

Determinants of Mother to Child Transmission of HIV In Public Hospitals of West Shewa Zone, Oromiya Region: mixed method study.

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Determinants of Mother to Child Transmission of HIV In Public Hospitals of West Shewa Zone, Oromiya Region: mixed method study.

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Abstract

Background: Mother-to-child transmission of HIV (MTCT) is when Human Immune deficiency Virus (HIV) of positive mother passes the virus to her baby. Without intervention transmission rate of HIV ranges from 15% to 45%, which can be reduced to below 5% with effective intervention. In Ethiopia, final mother-to-child transmission rate was 15% in 2016 which is much higher than target of the country to reduce transmission to lower than 5% by 2020. Aim of the study is to identify determinants of transmission of HIV from mother to child in West Shoa zone of Oromiya Region which has total population more than 2.1 million.

Methods: Mixed methods: unmatched case-control study among children tested HIV positive and negatives at the end of PMTC follow up; N=96(24 cases, 72 controls) and one-on-one questioner for mothers of positive infant conducted during June to August 2019; focusing on PCR done during the last two years (June 2017 to July 2019), in public hospitals. Variables of interest were collected using structured and semi-structured questioner and data abstraction forms from mothers of exposed infants, medical records of mothers and children.

Result: Majority among cases(70.8%) were not included in to option B+ program. Home delivery increases 6 times chance of HIV, AOR = 6.0; CI (1.5–29.2), none inclusion in to option B+ increase 18 chance of HIV transmission, AOR = 18.0; CI (5.0–68.1). Partner noninvolvement to HIV care increases chance of transmission by 7.3 times, AOR=7.3; CI(1.1–37.4). Mother-to- mother support program decrease chance of transmission by 86.5% with AOR = 0.13; CI (0.11–0.39). Poor ANC knowledge and practices among rural residents and unstable marriage in urban residents contributed to unaware MTCT of HIV.

Conclusion: ART clinics should focus on and strengthen mother-to-mother support program, should create space for partner involvement to HIV care and provide training for Health Extension Workers(HEW). Health education and awareness creation should be implemented by HEW to improve ANC practice, reduce home delivery and increase voluntary counseling and testing among residents.

Key words: PMTCT, West Shewa, HIV transmission

1. Background

HIV Mother-to-child transmission (MTCT) is when a Human Immunodeficiency Virus (HIV) positive mother passes the virus to her baby. This can occur during pregnancy, labor and delivery (at birth), or breastfeeding (1). Without treatment, around 15-30% of babies born to HIV positive women will become infected with HIV-1 during pregnancy and at birth. A further 5-20% will become infected through breastfeeding to 18-24 months. More than 90% of HIV infections in children under 15 years are acquired from the mother (2), and more than 50% of postnatal transmission through breast feeding occurs during the first 6 months of life (3). In the absence of any intervention, transmission rate range from 15% to 45%. This can be reduced to below 5% with effective intervention during the periods of pregnancy, labour, delivery and breast feeding (4), (5),(6),(7).

In Ethiopia, according to ECO- HIV, the estimated prevalence of HIV among adults was 1.0% in rural areas and 2.8% in urban areas in 2017. In the capital, Addis Ababa, it was estimated at 5.0% in 2017. In Oromiya region, which includes Addis Ababa, an estimated 185,1334 persons are living with HIV in 2019. Among them, 16,820 are pediatric age group (under 15) with 236 newly infected till May, 2019 (8).

Preventing MTCT comprises Primary prevention of HIV, prevention of unintended pregnancies, effective access to HIV testing and counseling, initiation of lifelong antiretroviral therapy (ART) with support for adherence, retention and viral suppression for mothers living with HIV, safe delivery practices, optimal infant- feeding practices and access to postnatal antiretroviral (ARV) prophylaxis for all infants contribute to the prevention of mother-to-child transmission (PMTCT), thereby reducing maternal and child mortality(9). Suppression of HIV in pregnant women is most important and achievable action to reduce MTCT. However, failure to initiate ART early in pregnant HIV-positive mothers, poor adherence to ART, lack of ANC and early diagnosis, and poor application of national policies like option B+ among care providers hinder PMTCT (10). Although Option B+ (test and treat) (11) was implemented in Ethiopia in 2011, by 2014 only an estimated 50% of infants born to women living with HIV received a virological test within two months of birth (EID). At a national level, 58% of HIV-positive pregnant mothers in Ethiopia receive ART (12). Mothers needing prevention of mother-to-child transmission (PMTCT) in urban area is estimated to be 16,959 in 2017 (13). According to EPHI estimates mothers needing PMTCT in Addis Ababa is 1466 in 2017 (14). According to EDHS 2016, country-wide, HIV testing and counseling for ANC clients in the country as a whole was 19%, reaching 56% in urban areas and 14% in rural areas . The 2016 EDHS shows that 62% of women received ANC from a skilled provider at least once for their last birth (15).

In May 2016, the World Health Assembly endorsed new WHO global health strategy on HIV, which calls for Member States and WHO to work together towards the goals of zero new HIV infections in infants by 2020(9). Ethiopia has implemented four pronged approach to reduce and control transmission of HIV from mother to child. These are: primary prevention of HIV infection, prevention of unintended pregnancies in HIV positive women, prevention of HIV transmission from mother to her infants and care and support for HIV positive mothers and her exposed infants (11). The target in Ethiopia for MTCT was set at <5% by 2020 (9); however, in 2016 the MTCT rate was still 15% (7).

Even though studies are conducted in different parts of the country(3), similar study have not been done in West Shoa yet. This study intends to identify particular determinants of HIV transmission from mother to child among patients of West Shoa Zone. This study, therefore, will contribute to identification of factors independently associated with PMTCT and have an input for interventional planning for future epidemic control.

2. Objective

To identify determinants of mother to child HIV transmission in West Shewa zone, Oromiya Region.

3. Methodology

Study settings: West Shewa Zone is located at the central parts of Ethiopia, between 9.1515°N and 37.808°E covering 14,788.78 square kilometers. It has 18 woredas with six Hospitals functional currently and 2.5 million population. We selected three hospitals those are providing ART service for more than four years (Figure 1).

Study design and period: mixed methods, one-on-one questioner for mothers of positive infant and unmatched case-control study was conducted employing exposed infants those whose sero status have been determined and known to be positive and who were declared to be negative in the last two years (June 2017 to June 2019). Variables of interest was collected from the mother of exposed infants by structured questioner and at the same time collected from medical record of study participants by data abstraction form. To minimize information bias, close ended questioner was designed for mother of exposed infants and information from medical record was collected by trained data clerks those who can counter-check the information from Log-book and database.

The study was taken place from June to August 2019 focusing on PCR done during the last two years (June 2017 to July 2019).

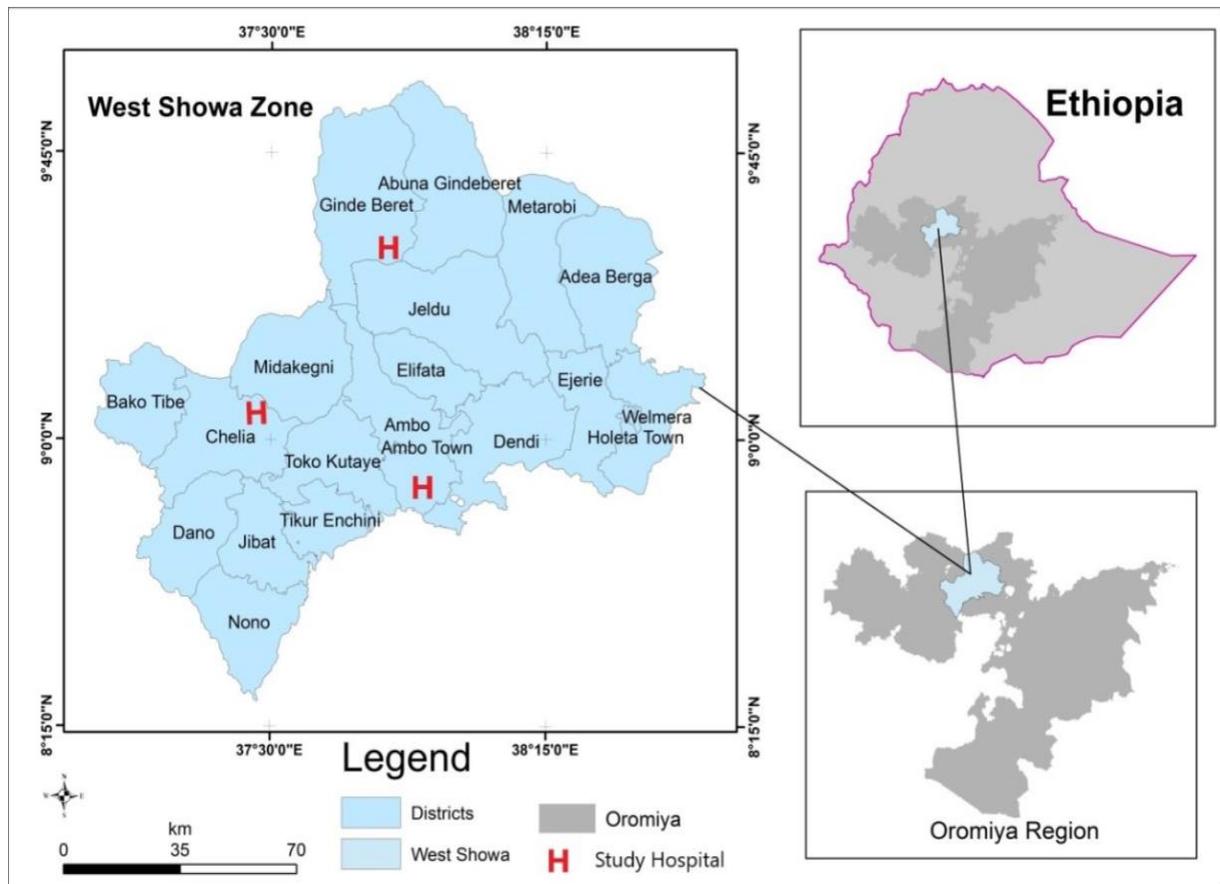


Figure 1: Shows geographical location of West Shewa zone in Ethiopia.

Study population: Infants born to HIV positive mothers and whose sero status was determined at Ambo, Gedo and Gindabarat Hospitals and their sero status was determined to be negative or positive.

Cases and controls: Infants born to HIV positive mothers and determined to be HIV positive were cases. Infants born to HIV positive mothers and found to be sero negative according to national guidelines were controls.

Inclusion and exclusion criterion: Singleton birth with both maternal & infant's record available in the hospital was included. Those infants whose medical record was not available and not well documented and Orphaned/denied infants with no maternal record were excluded.

Sample size determination: Using the methods of comparison between two population proportion with unequal sample size and "difference between population proportions" with unmatched case-control study sample size was determined (see formula below). We used 80% power, 95% level confidence interval, 5% margin of error and ratio of cases to controls being 1:3 and percent non exposure to ANC follow up among

infected group = 67.5% (from other similar study) and 34.4% among non infected(3), a sample size of 24 cases and 72 controls was calculated (same with result calculated by Epi info version 7.2).

$$n_1 = \frac{r+1}{r} \frac{\bar{p}(1-\bar{p})(Z_{\beta} + Z_{\alpha/2})^2}{(p_1 - p_2)^2}$$

Where n_1 = number of cases

And $n_2 = rn_1$

n_2 = number of controls

$Z_{\alpha/2}$ = Standard normal deviate for two-tailed test based on alpha level is 1.96

Z_{β} = Standard normal deviate for one-tailed test based on beta level is 0.84

r = Ratio of controls to cases is 3

p_1 = proportion of cases with exposure is 0.67 and $q_1 = 1-p_1$.

p_2 = proportion of controls with exposure is 0.34 and $q_2 = 1-p_2$

$$\bar{p} = (p_1 + rp_2)/(1+r) = 0.42$$

$$\bar{q} = 1 - \bar{p} = 0.58$$

$$\text{Thus, } n_1 = \frac{1.33(0.42)(0.58)(1.96+0.84)^2}{(0.34-0.67)^2} = 24,$$

$$n_2 = 3n_1 = 72,$$

\therefore Total sample = 96.

Sampling procedure: Three hospitals: Ambo Hospital, Gedo Hospital and Gindabarat Hospitals were purposively selected since these were only hospitals which had been providing ART service for more than four years in the zone. Based on total number of infants and children who were living with HIV at each hospitals, cases were assigned proportionately. Random sampling method was employed to identify study controls from each of the hospitals proportionate to their study cases (Figure 2).

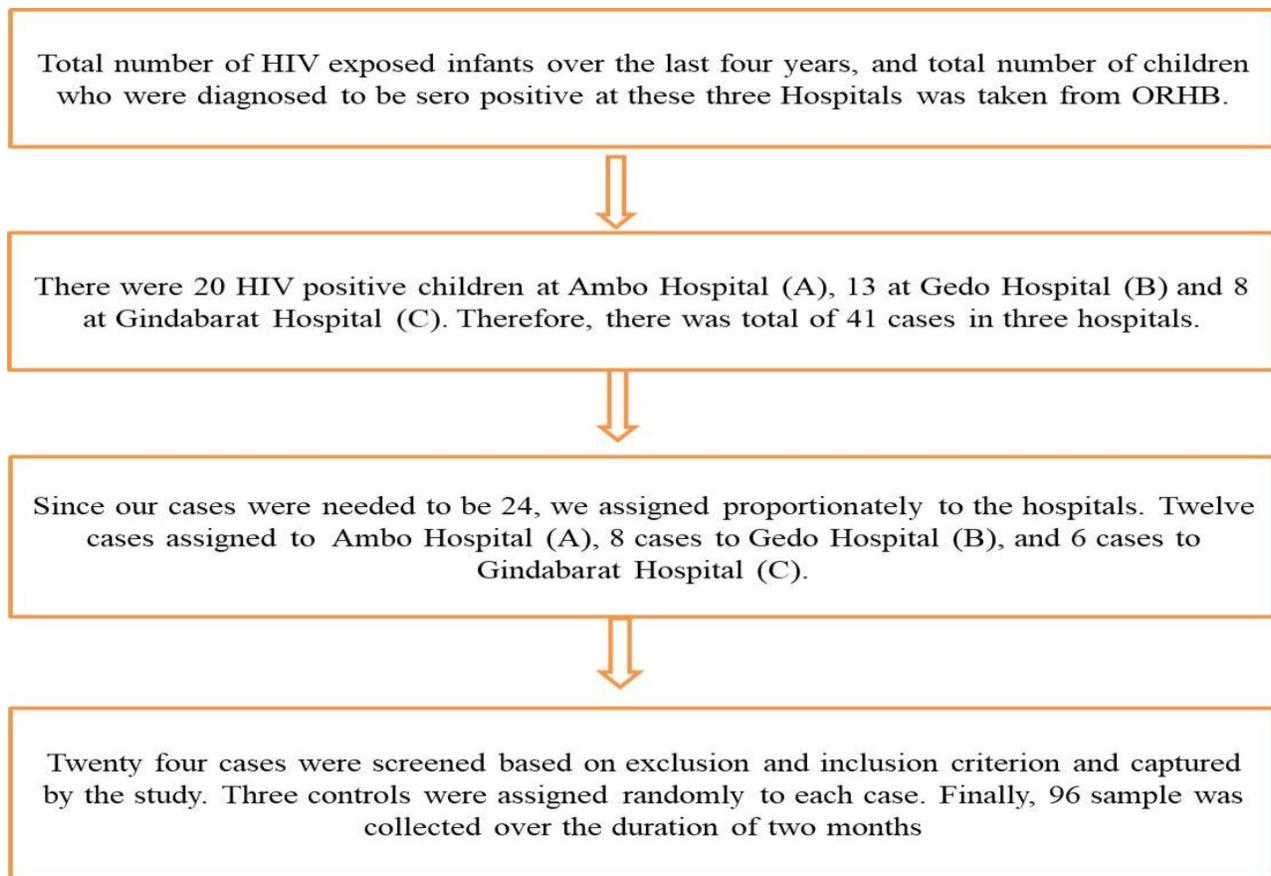


Figure 2: Approach used to select cases and controls from three Hospitals.

Independent variables: Age, Sex, Residence, socioeconomic status, clinical history, obstetric history

Dependent variables: HIV positive

Operational definition of terms

- ✓ **Poor adherence:** is those who missed their ART dose more than 10% per a month.
- ✓ **Fair adherence:** those who missed 5-10% of their ART doses.
- ✓ **Good adherence:** those who missed less than 5% of their ART doses

Data Collection: Data about HIV status of the hospitals was collected From Oromiya Regional Health Bureau. A questioner that contains study variables of interest was prepared to collect information from mothers of study participants. Data abstraction format was employed based on contents of health facility HIV/AIDS care records in touch of or directly addressing PMTCT and records of Anti-Retroviral Therapy (ART) to an infant or its mother.

Data analysis and interpretations: Data was entered to Microsoft excel and checked for redundancy, incompleteness, and ambiguities was eliminated from the data and analyzed by SPSS version 23.

Ethical consideration: The proposal was reviewed by the college’s ethical review board and written permission paper was obtained to conduct the study. Before the data collection an official letter from SPHMMC research office was sent to Oromiya Regional Health Bureau to get permission to access necessary data and respective health facilities.

4. Result

General description of the study

There were 96 total participants included to the study - from Ambo, Gindabarat, Gedo Hospitals; among them 24 were cases and 72 were controls. Majority of participants’ mothers (53.13%) were house wives, 89.5% were married, (29.1%) married orthodox who were living in urban followed by 25% married protestants who came from rural area.

Gedo Hospital has 13 HIV positive under five children with 135 exposed infants over the last four year. This made 9.6% transmission rate per 100 exposed infants. At Gindabarat Hospital there were 94 exposed infants and among them 8 were HIV positive that made 8.5% of transmission rate from mother to children at Gindabarat hospital. There were 192 exposed infants registered at Ambo Hospital over the last four years and among them, 20 (10.4%) were confirmed to be positive. Generally there were total of 421 exposed infants delivered, among them 41 acquired HIV down from their mothers. This made the transmission rate of 9.7% out of 100 exposed infants in West Shewa hospitals.

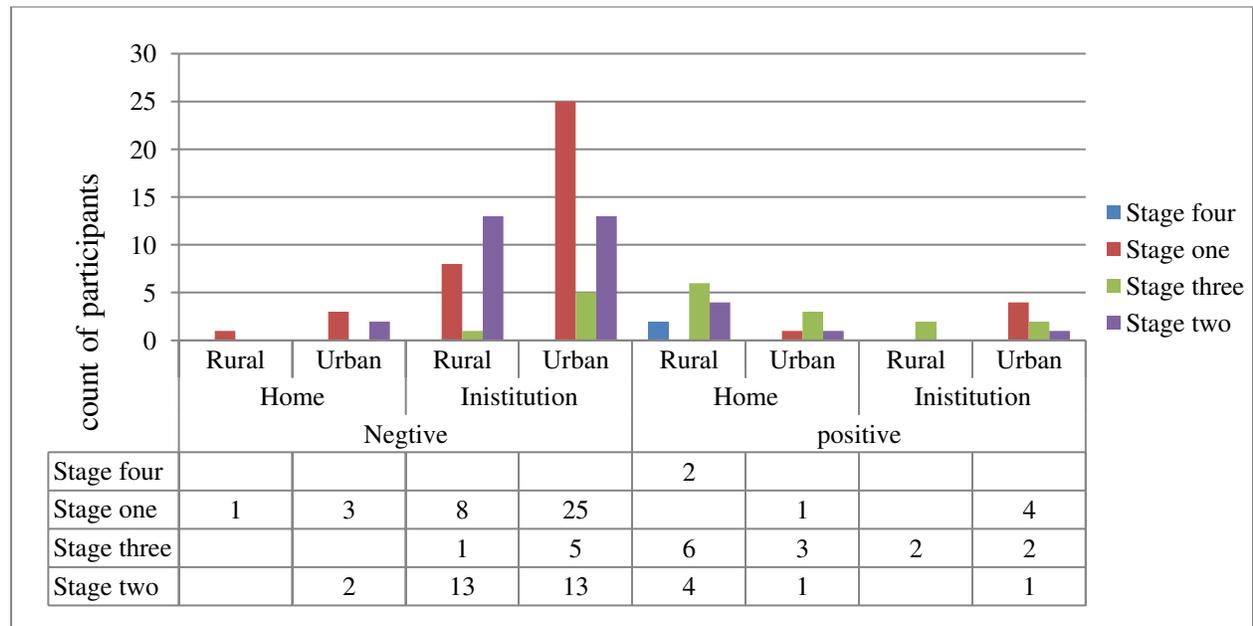


Figure 3: Clinical stage of mothers of cases and controls by residence and place of deliver.

From participants 2 (2.01%) were Stage I, 42 (43.75%) were Stage II, 19 (19.79%) were Stage III and the rest were 34 (35.41%) were Stage IV. From total of 72 controls 25 (34.7%) of them were classified as WHO stage one and were dwelling in urban (Figure 3).

Among who transmitted HIV to their children and dwelling in rural, 75% said they did not started ART during the pregnancy. However, 58.3% urban dwellers responded they started ART and had good adherence. Among cases majority (54.2%) of mothers had ANC visit at least once, however, 70.8% of them did not take ART during the follow up. Among cases, all deliveries were vaginal and 70.8% were delivered at home. Majority of controls partners were involved into HIV care (86.1%), but only 33.3% of partners of cases were involved in to HIV care (Table 1). Slightly half of cases (50.5%) did not get ART during pregnancy and 37.5% of them did not start ART during breast feeding too. Among controls however all started ART during pregnancy and 97.2% of them appropriately adhered to the medication.

Factors related to HIV MTCT

The relationship of factors with the transmission of HIV was tested by Chi-square test. Knowledge of mother about ANC has significant relationship with HIV transmission with $\chi^2(1, N = 96) = 37.27, P < 0.05$ and ART adherence has significant relationship with HIV transmission $\chi^2(3, N = 96) = 50.9, P < 0.05$. Involvement in to mother to mother support program has significant relationship with $\chi^2(1, N = 96) = 40.20, P < 0.05$.

Factors associated to HIV MTCT

Based on multivariate analysis, presence of mother to mother support has protective effect, while absence of partner involvement to HIV care, none inclusion to option B+, Home delivery, have significant association to transmission of HIV from mother to child (**Error! Reference source not found.**).

Mothers who are included in to mother to mother support program has lower chance of transmitting HIV to their children; mothers who were not included in to mother to mother support program has 86.5% more chance of transmitting HIV to their children, AOR = 0.135 with CI (0.111 – 0.396), $P < 0.05$. Mothers whose partners were not involved in to HIV care had more probability of transmitting HIV to their children. No involvement of partner to HIV care could increase chance of transmitting HIV to her baby by 7.3 times when compared to those whose partners were involved; AOR = 7.331 CI (1.142 – 37.459), $P < 0.05$. Mother's who were not included in to option B+ protocol has 18 times more chance of transmitting HIV down to her baby; AOR = 18.0, CI (5.0 – 68.1), $P < 0.05$.

Home delivery also increased chance of transmitting HIV from mother to child by 6 times when compared to those who delivered at institution; AOR = 6.047, CI (1.549 – 29.230), P < 0.05.

Factors inhibited application of Option B+ among sero-positive mothers.

From one-on-one interview it was identified that majority of cases (17 out of 24) or 70.8% did not included in to Option B+. Among 17 of cases who did not included in to option B+, 13 or 76.5% of them did not go to ANC visit even once. As a result of this they did not get any advice about HIV and institutional delivery during pregnancy. Main reason raised by mother of cases who did not included to option B+ program during pregnancy was lack of knowledge about ANC and HIV test during pregnancy. There was also policy application gap; four mothers out of 17 (23.5%) visited ANC clinic during pregnancy but did not diagnosed to be sero positive and included in to the program. Eight from 17 or 47.0% of mothers of cases responded that there was poor communication with health extensions workers (HEW) during their pregnancy period. They believed that they could have better understanding of ANC and HIV test if HEWs had advised them initially.

Table 1: Variables related to Socioeconomic and prevention intervention summary of mother-infant pair of the study.

| | | Status of the child | | | | | |
|-----------------------------|---------------|---------------------|-------|----------|------|-------|------|
| | | Negative | | Positive | | Total | |
| | | N | % | N | % | N | % |
| Marital status of mother | Married | 69 | 95.8% | 17 | 70.8 | 86 | 89.6 |
| | Divorced | 2 | 2.8% | 6 | 25.0 | 8 | 8.3 |
| | Widowed | 1 | 1.4% | 1 | 4.2 | 2 | 2 |
| Religion of the mother | Orthodox | 31 | 43.1% | 9 | 37.5 | 40 | 41.6 |
| | Protestant | 37 | 51.4% | 15 | 62.5 | 52 | 54 |
| | Muslim | 3 | 4.2% | 0 | 0.0 | 3 | 3 |
| | Other | 1 | 1.4% | 0 | 0.0 | 1 | 1 |
| Occupation of mother | Housewife | 41 | 56.9% | 10 | 41.7 | 51 | 53 |
| | Employee | 7 | 9.7% | 2 | 8.3 | 9 | 9.3 |
| | Farmer | 12 | 16.7% | 9 | 37.5 | 21 | 21.8 |
| | Daily laborer | 9 | 12.5% | 2 | 8.3 | 11 | 11.4 |
| | Other | 3 | 4.2% | 1 | 4.2 | 4 | 4.16 |
| Place of Residence | Urban | 48 | 66.7% | 12 | 50.0 | 30 | 31 |
| | Rural | 24 | 33.3% | 12 | 50.0 | 36 | 37.5 |
| Level of maternal education | No school | 12 | 16.7% | 11 | 45.8 | 23 | 24 |
| | Grade 1-6 | 28 | 38.9% | 11 | 45.8 | 39 | 40.6 |
| | Grade 7-8 | 11 | 15.3% | 2 | 8.3 | 13 | 13.5 |
| | Grade 9-12 | 14 | 19.4% | 0 | 0.0 | 14 | 14.5 |
| | College | 7 | 9.7% | 0 | 0.0 | 7 | 7.2 |
| Pregnancy planned? | No | 33 | 45.8% | 10 | 41.7 | 43 | 44.7 |

| | | | | | | | |
|------------------------------|-------------|----|--------|----|-------|----|------|
| | Yes | 39 | 54.2% | 14 | 58.3 | 53 | 55 |
| Partner involved to HIV care | Yes | 62 | 86.1% | 8 | 33.3 | 70 | 73 |
| | No | 10 | 13.9% | 16 | 66.7 | 26 | 27 |
| M2M support program | No | 3 | 4.2% | 15 | 62.5 | 18 | 18.7 |
| | Yes | 69 | 95.8% | 9 | 37.5 | 78 | 81 |
| Place of delivery | Institution | 66 | 91.7% | 7 | 29.2 | 73 | 76 |
| | Home | 6 | 8.3% | 17 | 70.8 | 23 | 24 |
| Mode of delivery | Caesarian C | 2 | 2.8% | 0 | 0.0 | 2 | 2 |
| | Vaginal | 70 | 97.2% | 24 | 100.0 | 94 | 98 |
| ART before pregnancy | Yes | 72 | 100.0% | 13 | 54.2 | 85 | 88.5 |
| | No | 0 | 0.0% | 11 | 45.8 | 11 | 11.4 |
| Option B+ | No | 8 | 11.1% | 17 | 70.8 | 25 | 26 |
| | Yes | 64 | 88.9% | 7 | 29.2 | 71 | 74 |

Questioners collected from mothers of children were summarized based on sero-status of the child. ANC= Antenatal care, M2M= mother to mother, ART before pregnancy = whether started ART before conception.

Table 2: Factors associated to HIV transmission from mother to child by regressions analysis. (Source: taken from main document of the project. It was produced by SPSS from raw data of participants by PI).

| | | Final outcome | | COR. | AOR | 95% C.I.for EXP(B) | |
|--------------------|-------------|---------------|----------|--------|--------|--------------------|---------|
| | | Positive | Negative | | | Lower | Upper |
| | | | | | | | |
| M2M support | Present | 9 | 69 | .26 | .135 | .111 | .396 |
| | Absent | 15 | 3 | 1 | 1 | | |
| Option B+ | No | 17 | 8 | 24.00 | 18.000 | 5.000 | 68.100 |
| | Yes | 7 | 64 | 1 | 1 | | |
| Place of Delivery | Home | 17 | 6 | 26.21 | 6.049 | 1.549 | 29.230. |
| | Institution | 7 | 66 | 1 | 1 | | |
| ARV prophylaxis | No | 18 | 2 | 105.00 | 92.00 | 0.966 | 121.161 |
| | provided | 6 | 70 | 1 | 1 | | |
| HIV Partner Care | No | 16 | 10 | 12.50 | 7.332 | 1.142 | 37.459 |
| | Yes | 8 | 62 | 1 | 1 | | |

M2M= mother to mother, ARV=antiretroviral, HIV= Human Immunodeficiency Virus.

5. Discussion

At three Hospitals which included in to the study there were total of 421 exposed infants delivered, among them 41(9.7%) acquired HIV down from their mothers. This made the transmission rate of 9.7 out of 100 exposed infants in West Shewa hospitals. This is slightly lower than the transmission rate documented in Ethiopia as a whole in 2016. In 2016 final mother-to-child transmission rate including breastfeeding period was recorded to be 15% in Ethiopia, which was very high compared other countries(7). In spite of this, the country set target to reduce the transmission rate to lower than 5% by 2020(9).

Over the past two decades, improved interventions in developed countries have reduced MTCT rates to less than 2% (4). Vertical transmission of HIV in low- and middle-income countries has declined to less than 5% in the best-case scenarios after the introduction PMTCT strategies, and in wealthy countries, transmission rates are below 2% (4), (5). In resource poor countries, applicable measures to reduce transmission include: safer delivery practices, infant feeding counseling and support, and use of anti-retroviral (ARV) treatment or MTCT prophylaxis(5). In this study majority of MTCT happened among who remained at home, delivered at home and did not know their sero status during pregnancy. This indicate that activities to mobilize pregnant mothers to follow ANC and institutional delivery was low.

According to this study presence of mother to mother support has protective effect, while absence of partner involvement to HIV care, none inclusion to option B+, Home delivery, maternal WHO clinical stage two and above, and undetermined Viral load has significant association to transmission of HIV from mother to child. Similar to this study, home delivery was found to be significant determinant of MTCT by study done in Dirre Dawa, Ethiopia(19). It is also similar to study done in North west part of Ethiopia which indicated that rural residence, home delivery, absence of maternal PMTCT interventions, were significantly and independently associated with maternal to child transmission of HIV (16). Additional study done at Gojjam, Amhara region identified factors which were associated with transmission of HIV from mother to child to be infants whose mother couldn't get PMTCT intervention(17). Other study done at Addis Ababa Ethiopia shows Lack of participation in mother-to-mother support program, low partner involvement, poor ART adherence, home delivery were significantly associated with MTCT of HIV(18).

Majority of cases or 70.8% did not included in to Option B+ and 76.5% them did not go to ANC visit even once. According to WHO the accelerated roll-out of ART for pregnant women was an important factor in the success of the global plan towards the elimination of new HIV infection among children (6). Main reason in this study was lack of knowledge about ANC and related to policy application gap that four mothers out of 17 (23.5%) visited ANC clinic but did not diagnosed appropriately and included in to the

program. Factors like fail to initiate ART early in pregnant HIV positive mothers, poor adherence to ART, lac of ANC and early diagnosis and poor application of national policies like option B+ among care providers are identified to cause HIV none suppression in previous study (10).

Poor communication with health extensions workers (HEW) during their pregnancy period was also raised as a gap that inhibited mothers from ANC, Inclusion to option B+ and institutional delivery. They believed that they could have better understanding of ANC if health extension workers (HEW) had advised them initially. The most effective way of preventing HIV transmission from mother to child could mainly achieved through prevention of HIV transmission in the community as a whole. Primary prevention of HIV transmission could be realized by promoting safer and responsible sexual behavior and practice, providing early diagnosis and treatment of STI, and providing HIV testing and counseling to adults and adolescents(11).

Variables like rural residence, unawareness of mother about ANC before pregnancy, maternal education, presence of mother to mother support program, partner involvement to HIV care, home delivery, positive syphilis test result, absence of ARV prophylaxis, poor ART adherence during pregnancy and mixed breast feeding and undetermined Viral load has significant relationship with HIV transmission from mother to child. Studies done previously supported this finding. According to study done in Dirre Dawa, Ethiopia determinants of HIV transmission from mother to child is identified to be Rural residence, home delivery, infant not receiving ARV prophylaxis, were among determinants of MTCT of HIV infection(19). Study done at Oromiya region (Assela, Adama and Bishoftu) was in line to this result that infants who were given ARV prophylaxis for 28 days after birth were found significantly less likely to contract HIV (3). Study done in North west part of Ethiopia also indicated that rural residence, home delivery, and absence of maternal PMTCT interventions were significantly associated with maternal to child transmission of HIV(16). Infants whose mother couldn't get PMTCT intervention were more likely to acquire HIV according to study done at Gojjam, Amhara region (17). Other study done at Addis Ababa Ethiopia also shows Lack of participation in mother-to-mother support program, low partner involvement, poor ART adherence, positive syphilis test, and home delivery and mixed feeding of the child during first six months of life were significantly associated with MTCT of HIV(18)(20).

Limitations: Since the the study Hospitals were purposively selected based on duration of ART service, it might limit generalization for new Hospitals which started providing ART service in recent years.

Conclusion and recommendation:

Different maternal, obstetric and child related factors related to and associated to and determining MTCT of HIV during pregnancy, delivery and post-natal period were identified. Mother to mother support program has protective effect, while None inclusion to option B+, absence of partner involvement to HIV care, Home delivery, higher maternal WHO clinical stage, and undetermined Viral load are significant factors association to transmission of HIV from mother to child. None inclusion to option B+ was mainly secondary to lack of ANC follow up among rural residents. Among rural residents there is high probability of home delivery while ANC follow up is low.

It is better if future study is conducted about the the problem related to poor ART adherence and factors related to home delivery. Health care workers who are assigned to rural health facilities like HEW should actively engaged in to community awareness and identification of pregnant mothers to include in to prenatal care. Among rural resident mothers improvement is needed to increase their awareness about ANC and health care workers should stick to national protocol while providing prenatal care. ART providers need to try to involve partner of mothers to be included to care of HIV.

Abbreviations:

ANC Ante Natal Care

ART Anti Retroviral Treatment

ARV Antiretroviral

EPHI Ethiopian Public Health Institute

INH Isoniazid

MTCT Mother-to-child transmission

PCR Polymerase Chain Reaction

PMTCT prevention of mother-to-child transmission (of HIV)

SPHMMC Saint Paul's Hospital Millennium Medical College

STI sexually transmitted infection

UNAIDS United Nations Program on HIV/AIDS

UNICEF United Nations Children's Fund

VL Viral load

6. Declarations:

We hereby declare that, this research on determinants of mother to child transmission of HIV in public hospitals of West Shewa zone, Oromiya region is our original work and has not been submitted to peer review journals else where, and all source materials used for this research have been duly acknowledged.

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Competing interests

The authors declare that they have no competing interests.

Availability of data and materials

Any data and materials related to this study are available upon request from the Principal Investigator (Fufa Hunduma , email: fhunduma@gmail.com)

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Authors' contributions

Fufa Hunduma: conceived the research idea, wrote proposal, supervised and conducted the data collection, data processing, analysis and data interpretation, wrote first draft, wrote final paper and manuscript write-up.

Ewnat Gebrehanna: reviewed the paper, reviewed and approved the final manuscript.

Ethics approval and consent to participate

Ethical clearance was obtained from the Institutional Review Board of Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia. Permission was also obtained from Oromia Regional Health Bureau Ethical Review Committee, Ambo Hospital, Gedo Hospital and Gindeberet Hospital administrative bodies prior to patient interview and document review. Consent of participants was taken before participating to this study.

Consent for publication: NA

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8. Legend of figures and tables:

- Figure 1:** Shows geographical location of West Shewa zone in Ethiopia. West Showa is located at central part of Ethiopia and has more than 2.5 million population. Has six hospital, however, we included three hospitals shown on image since they are serving ART clinic more than four years. The image was developed by PI from Arch GIS.....4
- Figure 2:** Approach used to select cases and controls from three Hospitals. Shows the flow chart of our steps to identify cases and controls. Initially we went to Oromia Regional Health Bureau to get data of infected children, then we get total number in the zone and stratify by hospitals and signed cases and controls. (source: developed by principal author based on study design of the project).....6
- Figure 3:** Clinical stage of mothers of cases and controls by residence and place of deliver. The figure indicates that distribution of cases and controls by their place of residence, place of delivery and clinical stages.(source: authors built from data by Microsoft Excel).....7

Figures

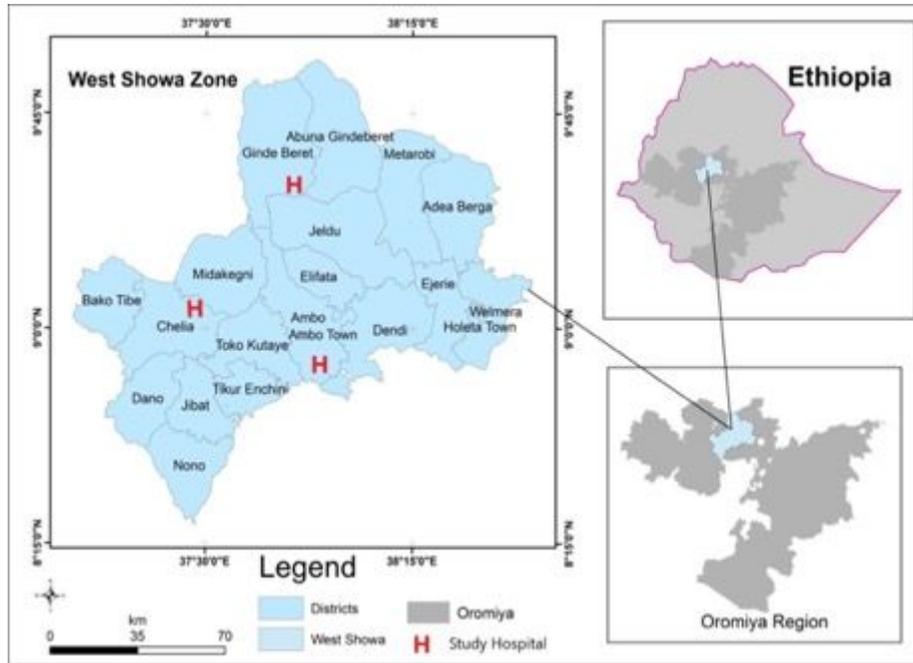


Figure 1

Shows geographical location of West Shewa zone in Ethiopia.

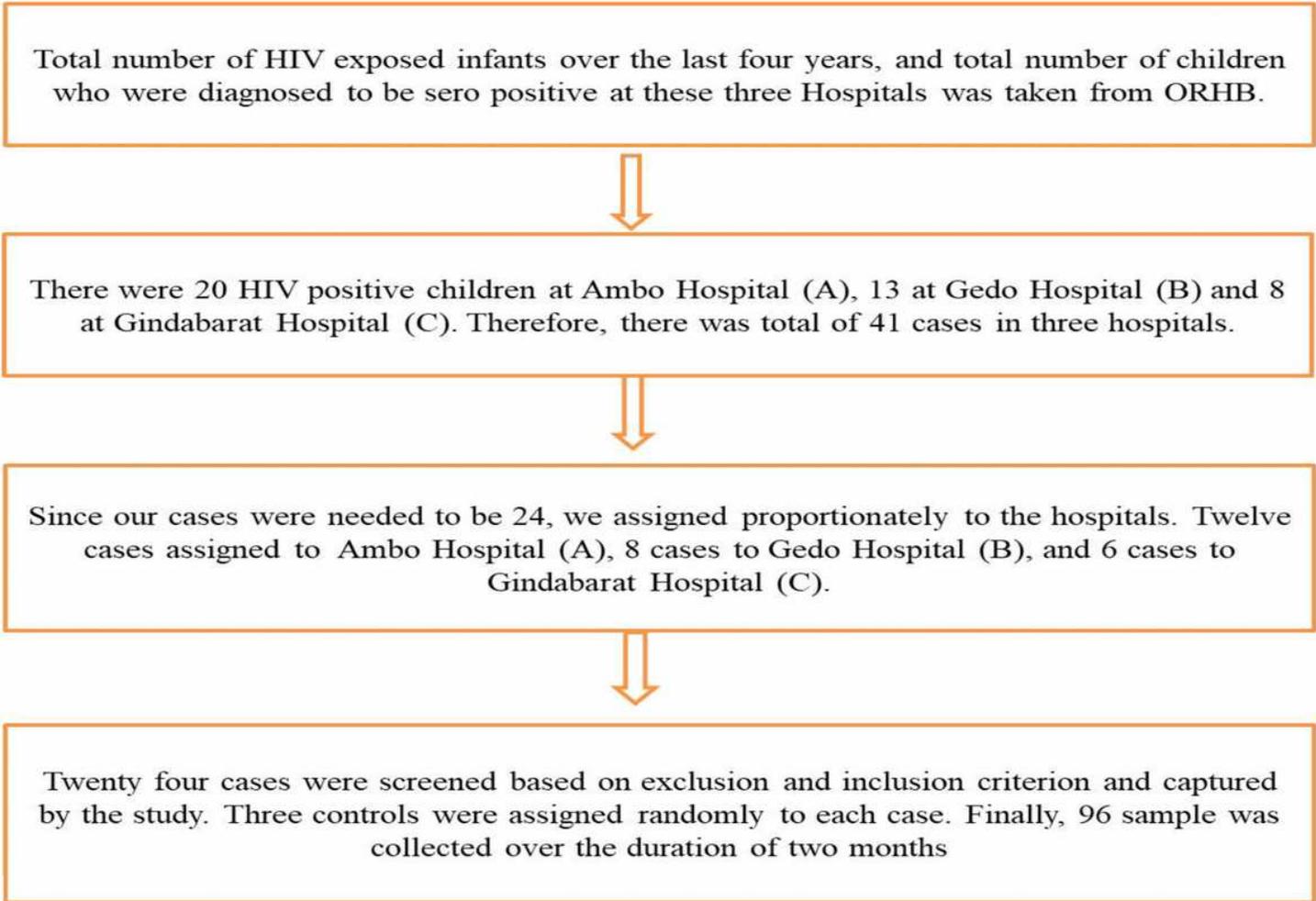


Figure 2

Approach used to select cases and controls from three Hospitals.

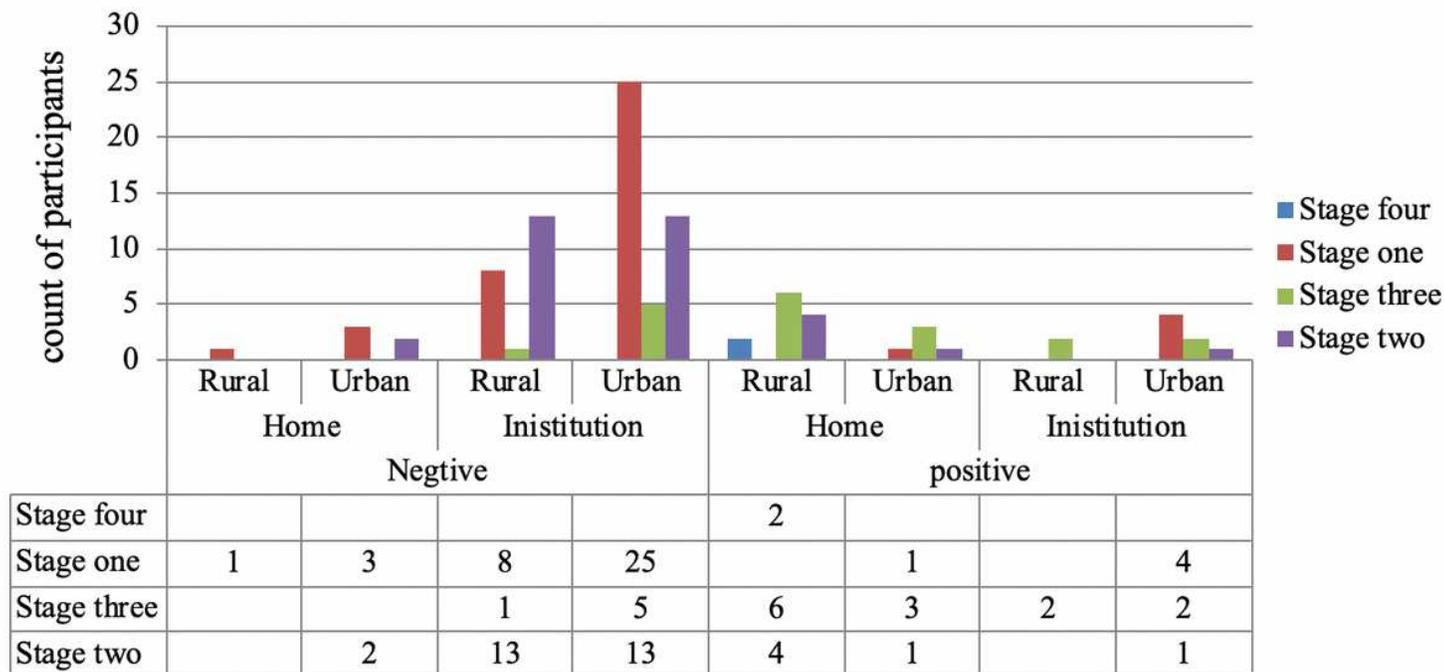


Figure 3

Clinical stage of mothers of cases and controls by residence and place of deliver.