ARSI UNIVERSITY

COLLEGE OF HEALTH SCIENCES

DEPARTMENT OF PUBLIC HEALTH

MAGNITUDE OF PRECANCEROUS CERVICAL LESION AND ASSOCIATED FACTORS AMONG HIV-POSITIVE WOMEN ATTENDING ADULT ART CLINIC AT PUBLIC HEALTH FACILITIES IN ARSI ZONE, OROMIA REGION, ETHIOPIA, 2025

By

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Abstract

Background: A precancerous cervical lesion is an abnormality in the cells of the cervix that could eventually develop into cervical cancer. Every year, more than 528,000 women develop cervical cancer and about 266,000 women die from the disease worldwide. Different studies in Africa indicated the varied prevalence of precancerous cervical lesions among HIV-infected women, ranging between 4.4% - 42.4%. In Ethiopia, cervical cancer was the second leading cancer diagnosis among adult women, with an estimated 6,294 new cases and 4,844 deaths annually. Even if the Ethiopian government declared and planned to screen and treat early for every HIV positive women, however, there was no clear data on the magnitude of the precancerous cervical lesion and associated factors among HIV-positive women on antiretroviral therapy before in the study area.

Objective: To assess the magnitude of precancerous cervical lesion and associated factories among a women who are HIV positive and receiving antiretroviral therapy at public health facilities in Arsi zone, Oromia region, Ethiopia, 2025

Methods: An institutional-based cross- sectional study was been conducted among HIV-positive women attending ART clinic at public health facilities in Arsi Zone from September 15 to October 15, 2025, Southeast Ethiopia. A sample of 422 participants was been selected using systematic random sampling methods. Data was been gathered using a structured and pretested questionnaire through a KOBO collect app. Data was been collected using 16 health professions (8 examiners who have done the screening and 8 data collectors who have interview for the associated factors using questioners). The data was been analyzed using SPSS version 25. Descriptive statistics such as percentage and frequency was been computed, and the mean with standard deviation is used to summarize the continuous variables accordingly. Both bivariate and multivariable logistic regressions was been performed to identify significant factors associated with precancerous cervical lesions among HIV-infected women. Those variables with p-value < 0.25 in bivariate analysis was been considered for multivariable logistic regression analysis to control the effect of confounding variables. The strength of associations was been expressed using adjusted odds ratios (AORs) with 95% confidence intervals, and the significance of associations is declared at a p-value of less than 0.05. The questionnaire was been pretested on 5% of the sample size in a similar study population at Awash Melkasa Health Center which found in Awash Melkasa town before the actual data collection.

Results: The prevalence of precancerous cervical lesions in this study was 16.1% (68 cases). Six variables showed statistically significant associations with PCL in multivariable analysis. Women with a history of oral contraceptive pill use were more likely to develop PCL (AOR = 4.43; 95% CI: 1.16–16.97). Early age at first sexual intercourse markedly increased risk (AOR = 7.31; 95% CI: 1.51–35.48). Participants with a history of STI showed strong association (AOR = 8.75; 95% CI: 2.40–31.89). A positive family history of cervical cancer significantly raised the odds of PCL (AOR = 10.56; 95% CI: 2.37–47.17). History of abortion has a statically significant with PCCL (AOR = 4.44; 95% CI: 1.26-15.65). Shorter HAART duration also showed a strong association (AOR = 13.03; 95% CI: 2.63–64.64).

Conclusion: This study points out the prevalence of pre-cancerous lesions of the cervix is high. Thus, the findings recommend rising of a screening strategy for cervical intraepithelial neoplasia for all women living with HIV should be undertaken. In addition, awareness creation about the impact of multiple sexual partners, promotion of early HIV diagnosis is important.

Keywords: Precancerous lesion, HIV positive women, Visual inspection, cross sectional

Acronyms and Abbreviation

AIDS - Acquired Immune Deficiency Virus

ART - Anti Retroviral Therapy

CC - Cervical Cancer

CCS - Cervical Cancer Screening

CIN - Cervical Intra Epithelial Neoplasia

HC - Health Centre

HCF - Health Care Facility

HCP - Health Care Provider

HIV - Human Immune Deficiency Virus

HPV - Human Papilloma Virus

HSIL - High Grade Squamous Epithelial Lesion

LMICs - Low and Middle-Income Countries

LSIL - Low Grade Squamous Epithelial Lesion

NGO - Non Governmental Organization

PAP smear - Papanicolaou Smear

SSA - Sub-Sahara Africa

STD - Sexually Transmitted Disease

VIA - Visual Inspection with Acetic acid

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1. Introduction

1.1. Background

A precancerous cervical lesion is an abnormality in the cells of the cervix that could eventually develop into cervical cancer. A primary cause of this condition is a persistent or chronic infection with human papilloma virus (HPV) which is the most common infection acquired during sexual relations, usually early at a young age(<20 years) (1,2). Precancerous cervical lesions are potentially preventable reproductive organ cancers (1,3). It shows pathological changes that may be preliminary to malignancy (4,5). Women with HIV are more likely to have persistent HPV infections leading to precancerous lesions (6). The late detection of precancerous lesions is related to a low rate of survival after surgery or radiotherapy (7,8). Although most HPV infections and precancerous lesions disappear on their own, there is a risk that HPV infection may become chronic and precancerous lesions will progress to invasive cervical cancer in all women (9). The World Health Organization (WHO) recommends priority targeting the HPV vaccine for girls' ages 9–13 years. Screening and prompt treatment are the most effective methods to reduce the chance of women already exposed to the virus from developing cervical cancer (10,11).

WHO currently recommends a high-quality screening program through visual inspection with acetic acid (VIA) in low-resource settings and HPV vaccination to overcome this situation (12,13). VIA is one of the screening modalities for precancerous cervical lesions, which provides quick results and helps to get early treatment (7,8,14).

Precancerous cervical lesions and cervical cancer are considered to be more aggravated and progress rapidly in immune compromised patients. In sub-Saharan Africa, cervical cancer is an intersecting epidemic with HIV and is the second most common cause of cancer-related deaths in women (15). Cervical lesions are three times more common in HIV-positive women than a women with HIV negative (16).

Ethiopia adopted Sustainable Development Goal (SDG) and WHO strategies and designed the National Cancer Control Plan (NCCP). The National Cancer Control Plan is a response by the Federal Ministry of Health (FMOH) and stakeholders to prioritize cancer Control in Ethiopia. The strategy aims to promote cancer prevention and early detection, and to improve diagnosis and treatment, including palliative care. It also aims to promote cancer surveillance, registration and research. The country has achieved some activities through this strategy such as cervical

cancer information dissemination for community through health extension workers, HPV vaccination before sexually active and expansion of cancer treatment services (8). The Ethiopian Health Sector Development Plan IV (HSDP-IV) is a policy in Ethiopia which includes the prevention and control of cancer (17). Based on this policy guidance, Federal Ministry of Health (FMOH) has recently designed and developed a national guideline on prevention and control of cancer (18).

Precancerous cervical cancer mostly caused by HPV infection which transmitted during unsafe sexual intercourse. The progression of precancerous lesion to cervical cancer mostly occurs in immune compromise patients. To prevent from acquiring this infection the FMOH adopted the WHO strategies. The first prevention strategy is to give HPV vaccine to girls whose age is 9 – 13. The second prevention strategy is early screening and treating before it progress to cervical cancer. Even if the Ethiopian government declared a strategy to early screening and treats for every HIV positive patients, however there is no clear data on the magnitude of precancerous cervical lesion and associated factors in Arsi zone, Oromia region, Ethiopia. So, this study fill this gap.

1.2. Statement of the problem

Cervical cancer is a cancer of the cervix which is the easiest gynecologic cancer to prevent and has a gradual onset with precancerous change. Every year, more than 528,000 women develop cervical cancer and about 266,000 women die from the disease worldwide. Over the past decades, the incidence and mortality had dropped in high income countries. In contrast, similar success has not yet been achieved in low and lower-middle income countries where the incidence is increasing. This drastic difference is due to the lack of access to effective screening and services that facilitate early detection and treatment (19).

In developing countries, it is the second most commonly diagnosed cancer after breast cancer and the third leading cause of cancer death after breast and lung cancers. In Ethiopia, cervical cancer is the second most frequently diagnosed cancer and the leading cause of cancer mortality among women aged 15 to 44 years. In Ethiopia 534,000 women age 15 year and above are living with HIV. These are among the most vulnerable to cervical cancer since their risk of pre-cancerous lesions are 10 times greater and are more likely to progress to invasive cervical cancer compared with uninfected women(20).

The poor socio-economic status, less accessible and underdeveloped healthcare system, and the high HIV/AIDS burden in sub-Saharan Africa have potentially increased the incidence of CC in the region (21). Due to this increment in CC incidence, women in this region are more affected with greater morbidity and mortality rates relative to other regions of the world (22). According to World Health Organization (WHO) estimation, CC is expected to kill over 443,000 women by 2030, and the majority (more than 98% of deaths) are believed to occur in developing countries (mainly in SSA) (21).

Despite being one of the few cancers that can be prevented with simple testing, cervical cancer is affecting women in the prime of their lives, causing suffering and death in a critically important segment of the world's population(12). In urban populations at increased risk for both diseases, cervical cancer is a crucial Acquired Immune Deficiency Syndrome (AIDS)- defining illness and maybe the most common AIDS-related malignancy in women(1). Women infected with the Human Immunodeficiency Virus (HIV) showed a median three-fold higher incidence of cervical lesions than uninfected women(23). Different studies in Africa indicated the varied prevalence of Precancerous Cervical Lesions (PCCL) among HIV-infected women, ranging between 4.4%-42.4%(24). Similarly, the various prevalence of PCCL among HIV-infected women were reported on limited studies conducted in Ethiopia, such as 18.7% in northwest

Ethiopia(25), 20.2% in southwest(26) and 9.9% in Amhara Regional State(13), 16% in Dukem city, Oromia (27).

In Sub-Saharan Africa(SSA) and Ethiopia precancerous cervical lesion among HIV infected women on ART was affected by Socio-demographic attributes(educational status, women's age, Marital status, Occupation and Resident) (28)), reproductive attributes (1st age of pregnancy, number of parity, Use of OCP and Hx. of abortion) (28)), clinical attributes (CD4 count, viral load, and ART regimen) (28)) and life style and sexual behavior related to sex and drug of abuse(Age of sexual debut, number of sexual partners, History of STIs, and smoking) (28)).

Although there are many factors that influence the magnitude of precancerous cervical lesion among HIV infected women, the economic barrier was strong; the rate of unemployment and relying on their marriage is high for the majority of women in low income countries (20).

However, the magnitude of precancerous cervical lesion among HIV infected women in Ethiopia has found inconsistent between 9.9% and 20.2% (28)). Vast studies in Africa also showed mixed effects; some showed positive effects of early age (13), others showed younger age less likely to be linked with the conditions (28), and others showed effects only in certain population groups heterogeneously (29).

Nevertheless, perception of precancerous cervical lesion among HIV infected women on ART beyond the economic barriers shaped by culture, personal experience and by the social discourse of risk.

Social discourse of risk factors also plays an important role in enabling the utilization of CCa preventive services. Thus, this study tries to determine the contribution of: Socio-demographic, reproductive, clinical and behavioral factors on the magnitude of precancerous cervical lesion among HIV infected women visiting ART clinic in Arsi zone, Oromia region, Ethiopia.

1.3. Significant of the Study

HIV infection and cervical cancer are critical public health issues affecting women in Ethiopia. Women living with HIV are at significantly higher risk of developing precancerous cervical lesions due to compromised immunity and persistent high-risk HPV infection. Early detection of these lesions is essential to initiate timely treatment and prevent progression to invasive cervical cancer. While cervical cancer screening services for HIV-positive women are available in health facilities across the Arsi Zone, there is a lack of local data on the magnitude of precancerous lesions and the factors associated with their development. Moreover, previous studies have reported inconsistent and sometimes conflicting evidence regarding the determinants of these lesions in HIV-positive populations, highlighting the need for context-specific research. This study aims to determine the magnitude of precancerous cervical lesions and identify associated factors among HIV-positive women attending ART clinics in Arsi Zone health facilities. The findings will provide robust, locally relevant evidence to guide targeted interventions, inform policy decisions, and contribute to reducing cervical cancer-related morbidity and mortality among women living with HIV.

Further, may be used as an advocacy tool for policy makers and health managers to develop policies and Strategies that could lead to increases PLWHA's women access to and use of cervical cancer screening services. Also, the findings have the potential of promising social change in the lives of women. This study fills the gaps in the literature by determining determinants of precancerous cervical lesion in Ethiopia. The study attempts to highlight the importance of other demand-side factors such as sharing detailed information about the health care system and services provided.

2 Literature Review

2.1 Magnitude of pre-cancerous cervical lesion among HIV-infected women

In the world different literatures shows that the prevalence of precancerous cervical lesion and associated factor in HIV infected women. So, cross sectional studies done in China and Russia, the prevalence of precancerous cervical lesion shows that 5.8% and 12.6% respectively (30). Systematic Review and Meta-Analysis study done in Latin America and the pooled prevalence of precancerous cervical lesion was 16.8% (31). And analytical experimental study done in Saudi Arabia, it was 6.5% (32).

In developing countries, the studies might be conducted in Rwanda and Cameroon by using cross sectional study design shows that the overall magnitude of precancerous cervical lesions in women was 5.9% and 3.33% respectively (33). And in other study done in Democratic Republic of Congo, Swaziland, Tanzania and Kenya while use a comparative cross sectional study conducted the overall prevalence of precancerous cervical lesion was 7.46%, 14.3%, and 30.5% and relatively compare with greater among HIV infected women was 31.3 %, 22.9%, 71.8% and 42% than in HIV uninfected women was 3.9 %, 5.7%, 27.3% and 19% respectively (34,35).

Two systematic review and meta-analysis done in Ethiopia, the pooled prevalence of precancerous cervical lesion was 15.16 and 13.4% respectively (36). Other cross sectional studies done in Gahandi Memorial Hospital, saint Paul's hospital, Adamma Hospital and Harar city, the prevalence of precancerous lesion was 14.6%, 24.1%, 15.7% and 15.3% respectively (37,38). In Amhara, the studies were conducted in Debre Markose hospital and Debre Tabor hospital, by used institution-based comparative cross-sectional studies show that the prevalence of precancerous cervical lesion were 8.8%, 14.1% and compare with HIV infected more exposed for PCCL 9.3%, 17.8% than HIV uninfected women 8.6%, 10.3% respectively (39).

2.2 Factors associated with precancerous lesion of HIV positive women

2.2.1 Socio-Demographic Characteristics

The findings of the study conducted in Nigeria indicated that women with 7 or more completed years of education were significantly less likely to have mild cervical dysplasia at CCS than women with less than 7 completed years of education (40). The findings of the study conducted in Kenya showed that women older age were associated with a lower rate of HPV 16 detection (28).

The findings of the study conducted in Amhara region showed that having PCCL was 71% times Lower among women who attend college and above level of education than their counterparts (41). The results of the study conducted in north west Ethiopia indicated that Younger women aged 20–29 years were 81.5% less likely to be positive for PCCL than older women (25). The findings of the study conducted in Amhara region showed that being single in marital status was almost 5 times more likely to develop precancerous cervical lesion compared to married individuals (25). The result of the study conducted in Bishoftu town showed that women in couples were the most aware ones in comparison with those living alone and also three times higher for those participants who were self-employed than those who were unemployed (20). The findings of the study conducted in Amhara region showed that individuals with age ≤30 years old had 73.0% less likely to develop precancerous cervical lesion compared to individuals with age > 30 years old (13).

The findings of the study conducted in Oromia region showed that marital status were associated with VIA positivity compered to single women (42).

The findings of the study conducted in Addis Ababa Ethiopia showed that Women in the age group of 40 - 49 years were two times more likely to have cervical precancerous lesion than those who were 30 - 39 years (29).

2.2.2 Reproductive Health-Related Characteristics

The findings of the study conducted in Morocco showed that STIs were mentioned as risk factors by 6.9% than those who have no STIs (43).

The findings of the study conducted in Amhara region, North West Ethiopia shows that the age at first birth and history of STD statistically associated with pre-cancerous lesion of the cervix (25). The findings of the study conducted in Adama town shows that Women who had a history of STI were two times at risk of developing precancerous cervical lesion than who had no history of STI and initiation of sexual intercourse before the age of 15 years has 5.6 risks to develop precancerous cervical lesion than those sexual intercourse starts after the age of 15 years (44). As well, in the same study area women who had partner having another sexual partner were 2.41 times more likely to have precancerous cervical lesion compared to those who have single partner (45).

The findings of the study conducted in Oromia region, find that Women with parity of four or more had two times higher risk of being positive for the VIA test compared to those with parity

of less than four, and Women with a history of STI were associated with higher odds of being positive for the VIA compared to those without a history of STI (46).

The findings of the study conducted in Amhara region and Adama town shows that use of oral contraception increases precancerous cervical lesion by two folds (41). The findings of the study conducted in Amhara region showed that Women having two or fewer numbers of children were 79.2% less likely to develop precancerous cervical lesion compared to women greater than two number of children (25).

The findings of the study conducted in Hawasa showed that women who had history of STI were 6.22 times more likely to have the precancerous lesions of the cervix than those with no history of STI (47).

2.2.3 Life style and sexual behavioral factors

The findings of the study conducted in Morocco showed that multiple sexual partners were mentioned as risk factors by 6.9% than limited number of sexual partners and delaying sexual debut were mentioned as helpful prevention measures (43). The findings of the study conducted in Kenya the result showed that, age of first sex < 18 years were not associated with increased or decreased HPV detection. The findings of the study conducted in Kenya the result showed that age of first sex, contraceptive usage, were not associated with increased or decreased HPV detection (28).

The findings of the study conducted in southern Ethiopia, Amhara region and Bahir Dar town showed that having a history of multiple sexual partners were found to be a significant predictor of precancerous cervical lesion in women with precancerous cervical cancer (48).

The findings of the study conducted in Amhara region shows that lifetime multiple sexual partners had a statistically significant association with PCCL, and the odds of having PCCL among women who had a history of sexual intercourse before the age of 15 were four times higher than those women who initiated sexual intercourse in the older age (41).

The findings of the study conducted in Addis Ababa Ethiopia shows that having a husband with two or more other lifetime sexual partners was also significantly associated with cervical precancerous lesions (49). The findings of the study conducted in Hawasa , women who had multiple sexual partners in their lifetime were 2.67 times more likely to have the precancerous lesions of the cervix than those who had not multiple sexual partners (47).

The findings of the study conducted in Oromia region Women with a history of smoking had higher odds of being positive for the VIA test compared to non-smokers, And Women with

three or more sexual partners in their lifetime were significantly associated with VIA positivity compared to their counterparts.

The findings of the study conducted in Addis Ababa showed that Women who had two or more lifetime sexual partners were significantly associated with cervical precancerous lesions and also having a husband with two or more other lifetime sexual partners was also significantly associated with cervical precancerous lesions (49).

The findings of the study conducted in South west Ethiopia indicated that those women who had one-lifetime sexual partner were 86.67% less likely to be positive for PCCL than those who had greater than or equal to two lifetime sexual partner (25). The findings of the study conducted in Amhara region, North West Ethiopia shows that participants who had only one sexual partner were 88.9% less likely to develop precancerous cervical lesion compared to multiple sexual partners,(13). The findings of the study conducted in Amhara region North West Ethiopia shows that number of lifetime sexual partners statistically associated with pre-cancerous lesion of the cervix (26).

2.2.4 Clinical factors

The finding of the study conducted in USA showed that magnitude of PCCL among HIV-positive women with viral load >10,000 copies/mL 2.31 times higher among those with viral load <10,000 copies/mL (50).

The findings of the study conducted in northwest Ethiopia showed that Women who were not on HAART were about 2.31 times more likely to develop PCCL those who had on HAART (25).

The findings of the study conducted in southern Ethiopia shows, being currently on HAART were 48% less likely to have precancerous cervical cancer lesion than those who were not on HAART (51).

The findings of the study conducted in Amhara region, Northwest Ethiopia shows that base line CD 4 count statistically associated with pre-cancerous lesion of the cervix (25).

The findings of the study conducted in Oromia region, Women with a history of post-coital bleeding were more to be positive for the VIA test compared to those who did not have a history of post-coital bleeding (46).

2.3 Conceptual Frame

The conceptual framework was adapted from different literatures from these socio-demographic, reproductive health characteristics, clinical characteristics and behavioral characteristics were possible determinants factors of PCCL.

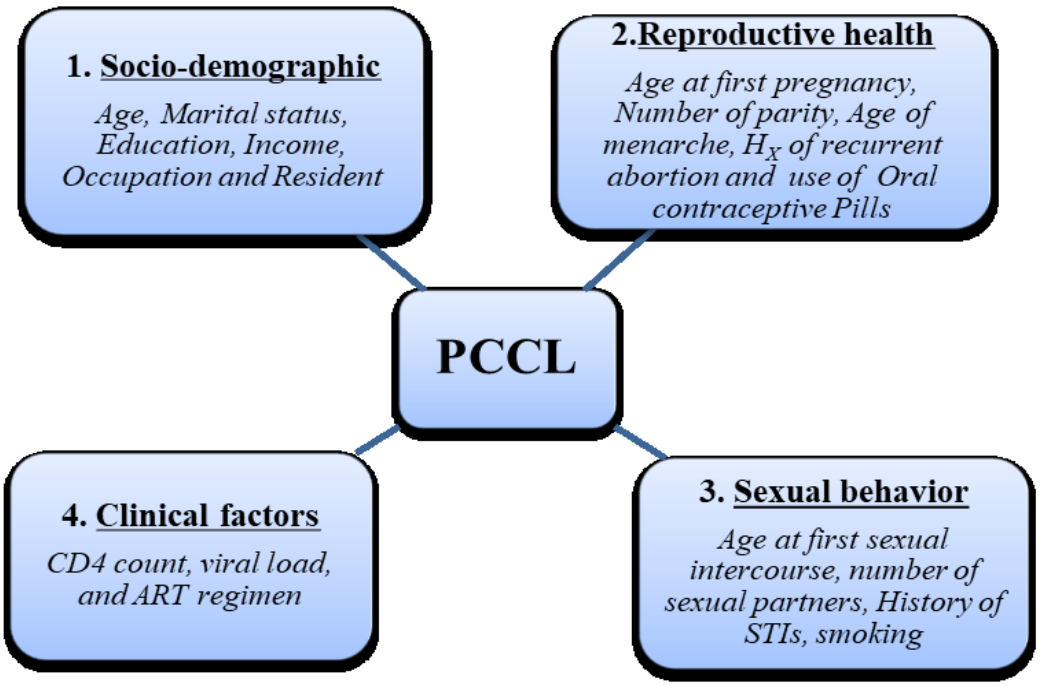


Figure1. Conceptual Framework showing risk factors associated with precancerous cervical lesion among HIV infected women on ART in Arsi zone, Oromia, Ethiopia, 2025

3 Objectives

3.1 General Objective:

To assess the Magnitude of precancerous cervical lesion and associated factors among HIV-positive women attending adult ART clinic in Public Health facilities in Arsi Zone, Oromia region, Ethiopia, 2025

3.2 Specific objectives:

- To determine the magnitude of precancerous cervical lesion among HIV-positive women attending adult ART clinic in Public Health facilities in Arsi Zone, Oromia region, Ethiopia, 2025
- To identify the factors associated with precancerous cervical lesion among HIV-positive women attending adult ART clinic in Public Health facilities in Arsi Zone, Oromia region, Ethiopia, 2025

4. Methods

4.1 Study Area

The study was been conducted in Health Facilities, which have ART Clinics, founds in Arsi Zone, Oromia, Ethiopia. Arsi Zone is found in the central part of the Oromia Regional State in central Ethiopia. Asella town is the capital city of Arsi Zone located 175 Kilometers South East of Addis Ababa (the capital city of Ethiopia). It covers an area of 19,825.22 km2, divided into 28 districts (25 Rural and 3 Urban). In the Study area there are 109 government Health centers, 9 districts and 1 referral Hospitals. From these Health Facilities 33 facilities (26 primary HCs, 6 district hospitals and 1 referral hospital) have ART clinic that proved treatment Services for Patients living with HIV. But, from these health facilities 19 primary HCs, 4 district hospitals and 1 referral hospital have health workers who were trained on the see and treat (SAT) approach and proved exempted Cervical lesion Screening using VIA and was treated by cryotherapy and thermal ablation in the zone for eligible women. In the study area there are totally 10,592 clients who have been enrolled in ART treatment. From these 4,529 are women. From 24 facilities that have ART clinic and VIA screening services and , the top 10 health facilities based on ART user are Arsi university Referral Hospital(3906), Asella HC(890), Bekoji HC(579), Dera HC(566), Robe dida Hospital(459), Abomsa Hospital(436), Huruta HC(436), Gobesa HC(316), Kersa HC(305) and Sagure HC(297).

4.2 Study design and period

A facility-based cross-sectional study design was employed to assess the magnitude of precancerous cervical lesions and associated factors among HIV-positive women attending adult ART clinics in public health facilities of Arsi Zone from September 15 to October 14, 2025, Southeast Ethiopia.

4.3 Source and Study population

4.3.1 Source Population

All HIV-positive women aged 15 - 49 years attended the ART clinic in public health facilities in Arsi zone.

4.3.2 Study Population

All HIV-positive women whose ages were 15 - 49 years attended the ART clinic in selected public health facilities in Arsi zone and who have fulfilled the inclusion criteria.

Inclusion Criteria

- All HIV positive women (15-49 ages) both who had a VIA screened result 1 year before the date of the data collection & who had never been screened before have been included in the study.

Exclusion Criteria

- HIV- infected women who had a history of diagnosed cervical cancer and those who had total hysterectomy was been excluded from the study
- Patients, who was absent during the data collection time due to dead, transfer out, lost to Follow-up and Stop. As well critically ill and unable to communicate, was been excluded from the study.
- A Women in pregnancy and postpartum before 12 weeks and menopause will be excluded from the study

4.4 Sample size determination and Sampling technique /Sampling procedures

4.4.1 Sample size determination

The sample size for the study was been determined manually using a single population formula and EPI-Info version 7.0 to obtain the largest sample size. Using the single population proportion formula, considering the following assumptions; as there had been previous study done in University of Gondar specialized comprehensive referral hospital, Northwest Ethiopia: cross-sectional study design, 2024(52), the prevalence of PCCL among HIV-infected women was been 24.48%; with 95% confidence interval ($za_{/2}$ = 1.96), 5% absolute precision (margin of error (d))

$$n = \frac{(Z_{a/2})^2\, p(1-P)}{d^2} \qquad n = \frac{(1.96)^2 * 0.24(1-0.24)}{(0.05)^2} \qquad n = \mathbf{280}$$

- The largest sample size will be **308** after adding a 10% for non-response rate

To calculate the sample size for the second specific objective we were used a data from the same study area done in University of Gondar specialized comprehensive referral hospital, northwest Ethiopia: cross-sectional study design, 2024.

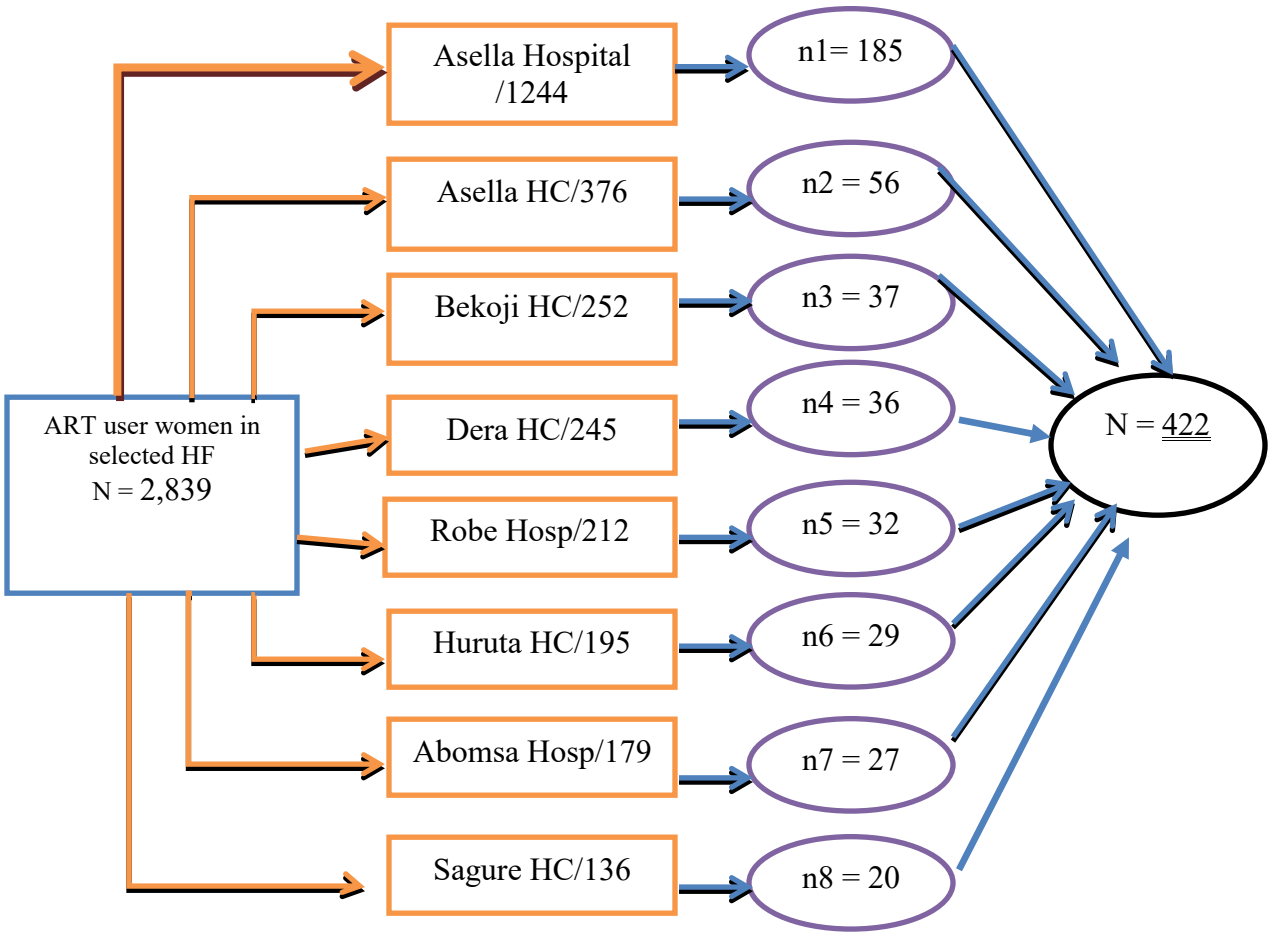
Based on from this study, factors which have the highest a significant association with PCCL is STI, with the prevalence rate of 48.63%; due to this the sample size was been,

$$n = \frac{(Z_{a/2})^2\, p(1-P)}{d^2} \qquad n = \frac{(1.96)^2 * 0.49(1-0.49)}{(0.05)^2} \qquad n = \mathbf{384}$$

- With 10% non-respondent rate the largest sample size was been n = **422**.

4.5 Sampling procedures

There are 109 primary health centers, 9 districts hospitals and 1 referral hospital in the Arsi zone. Of these 26 HC, 6 districts hospitals and 1 referral hospital have ART service. From these facilities, 19 health centers, 4 district hospitals and 1 referral hospital provide precancerous cervical lesion screening. Data was been collected from 1/3rd of these 24 health facilities. The health facilities was been selected based on their case load proportional to their number of ART user they have before the data collection. Based on this, data was been collected from Arsi University Referral Hospital (1244 women ART users), Asella HC (376 women ART users), Bekoji HC (252 women ART users), Dera HC (245 women ART users), Robe dida Hospital (212 women ART users), Huruta HC (195 women ART users), Abomsa Hospital (179 women ART users) and Sagure HC (136 women ART users). The sample size was been proportionally allocated to these health institutions by the rule of probability proportional to population size. Out of 4,529 total numbers of HIV-positive women visiting ART clinics in the Arsi zone, 416 females who had less than 15 years old and 1274 women who had greater than 49 years old were excluded from the study. So, 2,839 women aged 15-49 years old was been candidated for data collection in eight selected Health Facilities. Systematic random sampling method was been used to select participant's (patient's) card when they come for ART follow up during the data collection period. The sampling interval calculated by using 15-49 years of women using ART after excluding men and women whose age was bee less than 15 years and greater than 49 years. The interval for sampling selected every seventh individual, the random start selected by lottery method out of the first seventh arrivers. ART register identification number as sampling frame was been used. But, some of the study participants who had not visited the health facilities during the data collecting period due to different reasons they were excluded and the next client invited to be interviewed until the required sample size was been obtained.



Figur2. Proportional sample size allocation for Eight Health Facilities in Arsi zone

4.6 Study variables

4.6.1 Dependent variables

The dependent variable of the study is the presence/Absence of precancerous cervical lesions

4.6.2 Independent variables

Socio-demographic variables like age, marital status, occupational status, educational status, residence.

Reproductive health characteristics: Age at first pregnancy, Number of Parity, Age of menarche, History of recurrent abortion and use of Oral contraceptive pills.

Sexual behavioral factors: Age at first sexual intercourse, Family history of cervical cancer, History of post coital bleeding, History of genital hygiene after sexual intercourse and menstruation, History of smoking, Number of sexual partners and History of STIs and sexual partner STI history.

Clinical factors: like WHO clinical stage, recent baseline CD4 count, recent viral load and duration of HAART.

4.7 Operational definitions

WHO standard definition for VIA screening result

Negative = If there is no acetowhite lesions or faint acetowhite lesions due to squamous metaplasia or regenerating epithelium, cervicitis, inflammation; acetowhitening of polyps, Nabothian cysts; acetowhitening of the SCJ; satellite acetowhite lesions far away from the SCJ. (53)

Positive = If there is Sharp, distinct, well-defined, dense (opaque/dull or oyster white) acetowhite area with or without raised margins touching the SCJ; leukoplakia and warts. (53)

Suspicious for cancer = If there is large chalky white acetowhite lesions obliterating the endocervical canal with irregular surface and raised and rolled-out margins; bleeding on touch; clinically visible ulcerative, cauliflower-like growth or ulcer. (53)

NB: Women with positive results of the precancerous cervical cancer screening and those of suspicious invasive cervical cancer were grouped together for logistic regression analysis as the former is the predecessor of the same disease entity, however, cognizant that a positive VIA result does not necessarily equates with a cervical cancer diagnosis.

Diagnosis of cervical lesions using visual inspection with acetic acid

After the a women had lied on the coach the vagina has opened with speculum. After cleaning away any extra mucus from the cervix with a cotton swab, a three to five percent acetic acid solution was been applied to the cervix for VIA. After one minute, abnormal cervical tissues (e.g., pre-cancerous or cancerous lesions) turned white. On the other hand, no acetowhite lesions was been observed on the VIA of normal cervical tissue (see the detail in ANNEX 5)(54).

4.8 Data collection procedures (Instrument, personnel, data collection technique)

Data were collected using a structured interviewer-administered questionnaire deployed through the Kobo Toolbox mobile data collection application, along with Visual Inspection with Acetic Acid (VIA) screening results. The procedure followed several steps to ensure quality and accuracy. Prior to data collection, a two-day intensive training was given to the 8 nurse data collectors. The training covered the study objectives, Kobo Toolbox application use, and smart

phone-based data entry; skip patterns, GPS capture, confidentiality, and interviewing techniques. The questionnaire was adapted from previous studies and uploaded to Kobo Toolbox. All Kobo Toolbox entries were saved offline during interviews and synchronized to the Kobo server when internet access became available. The built-in data validation features, skip logic, and mandatory fields of Kobo Toolbox helped reduce data entry errors. The pre-test was been conducted on 5% of the study population who have the same character in Awash Melkasa Health Center which found in Awash Melkasa town before the actual data collection. Two data collection tools were used: Kobo Toolbox based structured interviewer administered questionnaire to collect socio-demographic, behavioral, reproductive, and clinical information and VIA screening results obtained from cervical cancer screening registries of the selected health facilities.

4.9 Data analysis procedures

The data which had been entered online from KOBO TOOL BOX questionnaires and exported in to MS Excel; then imported in to SPSS version 25 for analysis. Descriptive statistics such as frequencies, percentages, means, and standard deviations were computed to summarize the characteristics of the participants. Before analysis, data were explored for missing values, outliers, and inconsistencies. Categorical variables were summarized using frequencies and percentages, while continuous variables were summarized using means, medians, and standard deviations as appropriate. Continuous variables were categorized based on literature review, clinical relevance, and WHO guidelines rather than purely statistical intervals (e.g., age categorized as 15-30, 30–39, ≥40 years; CD4 count as <200 and ≥500 cells/mm³). The categorization was performed to facilitate clear interpretation of results and comparison with previous studies. This step was done after data cleaning and before running bivariable and multivariable analyses. Bivariable analysis was performed using the Binary logistic test for categorical variables to identify variables associated with precancerous cervical lesion status. Variables with a p-value of less than 0.25 were entered into a multivariable logistic regression model to identify independent predictors after controlling for potential confounding. Associations were reported using Crude Odds Ratios (COR) and Adjusted Odds Ratios (AOR) with their corresponding 95% Confidence Intervals (CI). Statistical significance was declared at $p < 0.05$.

4.10 Data quality assurance

A questionnaire adopted from reviewing similar studies and VIA was been used. It was been prepared in English language and then translated into the Afan Oromo language. A face-to-face interview using structured questions, VIA procedure, and secondary data from individual patient folders (CD4 count, WHO stage of HIV, viral load and HAART duration) was been conducted. Quality control was ensured at several levels. The principal investigator and supervisors closely monitored the data collection process. Kobo Toolbox's real-time data monitoring dashboard was used daily to check completeness, consistency, GPS readings, submission timestamps, and potential outliers. Supervisors reviewed all synchronized records each day and provided immediate feedback to data collectors. VIA results and chart data were cross-checked with facility registries for accuracy. The pre-test was been conducted on 5% of the study population who have the same character in Awash Melkasa Health Center which found in Awash Melkasa town before the actual data collection. Based on the pretest findings, adjustments were made to the digital form (e.g., improved skip logic and response checks).

4.11 Ethical consideration

The study had been reviewed and approved by the Institutional Review Board (IRB) of College of Medicine and Health Sciences of Arsi University. Communications with Oromia Regional Health Bureau, Arsi zone health office and the district health facilities where data was been collected made through a formal letter obtained from Arsi University. As well ethical clearance and support letter that had been written at 04/13/2017 E.C with a reference number of BFO/HQ/37/18 had been got from Oromia Regional Health Bureau. The purpose and importance of the study was been explained to the participants. Informed written consent was been obtained from each participant and anonymity was been maintained to ensure confidentiality. Participation has been on voluntary basis and they can withdraw from the study at any time. Women with positive results of VIA and eligible for cryotherapy has been treated immediately following the screening while suspicious invasive cervical cancer findings was been sent to Gynecology clinic for bunch biopsy.

4.12 Dissemination plan

The original copy of the study finding will be disseminated to Arsi University Asella Campus, department of public health, Oromia Regional Health Bureau and Arsi zone health department. In addition the findings will be presented on appropriate seminars, conferences and workshops.

5. RESULTS

5.1 Socio-demographic characteristics of study participants

A total of 422 HIV-positive women attending adult ART clinics in public health facilities of Arsi Zone participated in this study, making a response rate of 100%. The mean age of the participants was 35 years (SD ±7.65). Nearly half (n = 190, 45%) of the women were in the age group 30–39 years. The majority (n = 273, 64.7%) of the respondents were from urban areas. Regarding marital status, 42.2% (n = 178) were married, and about 39.3% (n = 166) were housewives by occupation. The mean monthly income of the participants was 6004.18 Ethiopian Birr (SD ±4013.11), with more than one-third (36.3%) earning between 3500–6999 ETB per month. (See Table 1)

Table-1: Distribution of study participants by their socio-demographic characteristic in Public Health facilities in Arsi zone, Oromia, Ethiopia, September 15 2025 to October 14, 2025

Type of variables	Categories	Frequency	%
Age in year	15-29	95	22.5
	30-39	190	45.0
	40-49	137	32.5
Residence	Urban	273	64.7
	Rural	149	35.3
Religion	Orthodox	230	54.5
	Muslim	129	30.6
	Protestant	52	12.3
	Catholic	11	2.6
Marital status	Married	178	42.2
	Single	56	13.3
	Widowed	118	28.0
	Divorced/separated	70	16.6
Educational status	Cannot read and write	73	17.3
	Able to read and write but with no schooling	25	5.9
	Primary school 1- 4 grade	57	13.5
	Primary school 5 - 8 grade	113	26.8
	Secondary school	108	25.6
	College diploma and above	46	10.9
Occupational status	Government employee	32	7.6
	Non-governmental employee	38	9.0
	Merchant	47	11.1
	Farmer	47	11.1
	Daily laborer	54	12.8
	Student	17	4.0
	Housewife (unemployed)	166	39.3
	Commercial sex worker	16	3.8
	Waiter	5	1.2
Monthly income	Low income (1000 - 3499)	126	29.9
	Middle income (3500 – 6900)	153	36.3
	High income (>=7000)	143	33.9

5.2 Reproductive health characteristics of respondents

The mean lifetime number of pregnancies among respondents were 2.33 (SD ±1.87), and nearly two-thirds (n = 273, 64.7%) had 1–4 pregnancies. The mean age at first pregnancy was 21.40 years (SD ±2.73), with more than half (n = 240, 56.9%) becoming pregnant between the ages of 19–24 years. About 38.6% (n = 163) of the respondents had ever used oral contraceptive pills (OCPs) in their lifetime. (See Table 2)

Table-2: Distribution of study participants by their reproductive health characteristic in Public Health facilities in Arsi zone, Oromia, Ethiopia, September 15 2025 to October 14, 2025

Type of variables	Categories	Frequency	%
Lifetime number of pregnancy	0	92	21.8
	1-4	273	64.7
	> 4	57	13.5
Lifetime history of abortion	No	300	71.1
	Yes	122	28.9
Lifetime number of abortion	0	300	71.1
	1	84	19.9
	2	35	8.3
	> 2	3	0.7
Age at first pregnancy	< 19	79	23.9
	19-24	207	62.7
	> 24	44	13.3
Birth interval	< 3	200	84.4
	3-5	36	15.2
	> 5	1	0.4
Age menarche	< 13	149	35.3
	13-15	193	45.7
	> 15	80	19.0
Menstrual pattern	Regular	276	65.4
	Sometimes Irregular	76	18.0
	Always Irregular	70	16.6
Lifetime Oral Contraceptive Pills use history	No	259	61.4
	Yes	163	38.6

5.3 Lifestyle and sexual behavior characteristics

The mean age at first sexual intercourse was 19.09 years (SD ±2.69), with the majority (n = 248, 58.8%) initiating sexual intercourse at age 19 years or above. About 13% of participants reported having a family history of cervical cancer, while 19.7% indicated that their sexual partner had a history of sexually transmitted infections (STIs). (See Table 3)

Table–3: Distribution of study participants by their Lifestyle and sexual behavior characteristic in Public Health facilities in Arsi zone, Oromia, Ethiopia, September 15, 2025 to October 14, 2025

Type of variables	Categories	Frequency	%
Lifetime number of sexual partner	One	291	69.0
	Two	96	22.7
	Three or more	35	8.3
Age at first sexual intercourse	< 16	87	20.6
	16-18	87	20.6
	> 18	248	58.8
Number of sexual partners of your current sexual partner	One	271	64.2
	Two	115	27.3
	Three	36	8.5
History of STI	No	314	74.4
	Yes	108	25.6
Sexual partner history of STI	No	339	80.3
	Yes	83	19.7
History post coital bleeding	No	350	82.9
	Yes	72	17.1
Family history of cervical cancer	No	366	86.7
	Yes	56	13.3
History of cigarette smoking	No	379	89.8
	Yes	43	10.2
Frequency of genital hygiene after sexual intercourse	Always	243	57.6
	Most of the time	91	21.6
	Sometimes	61	14.5
	Rarely	16	3.8
	Never	11	2.6
Number of sanitary modes or cloth per day used during menstrual period	Once per day	142	33.6
	2 - 3 times per day	201	47.6
	> 3 times per days	79	18.7

5.4 Clinical characteristics of respondents

Half of the respondents (50.47%) had a recent CD4 count ≥500 cells/mm³. Regarding ART treatment, the majority (68%) had been on HAART for four years or more. (See Table 4)

Table-4: Distribution of study participants by their clinical characteristic in Public Health facilities in Arsi zone, Oromia, Ethiopia, September 15, 2025 to October 14, 2025

Type of variables	Categories	Frequency	%
WHO clinical stage	01	340	80.6
	02	34	8.1
	03	38	9.0
	04	10	2.4
Recent Viral load count	<1000	343	81.3
	>=1000	79	18.7
Recent baseline CD4 (cells/dl)	<200	82	19.4
	200-500	126	29.9
	>=500	214	50.7
HAART year of duration	<01	87	20.6
	01-03	48	11.4
	>=04	287	68.0
VIA screening Result	Negative	354	83.9
	Positive	59	14.0
	Suspicious for cancer	9	2.1
Eligible for cryotherapy	Yes	55	93.2
	No	4	6.8

5.5 Magnitude of precancerous cervical lesion

Out of the total 422 HIV-positive women screened, 68 (16.1%, 95% CI: 12.6 – 19.6%) were found to have precancerous cervical lesions. Of those who were VIA positive, nearly all (93.2%) were eligible for cryotherapy and were treated by cryotherapy during the study period (Table 5). Nine women had suspected invasive cervical cancer and they were referred to a hospital for further diagnosis and treatment. (Figure 1)

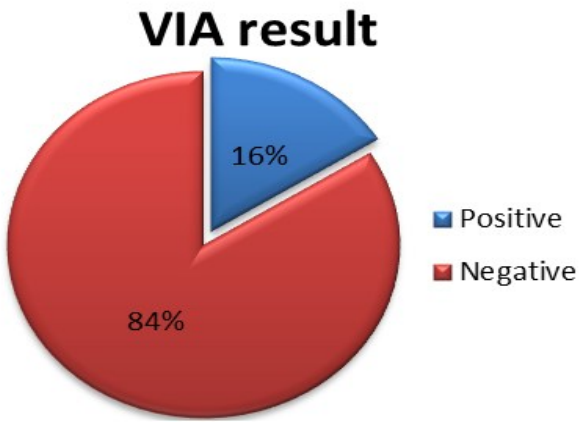


Figure 3: Visual inspection of the cervix with acetic acid (VIA) test result among women living with HIV in Public Health facilities in Arsi zone, Oromia, Ethiopia

5.6 Factors associated with precancerous cervical lesion

Bivariable and Multivariable logistic regression analysis

In the bivariable logistic regression analysis, the following variables showed a p-value <0.25 and were included in the multivariable model: marital status, lifetime number of parity, history of abortion, lifetime OCP use, lifetime number of sexual partners, age at first sexual intercourse, STI history, family history of cervical cancer, cigarette smoking, genital hygiene frequency, WHO clinical stage, recent CD4 count, and HAART duration.

After controlling for possible confounders in the multivariable logistic regression model, six variables remained significantly associated with the presence of precancerous cervical lesions among HIV-positive women. (See Table 5)

Lifetime oral contraceptive pill (OCP) use: Women who had ever used oral contraceptive pills were found to be 4.43 times more likely to develop precancerous cervical lesions compared to those who had never used OCPs (AOR = 4.43; 95% CI: 1.16–16.97; p = 0.03). This indicates that past or current exposure to hormonal contraceptives is an independent predictor of cervical lesion development in this population.

Age at first sexual intercourse (< 18 years): Early sexual debut was strongly associated with the development of precancerous cervical lesions. Participants who initiated sexual intercourse at the age of 18 years or earlier were 7.31 times more likely to have precancerous cervical lesions than those who began sexual activity after the age of 18 (AOR = 7.31; 95% CI: 1.51–35.48; p = 0.014). This suggests that early exposure to sexual activity may increase the risk of persistent HPV infection, contributing to precancerous changes.

History of Sexually Transmitted Infections (STIs): Women with a previous history of STI were significantly more likely to develop precancerous cervical lesions compared to women without such history. Specifically, having an STI increased the odds of precancerous lesions by 8.75 times (AOR = 8.75; 95% CI: 2.40–31.89; p = 0.001). STIs may facilitate HPV acquisition or compromise mucosal immunity, thus increasing the risk of cervical epithelial abnormalities.

Family history of cervical cancer: A positive family history of cervical cancer showed a very strong association with the occurrence of precancerous cervical lesions. Participants with a family history were 10.56 times more likely to have precancerous cervical lesions than those without such history (AOR = 10.56; 95% CI: 2.37–47.17; p = 0.002). This indicates that genetic predisposition or shared environmental and behavioral factors may significantly contribute to the development of cervical lesions.

History of Abortion: The study found that women who had ever experienced abortion were 4.44 times more likely to develop precancerous cervical lesions than those with no history of abortion (AOR = 4.44; 95% CI: 1.26–15.65). Repeated cervical manipulation or trauma during abortion procedures may contribute to the risk.

HAART duration: HAART duration was a strong predictor of cervical lesion development. Women who had used HAART for less than one year were 13.03 times more likely to have precancerous cervical lesions compared to those who had used HAART for one year or more (AOR = 13.03; 95% CI: 2.63–64.64; p = 0.002). This suggests that immune reconstitution from sustained ART use may protect against progression of HPV-related lesions. (See Table 5)

Table-5: Bivariate and multivariable logistic regression analysis of factors associated with PCCL among women on antiretroviral treatment in Public Health facilities in Arsi zone, Oromia, Ethiopia, September 15, 2025 to October 14, 2025.

Name of variable	Categories	VIA result		Odd ratio		P - Value
		Negative (%)	Positive (%)	COR (CI)	AOR (CI)	
Lifetime OCP use	No	248 (58.8)	11 (2.6)	1	1	
	Yes	106 (25.1)	57(13.5)	12.12 (6.12-24.04)	4.43 (1.16-16.97)	0.03
Age at first sexual intercourse	<16	56 (13.3)	31 (7.3)	14.70 (6.62-32.62)	7.31 (1.52-35.48)	0.014
	16-18	59 (14.0)	28 (6.6)	12.60 (5.64-28.14)	14.34 (2.71-75.85)	0.002
	>18	239 (56.7)	9 (2.1)	1	1	
STI history	No	300 (71.1)	14 (3.3)	1	1	
	Yes	54 (12.8)	54 (12.8)	21.43 (11.13-41.27)	8.75 (2.40-31.89)	0.001
Family history of cervical cancer	No	336 (79.6)	30 (7.1)	1	1	
	Yes	18 (4.3)	38 (9.0)	23.64 (12.05-46.38)	10.56 (2.37-47.17)	0.002
History of spontaneous abortion	No	279 (66.1)	21 (5)	1	1	
	Yes	75 (17.8)	47 (11.1)	8.33 (4.69-14.78)	4.44 (1.26-15.65)	0.020
HAART year of duration	<1	44 (10.4)	43 (10.2)	15.521 (8.14-29.60)	13.03 (2.63-64.64)	0.002
	1-3	40 (9.5)	8 (1.9)	3.18 (1.29-7.84)	2.51 (0.45-13.91)	0.292
	>=4	270 (64.0)	17 (4.0)	1	1	

6 Discussion

This study investigated the magnitude of precancerous cervical lesions and associated factors among HIV-positive women attending ART clinics in Arsi Zone, Oromia. The prevalence of precancerous cervical lesions was 16.1%. Six independent factors were identified: lifetime use of oral contraceptive pills (OCPs), early age at first sexual intercourse (< 18 years), history of sexually transmitted infection (STI), family history of cervical cancer, history of abortion, and HAART duration < 1 years.

This study found a 16.1% prevalence of precancerous cervical lesions among HIV-positive women. This is consistent with findings from Woldia (18.7%), Tigray (15.7%), and Hawassa (17%). However, the prevalence is higher than studies from Addis Ababa (9.3%) and Jimma (12.2%); These differences could be explained by variations in study population characteristics, such as age distribution, screening uptake, sexual behavior, and immune status. (55, 55–57)

Women with a history of OCP use were 4.43 times more likely to develop precancerous cervical lesions. This aligns with evidence suggesting that prolonged hormonal exposure may alter cervical epithelial susceptibility to HPV infection. Studies from Hawassa, Ethiopia (Tadesse et al., 2021) and Addis Ababa (Gebremariam & Aweke, 2019) reported similar findings. Globally, the IARC pooled analysis (2012) and studies from India (Singh et al., 2015) and Brazil (Costa et al., 2018) also documented increased risk among long-term OCP users. These findings support biological pathways suggesting that hormones may facilitate HPV persistence, leading to cervical cellular transformation. (41, 56)

Participants who initiated sexual intercourse early (<18 year) were 7.31 times more likely to develop precancerous cervical lesions. Early sexual debut increases lifetime exposure to HPV and occurs when the cervical transformation zone is more susceptible to microtrauma. This finding is consistent with a study conducted in Jimma, Ethiopia, where early sexual debut was a strong predictor of precancerous cervical lesions (AOR = 6.7) (Tesfaye et al., 2020). Likewise, research from Gondar demonstrated that women who began sexual intercourse before age 18 had higher odds of VIA-positive lesions (AOR = 5.3). The WHO also emphasizes early sexual debut as a key reproductive risk factor. This suggests that promoting delayed sexual initiation could reduce long-term cervical cancer risk. (21, 41)

Women with a history of STI were 8.75 times more likely to have precancerous cervical lesions, reflecting the synergistic role between infections and HPV persistence. Comparable findings were reported in Southern Ethiopia, where STI history increased the likelihood of VIA

positivity (AOR = 7.1) (Hailemariam et al., 2018). A study from Mekelle also showed similar associations (AOR = 4.9) (Berhe et al., 2020). Similar results were documented in Nigeria (Okunowo et al., 2020), supporting the strong link between STI exposure and cervical precancer. Inflammation and disrupted epithelial integrity due to STIs may facilitate persistent HPV infection, explaining the elevated risk observed. (49, 52)

This study found that women with a family history of cervical cancer had 10.56 times higher odds of developing precancerous lesions. This highlights possible shared genetic and behavioral risks. Evidence from Addis Ababa showed that family history increased the risk of VIA positivity (AOR = 8.3) (Sisay et al., 2019). Likewise, a study conducted in Bahir Dar found a similar association (AOR = 9.5) (Melaku et al., 2021). Internationally, a large cohort study in Sweden reported that first-degree relatives of cervical cancer patients had a two-fold increased risk (Gustafsson et al., 2017). A genetic susceptibility study from Japan also identified increased CIN risk in women with affected relatives (Nakagawa et al., 2016). These findings underscore the role of shared genetic predisposition or common environmental exposures—such as HPV exposure patterns—within families.(58, 59)

Women who had a history of abortion were 4.44 times more likely to develop precancerous cervical lesions. Cervical trauma from repeated abortions may damage the cervical epithelium, increasing vulnerability to HPV infection. A study in Wolaita Sodo, Ethiopia, similarly found that abortion history was strongly associated with precancerous cervical lesions (AOR = 3.7) (Amanuel et al., 2020). Research from Harar also showed positive association (AOR = 4.2) (Yonas et al., 2018). Globally, studies from Iran (Farahmand et al., 2019) and Turkey (Celik et al., 2017) also documented increased risk of cervical lesions among women with prior abortion procedures. This consistent pattern suggests that improved access to safe abortion services and post-procedure follow-up could mitigate this risk. (50, 52, 60)

Women who had been on HAART for less than one year were 13.03 times more likely to have precancerous cervical lesions. The protective immune-reconstitution effects of HAART require time to suppress viral replication and enhance clearance of HPV. A study in Addis Ababa showed similar findings where shorter HAART duration (<1 year) significantly increased VIA positivity (AOR = 12.4) (Abate et al., 2020). Additionally, research from Hawassa reported higher risk of cervical lesions among newly enrolled HAART users (AOR = 9.6) (Wolde et al., 2021). Globally, studies from South Africa (Firnhaber et al., 2016) and Kenya (DeVuyst et al., 2018) observed that women on HAART for longer duration demonstrated reduced HPV

persistence and CIN risk. These findings highlight the critical role of early HAART initiation and adherence in reducing cervical disease progression among HIV-positive women. (61,62)

Taken together, these findings suggest that among HIV-positive women, behavioral exposures (OCP use, sexual initiation, STI history), familial predisposition, and immunological/ART factors all inter-play to elevate risk for precancerous cervical lesions. Compared to HIV-negative populations, the HIV-positive sub-group may experience cumulative disadvantage: immunosuppression allows HPV persistence, while behavioral and reproductive exposures add extra risk layers. The observed 16.1% prevalence and strong associations highlight the need to priorities cervical screening programs within HIV care settings.

These results should inform program planners: screening efforts should not only target HIV-positive women generally, but priorities those with identified risk characteristics. For example, women with family history or OCP history may benefit from more frequent screening, while those newly initiated on HAART may be considered high priority for earlier intervention.

7 Strengths and Limitations of the Study

7.1 Strengths

Use of primary data: The study used primary data collected directly from HIV-positive women through structured interviews and medical record review, which enhanced data accuracy and contextual relevance.

Use of standardized and validated screening method: Precancerous cervical lesions were diagnosed using standard VIA/VILI screening procedures performed by trained health professionals, ensuring diagnostic consistency.

7.2 Limitations

Cross-sectional study design: The cross-sectional nature of the study limits the ability to establish causal relationships between associated factors and precancerous cervical lesions. Temporal sequence cannot be determined.

Recall bias: Some variables such as age at first sexual intercourse and lifetime OCP use relied on self-reported information, which may have been subject to recall or social desirability bias.

Measurement constraints: The study did not assess HPV infection directly, which is the main causal agent of cervical lesions. Therefore, residual confounding by HPV status cannot be ruled out.

Possible underreporting of sensitive behaviors: Due to the sensitive nature of questions about sexual behavior, underreporting could have occurred, potentially underestimating the strength of associations related to sexual practices.

8 Conclusion and Recommendations

8.1 Conclusion

This study assessed the magnitude of precancerous cervical lesions and associated factors among HIV-positive women attending ART clinics in public health facilities of Arsi Zone, Oromia Region, Ethiopia. The overall magnitude was 16.1%, which is higher than some studies done in Ethiopia and indicates a significant public health concern among this high-risk group.

The study identified six independent predictors: lifetime use of oral contraceptive pills, early age at first sexual intercourse (<18 years), history of sexually transmitted infection, family history of cervical cancer, history of abortion and HAART duration < 1 year.

These findings suggest that both behavioral factors (such as sexual initiation age, OCP use, and STI history) and clinical factors (ART duration) play an important role in the development of precancerous cervical lesions among HIV-positive women. The results emphasize that despite ART expansion, HIV-positive women remain vulnerable due to behavioral and biological risk factors.

Strengthening cervical cancer prevention and control programs that integrate screening with ART services is essential. Early detection and management of precancerous lesions can significantly reduce the burden of cervical cancer in this population.

8.2 Recommendations

8.2.1 For Health Facilities

1. Implement routine screening schedules for all women on ART, with referral linkages for confirmed precancerous cases.
2. Establish data recording and monitoring systems for cervical cancer screening outcomes in ART clinics.
3. Provide integrated health education sessions focusing on the risks of multiple sexual partners, STI prevention, and safe contraceptive use.

8.2.2 For Health Care Providers

1. Strengthen counseling services on cervical cancer risk factors during ART follow-ups.
2. Encourage women to adhere to ART and follow-up appointments, as prolonged ART reduces lesion risk.

3. Promote awareness about early symptoms and preventive behaviors, including genital hygiene and STI treatment.

8.2.3 For Researchers

1. Conduct longitudinal and multi-center studies to explore causal relationships and incorporate HPV typing to identify circulating high-risk strains.
2. Evaluate the impact of HPV vaccination and ART adherence on cervical lesion reduction in HIV-positive populations.
3. Investigate the role of family history (genetic and behavioral) in cervical neoplasia risk in Ethiopian populations

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10. ANNEXES

Annex 1: Information Sheet

Greetings: Good morning / Good afternoon!

Hello. My name is_____ I am going to collect data for a student who will conduct a study at ***ARSI UNIVERSITY, COLLEGE OF HEALTH SCIENCES, DEPARTMENT OF PUBLIC HEALTH*** in partial fulfillment of the requirements for the degree of general master of public health.

This study aims to assess the ***magnitude of precancerous cervical cancer lesion and associated factories among a woman who are HIV positive*** in public health facility in Arsi zone. The collected data will help your facility and hospital, the government, and other concerned bodies to plan in general on health services concerning prevalence of precancerous cervical cancer lesion and associated factories among a women.

Dear mother /sister/ as a women you are one of those who are expected to participate in this study to provide the information required from you. Even though your participation in this study is critically important, totally it depends on your interest either to participate, refuse, or withdraw any time from participation. Additionally even answering and refusing the question (that means jumping to some question that you are not interested to answer) in between conversations is only decided by you and You have full right to ask any question any time you like.

Your response will be utilized only for scientific study, which means that your personal information is always treated confidential (your name will not be written here and your responses are not shared with anyone).

Your all responses will be kept confidential, and be sure that by no means your responses are not displayed on the final result of this study found.

Do not worry, the questionnaire is prepared in your language, and ahead of your response the question is read clearly to you or read by yourself.

Benefit of the study: The participants will receive no direct gain from the research, but the findings will include valuable insight about how to solve the issue using evidence-based solutions.

Risk (harm) of the study: There is no risk in taking part in this research, but it will take about 30 minutes of your time to answer the questions.

Rights of participants: You have full freedom of choice on whether or not to participate in this study. You can also withdraw from the study at any time if you believe you are unable to continue. You are free to ask any question that is unclear to you.

Confidentiality: The information you provide to me will be kept strictly confidential and safe. To maintain anonymity, your name does not appear anywhere on the questionnaire. Only the principal investigator will have access to the information, which will be discarded once the study is completed.

Contact details of principal investigator and the person to whom to contact at any time for further explanation

- Name of principal investigator: **Alem Birhanu Alemayehu**.

  ☎ Tel: +251910771064

  ✉ E-mail: alembirhanu04@gmail.com

Consent Form

I've been told about a study that **is** conducted by a master's student of Arsi University College of Health Sciences, Department of Public Health, on Magnitude of precancerous cervical cancer lesion and associated factories among HIV-positive women attending adult ART clinic ın public health facilities, Arsi zone, Oromia region, Ethiopia. The study's ***objectives, benefits, risks, procedures***, and ***confidentiality*** have all been read and explained to me in a language I understand, and the interview and the examination will last 25 to 30 minutes. I also recognize that participation in this study and withdrawing from it at any time for any reason is entirely voluntary.

Are you willing to participate in this study?

1. Yes (If continue the interview) 2. No (say thank you, stop the interview)

Participants signature _____Date_____

Data collectore's signature _____Date _____

Date of interview (Ethiopian calendar) _____/_____/_____

Result of interview:

1- Completed_____

2- Refused _____

3- Partially completed _____

Checked by supervisor;

Name _____ Signature_____ Date _____

Annex 2: English Version Questionnaire

Date of data collection	_____/_____/_____
Patient code	_____
Health facility name	_____
Woreda/District	_____
Have you been screened for cervical cancer before?	1. Yes 2. No

Part I- Socio Demographic characteristics

SN	Questions and Filters	Response & Coding Categories	Skip
101	How old are you? (Complete in years)	_____ Years	
102	Where is your permanent residence?	1. Urban 2. Rural	
103	What is your religion?	1. Orthodox 2. Muslim 3. Protestant 4. Catholic 5. Other, Specify _____	
104	What is your marital status?	1. Married 2. Single 3. Widowed 4. Divorced/separated	
105	What is your current educational status?	1. Cannot read and write 2. Able to read and write but with no schooling 3. Primary school – 1- 4 grade 4. Primary school – 5- 8 grade 5. Secondary school 6. College diploma and above	
106	What is your current occupational status?	1. Government employee 2. Non-governmental employee 3. Merchant 4. Farmer 5. Daily laborer 6. Student 7. Housewife (unemployed) 8. Other specify _____	

107	What is your husband educational status currently?	1. Cannot read and write 2. Able to read and write but with no schooling 3. Primary school – 1- 4 grade 4. Primary school – 5- 8 grade 5. Secondary school 6. College diploma and above	
108	What is your average monthly household income (from all sources)?	_____ETB	
109	Does your household have electricity?	1. Yes 2. No	
110	What is the main material of the floor in your household?	1. Earth/sand/dung 2. Wood/bamboo 3. Cement/tiles	
111	What is the main material of the roof of your household?	1. Thatch/grass 2. Iron sheet 3. Concrete/tile	
112	What type of toilet facility does your household usually use?	1. None/open defecation 2. Pit latrine (unimproved) 3. Pit latrine (improved) 4. Flush toilet	
113	What is the main source of drinking water for your household?	1. River/pond/unprotected source 2. Protected well/spring 3. Public tap/standpipe 4. Piped into dwelling/yard	
114	Which of the following assets does your household own? (you can select more than one)	1. Radio 6. Motorcycle 2. Television 7. Car/truck 3. Mobile phone 8. Refrigerator 4. Bicycle 9. Agricultural land 5. Livestock (cattle, goats/sheep, poultry, donkey/horse, etc.)	

Part II- Reproductive History of Participants

SN	Questions and Filters	Response & Coding Categories	Skip
201	Have you ever had pregnancy in your life time?	1. Yes 2. No	If No skip to 209
202	How many pregnancies have you had so far?	_____	
203	How many living children do you have?	_____	
204	Have you ever experienced a miscarriage	1. Yes	If No skip

	(spontaneous abortion before 20 weeks of pregnancy) in your lifetime?	2. No	to 207
205	If yes for question number 204, how many miscarriages have you had in your lifetime?	1. 1 2. 2 3. >= 3	
206	If yes for question number 204, How were the miscarriages occurred?	1. Consecutive 2. Separated by normal pregnancies/live births	
207	Age at first pregnancy	_____Years	
208	Interval between births?	_____ Years	
209	Age at Menarche	_____ Years	
210	How do you describe your menstrual pattern?	1. Regular 2. Sometimes Irregular 3. Always Irregular 4. No menses	
211	In the past 12 months, have you used hormonal contraceptive?	1. Yes 2. No	If No skip to 213
212	Which type of contraceptive you have used?	1. Oral contraceptive pills 2. Injectable Contraceptive 3. Implants 4. IUCD 5. Other, specify _____	
213	Have you ever used Oral Contraceptive Pills in your lifetimes?	1. Yes 2. No	

Part III Lifestyle and sexual behavior

SN	Questions and Filters	Response & Coding Categories	Skip
301	Age at first sexual intercourse	_____ Years	
302	Over the course of your life, about how many different people have you had sexual intercourse with?	1. None 2. One 3. Two 4. Three or more	If None skip to 304
303	Can you estimate the number of sexual partners of your current sexual partner has he had in his lifetime?	1. One 2. Two 3. Three or more	

304	Have you ever been told by a health professional that you had a sexually transmitted infection (such as syphilis, gonorrhea, chlamydia, trichomoniasis, genital herpes)?	1. Yes 2. No	
305	In the past 12 months, have you experienced any of the following symptoms? (you can select more than one)	1. Unusual vaginal discharge 2. Genital ulcers/warts 3. Pain/Burning during urination 4. Lower abdominal pain 5. Genital itching 6. None of the above	
306	Does your sexual partner have history of sexually transmitted disease?	1. Yes 2. No	
307	Have you ever had post coital bleeding	1. Yes 2. No	
308	Do you have a family history of cervical cancer?	1. Yes 2. No	
309	Do you have history of cigarette smoking?	1. Yes 2. No	If No, skip to 311
310	On average, how many cigarettes do you smoke per day?	1. 1 2. 2 3. 3 4. > 4	
311	After having sexual intercourse, how often do you usually wash your genital area (vulva)?	1. Always 4. Rarely 2. Most of the time 5. Never 3. Sometimes	
312	When you washing your genital area (vulva), what do you usually use?	1. Clean water only 2. Water with soap 3. Water with other substances (herbs, detergents, antiseptics, etc.) 4. Other, specify_____	
313	During your menstrual period, how often do you usually change your sanitary pad, cloth, or towel?	1. Once per day 2. 2-3 times per day 3. >= 4 times per days	

Part 4: Questions related to clinical factors

SN	Question	Response	Skip
401	WHO clinical stage of the patient	A. 1 C. 3 B. 2 D. 4	
402	How much is the recent Viral load count of the patient?	A. < 1000 B. >= 1000	
403	How much is the baseline CD4 (cells/dl) of the patient?	A. <200 B. 200-500 C. >=500	
404	How many years the patient use HAART?	A. <1 B. 1-2 C. >=3	
405	VIA screening	**1. Negative** **2. Positive** **3. Suspicious for cancer**	
406	Eligible for Cryotherapy	1. Yes 2. No	

Annex 3: Furmaata Hayyamaa Beekamee

Waraqaa Oddeffannoo

Akkam bultan/Akkam ooltan! Maqaan kiyya _____ jedama. Ani barataa Univarsiitii Arsii, kolleejjii saayinsii fayyaatti ulaagaa cinaa digrii lammaffa waliigala fayyaa hawaasaa guttachuufi qorannaa gochaa jiruuf odeeffannoo guuruufiif adeemaa jira.

Kaayyoon qorannaa kanaatis dhabbile fayyya mootuma baruumsa kennu kana keessatti, babal'ina dhukkuba kaansarii qaccee gadaamessaa fi dhimmoota kanaan walqabatan irrattii dha. Odeeffannoon walitti qabamu kunis mootuma Godina Arsi dhabbile fayya keessan, mootummaafi qodafudhattootaaf tajaajila waliigala fayyaa babal'ina dhibee kaansarii qaccee gadaamessaatiif dhimmota hudhaa ta'aniin wal-qabatu irratti akka karoorifatan qarqaara.

Kabajamoo harmee/obboleettii/ odeeffannoo isin irraa barbaaddamu keennuuf, akka dubartiitti ati nama qorannaa kana keessatti hirmaatuu dha.

Qorannoo kan keessatti hirmaannaan kee akkaan barbaachisaa ta'us akka walii galaatti hirmaannaan kee kan hundaa'u fedhii kee irratti yoo ta'u, yeroo barbaadde kamittu diduu ykn hirmaannaa kee adda kutuu dandeessa.

Kana qofaayyuu mit, jidduma gaafiif deebii keessattuu,gadi'aantii deebicha kennuuf diduunuu (kana jechuun gaafilee deebisuu fedhii hin qabne irra utaaluu) kan murtaa'uun siin qofa ta'a. Akkasumas jiddumaan gaafii kamiyyuu yeroo kamuu gaafachuuf mirga guutuu qabdan.

Asi keessatti maqaan keessan hin barraayu,deebiin keennitanis nama birootiif hin qoodamu kana jechuun, deebiin keessanargannoo bu'aa xumara qorannaa kana irrattis hin ibamu,iccitiin keessan akkaan eeggamaa dha.

Gafileen afaan keetiin waan qophaayannif akkasumas dursa waan siif dubbifamuuf ykn mataa keetiin waan dubbiffattuuf wanti si dhiphisu hin jiru.

Fayyidaalee Qorannoo kanaa: Bu'aan qorannoo kana waa'ee dhibee kaansarii qaccee gadaamessaa fi tajaajila calallii isaa irratti odeeffannoo akkaan barbaachisoo ta'an argachuuf fayyada.

Kana qofas miti, ammas faayidaa isiniifs ta'ee walii gala hawaasaatiif akkaan faayida-qabeessa ta'aniif karoora calallichaa hojirra oolchuuf babal'isuufis kan oolanii dha.

Carraa saaxilamummaa qorannaa kanaa: Qorannaa kana keessatti hirmaachuun faayidaa malee midhaan hin jiru.

Teessoo armaan gadiitii, gaaffiif/odeeffannoo/ yeroo kamuu yoo barbaaddan qaamni isin qunnamuu dandeessan ,

- **Alam Birhaanuu Alamayyoo**; Univarsiitii Arsiitti,kolleejjii saayinsoota Fayyaa, garee saayisii fayyaa hawaasaa.

☎ Lakk.bilbilaa : +251 910771064

✉ E-mail: alembirhanu04@gmail.com

Unka waligatee

Kabajamo harmee/Obooleettii/ qorannoo kana keessatti hirmaattanii akkaataa gaafilee armaan gadiitiin deebii kennuuf fedhii harattan jechuummi? (use "√ ")

Eeyyee, galatoomaa! ☐ Miti, galatoomaa! ☐

Maqaa Odeeffannoo sassaabaa_____ Mallatoo_____

Maqaa gorsaa/ too'ataa/ _____ signature_____

Guyyaa gaafiif deebii _____

Sa'aatii gaafiif deebiin itti egalamu_____ Sa'aatii gaafiif deebiin itti xumuramu

Mallattoo addaa guca gaafilee _____

Dear interviewer, the question you are going to be asked takes 25 to 30 minutes.

Kabajamoo gaafataa, gaafiin isin gafachuuf deemtan daqiiqaa 25 hanga 30 fudhachuu dand'a.

1. Univarsiitii Arsiitti,kolleejjii saayinsoota Fayyaa, garee saayisii fayyaa hawaasaa.

Bu'aa gaafiif deebii

1-xumurame_____ 2- cinaan xumurame_____ 3- didame _____

4- Debii kennituun hin argamne_____

Gorsaa/ too'ataan ilaallame;

Maqaa …….Mallattoo……Guyyaa……

Annex 4: Afan Oromo version Questionnaire

Guyyaa Guurtii Daataa	_____/_____/_____
Maqqaa dhabille Fayyaa	_____
Aannaa	_____
Duratti qorannoon kansarii balbala gadameessa sitti taasifamee jira?	1. Eeyyee 2. Lakkii

Kutaa I - Haala Demografii Hawaasummaa

T/L	Gaaffilee fi Filaataroota	Deebii fi Koodii	Ce'ii
101	Umuriin kee meeqa? (Bara guutuu galchi)	_____ Waggaa	
102	Iddoo jireenya kee sirrii maalidha?	1. Magaalaa 2. Baadiyyaa	
103	Amantiin kee eenyu?	1. Ortodoksii 2. Islaamaa 3. Protestaantii 4. Kaatholiki 5. Kan biraa, ibsi _____	
104	Haala heerumaa kee maalidha?	1. Heerumtee 2. Kaan hin heerumne 3. Garaa dhabde 4. Addaan cite / addaan baate	
105	Sadarkaa barnootaa kee ammaa maalidha?	1. Barreessuu fi dubbisu hin dandeenye 2. Barreessuu fi dubbisu danda'a garuu barnoota mana barumsaa hin qabne 3. Mana barumsaa sadarkaa tokkoffaa – kutaa 1-4 4. Mana barumsaa sadarkaa tokkoffaa – kutaa 5-8 5. Mana barumsaa sadarkaa lammaffaa 6. Kollejii/dipiloomaa fi ol	
106	Haala hojii kee ammaa maalidha?	1. Hojjetaa mootummaa 2. Hojjetaa miti-mootummaa 3. Daldalaa 4. Qonnaan bultuu 5. Hojii guyyaa hojjettu 6. Barataa 7. Haadha manaa (hojii hin qabu) 8. Kan biraa, ibsi _____	

107	Sadarkaa barnootaa abbaa manaa kee ammaa maalidha?	1. Barreessuu fi dubbisu hin dandeenye 2. Barreessuu fi dubbisu danda'a garuu barnoota mana barumsaa hin qabne 3. Mana barumsaa sadarkaa tokkoffaa – kutaa 1-4 4. Mana barumsaa sadarkaa tokkoffaa – kutaa 5-8 5. Mana barumsaa sadarkaa lammaffaa 6. Kollejii/dipiloomaa fi ol	
108	Galii giddu-galeessaa ji'a tokkoof maatii keetii (madda hunda irraa)	_____ ETB	
109	Mana jirenya kee ibsa qaba?	1. Eeyyee 2. Lakkii	
110	Maateeriyalii bu'uuraa lafa mana kee irratti jiru maalidha?	1. Lafa/bineensaa/balaqqeessa 2. Muka/baamboo 3. Simimetti/taayilii	
111	Maateeriyalii bu'uuraa saafaa mana keetii eenyu?	1. Qottoo/baala 2. Sibila 3. Konkiriitii/taayilii	
112	Mana fincaanii maatii keetii amala eenyu fayyadama?	1. Hin jiru/ba'aa banaa 2. Mana fincaanii lafa jala (fooyya'ee hin jirre) 3. Mana fincaanii lafa jala (fooyya'e) 4. Mana fincaanii dhiquu	
113	Maddi bishaan dhugaatii maatii keetii bu'uuraa eenyu?	1. Lagaa/bishaan qabaa hin qabne 2. Bofaa/qubannoo eeggataa 3. Tapii uummataa 4. Qubannoo manaa/yeroo galtee	
114	Mana jirenya kee maallaqa ykn qabeenya armaan gadii keessaa kan qabdu eenyu? (kan hedduu filachuu dandeessa)	1. Raadiyoo 2. Televizhinii 3. Bilbila harkaa 4. Baayisikilii 5. Beeylada (loon, re'ee/shii, farda/hoolaa, kkf) 6. Mootorsayikil 7. Konkolaataa/taarika 8. Firiji 9. Lafaa qonnaa	

Kutaa II - Seenaa Walhormaataa Hirmaattotaa

T/L	Gaaffilee fi Filaataroota	Deebii fi Koodii	Ce'ii
201	Yeroo jireenya kee keessatti ulfaa turteetta?	1. Eeyyee 2. Lakkii	Lakkii yoo ta'e gara 209 deemi
202	Amma hanga ammaatti ulfa meeqa qabdu?	_____	
203	Ilmaan jiraatan meeqa qabda?	_____	
204	Yeroo jireenya kee keessatti ulfa dhabu (miskaariijii "spontaneous abortion" – ulfa torbaan 20 dura) mudateeraa?	1. Eeyyee 2. Lakkii	Lakkii yoo ta'e gara 207 deemi
205	Yoo deebii 204 "Eeyyee" ta'e, hanga ammaatti miskaariijii meeqa mudate?	1. 1 2. 2 3. >=3	
206	Yoo deebii 204 "Eeyyee" ta'e, miskaariijoonni "spontaneous abortion" akkamitti mudatan?	1. Walitti fufee 2. Ulfa/jireenya ilmaatti adda adda	
207	Umuriin ulfa jalqabaa meeqa ture?	_____ Bara	
208	Giddu-galeessa umrii dhaloota tokkoo fi isa itti aanuu meeqa?	_____ Bara	
209	Umurii ji'a dhiiguu jalqabdee	_____ Bara	
210	Sirna dhiiguu kee akkamitti ibsita?	1. Sirrii 2. Yeroo tokko tokko sirrii miti 3. Hunda yeroo sirrii miti 4. Ji'aan hin jiru	
211	Ji'oota 12 darban keessatti meeshaa ittisaa hormoonii fayyadameetta?	1. Eeyyee 2. Lakkii	Lakkii yoo ta'e gara 213 deemi
212	Meeshaa ittisaa kami fayyadameetta?	1. Pilsi Ittisaa Afuuraa 2. Meeshaa Ittisaa Fakkii 3. Implanti 4. IUCD 5. Kan biraa, ibsi _____	
213	Yeroo jireenya kee keessatti Pilsi Ittisaa Afuuraa fayyadameetta?	1. Eeyyee 2. Lakkii	

Kutaa III - Jireenya fi Haala Saalaa

T/L	Gaaffilee fi Filaataroota	Deebii fi Koodii	Ce'ii
301	Umuriin yeroo jalqaba wal-qunnamtii saalaa godhame meeqa ture?	_____ Bara	
302	Yeroo jireenya kee keessatti namoota meeqa waliin wal-qunnamtii saalaa goote?	1. Homaa 2. Tokko 3. Lama 4. Sadii fi isaa ol	Yoo homaa ta'e gara 304 deemi
303	Wal-qunnamtii saalaa abbaa waliin qabdu kanaan dura namoota meeqa waliin godhe jedhanii tilmaamu dandeessa?	1. Tokko 2. Lama 3. Sadii fi isaa ol	
304	Ogeessa fayyaa irraa dhukkuba wal-qunnamtii saalaa (akka syphilis, gonorrhea, chlamydia, trichomoniasis, genital herpes) qabdu jedhamee siif himameera?	1. Eeyyee 2. Lakkii	
305	Ji'oota 12 darban keessatti mallattoolee armaan gadii keessaa tokko ykn hedduu mudateeraa?	1. Dhiigni haadha hin taane/bishaan baay'ee dhangala'e 2. Caccabbiin gogaa saalaa / qillensa gogaa 3. Dhukkuba/buurra yeroo daakuu 4. Dhukkuba garaa gadi 5. Qoricha gogaa saalaa 6. Isa kamiyyuu miti	
306	Wal-qunnamtii saalaa waliin qabdu dhukkuba wal-qunnamtii saalaa yeroo darbe qaba?	1. Eeyyee 2. Lakkii	
307	Wal-qunnamtii sallaa booda dhiiga baasa turtee?	1. Eeyyee 2. Lakkii	
308	Seenaa dhukkuba kansarii balbala gadameessa maatii kee keessaa qabduu?	1. Eeyyee 2. Lakkii	
309	Tamboo (cigarette) xuuxu seenaa qabda?	1. Eeyyee 2. Lakkii	Lakkii yoo ta'e gara 311 deemi
310	Guyyaa tokko keessatti tamboo meeqa xuuxa?	1. 1 2. 2 3. 3 4. >=4	

311	Wal-qunnamtii saalaa booda gogaa saalaa kee (vulva) yeroo meeqa dhiqxa?	1. Yeroo hunda 2. Yeroo baay'ee 3. Yeroo tokko tokko 4. Yeroo muraasa 5. Hin dhiqxu	
312	Gogaa saalaa kee (vulva) dhiqxu yeroo, maal fayyadatta?	1. Bishaan qulqulluu qofa 2. Bishaan fi saabuun 3. Bishaan fi wantoota biroo (baala, xaboo, antiseptic, kkf) 4. Kan biraa, ibsi _____	
313	Yeroo ji'a dhalaa, padii, uffata ykn tuwaalicha yeroo meeqa jijjirta?	Guyyaa tokko Guyyaa 2–3 Guyyaa 4 fi ol	

Kutaa IV - Gaaffilee Haala Wal'aansa Fayyaa

T/L	Gaaffilee fi Filaataroota	Deebii fi Koodii	Ce'ii
401	Sadarkaa klinika WHO fayyadamtootaa	A. 1 C. 3 B. 2 D. 4	
402	Lakkoofsa vaayirasii HIV haaraa fayyadamtootaa meeqa?	A. < 1000 B. >= 1000	
403	Lakkoofsa CD4 jalqabaa (cells/dl) fayyadamtootaa meeqa?	A. <200 B. 200-500 C. >=500	
404	Fayyadamtoonni HAART waggaa meeqa fayyadamaa turan?	A. <1 B. 1-2 C. >=3	
405	Qorannoon VIA sirrii / dhukkubaa agarsiisa?	1. Negative 2. Positive 3. Kaansarii irratti shakkii	
406	Dandeettii Cryotherapy qabu	1. Eeyyee 2. Lakkii	

Annex 5: Standard Checklist for VIA screening

Steps of VIA procedure	
1.Instruments and supplies needed for procedure	2. VIA PROCEDURE
Examining table	**Step 1**: Inspect external genitalia.
Light source	**Step 2**: Gently insert speculum.
Bivalve speculum	**Step 3**: When entire cervix can be seen, fix blades of speculum.
Instrument tray	**Step 4**: Move light source to see cervix clearly.
Cotton swabs or cotton wool plus forceps	**Step 5**: Look at cervix for infection, ectopy, etc
New examination gloves or high-level disinfected surgical gloves	**Step 6**: Use cotton swab to remove discharge, blood or mucus from cervix.
Dilute (3-5%) acetic acid solution	**Step 7**: Identify the cervical os, SCJ and area around it.
0.5% chlorine solution	**Step 8**: Soak a clean swab in dilute acetic acid solution and apply it thoroughly to cervix.
Record format	**Step 9**: Wait 1 minute for acetic acid to be absorbed and any acetowhite reaction to appear.
	Step 10: Inspect SCJ carefully for acetowhite epithelium or areas suspicious for cancer.
	Step 11: As needed, reapply acetic acid or swab cervix with clean swab.
	Step 12: When visual inspection has been completed, use a fresh cotton swab to remove any remaining acetic acid from cervix and vagina
	Step 13: Remove speculum.
	Step 14: Perform bimanual examination and rectovaginal examination (if indicated)

POST-VIA TASKS

If VIA test is negative:

- Have woman get dressed and get down from table
- Record test results and other findings
- Discuss results with woman and when to return for testing in the future

If VIA test is positive or cancer is suspected:

- Tell woman what recommended next steps are
- If treatment is immediately available, discuss with her
- If referral is required, make arrangements

ANNEX 6: Declaration of Investigator

I, the undersigned student of the Master of Public Health program, declare that this thesis is my original work, submitted in partial fulfillment of the requirements for the degree of Master of Public Health in General Public Health, to the best of my knowledge.

Name of investigator: Alem Birhanu Alemayehu

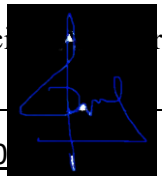
Signature: 

Date: 12/1

ANNEX 7: Declaration of Advisors

We, the undersigned, hereby declare that we have carefully reviewed this thesis and provided guidance for its preparation. We confirm that this thesis is ready for defense with our approval as the university advisor(s), and to the best of our knowledge, the work presented meets the academic standards and is in partial fulfillment of the requirements for the degree of Master of Public Health in General Public Health.

1. Name of Princi r: Seifadin Ahimed

   Signature: 

   Date: 10/12/20

2. Name of Co-Advisor: Mesfin Tafa

   Signature: 

   Date: 12/12/2025

ANNEX 8: Examiners' Declaration

We, the undersigned examiners, hereby declare that we have thoroughly examined the thesis presented for the degree of Master of Public Health in General Public Health. After careful review and defense of the thesis, we confirm that it meets the academic standards and requirements of the university. We hereby approve the thesis and consent to the student proceeding with the next steps toward completing the full thesis, which is required for the award of the degree.

Name of Examiner 1: _____

Signature: _____

Date: _____

Name of Examiner 2: _____

Signature: _____

Date: _____