

## Prevalence of HIV and Trends of ART Utilization among Key and Priority Population in Tigray Regional State, Northern Ethiopia 2019

### Abstract

**Background:** Even though Ethiopia accepted the strategies to eliminate HIV/AIDS epidemic by 2030 still the burden is continued to be one of the priority agenda at national and regional level, which needs subsequent responses particularly among the hotspot areas and key priority population. The prevalence of HIV in late 2018 was about 74.9 million people of them 32 million had died due to acquired immune deficiency syndrome related illness in the world and 38 million in 2019 of them 1.7 million were newly infected the United Nation program (UNAIDS) and thousands had died of the disease. Sub-Saharan African (SSA) countries including Ethiopia share the highest global burden of HIV/AIDS. With the introduction of antiretroviral therapies (ARTs), HIV is increasingly becoming a chronic manageable disease. The global efforts on people living with HIV (PLHV) and receiving ART has increased by third since 2013 and reached 17 million people received ART in 2015. Timely ART start among PLHV donated that a pivotal role to handle the epidemic and can shifts from survival to improve quality of life through adherence, retention in care and speed up of viral suppression. The UNAIDS' made an ambitious plan that less than 200,000 HIV prevalence worldwide and to end new HIV infection by 2030.

Treatment success requires both a sustainable supply of ART to clinics and lifelong adherence to treatment by patients. In the last 30 years, there was high achievement in effective preventive methods like behavioral, PMTCT care and treatment (ART). Antiretroviral therapy (ART) has played an important role in improving prognosis and quality of life of HIV/AIDS patients, reducing rate of disease progression and death, can also reduce the risk of HIV transmission to sexual partners by 96%, adherence is also considered a major predictor of survival among PLHV/AIDS, more than 95% adherence to ART reduce destruction of CD4 cells, increase survival, and improve quality of life. The present study aimed to estimate trends of ART utilization among HIV-infected patients in Tigray region.

**Method:** A quantitative study design was used to know the prevalence of HIV and trend of ART utilization among KPP. Secondary data review (Chart/document) was done for the period of 2012 to 2019.

Result According to the survey report, there was inconsistent HIV positivity rate across the reference period among different population segments and the trend in HIV positivity rate has shown a marked decline from 1.92% in 2012 to 0.65% in 2019. Here there were no any indicators which indicate HIV positive clients linked to ART till 2015. However, from 2015 to 2016, almost all the HIV positive clients linked to ART. After 2016, link to enrolments of HIV positive clients to ART clinics showed that declined trend across the years till 2019 which indicates that, many HIV positive clients didn't get ART care. Overall, there were fall down of HIV positive patients enrolled to ART care was 85.46%, 75.74% and 69.20% in the years 2017, 2018 and 2019 respectively. However, poor ART adherence can create a dangerous public health problem and limit the effectiveness of available HIV treatments and is the most common reason for treatment failure. Poor ART adherence also leads to increased morbidity and mortality in low-and middle-income countries (LMIC) as patients still show poor ART adherence, become a major obstacle for fighting against HIV/AIDS. Factors affecting ART adherence include patient characteristics, ART regimen, clinical setting, social and environmental factors, and the relationship between patients and their health care providers. The overall HIV prevalence in Tigray was 1.2% greater than the global cut off point declared epidemic (>1%) contributes 9% of PLHV nationally. Taking different population segments in Tigray, HIV prevalence was inconsistent. Among urban adults of Ethiopian population the HIV impact assessment in Tigray was 2.7% (95% CI: 1.3-4.0). According to survey report on HIV prevalence estimation and projection showed 1.85% in 2015 and 1.7% in 2019. The HIV positivity rate at 18 months among HIV exposed infants showed declining trend 9.2% to 2.49% indicating a promising PMTCT service. The proportion of HIV positive cases among those who tested for HIV was about 0.008% (332/38750) and about 86% (284/332) of them were under clinical care and about 90% initiated ART in 2019 in Tigray.

**Conclusion:** Trends Link to enrolment of HIV positive clients to ART clinics have declined across years, indicates that, many HIV positive clients didn't get ART care. Poor ART adherence can create a dangerous public health problem and limit the effectiveness of available HIV treatments and is the most common reason for treatment failure. Fall to-adherence can lead to drug-resistant HIV caused by failure to achieve maximal viral suppression. A number of efforts should be implemented in healthcare services throughout the region to increase ART utilization by KPP patients in Tigray.

**Keywords:** Know your HIV epidemic; Know your HIV response; KPP/MARPs; HIV synthesis; Quantitative study; Positivity rate; Trends in HIV/AIDS; Response to HIV/AIDS; Antiretroviral treatment (ART)

Ataklti Gessesse Teka<sup>1</sup>, Equbay Gebregzabiher<sup>1</sup>, Ataklti Hailu Atsbaha<sup>1</sup>, Mulugeta Woldu<sup>1</sup>, Ataklti, Geberetsadik<sup>1</sup>, Hailay Gebretinssae<sup>1</sup>, Tsegay Hadgu<sup>1</sup>, Brhane Ayele<sup>1</sup>, Abraham Aregay<sup>1</sup>, Asfawesen Aregay<sup>1</sup>, Tewelde Wubayehu<sup>1</sup>, Teasfay Gebregzabher Gebrehiwet<sup>2</sup>, Getachew Reda<sup>2</sup>, Mache Tsadik<sup>2</sup>, Tsegay Welay<sup>2</sup> and Hagos Godifay<sup>3</sup>

- 1 Department of Health Science, Tigray Health Research Institute, Mekelle, Ethiopia
- 2 Department of Health Science, Mekelle University, Mekelle, Ethiopia
- 3 Tigray Regional Health Bureau, Ethiopia

**\*Corresponding author:**

Mulugeta Tilahun Gebremedhin

✉ muluzem1221@gmail.com

Tigray Health Research Institute, Mekelle, Tigray, Ethiopia

**Citation:** Teka AG, Gebregzabiher E, Atsbaha AH, Woldu M, Geberetsadik A, et al. (2023) Prevalence of HIV and Trends of ART Utilization among Key and Priority Population in Tigray Regional State, Northern Ethiopia 2019. Health Sci J. Vol. 17 No. 11: 1079.

**Received:** 01-Nov-2023, Manuscript No. iphsj-23-14307; **Editor assigned:** 03-Nov-2023, Pre-QC No. iphsj-23-14307 (PQ); **Reviewed:** 17-Nov-2023, QC No. iphsj-23-14307, **Revised:** 22 Nov-2023, Manuscript No. iphsj-23-142 iphsj-23-14307 (R); **Published:** 29-Nov-2023, DOI: 10.36648/1791-809X.17.11.1079

## Background

Acquired Immunodeficiency Syndrome (AIDS) is one of the most serious public health and development challenges in sub-Saharan Africa, including Ethiopia [1]. A systematic review in 2014 affirmed that in the glob around 36.7 million people living with HIV, of which 52% from sub-Saharan Africa (SSA) [2] by the end of 2018, about 74.9 million people were infected and 32 million had died due to acquired immune deficiency syndrome (AIDS) related illness in the glob [3]. Other study in 2019 by the United Nation program (UNAIDS) reported 38 million, among them 1.7 million were newly infected and thousands had died of the disease [4]. Sub-Saharan African (SSA) countries including Ethiopia share the highest global burden of H/IV/AIDS [4,5]. With the introduction of antiretroviral therapies (ARTs), HIV is increasingly becoming a chronic manageable disease [6]. The global effort on people living with HIV (PLHV) and receiving ART has increased by third since 2013 and in 2015 reach 17 million people received ART globally. Timely ART start among PLHIV donate a pivotal role to handle the epidemic and it shifts from survival to improving quality of life through adherence, retention in care and speed up of viral suppression [7] with the UNAIDS' ambitious plan of less than 200,000 HIV prevalence worldwide and to end new HIV infection by 2030 [4,7]. Treatment success requires both a sustainable supply of ART to clinics and lifelong adherence to treatment by patients [2,8,9]. The launching of Millennium Development Goals (MDG) aimed to reduce incidence of HIV/AIDS in 2015 by 50%. However, HIV is still the major public health problem [10] and it remained high in Ethiopia. Thus, to achieve HIV/AIDS related Sustainable Development Goals (SDGs) in Ethiopia; require efforts on scaling up comprehensive HIV/AIDS interventions and robust health management information system (HMIS) to evaluate the burden of HIV/AIDS. Since 2016 Ethiopia has integrated the universal test and treat (UTT) strategy in its national policy and the current ART guideline is adhered to and implemented accordingly [11]. Its burdens of HIV exhibit varies across geographic and population groups.[11,12] with universal HIV test, immediate ART start, and rapid viral suppression with full benefit of the ART will be achieved [13-15] Time from getting tested for HIV to start of ART use in newly diagnosed HIV clients varies from as short as one day to longer than 12 months [16].

There are some distinct transmission pockets among key and priority populations (KP & PP). The Ethiopian demographic and Health survey (EDHS) is one of the major sources of data to determine the level of HIV epidemic and response both at regional and national level used as an input to plan interventions in control of HIV epidemics (21-23). According to the three consecutive EDHS report, the HIV prevalence was 1.4% (2005), 1.5% (2011) and 0.9% (2016), which is higher than in Nepal, HIV is epidemic with an overall prevalence of 0.30% in the population aged [15] years. Of them 28.5% were women and 58% were men

of reproductive age. In contrast to this in all EDHS reports, the HIV burden was almost double among women compared to men due to various factors that increase vulnerability With significant reduction of HIV magnitude both in female and male 1.2% and .6% respectively in 2016 EDHS report compared to 2005 and 2011 EDHS studies. The HIV prevalence has also varied with age in both sex despite the inconsistent proportion of the magnitude in different age groups and high among urban than rural settings EDHS 2016. Similar report from the Ethiopian Population-based HIV Impact Assessment (EPHIA) conducted in 2018 has shown high (3.0%).

In the last 30 years, there was high achievement in advancement of HIV knowledge related to routes of transmission, effective preventive methods like behavioral and PMTCT, care and treatment (ART), and other proven intervention strategies at the population level (behavioral change interventions). However, the inability to maintain and reach the population with these effective interventions has remained a challenge to prevent and control HIV. As a consequence, new HIV hotspot areas and vulnerable population who are at risk of HIV infection were emerged across the region that needs a timely response. According to challenges in the HIV-care cascade are well documented with low HIV test uptake as well as poor linkage to care and delay in initiating ART amongst eligible individuals in care often cited as barriers to achieving these benefits (Fox et al., 2014; McNairy et al). A systemic review shows that non-adherence is the most common reason for treatment failure, demand for second-line treatment often associated with poorer patient health outcomes and increasing healthcare costs. For these reasons, a thorough understanding of determinants of adherence to ART is paramount. Studies on ART adherence showed that predictors and risk factors differ per region of the world, necessitating context-specific development of non-adherence profiles. This will enable healthcare providers to offer tailored care for patients at risk of non-adherence.

Antiretroviral therapy (ART) has played an important role in improving prognosis and quality of life of HIV/AIDS patients, reducing rate of disease progression and death. Increased access to ART can also reduce the risk of HIV transmission to sexual partners by 96%. ART adherence is also considered a major predictor of survival among PLHIV/AIDS. More than 95% adherence to ART reduce destruction of CD4 cells, increase survival, and improve quality of life. However, poor ART adherence can create a dangerous public health problem and limit the effectiveness of available HIV treatments. Poor ART adherence also leads to increased morbidity and mortality in low-and middle-income countries (LMIC) As patients still show poor ART adherence, become a major obstacle for fighting against HIV/AIDS. Factors affecting ART adherence include patient characteristics, ART regimen, clinical setting, social and environmental factors, and the relationship between patients and their health care providers.

Thus, knowledge of epidemic and transmission dynamics will help HIV/AIDS programs invest in the right interventions, that enable targeting resources and interventions on geographic targeting and hotspot mapping can assist in identifying both geographic areas of elevated transmission and high-risk groups (46) In the meantime, greater understanding of transmission dynamics and more efficient implementation and delivery of prevention, detection, and treatment programs can prevent a substantial proportion of new infections.

It is highly important regional and federal government achieving the targeted goals of 2030. Hence, mapping hotspot areas, identifying social determinants and affected population groups, especially in resource-limited settings, would help targeting and prioritizing interventions. In Tigray, there is an urgent demand for evidences about the dynamics of HIV/AIDS mainly the epidemic status and response in hotspot areas, urban, rural and emerging towns (infant areas) and associated factors. Thus, this study aimed to explore the risk behavior and social determinants of HIV infection, magnitude and response to HIV/AIDS and the intervention of the existing strategies in hotspot areas, and subpopulation groups which might help to effectively target interventions in the region with limited resources.

## Rationale of the study

HIV/AIDS has been one of the most killer diseases in the history of human kind particularly in LMIC for the last three decades. Consequently, it resulted in social, economic and political barriers that demand the attention of global community. Fighting against HIV/AIDS, several proven interventions have been invented such as ART and PMTCT. Besides, intensive educational and counseling interventions have been given with the aim of awareness creation and behavioral change with special emphasis to high risk groups. The interventions that have been done to reduce the burden of HIV were successful and there was a remarkable declining of prevalence of HIV in countries like Ethiopia. However, in recent years survey studies and reports from different organizations evidenced the increment of HIV prevalence among special groups or KPPs in hotspot areas.

Despite the availability of multiple proven interventions and government efforts to reduce the burden of HIV in the country, HIV continued to be one of the prior agendas both at the national and regional level. Thus, this study will investigate the hotspot areas to determine the trend of ART utilization, among KPP in Tigray regional state.

## Significance of the study

The findings of this study helps to understand the regional and local context for evidence-based decision in improving programs and targeting the key and priority population groups and implement possible interventions. And developed a policy document to use as evidence-based decision making which will be disseminated to policy makers and other relevant stakeholders. The findings will also be helpful to update the current situation of the epidemic to top, mid and low-level health managers so as to, it enables for planning shorter and long-term solution in prevention and control of the epidemic. So, the aim of this study was to assess the prevalence of HIV and trends of ART utilization among Key

and priority population of Tigray regional state.

## Methods

### Study area and setting

The study was conducted in both Urban and Rural settings of Tigray Region. The region has 52 administrative districts (34 Rural and 18 Towns), 799 Kebelles (722 Rural and 77 Urban), with 2.5 annual growth rate. The estimated population of the region was 5,151,998 according to 2016 Population and Housing Census projection with male to female ratio of 0.97 (CSA, 2016/17). The young population (15 to 24 years old) constituted about 20% of the total population (CSA, 2016/17).

Health facilities in the selected hotspot areas were also involved in the study. On top of HMIS data review studies, documents and reports were used to enrich the prevalence of HIV and ART utilization among Key and Priority Population (KPP).

### Study design and period

A quantitative study design was used to know the prevalence of HIV and trend of ART utilization among KPP. Secondary data review (Chart/document) was done for the period of 2012 to 2019.

### Study population

The study populations were all relevant documents of HIV care and treatment, interventions to mitigate HIV and Survey studies related to HIV prevalence and ART utilization.

### Data collection procedure

Retrospective charts/documents review of potential and accessible KPPs in selected HIV hotspot areas in Tigray region were extracted. The documents included in the review for HIV prevalence were facility-based ANC surveillance, PMTCT, PICT and HCT services. Administrative reports other relevant documents. Tigray regional health bureau HMIS annual reports and health facilities ART utilization was reviewed to see ART trend. Besides, a review was done from surveys, guidelines, administrative reports and other relevant documents.

### Sample size determination

There was no hard and fast assumption applicable to determine the sample size for the document review. Any relevant documents such as the HMIS report from RHB and collaborating organizations, survey reports in the region, administrative reports and working guidelines were reviewed. To check the data consistency, the inflated HMIS reports in the regional health bureau were cross checked with the reports of respective health facilities within the hotspot areas. Regarding other sources of information for HIV in the region, both local and national studies were included.

### Data collection tools

The data collection tools adopted from the previous similar studies conducted by FHAPCO and UNAIDS. For HIV prevalence and ART utilization, a sort of data extraction format was used to collect relevant information. Data were reviewed from healthcare services such as (ANC surveillance, PMTCT, PITC, HCT and other

services), surveys (EDHS and other studies) and administrative reports. Previous survey studies on HIV/AIDS conducted by different

Organizations were also considered for review. Data were collected by well trained and experienced health workers. The collected data were kept confidential and used for the intended purpose only.

### Data analysis

Initially, a simple descriptive analysis was done regarding the hotspots and KPPs and then the distribution of the HIV infection among the KPPs in the selected hotspot areas in reference to the data generated from the health facilities such as ANC surveillance, PMTCT, PITC, HCT services and other relevant studies in the area was described. For the analysis of HIV prevalence, ART utilization and its trends over the specified time, simple proportion and trend analysis was used. Frequency tables and figures were used to present data.

### Inclusion and exclusion criteria

Charts or documents of HIV/AIDS care and treatment with complete records and information, all relevant studies on HIV/AIDS in the region available during 2012 to 2019. Documents and reports that lack completeness and inconsistency were excluded.

## Result

### Epidemiology of HIV/AIDS in Tigray

The second KYE/KYR HIV synthesis report was based on different data sources including survey reports such as demographic and health survey and relevant literatures and routine health service reports such as HMIS data, PMTCT data, HIV counseling and testing (HCT) and provider initiated testing and counseling (PITC). As 2016 EDHS survey report, overall HIV prevalence in Tigray was 1.2% greater than the global cut off point declared epidemic (>1%) contributes 9% of PLHIV nationally.

Taking different population segments in Tigray, HIV prevalence was inconsistent. Among urban adults of Ethiopian population HIV impact assessment in Tigray was 2.7% (95% CI: 1.3-4.0) Study reported by EPHI on HIV estimation and projection showed prevalence of 1.85% in 2015 and 1.7% in 2019 Other studies reported that HIV prevalence shows 0.3% and 2.1% among youth and HIV exposed infants born from HIV positive mothers respectively In Tigray, the positivity rate of HIV was higher among children of people living with HIV/AIDS (2.7%). The HIV prevalence in the rural parts of Ethiopia and Tigray was 0.99% and 0.7% respectively which show relatively lower than the urban report and highly varied across the sites, especially in urban areas.

### Prevalence of HIV among the vulnerable population

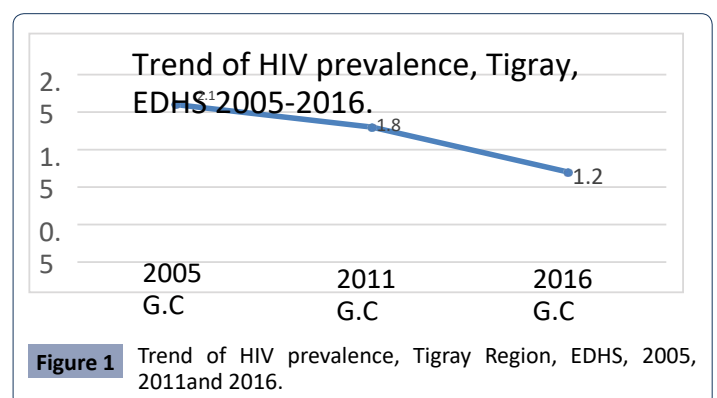
According to EDHS 2016 report, overall prevalence of HIV among youth aged 15-24 years was 0.3%. When stratified by young women and men aged 15-24 years, the HIV prevalence were 0.5% and less than 0.1% respectively in Tigray, refugees from camps in Tigray 0.003%, prisoners 1.03% in 2019 among MARPs

population, daily/seasonal laborers ranges 0.5% to 8.2% where as 0.82% from current quantitative study, among long truck drivers varied from 4.5% [16] to 4.9 % with 1500 sample size; nationally and 0.4% with only 228 drivers in Tigray. According to national HIV prevention road map 2018-2020 reports that the HIV prevalence among mobile and resident workers in hotspot areas 1.5% from 1,000,000 population. Since scarce information on regional level, some pocket studies revealed that HIV prevalence among female sex workers was ranged 11.9% to 32%.

### Trends of HIV prevalence in Tigray

The overall trend the HIV positivity rate in Tigray 2012 to 2019 showed that a marked declined from 1.92% in 2012 to 0.065% in 2019. However, some districts are still in a state of epidemic based on the review of 2019. Accordingly Setit Humera, Semen sub city (Meklle), Maichew and Alamata had higher HIV positivity rate more than 1% compared to the regional positivity rate (HMIS report). Based on EPHI report, there was an increasing trend of HIV positive population across the years from 2015 to 2019. However, the trend in HIV prevalence in Tigray has slightly decreased from 1.85 in 2015 to 1.7 in 2019 among adult population. Among the HIV positive population reported, females had a significant contribution to the positivity rate. Similarly, new HIV infection has shown an increasing trend during the 2015 to 2016. However, it declined through 2017 to 2019. New HIV infection was also found higher among females across the survey years. The number of HIV cases among children 0-14 years declining from 2015-2019, males higher in number than females. And increasing trend, number of HIV exposed infants from 2005 to 2018 started declining from 2018 to 2019. HIV positivity rate at 18 months among HIV exposed infants showed declining trend from 9.2% in 2005 to 2.49% in 2019 indicating a promising PMTCT service.

The HIV prevalence across rural sites is more homogeneous at low levels than urban sites. Like in 2014 report, twelve rural sites have shown 0% HIV prevalence in 2016 in Tigray, in contrast higher HIV prevalence in Tigray in. Here, there is reduction of HIV prevalence in several sites of rural areas in this survey compared to 2014 surveillance report, from 6.8% in 2014 to 2.7% in 2016 in Chercher. Data from EDHS in Tigray showed that declining trend of HIV prevalence over the past 5 years (1.8% (CI: 0.1-2.5) in 2011 VS 1.2% (CI: 0.7-1.6) in 2016). But greater than the national average (1.5% in 2011 and 0.9% in 2016) (Figure 1).



The prevalence of HIV is higher among females than males and greater than the regional average in all the subsequent surveys. During the subsequent surveys, the prevalence of HIV was declining in both sexes but steady in males than females. Based on HMIS data report from 2012 to 2019 the overall trends of HIV positivity rate significantly declined from 1.92% in 2012 to 0.65% in 2019. However, in Mekelle and western zone remain more than the regional average. In most of zones, there was inconsistent HIV trend over the years. Even though in Central and South East zones have least positivity rate from 2013-2019 but the reverse was true in most of zones from 2016 to 2017 and then started declining in 2018.

The HIV testing was done among the key population as HIV control and prevention responses. As shown in **Table 1** below, the HIV test campaigns did not reach majority of the target population. Among the key population who tested for HIV, the percentage of being tested positive were less than 0.1 in all groups.

### Vulnerability of population for HIV

HIV positive cases were higher among children's of PLWHIV and patients presented with STIs as shown in figure two below. Besides, OVC and partners of PLHIV were also significant

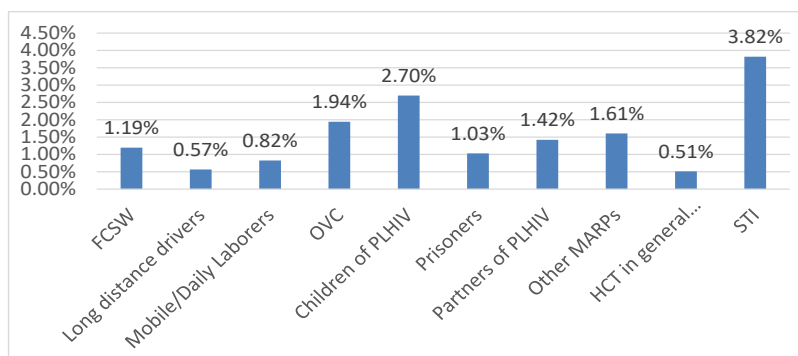
contributors of HIV positivity (**Figure 2**).

### Responses for vulnerable and key populations

Different interventions have been implemented to prevent and control HIV/AIDS by the Government, NGOs or other partners. Strengthening awareness creation on HIV transmission, peer to peer discussion and community partnership were among the main interventions at community level. On top of that condom distribution and behavioral change towards condom utilization, distributing SBCC materials, celebrating HIV/AIDS days, early enrolled HIV positive individuals to ART, integration of HEWs with high level health professionals, establishment of board working on HIV follow up and monitoring, health education in hotspots areas were key interventions implemented. In addition to these interventions; awareness creation in tea and coffee program, establishment of "Equb" by FSWs as a bridge or road mapping for shifting FSWs from sex work to other non-risk work environment, mobilization, support and care, HIV training were motivating interventions which has been carried out by partners. To support these interventions, the government decided all sectors to allocate 2% of their annual budget for HIV/AIDS prevention and control program (**Table 2**).

**Table 1.** Campaign based HIV testing among Key population June, 2017.

Key Population	Target pop	Tested	%tested	Tested pos	%pos
FFSWs	8,107	10884	134	214	0,019
Long Distance truck drivers	871	1403	161	13	0.009
Mobile workers/Daily Laborer	236229	13024	6	102	0.007
Pregnant women	23,480	30379	129	203	0,006
Partners of pregnant women	11,956	5558	46	30	0.005
AIDS orphans	5,146	2159	42	15	0.007
Evening Class attendees	5,436	1847	34	5	0.003
Family members of ART	21301	3583	17	101	0.03
<b>Clients</b>					
OPD clients/IPD	46,761	37435	65	535	0,01
TB/Inpatients		4318		71	0.016
Discordant couple		41		3	0.073
Prisoners	6,003	4065	68	31	0.007
HEI	793	203	26	2	0.009
Refugee	15578	2941	19	15	0.005

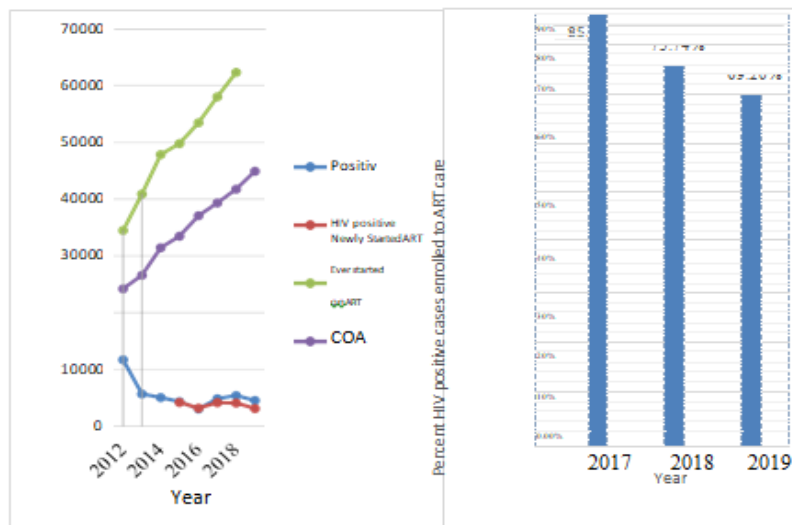


**Figure 2** HIV positivity pattern by MARPs in 2019.

**Table 2.** HCT, HIV positive cases, enrolled in clinical care, initiated ART, currently on ART among different population in 2019 in Tigray Region.

Indicators	No HCT	HIV Positive cases	Cases enrolled In clinical care	Cases initiated ART	Cases currently On ART
FSW	1231	11	9	14	1496
LTD	208	1	1	1	0
DL	2084	14	10	6	0
PW	5939	32	27	19	0
PPW	1990	13	12	11	0
AIDS orphan	120	0	0	0	0
NS. students	35	0	0	0	0
Family ART	745	8	8	4	0
OPD/IPD pts	15229	132	115	59	6
TB/STI pts	2536	39	32	33	0
D.Couple	30	0	0	0	0
Prisoner	9	1	0	0	0
HEI	90	0	0	0	0
Refugee	1180	4	4	4	2
Other	7324	77	65	147	0
Total	38750	332	284	298	6619

FSW: Female sex workers, DL: Daily laborers, LTD: Long track drivers, PW: pregnant women, PPW: partners of pregnant women, NS: student: Night shift student, D. couples: discordant couples



**Figure 3** The overall trends of ever started on ART and Currently on ART (COR) to PLHIV from 2012 to 2019 for all groups in Tigray region.

### HIV testing and counseling, enrolled in clinical care and currently on ART

The HIV testing and counseling (HTC) is one of the strategies to track the HIV cases and to put them under clinical care and on ART. As indicated in **Table 2** the proportion of HIV positive cases among those who tested for HIV was about 0.008% (332/38750). Of the HIV positive cases, about 86% (284/332) of the cases were under clinical care and about 90% initiated ART in 2019 in Tigray region.

### The trend for ART use among HIV positive case

As shown in **Figure 3** below, there was no any indicator which indicated HIV positive clients linked to ART till 2015.

### Discussion

#### HIV infection among key populations in Tigray

Taking local epidemiology, Ethiopia has defined its key and priority population groups. The key populations female sex workers and prisoners and the priority populations widowed, separated or divorced women; long truck drivers; PLHIV and their partners; mobile and resident workers in hotspot areas with high risk of HIV infection, limited access to services, stigma and discrimination.

#### Female sex workers: Even if scanty evidences in the region

HIV prevalence among FCSWs showed that 11.9-32% Based on

EDHS 2016 reported that, prevalence of HIV among the youth [15] and College/University students of females and males was 0.5% and <0.1% respectively in Tigray, with overall 0.3% among them According to UNHCR about 89,591 Eritrean refugees found in four camps in January 31st 2020 have 0.46% HIV positivity rate.

Regionally, prisoners recognized as high risk groups for HIV than the general population, exposed to stress, malnutrition, drugs and violence become more susceptible to illness and HIV prevalence among them is very limited nationally including Tigray. However, campaign HIV testing showed that 7.9% national positivity rate in 2017 and 1.03% in 2019 in Tigray among the MARPs. Factory workers are the other vulnerable to HIV become a global problem due to their high risk behaviors and negative effects on production, human capital, increase AIDS dependent orphans and child labours remain major challenge for social security systems. According to the national HIV prevention road map 2018-2020 report, the HIV prevalence among mobile and resident workers in hotspot areas was 1.5% from population of 1,000,000. Data in Tigray regional health bureau and FGD participants reported that the known agricultural site of Tigray attracts so many seasonal workers from all parts of Ethiopia looking for higher wages, driving HIV epidemic with prevalence of HIV ranges 0.5% to 8.2%. However, the current quantitative study revealed that 0.82%, which is comparable with a study in Metma, Ethiopia (0.5%). Furthermore HIV infection among long truck drivers is the public health problem due to their movement crossing Addis Ababa-Alamata-Mekelle-Adigrat-Shire-Humera routes and Mekelle is a major destination for Tigray bound trucks departed from Djibouti and Addis Ababa. Alamata, Makoni and Hi-wane are known overnight truck stations. As different studies reported that low condom utilization, making transactional sex with CSWs have high-risk behaviors of HIV with their national HIV prevalence ranging 4.5 to 4.9 % and 0.4% in Tigray.

Knowledge of HIV prevention methods in Tigray accounts 84.2% in men and 66% in women compared to the national 68.6% in men and 48.7% in women among the age group 15-49. People who had 2+partners in the age of 25-49 years in the past 12 months found to have HIV prevalence of 0.3% in Ethiopia and 0.5% in Tigray region. Nation wise there was 57% of women and 77.1% of men have used condom compared to 75% of women and 89.8 % of men in Tigray.

### HIV/AIDS response/interventions in Tigray

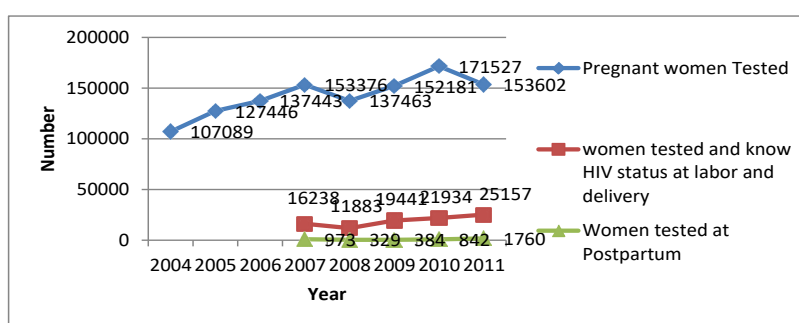
Both clinical and non-clinical interventions to HIV/AIDS have been provided regionally. At national level, the HIV AIDS policies and law have been formulated to respond HIV/AIDS pandemic. Ethiopia has also designed a functional strategic plan as part and package of the HIV/AIDS response ultimately to control and prevent HIV. All the interventions that respond to HIV/AIDS prevention and control at regional, district and facility level are derived from the national policy, laws and strategies. To implement these intervention strategies, guidelines related to HIV prevention and treatment and care have been developed. The most recent strategic plan covers condom promotion and distribution, VCT, PMTCT, IEC/BCC, care and support service, capacity building, HIV mainstreaming, school-based education and Anti-HIV club.

### Clinical Interventions to HIV/AIDS

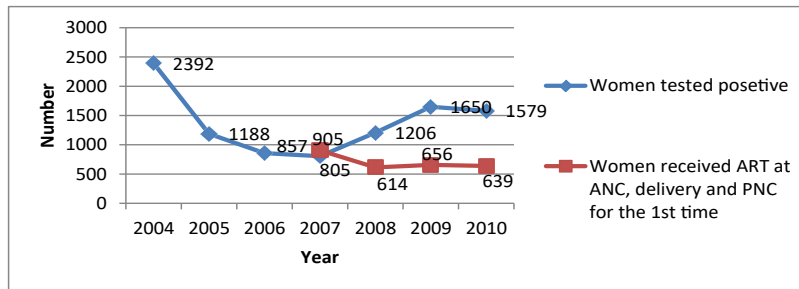
According to the reviewed report, the number of women tested for HIV during pregnancy forth last 8 years steadily increased till 2018 and started declining 2018 to 2019. In contrast, number of women tested for HIV during labor, delivery and postpartum relatively lower compared to women tested during pregnancy (see **Figure 4** below). This disparity may indicate that mothers who know their HIV status during pregnancy don't repeat HIV test during labor and post-natal.

### HIV positivity rate and provision of ART

HIV positivity rate among routine tested women was not consistent. They decreased steadily from 2012 to 2015 and again increased 2015 to 2017 and then decline slowly in 2019. With regard to provision of ART, there was irregular trend starting 2015 to 2018. The number of women who received ART during ANC, delivery and post-natal care were far from the women tested positive and trend was almost constant 2016-2018 (see **Figure 5** below). Other study finding showed that patients with a history of substance use are significantly less engaged with their health care provider, and are likely to exhibit a higher rate of treatment refusal. A review of ART adherence, (Mills et al) showed that reminders in the form of support from friends and family facilitates successful ART adherence and disclosing one's HIV status to others had a positive influence on adherence. However, several other studies have shown that ART adherence



**Figure 4** Number of women tested for HIV at pregnancy, labor and delivery and postpartum 2012 to 2019 in Tigray.



**Figure 5** Number of women tested positive for HIV and HIV positive women received ART for the first-time during ANC, Delivery and PNC from 2004 to 2010 in Tigray region.

**Table 3.** HIV testing and counseling, enrolled in clinical care and currently on ART.

Indicator	No HCT				HIV Positive cases				HIV-positive cases enrolled in clinical care				HIV positive cases-initiated ART				HIV positive cases currently on ART			
	<15M	<15F	>15M	>15F	<15M	<15F	>15M	>15F	<15M	<15F	>15M	>15F	<15M	<15F	>15M	>15F	<15M	<15F	>15M	>15F
Age	<15M	<15F	>15M	>15F	<15M	<15F	>15M	>15F	<15M	<15F	>15M	>15F	<15M	<15F	>15M	>15F	<15M	<15F	>15M	>15F
FSW	0	4	0	1227	0	0	0	11	0	0	0	9	0	3	0	11	65	535	41	855
LTD	0	6	191	11	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0
DL	4	0	1430	650	0	0	11	3	0	0	8	2	0	0	4	2	0	0	0	0
PW	0	41	31	5830	0	0	2	30	0	1	0	26	1	0	0	18	0	0	0	0
PPW	0	7	1394	589	0	2	7	4	0	2	6	4	2	2	3	4	0	0	0	0
AIDS orphan	9	3	108	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E. students	0	0	16	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Family ART	228	226	160	131	2	1	2	3	1	3	3	1	1	1	2	0	0	0	0	0
OPD/IPD pts	1307	#####	4594	8134	1	13	56	67	2	11	49	53	3	16	16	24	0	0	6	0
TB/STI pts	234	247	925	1130	3	3	16	17	2	15	2	13	2	15	2	14	0	0	0	0
Discordant Couple	1	3	17	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prisoner	3	0	2	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
HEI	42	26	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Refugee	63	31	548	538	0	1	1	2	0	1	1	2	0	0	1	3	0	0	0	2
Other	113	246	3400	3565	1	5	28	44	1	4	24	36	5	11	98	33	0	0	0	0
Total	2004	#####	#####	#####	7	25	124	18	9	37	91	147	14	48	127	109	317	2470	570	4460

decreases with an increasing number of tablets and number of daily doses. Nevertheless, various studies reported that despite new ART regimen with fewer tablets and daily doses, adherence remains a problem.

### HIV testing and counseling, enrolled in clinical care and currently on ART

HIV testing and counseling (HTC) is one of the strategies to track HIV cases and to put them under clinical care and on ART. HTC mainly focuses on most at risk population groups such as FSWs, long truck drivers, daily laborers and other population segment like pregnant women, AIDS Orphan, night shift students, patients from OPD/IPD, TB/STIs patients and prisoners. Higher number of HCT was observed from OPD/IPD followed by pregnant women. As indicated in **Table 3** the proportion of HIV positive cases among those who tested for HIV was about 0.008% (332/38750). About 86% (284/332) of them were under clinical care and 90% initiated ART in 2019 in Tigray.

### Trend for ART use among HIV positive cases

As **Figure 3** above showed that, there were no any indicators which indicate HIV positive clients linked to ART till 2015. However, from 2015 to 2016, almost all the HIV positive clients linked to ART. After 2016, link to enrolment of HIV positive clients to ART clinics showed that declined trend across the years till 2019 which indicate that, many HIV positive clients didn't get ART care. Overall there were fall down of HIV positive patients enrolled to ART care was 85.46%, 75.74% and 69.20% in the years 2017, 2018 and 2019 respectively. A study in rural South Africa results showed that ART uptake was high, with more than four out of five individuals initiating ART within the first three months of entering care, a promising observation. Furthermore, the rates of those with CD4>350 cells/mm<sup>3</sup> and without WHO stage 3/4 or pregnancy who initiated ART were as high as 79.8% at month 3 and 85.3% at Month 6. Even in the context of overall high ART uptake, only half the individuals initiated ART within one month with their findings suggesting a more rapid initiation in sicker patients.



## HIV Treatment and Care Programmers'

A meta-analysis study result; prevalence of adherence to Highly Active Antiretroviral Therapy (HAART) among Children was 87.3% in Tigray and the national average was 88.8%. Moreover; in Tigray 85.1% of patients who start ART were able to retain after one year of ART initiation with different identified determinants like; level of health facilities, gender differences and having active TB. Another longitudinal study in Tigray, attrition was mainly due to loss to follow-up, patients transferred-out and documented mortality. Another studies from India and Africa showed that traveling from distant places to ART centers was one of the barriers to ART adherence; in contrast to this study in Nepal has been reported that, despite the extension of ART centers into different regions of Nepal, people living with HIV are unwilling to seek treatment at the nearest health institution due to fear of stigmatization in addition, one meta-analysis showed that varying from mild to severe and from acute to chronic, adverse effects and toxicity of the complex ART drugs was an important reason for non-adherence; though ART program has been successful over several critical areas, equitability issues, variability in retention of care, and slow and low shift to second-line ART still remained to be important challenges.

Non-clinical response/interventions to HIV/AIDS: HIV/AIDS has been one of the top public health problems in Ethiopia and the study area in Tigray. In response to the public health problem/concern of HIV/AIDS, various interventions have been exercising to avert the disease burden. The interventions that have been implementing in response to HIV/AIDS prevention and control strategy include: Condom promotion and distribution, expansion of community conversation, school based HIV prevention programmers', life skills education, school CC programme, training for IGA and start-up capital for sex workers and vulnerable women, food and nutritional support for PLHIV& OVC, training for and for OVCs, training for IGA and start-up capital for PLHIV, educational and psychosocial support to OVC, HIV mainstreaming in government sectors, Social mobilization and distribution of IEC/BCC materials and partners allocated to respond HIV and AIDS.

### Condom promotion and distribution

Distribution among the general population was increased from 3,882,237 in 2016 to 4,615,935 in 2019. However, among MARPs/KPP was declined from 7,834,076 in 2016 to 6,290,103 in 2019, furthermore the overall distribution was declined from 11,716,313 in 2016 to 10,906,028 in 2019. This might be due to phase out of partners working on HIV/AIDS and under reporting from different sectors or health facilities.

**HIV mainstreaming:** It is one of the key activities of all sectors in the region, which is conducting in government, non-government and private sectors to protect employees and surrounding communities from HIV and ensure provision of treatment, care and support for infected and affected employees and their families. Sectors or organizations are expected to assess the vulnerability and impact of HIV on employees, develop HIV work place policies, prepare evidence-based plans of action, and implement activities; allocating the necessary resources and ownership of the HIV response. Mainstreaming was done at

different level including at regional and woreda levels. Different sectors are implementing HIV mainstreaming at different level. For instance, a total of 817 sectors implementing mainstreaming activities in the region including 22, 17 and 778 in regional, woreda and non-governmental and private sectors respectively. These various activities were implemented to create an enabling environment such as work place policy, establishing AIDS fund committee and assigning focal person. Work place policy was developed and implemented by most regional sectors and woreda offices to guide implementation of HIV and AIDS prevention and control [16-18]. Aids Fund Committee for HIV mainstreaming was established at all regional sectors and woreda offices. This shows sectors and offices are developing a sense of ownership in the prevention and control of HIV/AIDS.

## Conclusion and Recommendations

Trends Link to enrollment of HIV positive clients to ART clinics have declined across years indicates that, many HIV positive clients didn't get ART care. Overall, there were fall down of HIV positive patients enrolled to ART care was 85.46%, 75.74% and 69.20% in the years 2017, 2018 and 2019 respectively. Poor ART adherence can create a dangerous public health problem and limit the effectiveness of available HIV treatments and is the most common reason for treatment failure. Fall to-adherence can lead to drug-resistant HIV caused by failure to achieve maximal viral suppression. A thorough understanding of factors associated with ART (non-) adherence allows for targeted interventions. A number of interventions should be implemented in health care services throughout the region to increase ART utilization by KPP patients in Tigray and disclosing one's HIV status to others had a positive influence on adherence.

### Conflicts of Interest

The authors declare that they have no any conflicts of interest.

### Authors Contributions

All the authors conceived the study idea and performed the analysis, participated in designing data collection tools, data management and the write-up of the manuscript. The authors agree to be accountable for all aspects of the work related to the integrity of any part of the work. All authors have read and approved the manuscript.

### Acknowledgments

The authors would like to acknowledge Tigray health research institute and Tigray regional health bureau, the health facilities, and study participants for their cooperation during the study.

### Abbreviations

AIDS: Acquired Immune Deficiency Syndrome; ANC: Antenatal Care; ART: Antiretroviral Treatment/therapy; BCC: Behavioral Change and Communication; CDC: Center for Disease Control and Prevention; CSA: Central Statistics Agency; DHS: Demographic and Health Survey; EDHS: Ethiopian Population-based HIV Impact Assessment; FCSWS: Female Commercial Sex Workers; HAART: Highly Active Antiretroviral Treatment/Therapy; FHAPCO: Federal HIV Prevention and Control Office; HC: Health Centers; HCPs:

Health care Provider; HCT: HIV Counseling and Testing; HEI: HIV exposed infant 6; HEW: Health extension workers; HIV: Human Immunodeficiency; HMIS: Health Resource Information System; KPP: Key and priority Population; KYE: Know your Epidemic; KYR: Know your Response; MARPS : Most at Risk Populations; MDG:

Millennium Development Goals; OCV: Orphan and Vulnerable Children; PLHIV: People living with HIV; SDG: Sustainable Development Goal; SSA: Sub Saharan Africa; STIs: Sexually Transmitted Infection; UNAIDS: United Nation Programme on HIV and AIDS; UNHCR: United Nation High Commission for Refugees

## References

- 1 Shiferaw MB GG, Sinishaw MA, Yesuf YA (2016) Decreases in human immunodeficiency virus infection rates in Kombolcha, Ethiopia: a 10-year data review. *HIV AIDS* 8: 119-124.
- 2 UNAIDS, report on the global AIDS epidemic shows that 2020 targets will not be met because of deeply unequal success. COVID-19 risks blowing HIV progress way off course 2020.
- 3 Gesesew H, Ward P, Woldemichael K, M wanri L (2020) HIV care continuum outcomes: can Ethiopia meet the UNAIDS 90-90-90 Targets? *Ethiop J Health Sci* 30: 179-188.
- 4 Dorfman D, Saag MS (2014) Decline in locomotor functions over time in HIV-infected patients. *AIDS* 28: 1531-1532.
- 5 Mayanja Y, Kamacooko O, Bagiire D, Namale G, Kaleebu P (2018) Test and treat' among women at high risk for HIV-infection in Kampala, Uganda: antiretroviral therapy initiation and associated factors. *AIDS Behav* 22: 1053.
- 6 Vyankandondera J, Mitchell K, Asiimwe-Kateera B Antiretroviral therapy drug adherence in Rwanda: perspectives from patients and healthcare workers using a mixed-methods approach. *AIDS Care* 25: 1504-1512.
- 7 Dahab M, Charalambous S, Karstaedt AS (2010) Contrasting predictors of poor antiretroviral therapy outcomes in two South African HIV programmes: a cohort study. *BMC Public Health* 10: 1-14.
- 8 Wilson DJT (2013) Tailoring the Local HIV/AIDS Response to Local HIV/AIDS Epidemics. Challenges of containing new HIV infections in Ethiopia: unacknowledged transmission route. Capstone Collection.
- 9 Kibret GD, Ferede A, Leshargie CT, Wagnew F, Ketema DB (2019) Trends and spatial distributions of HIV prevalence in Ethiopia. *Infect Dis Poverty* 8: 90.
- 10 World Health Organization (2017) Guidelines for managing advanced HIV disease and rapid initiation of antiretroviral therapy.
- 11 HIV prevention in Ethiopia national road map 2018-2020 Final.
- 12 Immediate initiation of antiretroviral therapy in the outpatient clinic (2015).
- 13 Alvarez-Uria G, Pakam R, Midde M, Naik P (2013) Predictors of delayed antiretroviral therapy initiation, mortality, and loss to follow-up in HIV infected patients eligible for HIV treatment: data from an HIV cohort study in India. *Biomed Res Int*.
- 14 Benzekri NA, Sambou JF, Ndong S (2019) Prevalence, predictors, and management of advanced HIV disease among individuals initiating ART in Senegal, West Africa. *BMC Infect Dis* 19: 261.
- 15 Gesesew HA, Ward P, Woldemichael K, Mwanri L (2017) Prevalence trend and risk factors for antiretroviral therapy discontinuation among HIV-infected adults in Ethiopia in 2003-2015. 12: e0179533.
- 16 Ingabire PM, Semitala F, Kanya MR, Nakanjako D (2019) Delayed antiretroviral therapy (ART) initiation among hospitalized adults in resource-limited settings: a challenge to the global target of ART for 90 % of HIV-infected individuals. *AIDS Res Treat*. 1-8.
- 17 Kahn TR, Desmond M, Marx GE (2013) Delayed initiation of antiretroviral therapy among HIV-discordant couples in Kenya. *AIDS Care* 25: 265-272.
- 18 Pacheco PR, Zara AL, Silva e Souza LC, Turchi MD (2019) Late onset of antiretroviral therapy in adults living with HIV in an urban area in Brazil: prevalence and risk factors. *J Trop Med* 5165313.