.05^2}$$

$$n = 384$$

Where n= sample size, d = 5% margin of error, P= is an estimate proportion (0.5)

Z_(1-α/2) = the standard normal variable at (1-α) % confidence level, 5%, i.e. 95% confidence level Z= 1.96

Since the total population (total number HIV exposed infants enrolled into care in the study area is small and finite), adjustment was made by the following formula $n_f = n_i/[1 + (n_i/N)]$; where n_f was the sample size calculated by adjustment, n_i was the initial sample size calculated by single proportion formula (384), N was the total number of HIV exposed infants enrolled in to care (400). Based on this formula the sample size for the study was 196. Considering 10% allowance for missing or non-response rate, the minimum sample size was calculated to be **216**.

But since all HIV exposed infants enrolled at health facilities were manageable to recruit in the study, all infant-mother pairs having complete registers and follow-up cards were included in the study (N=349).

4.7. Sampling technique

Of the 67 health facilities enrolled for EID of HIV infection service in the study area, 35 health facilities had no enrolled HIV exposed infants and 5 facilities have very few (only 1 or 2) enrolled infants during the study period, thus 27 health facilities were selected for the study.

A total of 376 four weeks to eighteen months age HIV-exposed infants and young children were identified from HEI register of the selected health facilities in the study area.

Twenty seven HIV exposed infants and young children- mother pairs were excluded from the study due to lack of charts and incomplete records (8, 3, 2, 3, 2, 2, 2, 2, 3 from Nekemte Hospital, Gimbi HC, Nedjo Hospital, Dembi Dolo Hospital, Aira Hospital, Mendi HC, Gutin HC, Gida Ayana HC and Kiremu HC, respectively) resulting in a total of 349 HEI infant and young children - mother pairs included in the study. Table 4.1 summarizes the distribution of participants among health facilities.

Purposive sampling technique was employed for qualitative part of the study.

Table 4.1: Study participant distribution among health facilities, Western Oromia Region, Ethiopia 2014

S. No	Health Facility	Study participant	S. No	Health Facility	Study participant
1	A/Gudetu HC	6	15	Jarte HC	4
2	Agemsa HC	4	16	Keto HC	7
3	Aira H.	5	17	Kiremu HC	15
4	Arjo Jima HC	6	18	Kombolcha HC	3
5	Dembi Dolo H	29	19	Mendi HC	9
6	Fincha HC	16	20	Mugi HC	6
7	Fincha Sugar	11	21	Nejo H.	14
8	Gelila HC	9	22	Nekemte HC	30
9	Gida A HC	12	23	Nekemte Hosp	75
10	Gidami HC	5	24	Shambu Hosp	17
11	Gimbi Ad H	15	25	Sire HC	6
12	Gimbi HC	5	26	Uke HC	6
13	Gimbi Pub H	10	27	Wayu HC	13
14	Gutin HC	11	Total		349

4.8. Study Variables

4.8.1 Dependent Variable: -

Utilization of EID service (infant HIV testing)

4.8.2. Independent Variables:-

Mother/ care giver factors: - socio-demography (maternal age, marital status, residence, total number of children, level of education, distance from a health facility, occupation), period maternal heard of her sero-status, enrolled to care, disclosure of maternal HIV status

HIV chronic care services and psychosocial factors: - infant care giver (mother or guardian), mother enrollment in chronic care and treatment, adherence of mother, HIV support groups, and mother and infant PMTCT interventions, age of infant at enrollment

Healthcare related factors: - trained HCW, DBS kits, ARV prophylaxis, sample and test results transportation system and presence of mother support group at the facility.

4.9. Data collection Procedures

4.9.1. Quantitative data collection:

Data were collected by four data clerks, who were familiar and experienced with ART registrations and follow-up cards, but have no health profession backgrounds. Two supervisors (nurses) were assigned and supervised data collection process.

Developed checklists were used to collect:

- Data about mothers' demography, HIV sero-status disclosure status, HIV chronic care and treatment follow-up status from HIV chronic follow-up records and cards of mothers to assess mother related factors affecting utilization of EID for HIV infection, and;
- Data about HEI follow-up and HIV testing status of infants from HEI registers and cards.
- Data about the health facility factors that affect the utilization of EID for HIV infection through observation and interview with health service providers.

4.9.2. Qualitative data collection

A qualitative descriptive study was conducted to supplement quantitative part of the study.

In-depth interview with a total of 13 key informants was employed using in-depth guide, which were first written in English and converted into Afan Oromo for the discussions. The key informants included 6 HIV exposed infant mothers who had been in chronic HIV care service for at least three years (3 who utilized EID service and 3 who did not utilize the service); and 7 trained health service providers having direct involvement with the service at least for one year (4 ART nurse, 2 PMTCT counselor, 1 ART coordinator). In-depth interview was conducted by an experienced data collector who knows the local language (Afan Oromo) and the information obtained through the interview was audio-recorded and note was taken by note taker

4.10. Operational definitions

ART drug adherence good, fair and poor: HIV exposed infant mother who missed take ≤ 2 doses, 3-5 doses and ≥ 6 doses of ART drugs per 30 doses, respectively.

Availability of DBS kits and ARV prophylaxis: Presence of DBS kits and prophylaxis in the facility without any interruption throughout the year.

Distance of mother's residence from health facility: It is defined as the estimated distance by kilometer of mothers' residence Kebele from health facilities.

Early infant diagnosis service utilization: infant and young child aged 4 weeks to 18 months for whom whole blood (DBS sample) was collected and sent to a referral laboratory for HIV DNA- PCR testing.

HIV exposed infants: infants born to known HIV positive mothers.

Trained man power: health professional who has trained on DBS sample collection and transportation either on Pediatrics ART or PMTCT training.

4.11. Data Processing and analysis

For quantitative part of the study, data were cleaned, edited and entered into the Epi-data version 3.1; and exported to SPSS version 16 for analysis. Frequencies and percentages were calculated for all variables related to the objectives of the study and summarized by using simple frequency tables, graphs and charts. Odds ratio with 95 % confidence interval was used to assess the presence and degree of association between dependent and independent variables. A P value less than 0.05 was considered for statistical significance of the association. Moreover, for variables with p-value less than 0.25 in bivariate analyses, multivariate logistic regression analysis was carried out to control the possible confounding effects and assess the separate effect of the variables. In addition, multicollinearity diagnostics of variables were carried out and ensured for the absence of multicollinearity effect. Goodness of model fitness was also checked by the Likelihood ratio test and Omnibus test.

For qualitative data, thematic analysis was employed by identifying the main themes of participants' response.

4.12. Data Quality Assurance

Data collectors were assigned in fact that they were familiar and experienced with registers to increase accuracy and completeness of the data; but with no health profession background to decrease biases.

Checklists were developed considering the content and layout of the records to make ease of accessing necessary information, and pre-checked with records. Data collectors and supervisors were trained on how to use records and fill the checklists.

All the data from each health facilities had been checked for completeness, accuracy, and consistency by the principal investigator and the supervisors immediately after the data collection.

4.13. Ethical Consideration

Ethical clearance was obtained from Jimma University, College of Public Health and Medical Sciences ethical committee. The permission of the Zonal and Woreda Health offices and health facilities managers were also obtained.

By assuring the confidential nature of responses and obtaining informed consent from the study participants, in-depth interview was conducted with strict privacy for qualitative data collection.

4.14. Dissemination of the results

The results of the study were presented to Jimma University Scientific community. The findings also will be disseminated to government and non-governmental organizations to provide information about utilization of early infant diagnosis of HIV infection in the study area. Furthermore, efforts will be made to prepare manuscripts for publishing the results in scientific journals

CHAPTER FIVE: RESULTS

5.1. Socio-demographic characteristics of study population

From a total of 376 four weeks to eighteen months age HIV-exposed infants and young children identified from the HEI register of study facilities a total of 349 (93%) of them were included in the study.

Among 349 HIV exposed infants and young children recruited into the study, 180 (51.6%) were males, and the mean age of HIV exposed infants and young children was 10.1 (\pm 4.5) months.

Of the 349 caregivers recruited for this study, 342 (98.0%) were mothers of HIV exposed infants and young children, and 7 (2.0%) were fathers or other guardian for HEI. The mean age of the mothers was 28 (\pm 5. 4) years; and in average each mother has 2 children. About two third (67.9%) of the study participants were urban dwellers and the rest (32.1%) were rural residents. Most respondents (68.5%) live within 10 kilometers of health facilities.

One in five mothers (21.5%) completed secondary and above educational level; while 139 (39.8%) did not attend formal education. The majority of respondents, 292 (83.7%) were married, 40 (11.5%) divorced or widowed and 17 (4.9%) were single. Table 5.1 shows Socio-demographic characteristics of the study population.

Table 5.1: Socio-demographic characteristics of HIV exposed infants and their mothers, Western Oromia Region, Ethiopia 2014

Variables (n=349)		Frequency	
		Number	Percent
Sex of the infant	Male	180	51.6
	Female	169	48.4
Caretaker relation to infant/child	Mother	342	98.0
	Father or other guardian	7	2.0
Age of mother (years)	15- 24	83	23.8
	25 – 34	214	61.3
	>=35	52	14.9
Mother residence	Urban	237	67.9
	Rural	112	32.1
Mother educational status	No education/illiterate	139	39.8
	Primary School	135	38.7
	Secondary & above	75	21.5
Marital status	Married	292	83.7
	Single	17	4.9
	Divorced or widowed	40	11.5
Mother employment	Employed	18	5.2
	Not employed	331	94.8
Distance from health facility	<10km	239	68.5
	>=10km	110	31.5

5.2. HIV chronic care follow-up and PMTCT interventions

Table 5.2 summarizes HIV chronic care follow-up, and PMTCT interventions of the mother and infant. Two hundred fifty (71.6%) of HEI mothers had heard about their HIV sero-status before pregnancy, and only 24 (6.9%) of them heard their sero-status during or after delivery. Almost all mothers, 346 (99.1%) were following ART chronic care during the study period. Most mothers had disclosed their HIV sero status, of which 80.5% disclosures were to male partners. Three in five (60.2%) mothers of HEI were linked to mother support group at health facility. Regarding place of delivery, 84.5% and 15.5% of mothers gave birth at health institution and home, respectively.

The mean enrolment age of the infants to HEI care was 2 months with minimum and maximum age at birth and 14 months, respectively. Regarding PMTCT interventions and infant feeding, 91.1% of HEI had received ARV prophylaxis and exclusive breast feeding was the most common (98%) reported mode of infant feeding.

Table 5.2: HIV chronic care follow-up and PMTCT interventions of mothers and infants, Western Oromia Region, Ethiopia 2014

Variables		Frequency	
		Number	Percent
Period mother heard her sero status (N=349)	Before pregnancy	250	71.6
	During pregnancy	75	21.5
	During or after delivery	24	6.9
Mother currently in care (N=349)	Yes	346	99.1
	No	3	0.9
Mother disclosure HIV status (N=349)	Yes	327	93.7
	No	22	6.3
To whom disclose Sero status (N=327)	Husband	281	80.5
	Mother	10	2.9
	other relative	36	10.3
Adherence of mother	Good	316	90.5
	Fair	20	5.7
	Poor	13	3.7

Table 5.2 continues....

Mother support group linked with	Yes	210	60.2
	No	139	39.8
Enrollment age of the infant	At birth to 6 weeks	295	84.5
	Greater than 6 weeks	54	15.5
Place of infant delivery	Health institution	295	84.5
	Home	54	15.5
Mother received PMTCT interventions	Yes	340	97.4
	No	9	2.6
Infant received PMTCT interventions	Yes	318	91.1
	No	31	8.9
Mode of infant feeding	Exclusive breast feeding	342	98.0
	Replacement (formula)	4	1.1
	Mixed feeding	3	0.9

5.3. HIV exposed infants and young children HIV testing

The proportion of HIV testing among HIV-exposed infants and young children was 83.7%; with the median testing age of 6 weeks. Among tested infants and young children 53.1% and 46.9% were male and female, respectively. The DBS DNA results of the 281 (96.2%) were returned from testing facility (referral laboratory) to the health care facilities; of which 5.3% were HIV positive.

Table 5.3: HIV exposed infants and young children HIV testing, Western Oromia Region, Ethiopia 2014

Variables		Frequency	
		Number	Percent
Infant tested (DNA-PCR) (N=349)	Yes	292	83.7
	No	57	16.3
Test result received(N=292)	Yes	281	96.2
	Pending	10	3.4
	No	1	0.3
Infants HIV test results (=281)	Positive	15	5.3
	Negative	266	94.7

5.4. HIV exposed infants and young children HIV testing in relation to socio-demographic factors

Table 5.4 summarizes testing of HIV-exposed infants by the socio-demographic characteristics. Among socio-demographic factors, urban dweller mothers were more likely to utilize EID service when compared to rural residents and the difference was statistically significant in bivariate analysis [OR= 2.61, 95% CI (1.46-4.65)]. Regarding maternal educational status, mothers with secondary & above school and primary education level were more likely to utilize EID service when compared to mothers with no formal education [OR= 4.89 (1.65 - 14.46)] & [OR= 1.34, 95% CI (0.73-2.45)], respectively, and the difference was statistically significant for secondary and above school level in bivariate analysis. Regarding number of live children, mothers with relatively few number of live children were more likely to utilize the service than mothers with high number of children [OR= 9.10, 95% CI (4.50-18.36)].

Table 5.4: HIV exposed infants and young children HIV testing in relation to socio-demographic factors, Western Oromia Region, Ethiopia 2014

Factors		Infant tested for DNA			P value
		PCR		OR (95% CI)	
		Yes, Number (%)	No, Number (%)		
Sex of the infants	Male	155(53.1)	25(46.9)	1.45 (0.82- 2.56)	0.20
	Female	137(46.9)	32(56.1)	1.00	
Relation to HEI	Mother	286 (83.6)	56 (16.4)	0.85 (0.10- 7.21)	0.80
	Other, guardian	6 (85.7)	1 (14.3)	1.00	
Residence	Urban	209 (88.2)	28(11.8)	2.61(1.46-4.65)	0.001
	Rural	83(74.1)	29(25.9)	1.00	
Marital status	Married	247(84.6)	45(15.4)	1.00	0.28
	Single	15(88.2)	2(11.8)	1.37(0.30-6.18)	
	Divorced or Widowed	30(75.0)	10(25.0)	0.55(0.25-1.20)	

Table 5.4 continues

Educational status	No formal education	109(78.4)	30 (21.6)	1.00	
	Primary	112(83.0)	23(17.0)	1.34(0.73-2.45)	0.02
	Secondary & above	71(94.7)	4(5.3)	4.89(1.65-14.46)	
Distance from Health facility	<10km	204(85.4)	35(14.6)	1.46(0.81-2.63)	0.20
	>=10km	88(80.0%)	22(20.0%)	1.00	
HEI mother age	15- 24	70(84.3%)	13 (15.7%)	1.13(0.44-2.86)	0.97
	25 – 34	179(83.6%)	35(16.4%)	1.07(0.48-2.39)	
	>=35	43(82.7%)	9(17.3%)	1.00	
Occupational status	Employed	18(100%)	0(0%)	3.36E8	1.00
	Not employed	274(82.8%)	57(17.2%)	1.00	
Number of live children	1 to 3	255(86.7%)	39(13.3%)	3.18(1.65-6.13)	0.00
	4 and above	37(67.3%)	18(32.7%)	1.00	

5.5. HIV testing of HIV exposed infants and young children in relation to HIV chronic care follow-up and PMTCT interventions

Table 5.5 summarizes HIV testing of HIV exposed infants and young children in relation to HIV chronic care follow-up and PMTCT interventions. In bivariate logistic regression analysis it was found that mothers who disclosed their HIV sero-status either to their partners or other relatives were 4.02 times more likely to bring their infants for HIV testing than those who did not disclose their HIV sero-status [OR=4.02, 95% CI (1.63 – 9.93)]. Similarly, mothers who were from health facilities having mother support group (psychosocial support groups) were 10.22 times more likely to utilize EID service of HIV infection than those who were not from health facilities with mother support group [OR= 10.22, 95% CI (4.94 – 21.110)]. Also, PMTCT interventions of mother [OR= 4.33, 95% CI (1.13 – 16.66) and infants [OR= 4.50, 95% CI (2.06 – 9.82)], institutional infant delivery [OR= 6.35, 95% CI (3.32 – 12.14), and infants' early age enrollment [OR= 7.09, 95% CI (3.70-13.55)] were found to be predictors of HIV testing of infants and young children.

Table 5.5: HIV testing of HIV exposed infants and young children in relation to HIV chronic care follow-up and PMTCT interventions, Western Oromia Region, Ethiopia 2014

Variables		Infant tested for DNA PCR		OR (95% CI)	P value
		Yes, Number (%)	No, Number (%)		
Time mother heard her sero-status	Before pregnancy	213(85.2)	37(14.8)	2.88(1.15-7.21)	0.02
	During pregnancy	63 (84.0)	12(16.0)	2.63(0.92-7.50)	
	During or after delivery	16(66.7)	8(33.3)	1.00	
Mother in chronic care	Yes	291(84.1)	55(14.9)	10.58(0.94 - 118.73)	0.06
	No	1(33.3)	2(66.7)	1.00	
Mother HIV disclosure status	Yes	279(85.3)	48(14.7)	4.02(1.63 - 9.93)	0.003
	No	13(59.1)	9(40.9)	1.00	
Mother support group linked with	Yes	200(95.2)	10(4.8)	10.22(4.94 - 21.11)	0.00
	No	92(66.2)	47(33.8)	1.00	
Mother PMTCT interventions	Yes	287(84.4)	53(15.6)	4.33(1.13 – 16.66)	0.03
	No	5(55.6)	4(44.4)	1.00	
Place of infant delivery	Health institution	262(88.8)	33(11.2)	6.35(3.32 – 12.14)	0.00
	Home	30(55.6)	24(44.4)	1.00	
Infant received PMTCT	Yes	274(86.2)	44(13.8)	4.50(2.06 – 9.82)	0.00
	No	18(58.1)	13(41.9)	1.00	
Infant enrollment age	At birth to 2 months	263(89.2)	32(10.8)	7.09(3.70-13.55)	0.00
	Greater than 2 months	29(53.7)	25(46.3)	1.00	
Infant feeding mode	Exclusive breastfeeding for 6wk	286(83.6)	56(16.4)	1.00	0.88
	Replacement or mixed feeding	6(85.7)	1(14.3)	0.85(0.10 – 7.21)	

5.6. Description of Health facility factors related to utilization of EID services

Table 5.6 summarizes descriptions of health facility factors related to utilization of EID services

An assessment was conducted on 27 (7 hospitals and 20 health centers) health facilities of the Western Oromia Region of Ethiopia. Factors related to EID service was assessed among all facilities.

All health facilities (27) had trained human power on the DBS sample collection and one facility had no DBS kits, and all had an experience of advising parents for EID service. In average, health care facilities had 3 number of trained HCW by 2:1 female to male ratio, and the average number of HCW collecting DBS sample was two.

Of all health care facilities, 3 (11.1%) and 24 (89.9%) of them reported to offer EID service for 6 and 5 days per week, respectively. All facilities reported that there was no regular schedule for DBS sample collection and transportation; the sample had been collected at any time of working days according to the appointment given to clients which coincides 6 weeks of EPI service.

It was reported that only 2 (7.4%) health care facilities had no job aids for DBS sample collection, and 7 (25.9%) of them experienced stock out of DBS kits in past one year with a frequency of once and twice for three and four health care facilities, respectively.

Regarding postal service and telephone, 24 (80.9%) of health care facilities had access to the post office in the town, and only 5 (18.5%) of facilities had a functional telephone at ART clinic, for DBS sample transportation and DNA-PCR result receiving, respectively.

Table 5.6: Description of Health facility factors related to utilization of EID services, Western Oromia Region, Ethiopia 2014

Factors describing the Health facility	Frequency	
	Yes (%)	No (%)
Health Workers trained in DBS sample collection	27 (100.0)	
Parents advised by HCWs when to come for DBS	27 (100.0)	
Availability of job aids	25(92.6)	2(7.4)
Current availability of DBS kits	26 (96.3)	1 (3.7)
Regular stock out of DBS kit	7 (25.9)	20 (74.1)
Availability of DBS transportation system	24(88.9)	3 (11.1)
Functional telephone for receiving the result at ART	5 (18.5)	22 (81.5)
Presence of psychosocial support at facility	8 (29.6)	19 (70.4)

5.7. Multivariate logistic regression analyses of factors associated with testing of HIV exposed infants and young children

In the bivariate analysis:- care taker residence, maternal educational level, number of live children a mother has, mother HIV sero-status disclosure, presence of mother support group at facility, mother and infant PMTCT interventions, place of delivery, and early age of infant enrollment were found to be significant predictors for testing of HIV-exposed infants and young children.

Multivariate logistic regression model was used to adjust for the effects of confounding (if any exist) for those variables showed association in bivariate analyses, and P value less or equal to 0.25 to include any variables with the possible potential association. Table 5.7 shows multivariate logistic regression analyses of factors associated with testing of HIV exposed infants and young children. In multivariate analyses, mother's residence [AOR= 2.92, 95% CI (1.15-7.40)], number of live children mother has [AOR= 3.37, 95% CI (1.38-8.22)], mother HIV sero-status disclosure [AOR= 3.29, 95% CI (1.05-10.29)], presence of mother support group at health facility [AOR= 6.55, 95% CI (2.88 – 14.90)], and early age enrollment of infant to care [AOR= 4.52, 95% CI (2.00-10.27)] were independent significant predictor for testing of HIV-exposed infants and young children.

Table 5.7: Multivariate logistic regression analyses of factors associated with testing of HIV exposed infants and young children, Western Oromia Region, Ethiopia 2014

Variables	HIV testing		COR (95% CI)	P Value	AOR (95% CI)	P Value
	Yes N(%)	No N(%)				
Residence						
Urban	209 (88.2)	28(11.8)	2.61(1.46-4.65)	0.001	2.92(1.15-7.40)	0.02
Rural	83(74.1)	29(25.9)	1.0		1.00	
Educational status						
No formal education	109(78.4)	30 (21.6)	1.00		1.00	
Primary	112(83.0)	23(17.0)	1.34(0.73-2.45)	0.01	1.02(0.46-2.23)	0.67
Secondary & above	71(94.7)	4(5.3)	4.89(1.65-14.46)		1.76(0.49-6.38)	
Distance from Health facility						
<10km	204(85.4)	35(14.6)	1.46(0.81-2.63)	0.20	0.50(0.20 – 1.26)	0.14
>=10km	88(80.0)	22(20.0)	1.00		1.00	
Number of live children						
1 to 3	255(86.7)	39(13.3)	3.18(1.65-6.13)	0.00	3.37(1.38-8.22)	0.01
4 and above	37(67.3)	18(32.7)	1.00		1.00	
Time mother heard her sero-status						
Before pregnancy	213(85.2)	37(14.8)	2.88(1.15-7.21)	0.08	1.34(0.36-5.06)	0.67
During pregnancy	63 (84.0)	12(16.0)	2.63(0.92-7.50)		0.76(0.17-3.46)	
During /after delivery	16(66.7)	8(33.3)	1.00		1.00	
Mother currently in care						
Yes	291(84.1)	55(14.9)	10.58(0.94 - 118.73)	0.06	7.06(0.16-309.74)	0.31
No	1(33.3)	2(66.7)	1.00		1.00	

Table 5.7 continues

Mother disclosure HIV status						
Yes	279(85.3)	48(14.7)	4.02(1.63 - 9.93)	0.003	3.29(1.05-10.29)	0.04
No	13(59.1)	9(40.9)	1.00		1.00	
Mother support group present						
Yes	200(95.2)	10(4.8)	10.22(4.94 - 21.11)	0.00	6.55(2.88 – 14.90)	0.00
No	92(66.2)	47(33.8)	1.00		1.00	
Mother PMTCT						
Yes	287(84.4)	53(15.6)	4.33(1.13 – 16.66)	0.03	0.41(0.04 – 4.69)	0.47
No	5(55.6)	4(44.4)	1.00		1.00	
Place of infant delivery						
Health institution	262(88.8)	33(11.2)	6.35(3.32 – 12.14)	0.00	1.80(0.71-4.54)	0.22
Home	30(55.6)	24(44.4)	1.00		1.00	
Infant received prophylaxis						
Yes	274(86.2)	44(13.8)	4.50(2.06 – 9.82)	0.00	3.34(0.93-12.02)	0.07
No	18(58.1)	13(41.9)	1.00		1.00	
Infant enrollment age						
At birth to 2 months	263(89.2)	32(10.8)	7.09(3.70-13.55)	0.00	4.52(2.00-10.27)	0.00
Greater than 2 months	29(53.7)	25(46.3)	1.00		1.00	

Findings of Qualitative Data

In-depth interview with a total of 13 key informants (6 mothers and 7 health service providers) was employed to supplement quantitative part of the study. The followings were findings identified during the interview.

1. Knowledge about infant HIV infection and prevention of mother to child transmission

Understanding of infants and children, HIV infection was universal by all service provider participants and most of mother participants.

“Children can be infected by HIV from their mothers during breastfeeding (if there is an injury to mothers’ breast), if they share sharp materials, and if the mother does not take drug” (37yrs of age mother from Mendi HC)

Lack of adequate knowledge about the route of mother-to- child transmission of HIV infection was identified by few mother respondents.

“I don’t know another way of HIV transmission from mother to child except sharing of sharp materials with the child” (30 yrs of age Mother from Nedjo Hosp)

On prevention of mother to child transmission, good understanding was demonstrated by all service providers and most mothers participated. However, knowledge gap about getting of HIV free child by using PMTCT service was identified by few mothers.

“I did not expect my child will be HIV free because she was born of my blood” (30 yrs of age Mother from Nedjo Hosp)

2. Knowledge about Early Infant Diagnosis of HIV infection

It was reported that all participants had information about EID service for HIV infection to identify HIV status of HIV exposed infants. All participants knew availability of EID service for early diagnosis of children born to HIV infected mothers.

Concerning the importance of early infant diagnosis of HIV infection, good understanding was

revealed by both mother and service provider respondents. It was reported that HIV exposed infants need to be tested as early as possible to identify their HIV status.

“Early testing of HIV infection for HIV exposed children is mandatory for decision making about care of children born to HIV positive mothers” (Male ART nurse from Nedjo Hosp.)

However, there was misunderstanding about obligatory testing of infants born to HIV positive mothers by few mother and service provider respondents assuming that the healthy looking infant is HIV negative and PMTCT intervention can fully protect infant from HIV infection, respectively.

“I can estimate if my child has HIV or not, because children are sick if they are HIV positive. For example, my child looks HIV free because she is healthy” (27 yrs old mother from Mendi HC)

“It is preferable if all HIV exposed infants are tested at their 6 weeks age or as early as possible; but if conditions are not convenient for testing, it is not mandatory since both mother and infant received PMTCT interventions because most probably the child will be negative” (Female ART nurse from Mendi HC)

Both mother and service provider key informants demonstrated to have full information about the right time for early diagnosis of HIV infection in infants.

“Infants will be tested at their six weeks age, when they come for their immunization” (35 yrs old mother from Fincha HC)

“The right time for diagnosis of HIV exposed infants for HIV infection is exactly at the age of six weeks during their visit of EPI if possible, if not they should be tested as early as possible after that” (Female ART nurse from Mendi HC)

Concerning the place EID of HIV infection (DBS sample collection and DNA-PCR testing sites), service provider respondents had full information. However, mother participants knew the place for DBS sample collection but the major information gap was identified on site for running of the sample (DNA-PCR testing facility).

“DBS sample is collected in this facility and sent to Nekemte Regional Laboratory for testing through postal office and the result will received by telephone” (Male ART nurse from Nedjo Hosp.) “They took blood from the child here (health facility) and sent it somewhere else, but I don’t know where they sent it....., They collected blood here in hospital & appointed me for the result after a month; and I think all things were completed here” (30 yrs of age Mother from Nedjo Hosp)

3. Challenges in utilization of early infant diagnosis

Different challenges toward HIV testing of HIV exposed infants and young children were mentioned by study participants during in-depth interview. These challenges were categorized in to four themes by the investigator:

- Mother/care taker related factors
- Service provider related factors
- Health facility and supply related factors, and
- DBS sample transportation and result collection system (post office and telephone)

3.1. Mother or care taker related factors

It was reported that most mothers had good awareness of the service and volunteer to bring their children for HIV testing, and also they had been utilizing the service. However, as reported by few service providers, there were mothers who did not bring their infants for HIV testing even though they frequently visit ART clinics for their own follow-up. Even there were mothers who were not volunteered to disclose having HIV exposed children at home.

“Some mothers do not bring their children to health facilities, although they told to do that.... There are also mothers who hide us having infants or young children at home” (Male ART nurse from Nedjo Hosp.)

Long distance of mother’s residence from health facility was also reported as one challenge for mothers to bring their children for HIV testing.

“Some mothers do not bring their children to the health facility due to the long distance of their residence from the facility.” (Male ART nurse from Fincha HC)

Most mothers experienced good willingness to know HIV status of their children. However, as reported by few mothers, mothers’ fear of positive results of their children can also affect utilization of early infant diagnosis of HIV infection.

“Although I brought my child for HIV testing, my fear was that my child will totally having HIV virus” (30 yrs of age Mother from Nedjo Hosp)

3.2. Health service provider related factors

Generally, the problems mentioned related to service provider affecting HIV testing of infants were lack of commitment, skill gap and high work load.

As reported with one mother, there were some service providers lacking commitment to give the service.

“Frequently I have been bringing my child to the clinic and asking them to test my child for HIV, but they did not do it and I don’t know why they did not test. My child not tested for HIV till today, now she is 5 months age” (37yrs of age mother from Mendi HC)

Skill gap and experience on DBS sample collection and use of registration, and high load of work were also reported as another challenge for giving the service, as reported by service provider participants.

“I have never collected DBS sample because it is being done at ART clinic, but I think I can collect the sample” (Female PMTCT counselor from Mendi HC)

Some providers do not fill follow-up registers for infants due to high load work and confusion on utilization of records” (Male ART nurse from Nedjo Hosp.)

3.3. Health facility and DBS kits supply

DBS kits shortage and stock out were reported as a major problem for testing of HIV exposed infants by some service provider participants.

“Approximately, for the last five months there was no DBS kit in this facility to collect DBS sample” (Female ART nurse from Mendi HC)

3.4. DBS sample transportation and result collection system (postal office and telephone)

Since collected DBS sample is transported to the testing site through postal office, participants complained that there was no functional postal office in the town. Lack of telephone at ART clinic was also reported as factor affecting EID service since the test result need to be collected from referral laboratory by telephone.

“We are using our own mobile phone to collect the test result, which is not right; there must be telephone at working place. (Male ART Nurse from Fincha HC)

CHAPTER SIX: DISCUSSION

6.1. Introduction

The main objective of early infant diagnosis of HIV infection is to detect HIV infection in infants and young children that allows health care providers to offer optimal care and treatment of HIV infected children, assists in decision making on infant feeding, and avoids needless stress in mothers and families. To achieve this objective the service has to be available and properly utilized by caretakers of HEI at health facility level. This study aimed to determine the magnitude of HIV testing and factors associated with utilization of EID using the available DBS, DNA PCR method among HIV-exposed infants and young children in Western Oromia Region, Ethiopia.

6.2. Proportion of HIV testing in infants and young children

In this study, 83.7% of HIV-exposed infants aged 4 weeks to 18 months among all enrolled at healthcare facilities of Western Oromia region were tested. The study finding is slightly in agreement with what was reported in Tanzania which was 87% [16] but higher than that reported from Malawi (71.6%) [15], Kenya (67%) [17]; and Zambia (10%) [10]. The finding is also higher than the report from study conducted in Addis Ababa, Ethiopia where 52% of HIV exposed children tested [18]. This result showed that utilization EID of HIV infection in the study area was high relative to previous studies conducted in different countries. Integration of EID in EPI services, decentralization of the services to primary health care, expanding of testing, referral laboratory and support from NGO partners (technical support & capacity building) may explain the high utilization of the service in Western Oromia Region of Ethiopia. Even though the coverage was good (83.7%), still 16.3% of HIV exposed infants and young children were not tested for HIV, which is against WHO recommendations (WHO recommends that all HIV exposed infants should be tested at their early age 4-6 weeks [7]). Therefore, more efforts are needed to maximize identification and testing of HIV-exposed infants by strengthening EID of HIV infection testing with PMTCT services and other potential entry points.

The current Ethiopian national algorithm for EID of HIV infection recommends testing of HIV exposed infants at the age of 4-6 weeks or as early as possible thereafter [2]. In this study, the median age of HIV testing was 6 weeks, which is consistent with WHO recommendations [7]. This finding is in contrast with finding in Tanzania, reported 4 weeks median age of testing [16] and study conducted in Mozambique (5 months median age) [20]. The median age of EID testing found in this study might have been contributed by more sensitization through mother counseling, increased awareness on EID of HIV infection and integrating the appointment for DBS sample collection with 6 weeks EPI service.

6.3. Factors associated with HIV testing among HIV exposed infants

The study identified some factors which were associated with HIV testing among HIV exposed infants and young children. As shown in table 5.7 from multivariate logistic regression analyses: mothers' residence, number of children a mother has, HIV sero- status disclosure, presence of mother support group and early age enrollment of infants were significantly associated with utilization EID of HIV infection.

In this study it was found that mothers who has less number of live children had more likely utilized EID of HIV infection when compared to mothers who have more number of live children [AOR= 3.37, 95% CI (1.38-8.22)]. This is similar to findings of a study conducted in Addis Ababa, Ethiopia, where number of children's mother possess was significantly associated with HIV testing of HIV exposed infants and young children [22].

Mothers who disclose their HIV sero- status were also more likely utilize EID services than those who did not [AOR= 3.29 95% CI (1.05-10.29)], which is similar findings with a study conducted in Kenya [19].

Linkage of mothers to mother support group at health facility were also significantly associated with HIV testing of exposed infants and young children [AOR= 6.55, 95% CI (2.88 – 14.90)]. Similarly, a study conducted in Kenya revealed that the presence of the psychosocial support group was significantly associated with HIV testing of HEI [19].

Early enrollment of HIV exposed infants and young children to care were also reported as one predictor for utilization of EID service [AOR= 4.52, 95% CI (2.00-10.27)]. This may be contributed due to children who were enrolled to care in their late age (after a few months) may be antibody tested due to their older age

Strengths and limitations of the study

Strengths

- The study reflects the diversity of practical management of EID of HIV infection in a diverse population living in Western Oromia region since it was conducted in 27 health facilities with different recruitments and working practices (hospitals and health center).
- The other strength of the study was also supplementation of the quantitative data with qualitative data

Limitations

- Use of secondary data is one limitation in this study
- The fact that it was carried in a health facility level and included participants who came to the clinic for services and may not be a representative sample of those who are potentially in the community and had no opportunity to reach the health care facility for services.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusions

Utilization of early infant diagnosis of HIV infection was relatively high in Western Oromia Region when compared to previous literatures in Ethiopia. There were commodities for identifying and testing of HIV exposed children, and skilled health care providers.

Mothers' residence, number of children a mother has, HIV sero- status disclosure of mother, presence of mother support group, and early age enrollment of infants to care were identified as predictors of utilization EID of HIV infection.

7.2. Recommendations

The ministry of health should focus on implementation of PMTCT services in collaborating with different partners and stakeholders by giving emphasis on expansion of EID services to the rest of health facilities. It should also strengthen the current health system to ensure uninterrupted supply chain of DBS kits, DNA- PCR reagents, job aides and proper service documentation.

The Ethiopian post office should expand its services to branch offices at woreda towns and corporate DBS sample transportation to referral laboratories by coordinating with health care facilities.

Health care facility managers should give emphasis to DBS sample transportation and result receiving system by linking with nearby postal office and ensuring availability of the telephone at a service area.

Health care providers should be re-trained and supported by different partners (like NGOs) to improve early infant diagnosis of HIV infection service.

Efforts should be directed to the community to raise awareness of HIV testing during pregnancy, appropriate initiation of PMTCT intervention and early age enrollment of infants to care which help earlier EID of HIV infection.

Lastly, there is a need for further research regarding utilization and coverage of early infant and young children HIV testing.

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Annex I. Checklists

Instruction: Review the records carefully and encircle or write the correct option you read from the record (Note: the quality of information you fill determines the quality of the research finding)

Part I: Mother/care giver and HEI information

Name of Health Facility-----

Checklist identification number -----

NO	Questions	Coding classifications	
Section one: Socio-demography			
101	Sex of the care giver	Male---1	Female---2
102	Age in years	_____ Write full (yrs)	
103	Relationship to HEI	Mother...1	Father...2 Guardian (specify)...3
104	Residence	Urban...1	Rural...2
105	Religion	Orthodox – 1 Muslim -- 2 Protestant -- 3	Catholic -- 4 Other (specify) -- 5
106	Ethnic group	Oromo – 1 Amhara -- 2	Gurage – 3 Tigre – 4 Other 5
107	Marital status	Married – 1 single -- 2 Divorced -- 3	Widowed -- 4 Unmarried couples- 5
108	Educational status	No education/Illiterate--1 Primary.....-2	Secondary---3 Tertiary..... – 4
109	Current occupation	Farmer...1 Household wife -- 2 Daily laborer -- 3 Government employee 4 Private employee—5 NGO employee---6	Domestic servant -- 7 Student -- 8 Merchant -- 9 No job -- 10 Others(specify) -- 11
110	Number of live children	----- in number	

111	Distance estimate from the health facility	<10km....1	>=10km....2	
Section two: Mother HIV testing period, sero-status disclosure, and social support				
201	Time/period mother heard of her sero-status (relating to this child)	Before pregnancy....1	During pregnancy...2	During delivery...3 After delivery...4
202	Mother disclose her HIV sero-status	Yes1		No.....2
203	Person to whom she disclosed	Husband....1	Mother.....2	Other (specify),3 None....4
204	Is mother enrolled to Chronic HIV care?	Yes.....1		No.....2
205	Adherence of mother to chronic care	Good...1	Fair2	Poor...3 Unknown...4
206	Is there any social group/supporter linked with	Yes (specify).....1		No.....2
207	Mode of infant feeding	EBF for 6 m...1 Replacement ..2	Mixed feeding...3	
208	PMTCT intervention mother receive	Option B+ (TDF + 3TC + EFV)...1 AZT prophylaxis 14 th weeks...2 Triple drugs (Lami +AZT +NVP)...3 Other (specify)...4 None....5		
209	Place of delivery	Hospital1	HC/clinic...2	Health post...3 at home.....4
Section three: HEI follow-up				
301	Birth date of infant	_____ (DD/MM/YYYY EC)		
302	Age at enrollment	_____ (month)		
303	Current age of infant	_____ (month)		
304	Sex of the infant	Male...1		Female...2
305	PMTCT intervention infant receive	Neverapine (for 6wk)1 Sd neverapine....2	Other (specify)...3 None....4	
306	Infant tested for HIV (DNA- PCR)	Yes 1		No2
307	Date of Sample collection for HIV	_____ (dd/mm/yyyy EC)		

	testing		
308	Age of infant during sample collection	_____ (months)	
309	Test result returned	Yes....1 Pending....2 No ...3	
310	Date test result returned	_____ (dd/mm/yyyy)	
311	Waiting time of result	_____ (days)	
312	Test result	Positive.....1 Negative.....2 Indeterminate....3	
313	'Positive' infant receiving ARV drug	Yes....1 No....2	
314	Appointment of child for HEI care services	Every month....1 Every two months....2 Other(specify)....3	

Part II. Information related to healthcare factors

No	Questions	Coding classifications	remark
1	Name of Facility	_____ Write name	
2	Facility owner ship	Government.....1 Non government organization (NGO)..2 Private...3	
3	Date EID service started	_____ (dd/mm/yyyy EC	
4	HCWs trained on DBS sample collection	Yes----1 No-----2	
5	Number of females HCWs trained?	_____ (number)	
6	Number of males HCWs trained	_____ (number)	
7	Total number of HCW trained on DBS sample collection	----- (number)	
8	Number of HCWs performing DBS sample collection	_____ (number)	
9	Number of days/ week HEI care service given	_____ (number)	
10	HCWs at the registration desk check for HIV exposure status	Yes----1 No-----2	
11	HCWs at the registration desk refer HEI to EID/DBS services	Yes----1 No-----2	

12	Availability of Job aids i.e. guidelines, algorithm, posters	Yes----1 No-----2	
13	These job aids in use	Yes----1 No-----2	
14	Current availability of DBS kits		
15	Regular stock out of DBS kits	Yes----1 No-----2 If yes frequency (this year)_____	
16	Is there regular stock out of cotrimoxazole drugs/syrup	Yes----1 No-----2 If yes frequency (this year)_____	
17	Parents advised when to come	Yes----1 No-----2	
18	Availability of DBS transportation system (postal office) in the town	Yes----1 No-----2	
19	Frequency of sample transportation	-----	
20	Of mother support group at facility	Yes----1 No-----2	
21	Functional telephone to receive DNA-PCR test result	Yes----1 No-----2	

Annex II: Information sheet (English version)

I want to thank you for taking the time to meet with me today. My name is _____ and I would like to talk to you about your awareness and experiences of early diagnosis of HIV infection in HIV exposed infants to conduct study on “UTILIZATION AND DETERMINANT FACTORS OF EARLY INFANTDIAGNOSIS OF HIV INFECTION IN WEST OROMIA REGION, ETHIOPIA”. The interview should take 25-30 minutes. I will be taping the session because I don’t want to miss any of your comments. Although I will be taking some notes during the session, I can’t possibly write fast enough to get it all down. Because we’re on tape, please be sure to speak up so that I don’t miss your comments.

All responses will be kept confidential. This means that I will ensure that any information I include in my report does not identify you as the respondent.

Remember, you don’t have to talk about anything you don’t want to and you may end the interview at any time.

Are there any questions about what I have just explained?

Are you willing to participate in this interview? Yes No

Signature _____ Date _____

Annex III: In-depth interview guides (English Version)

A. Mother Interview Guide (English version)

Code number_____

i. Background Questions:

1. Age of the mother_____
2. Age of the child/infant_____
3. Residence_____
4. Number of children alive _____
5. Marital status of the mother_____
6. Level of education_____
7. Employment status_____
8. Time of diagnosis of HIV in mother and ART enrollment_____
9. Did your infant HIV tested_____

ii. Knowledge and Attitude Questions:

1. Can you tell me about HIV infection in young infant and children? Its transmission and prevention? Effect if not treated early?
2. How can we know that a baby is having HIV infection?
3. Please tell me about HIV testing in infants? Source of your information, when and where to be tested, importance of testing?
4. Are you willing to do HIV test on your child now?
5. What factors may hinder you to bring your infant for HIV testing? If any
-Probe: Scared of test (painful, positive result), fear of confidentiality, fear of discrimination, distance, HCW
6. What was/will be your expectations while waiting for the HIV result of your baby?
7. Do you think it is mandatory to test infants early to know his/her status? Why?
8. Any other to add (if any)

B. In-depth interview guide for service providers key informants

Code number_____

i. Background information

1. Facility_____
2. Age of service provider_____
3. Sex of service provider_____
4. Professional background_____
5. Service point_____
6. Training on DBS/EID_____
7. Experience year on this service_____

ii. Knowledge and attitude questions

Can you tell me about HIV infection in infants and young children? Its transmission and prevention?

1. Please describe what you know about EID service for infant HIV infection? Its benefit, right time of testing, place of testing, and experiences?
2. What are challenges for testing of HEI early in this facility? Probe:
 - a. Care giver/mother factors
 - b. Health service provider (adequacy of manpower, skill....)
 - c. Facility related (postal, telephone, distance, road....)
 - d. Supplies
 - e. Others

Annex IV: Information sheet (Oromiffa version)

Unka Odeeffannoo

Maqaan koo_____ Jedhama. Jalqabarratti dursee yeroo kee waan naaf kenniteef si galateeffachuun barbaada. Itti fufuudhaan waa'ee qorannoo HIV daa'imman haadha HIV waliin jiraattu irraa dhalatan ilaalchisee gaaffilee tokko tokko sigaafachuun barbaada. Kunis faayidaan isaa qorannoo "Fayyadaminsa qorannoo HIV daa'immanif rakkoolee fayyadaminsa isaa waliin wal qabatan, lixa Oromiyaa keessa" jedhu irratti odeeffannoof waan barbaadameef. Haasawaan kun yeroo daqiiqaa 25-30 fudhachuu ni danda'a. Waanta ati dubbattu hundi sababa baay'ee nu fayyaduuf tokkollee dhabuu hin barbaadu, kanaaf sagalee keessan waraabuu fi yaadanno qabachuun barbaachisaadha. Hanga danda'amaa ta'etti sagalee keessan guddisaatii nuuf dubbadhaa.

Iccitiin odeeffannoo isin nuuf kennitan hundinuu ni eegama, gabaasa barbaachisaa godhamurrattis odeeffannoon kun akka isin irraa argame tokkollee kan ibsu hinjiru; maqaan keessanis gabaasa keessatti hin waamamu.

Hub: Waanta keessi keessan odeessuu hin fedhiin odeessuu dhiisuun mirga keessan.

Yoo gaaffii qabaattan gaafachuu ni dandeessu.

Gaaffii fi deebii kana irratti hirmaachuun fedha keetii? 1. Eeyyeen 2. Lakkii

Mallattoo_____ Guyyaa_____

Annex V: In-depth interview guides (Oromiffa version)

Adeemsa gaaffii fi deebii gad-fageenyaanii haadholiif

i. Gaaffii dimoogiraafii fi qorannoo HIV

1. Umurii haadhaa_____
2. Umurii daa'ima _____
3. Lakk. Ijoollee jiran_____
4. Haala fuudhaa fi heeruma_____
5. Sadarkaa barnootaakee_____
6. Hojii/dalaga_____
7. Yeroo HIV dhiiga keessan jiraachuu baratan_____
8. Daa'ima keessan qoraachhifanii?

ii. Gaaffii hubannoo fi ilaalchaa

- a. Waa'ee daa'imman HIVdhaan qabamuu natti himuu ni dandeessa? Haala itti qabaman, ittisa isaa fi miidhaa isaa illalchisee.
- b. Daa'imni haadha HIV qabdurraa dhalate tokko HIVn qabamuu fi dhiisuu isaa akkamiin beekuu dandeessa?
- c. Waa'ee qorannoo HIV daa'immani ilaachisee waan beektu natty himi. (eenyurraa dhageesse, Yoomii fi eessaatti qoratamu, faayidaan isaas maali?)
- d. Daa'ima kee qorachiisu ilaalchisee fedhiin kee maali fakkata?
- e. Daa'ima kee HIV qorachiisuu waliin wal qabatee rakkooleen ji jiraatan utuu natty himte. (Bu'aa qorannoo, icciitii ni ba'a fi loogii sodaachuu, rakkoo ogeessaa, fageenya fi kkf)
- f. Yeroo daa'ima kee qorachiistuuf yaaddu ykn qorachiifte, waa'ee firii qorannoo ishee/isaa maal yaadda/yaadde?
- g. Waa'ee daa'ima HIV qabamuu fi dhiisuu baruuf, yeroodhaan fidanii qorachiisuun dirqama jettee yaaddaa? Eeyyeen ykn miti? Maaliif?

Xumurreera! Baay'ee galatoomaa!