AMBO UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DEPARTMENT OF PUBLIC HEALTH

DETERMINANTS OF VIRAL LOAD NON-SUPPRESSION AMONG ADULT HIV POSITIVE PATIENTS ON ANTIRETROVIRAL THERAPY IN PUBLIC HEALTH FACILITIES, AMBO TOWN, WEST SHOWA, OROMIA, ETHIOPIA.

BY: BEDILU HIRPA

A RESEARCH THESIS TO BE SUBMITTED TO AMBO UNIVERSITY, COLLEGE OF MEDICINE AND HEALTH SCIENCES, DEPARTMENT OF PUBLIC HEALTH IN PARTIAL FULFILLMENT FOR THE REQUIREMENTS OF MASTER DEGREE IN EPIDEMIOLOGY

March 2023

Ambo, Ethiopia

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Appendix A: APPROVAL SHEET

Submitted by:

Bedilu Hirpa _____ _____ PG
Candidate Signature Date

Approved by:

1. Advisor

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2. Co-advisor

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Signature Date

6. Director, School of Graduate studies

_____ _____ _____ Name
Signature Date

Appendix B: Certification sheet

AMBO UNIVERSITY SCHOOL OF GRADUATE STUDIES

CERTIFICATION SHEET

A thesis research advisor, I hereby certify that I have read and evaluated this thesis prepared under my guidance by Bedilu Hirpa entitled ‘‘Determinants of viral load non-suppression among adult H I V positive patients on antiretroviral therapy in Public Health Facilities of Ambo Town, West Showa, Ethiopia, 2022.’’ I recommend that it be submitted as fulfilling the thesis requirement.

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_____	_____	_____
Name of Major Advisor	Signature	Date
_____	_____	_____
Name of Co-Advisor	Signature	Date

As mentioned of the Board of Examiners of the M.Sc./MA thesis open defense examined. We certified that we have read and evaluated the thesis prepared by Bedilu Hirpa and examined the candidate. We recommend that the thesis be accepted as fulfilling the thesis requirements for the degree of Master of Public Health in Epidemiology.

_____	_____	_____
Chair Person	Signature	Date
_____	_____	_____
Internal examiner	Signature	Date
_____	_____	_____
External examiner	Signature	Date

DECLARATION

I, the undersigned, declare that the thesis comprises my own work. In compliance with internationally accepted practices, I have dually acknowledged and refereed all materials used in this work. I understand that non-adherence to the principles of academic honesty and integrity, misrepresentation /fabrication of any idea/data/fact/source will constitute sufficient ground for disciplinary action by the university and can evoke penal action from the sources which have not been properly cited or acknowledged.

Bedilu Hirpa

Name of the student

_____

Signature

_____

Date

Abstract

Background: Non-suppressed viral load in patients on antiretroviral therapy occurs when treatment miss to reduce a person's viral load less than 1000 copies/ml. During 2020 UNAIDS estimate, more than 66 thousand patients on antiretroviral therapy in Ethiopia is resulted in viral load non-suppression and associated with decreased in life expectancy and increased Human Immunodeficiency Virus transmission.

Objective: The objective of study is to identify determinants of viral load non-suppression among adult Human Immunodeficiency Virus positive patients on antiretroviral therapy in Public Health Facilities of Ambo Town, West Showa, Ethiopia, 2022.

Methods: An institutional-based unmatched case-control study was conducted from January 2022 to March 2022 on total 376 (131 cases: 245 controls) clients on Anti-Retroviral Therapy from January 2020 to December 2021 in Ambo town. Clients whose viral load result $\geq$1,000 copies/mL were cases, and < 1000 copies/ mL were controls. A simple random sampling technique was implemented to select cases and controls. Data were collected through pre-tested, structured questionnaire and secondary data extracted from patient records. All data were entered into computer using Epi data version 3.1 and then exported to SPSS version 26.0 for analysis. All variables having a P-value of < 0.25 in binary logistic regression were entered in to a multivariate logistic regression model to declare statistically significant at p value <0.05. Tables were used for result presentation.

Results: Treatment discontinuation (AOR= 2.29, 95% CI: 1.15, 4.61), two and more treatment taken daily (AOR= 7.33, 95% CI: 3.36, 16.02), poor and fair adherence (AOR= 16.5, 95% CI: 5.59, 49.13) and 4.9 (AOR= 4.9, 95% CI: 2.61, 9.32), unscheduled follow up (AOR= 3.7, 95% CI: 2.03, 6.81), had significant association to HIV viral non-suppression. While Married (AOR= 0.23, 95% CI: 0.07, 0.83) and widowed (AOR =0.23, 95% CI: 0.06, 0.98) marital status less likely associated to HIV viral non-suppression.

Conclusion: The risk of HIV viral non-suppression was increases among clients on ART. Treatment interruption, two and above treatment taken daily, sub optimal adherence and unscheduled follow up were had significant association to viral non-suppression. Hence, intensive working on enhanced adherence counseling, early tracing of loss to follow up, text notification and prescribing one tablet per day resulted in viral suppression.

Key Words: Adult HIV Positive Patients, Ambo Town, Antiretroviral Therapy, Viral Non-suppression.

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List of Acronyms and abbreviations

AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
ARV	Antiretroviral
BMI	Body Mass Index
CD4	Cluster of differentiation 4
DATIM	Data for Accountability, Transparency and Impact Monitoring
EAC	Enhanced Adherence Counseling
HIV	Human Immunodeficiency Virus
IDU	Injecting Drug Users
IeDEA	the International Epidemiology Databases to Evaluate AIDS
MTC	Mother- to- Child Transmission
PLHIV	People Living with HIV
RNA	Ribonucleic Acid
SDG	Sustainable Development Goal
TB	Tuberculosis
UNAIDS	United Nations Program on HIV/AIDS
VL	Viral Load
VLS	Viral Load Suppression

Chapter one: Introduction

1.1. Background

Viral non-suppression is the inability of patients on antiretroviral therapy (ART) to achieve viral suppression below a certain threshold or detectable viral load exceeding 1000 copies/mL after at least six months of using ART (1). Viral load (VL) test quantifies the actual number of HIV viral RNA copies per milliliter of blood. A non-suppressed VL indicates a poor treatment response after initiating ART (2). A non-suppressed in a person on treatment indicates that, the medication is not being taken properly (poor adherence to Medication), the virus is becoming resistant to ARV medication, Drug-drug interaction, mal-absorption (1). Mostly, many people will achieve an undetectable viral load within 6 months or less of starting ART, but some patients could take more time for suppression after starting ART (3). Patients with a non-suppressed VL implies, HIV can be transmitted more easily to their sexual partner and the higher the VL, the greater the chance of transmission (4,5).

HIV/AIDS patients who experienced severe morbidity had a higher chance of virological and immunological failure, and hence, enhance risk of mortality. Suboptimal treatment adherence (6), interruption of drugs (3), history of exposure to opportunistic infection (7,8), an advanced clinical stage, a history of tuberculosis infection, a low BMI, a less CD4 count and, lost to follow-up, a continues detectable viral load are determinant factors for treatment failure and viral non-suppression (9).

Non-suppressed viral load resulted due to different reasons, an-inappropriate treatment dose, drug-drug interaction, improper absorption, failing to disclose their HIV status to a partner (6). Findings from Zimbabwe being initial viral load test result >= 1000 copies per ml the risk of getting viral non-suppressed were increased (10).

Routine viral load testing is mandatory to confirm that an individual has achieved and is maintaining an undetectable viral load and early detection of treatment failure confirmation (11). After providing enhanced adherence support to treatment, viral load testing for patients who are virally non-suppressed could be conduct more frequently than currently recommended. Retention on treatment and viral suppression are used as prevention strategies (3). This means when a person living with HIV is taking drugs as prescribed and their viral load has reached undetectable levels,

the chance of the person to transmit HIV to HIV negative partner is reduced (12). Viral load testing should be done whenever there is clinical or immunologic suspect of treatment failure in addition to the routine viral load-testing schedule (13).

In 2003, ART program was introduced Ethiopia with the goal of reducing HIV-related morbidity and mortality, improve the quality of life of people living with HIV, and free ART was launched in 2005 to mitigate some of the impact of the epidemic, and started at the end of November 2006 (13,14). In addition, routine viral load testing for patients receiving antiretroviral therapy was implemented in March 2016 (15).

The golden standard for monitoring adherence to diagnose and confirm treatment response and failure was viral load test. Routine viral load testing for newly initiated client carried out at 6 months, at 12 months, and then every 12 months on ART thereafter if the patient is stable on ART. Viral load testing for pregnant mothers will be conducted for newly diagnosed after 3 months of ART initiation followed by every six months until the MTC risk ends. In addition, for those who are already on ART and their VL test done before 6 months, the VL is done soon after pregnancy known; then continue every six months until the MTC risk ends or routine VL testing should continue (13).

Ethiopia providing patient-centered care by the provision of rapid and same-day ART initiation, appointment spacing options, and adolescent-friendly services for improved linkage to program services and clinical outcomes. This has led to significant improvements towards reaching HIV epidemic control with seventy nine percent prevalence of viral load suppression with twenty one percent viral non-suppression among HIV-positive people adult ages (16). Addressing predictors of viral non-suppression had been the objective to meet the global and national target of third 95.

1.2. Statement of the problem

Globally at the end of 2020, more than 37.7 million people live with HIV including 10.2 million were not on treatment, 680,000 died from AIDS related. HIV Viral non-suppression among patients on ARV treatment 10% (17), although it varies among the regions and countries. However, from people who know their HIV status are 59% receiving ARV treatment Caribbean region where as nine percent are Asia and Pacific region. Western & Central Africa 24%, Middle East and North Africa 20% and Eastern Europe & Central Asia regions 23% virally non-

suppressed (18). In Ethiopia viral non-suppression varies among the different states and nationally eight percent of the peoples assessing ARV medication achieving non suppressed viral load (19).

Survey conducted in different countries indicated that- self-reported virological suppression was seventy four percent; and the rest twenty six percent were either viral non-suppressed or not reported their viral load status (20). Another evidence showed that thirty percent of HIV-infected persons had resulted in virologic non-suppression which is beyond the UNAIDS target (21).

There are an estimated 20.6 million people living with HIV in Eastern and Southern Africa region. During 2018, eighty five percent of people knew their HIV status, sixty seven percent of people living with HIV were on treatment and forty two percent virally non-suppressed; too far from the three 95 target when compared to other parts of the world (22).

Additionally, a facility based study conducted on prevalence of HIV viral load suppression and related factors reveals that more than ninety one percent patients achieved viral load suppression whereas more than eight percent patients result were virally non- suppressed (23).

The UNAIDS Spectrum estimate for PLHIV in Ethiopia in March 2020 is 665,723. Of these, it is estimated that seventy nine percent of HIV positive adults know their HIV status and from adults who know their HIV status, ninety seven percent were receiving ART and among adults living with HIV who use ART, more than eighty seven percent had suppressed viral loads with non-suppressed viral of more than twelve percent which needs to be addressed appropriately (24).

According to the national routine viral load program, data from Ethiopian Public Health Institute indicated that twenty percent of patients on second-line had virally non-suppressed (13). Evidences from Jimma public health facilities viral non-suppression is more than twenty percent after ≥6 months' ARV therapy. Among non-suppressed viral load most of them are female in gender (25).

The higher viral load, the more likely that person is transmitting HIV. The amount of HIV Viral load in the blood is high resulted immunological effect that reduces the body defense mechanisms. Viral load is highest during the sub optimal adherence to HIV treatment resulted in resistant to treatment (1). So, working on viral non-suppression reduces the impacts of treatment failure and increases prevention of the infection of HIV.

According to DATIM fiscal year 2021 quarter 2 of report, Nationally and Oromia region viral non-suppression among patients on ART was twelve and six percent respectively and reports from Ambo town health office indicated that viral non-suppression among adult patients on ART is 6% from treatment current. This means there are gaps in attaining the third 95 targets related to viral-suppression. (Oromia health bureau of quarter two report, Adama 2021). Therefore, this study was aimed to identify determinants of viral non-suppression among adult patients on treatment in Ambo town health facilities.

1.3. Significance of the study

Achieving 2030 UNAIDS target to end the epidemic of HIV/AIDS, different activities launched and implemented internationally and nationally. Ethiopia has prepared a plan to achieve the three 95 and has supported by different evidence-based research for enhancing quality of service to reach the target. Basically, HIV viral suppressed occurs within three to six months of treatment initiation, unless the treated patient develops barriers. The particular significance of this study provide valuable information's on determinants of HIV viral non suppression among adults on ARV in health facilities and care providers in designing strategies to combat viral non-suppression of HIV patients for attaining the national and global target of the three 95, and used as an input for other researchers, Town health office, Government program planners, stake holders and health care workers in designing way of achieving ART patient's viral suppression.

Chapter two: Literature review

Socio demography

Studies from different regions and countries, socio demography of the study participants especially age, sex, education, marital status had its own effect on viral load result as seen below. Male in gender were more likely experience odds of HIV viral non-suppression than compared to females, Evidence from Kombolcha town shows that the odds of virological failure were higher in clients aged <35 years compared with older patients (6). A cross sectional study from Tigray shows age categories (20–24 years, 25–29 years, 30–34 years, 35–39 years and 40–49 years) were significantly associated with viral non-suppression (26). In contrary marriage and female sex were less significant than those not married and male in gender (27).

Individuals never having married were significantly associated with high viral load compared to those married clients (27). Residence, less education and Social protection (28) were associated with higher odds of non-suppressed HIV viral load (26). And other factors that resulted in viral non-suppression or prevent attainment of optimal ART outcomes among ART patients.

According to studies conducted in South Africa on detectable HIV viral load and non-communicable diseases comorbidity in HIV positive adults on antiretroviral therapy shows ages $\geq$ 35 years had less significant HIV viral non-suppression (29).

Other case control study from Ethiopia illustrate, viral non-suppression was associated with lower relative wealth, patients with geographic work mobility and self-perceived wellbeing (30).

ART related

Study from America enumerates that ART patients not fully supported on treatment adherences programs increases their viral non-suppression (31). Other study shows that individuals with poor adherence to treatment (32) and findings shows that antiretroviral treatment discontinued or interrupted (26,33) had more times likely the odds of viral load non-suppression. The odds of virologic non-suppression were more likely among sub optimal (poor and fair) adherence to ART than those good adherence (20,32,34–36).

Studies from Vietnam on clinical characteristics viral load suppression, shorter duration on ART (27) had no effect on viral load suppression, however, the proportion of individuals on ART for more than 24 months suppressed compared to those on ART for 6-12 months were less (37). Individuals those who are receiving nevirapine based antiretroviral treatment had higher odds of viral suppression (27). Being on second or third line regimen protected patients against viral non-suppression (34).

Studies revealed that, suspected ART failure were significantly associated with viral non-suppression (26).

Patient Health related

The International Epidemiology Databases to Evaluate AIDS (IeDEA) evidence show that, patients having AIDS-defining illness /advance HIV disease/ were increases the effect of viral non-suppression and negatively affected VL response (38). Different studies revealed that WHO staging II (26) increases the odds of HIV viral non suppression.

Individuals who have ever been diagnosed with tuberculosis were more likely to have non-suppressed viral loads with a trend towards non-suppression in individuals having active TB (34) and treated for TB since initiation of ART. Opportunistic infection and exposure to opportunistic infection and not using trimethoprim were increased risk of non-suppression compared to no exposure (37,39,40).

Patients with a decrease in body weight from the start or ART treatment to the current body weight are more likely to have non-suppressed viral load results as compared to patient that have no change in body weight and low body mass index <16 kg/m2 (36,41).

Health service related

Study shows that there are factors that determine viral non-suppression among patients on ART, not disclosing their HIV status to their care giver (26), individuals not retained in care and treatment (42), Evidences shown patients delay to initiate in ART treatment (41) were more likely to have viral load non-suppression as compared to the patients disclosed, retained on care and that start ART treatment early respectively (6,39,40).

Patient Behavior

Studies on the association of clinical follow-up intervals in HIV-infected persons with viral suppression on subsequent viral suppression reveals that follow up interval of HIV infected persons have an association with their viral load replication. Patients with non-scheduled follow up visits have had higher viral non-suppression (43).

Findings from different African countries shows that, alcohol use were associated with lower odds for virological failure / non-suppressed viral load/ (27).

This conceptual framework amended from different literatures that show the determinants of viral non-suppressions like socio-demography, personal health, health service related, and treatment related and patient behaviors related that directly or indirectly influence viral load results of ART patient.

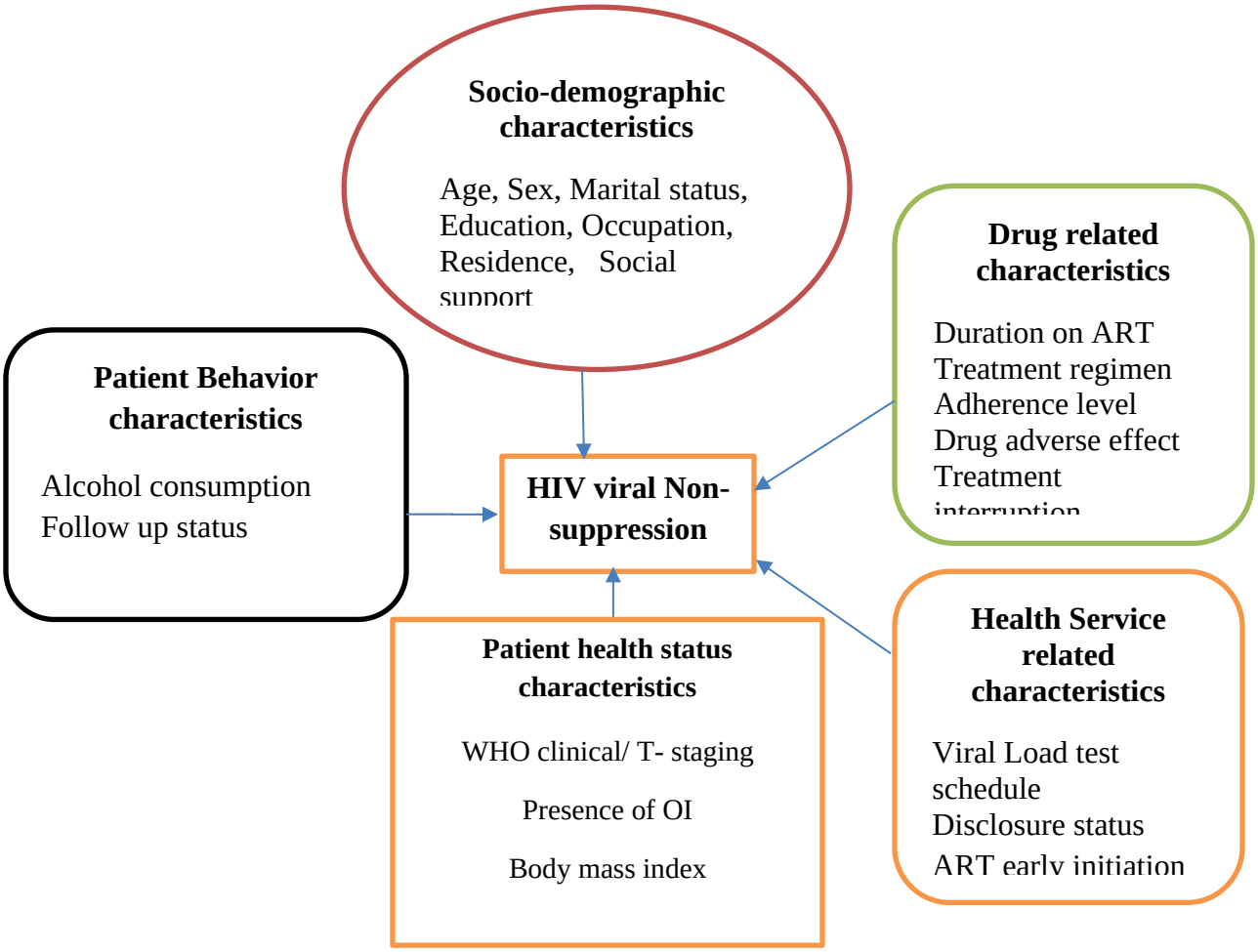

Figure 1 Conceptual framework for study of determinants of HIV viral non-suppression. Adopted & amended from different literature (9,10,20,25,42,44,45)

Chapter three: Objectives

To identify determinants of viral load non-suppression among adult HIV positive patients on antiretroviral therapy in public health facilities of Ambo town, West Showa, Oromia region, Ethiopia, 2022.

Chapter Four: Methods

4.1. Study area and Period

The study was conducted in Ambo town public health facilities. Ambo town is the capital of West Showa zone and estimated PLHIV currently on ART more than 10,619 and viral suppression 96 % patients present in the zone (DATIM report of January to March Report of 2023). The town is one of the towns in Oromia regional state and 114 km far from the capital city Finfine to the West of Ethiopia with a total population of 97,317. The town has four public facilities providing ART services. During the study, a total of 3342 clients are getting the services; of this 3089 of them are >18 years of age. Those facilities are Ambo University referral hospital, Ambo general hospital, Ambo health center and Awaro health center having 166, 2932, 193 and 51 patients, respectively. In addition, private facilities provide HIV/AIDS testing services and link positive clients to public facilities for ART service (facility based DATIM report, December 2021). The study was conducted from January 2022 to March 2022.

4.2. Study design

A facility based unmatched case-control study was conducted.

4.3. Population

4.3.1. Source population

All HIV positive patients currently on Antiretroviral Therapy in Ambo town public health facilities providing ART service.

Cases – those adult patients currently on ART whose plasma viral load measurement $\geq$1000 RNA copies/ml after at least six months of treatment initiation and

Controls - Adult patients currently ART whose plasma viral load measurement < 1000 RNA copies/ml at least 6 months on ART and with available VL results in patient folder.

4.3.2. Study population

Cases- Selected HIV positive adult patients who were currently on ART, at least six months on treatment and archived VL result >= 1000 copies/ml and

Controls- Selected HIV positive adult patients who were currently on ART, at least six months on treatment and archived VL result < 1000 copies/ml in selected public health facilities in Ambo town.

4.4. Eligibility criteria

4.4.1. Inclusion criteria

Adult patients who currently were on ART for six months and above retention and who have had at least one viral load test result during the recent three months and hard copy archived in the client chart /updated on smart care were eligible.

4.4.2. Exclusion criteria

Adult patients, who were unable to respond the interview, transfer from other facilities and patients with incomplete records were excluded from the study.

4.5. Sample size determination and sampling technique

4.5.1. Sample size determination

Sample size was calculated using Epi Info 7 Stat Calc an unmatched case–control formulae. Assumptions such as 5% level of significance, 80% power and 1:2 case to control ratio, odds ratio of opportunistic infection at ART initiation were 1.9, Proportion of controls exposed to opportunistic infection=53% was used in the sample size determination which was 396 (132 cases and 264 controls) included in the study (8).

4.5.2. Sampling technique

Ambo town has four medical facilities, Ambo general hospital, Ambo health center, Ambo university referral hospital and Awaro health center, which provide ART. Of these, Ambo general hospital and Ambo health center were selected by random sampling and considering two year data of cases and controls (January 2020 to December 2021) at the facility. Cases (Patients with viral load result ≥1 measurement of HIV RNA ≥ 1000 copies/mL in two year) and controls (Patients with viral load result ≥1 measurement of HIV RNA <1000 copies/ ml and previously documented VL results not exceeding this level) in the facility. Since sampling frame available, the study units were selected by using simple random sampling applied for both cases and controls in the selected facility. Secondary data extracted from patient chart, register and smart care for those study units.

Incomplete data were managed through electronic records cross check by supervisor and were rejected otherwise.

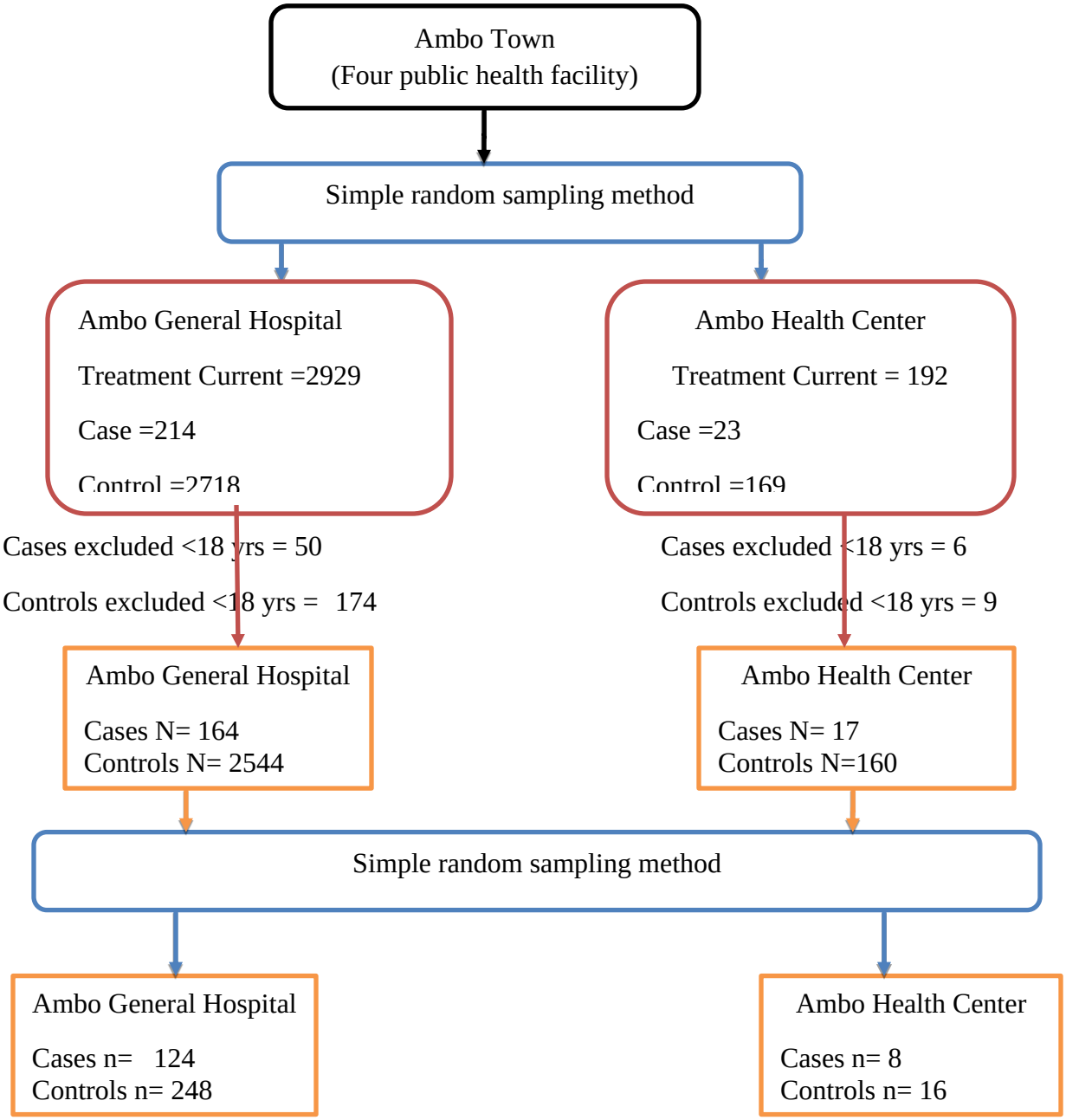

Figure 2. Schematic presentation of sampling technique of HIV viral non-suppression determinants among adults on ART in Ambo town administration, West Showa Zone, Ethiopia, 2021.

4.6. Variables

Dependent Variable

HIV viral load measurement (non-suppressed /suppressed)

Independent variables

Socio demographic characteristics

Variables like age, sex, religion, ethnicity, marital status, residence, educational status, occupations and social support.

Treatment related characteristics

Duration on ART, treatment regime, treatment side effect, treatment interruption, number of treatments taken daily and adherence to treatment were variables assigned under treatment related.

Health service-related characteristics

Health service-related variables were early initiation, disclosure status, information on viral load test schedule.

Patient Health Status/ clinical characteristics

Variables like viral load result level, WHO clinical and T-stage, body mass index and opportunistic Infection status were assigned under personal heath.

Patient Behavior characteristics

Follow up status and alcohol use variables were categorized under patient behavior characteristics.

4.7. Operational definition

Viral load information – information provided by provider for the patient on date of viral load test, schedule of viral load test, the reason of viral load test and result interpretation.

Viral load non-suppression - patients at least one viral load result >= 1000 RNA copies per one milliliter of plasma sample after six months of ART initiation.

Viral load suppression – patients whose viral load result < 1000 RNA copies per one milliliter of plasma sample after six months of ART initiation.

Adherence – Frequency of ART patients taking their drugs as it prescribed and classified as good (<2 missed dose/month), fair (2-4 missed dose/month) and poor (>4 missed dose/month) adherence based on their missed pills.

Initial VL result – the first viral load /HIV RNA copies per milliliter/ after at least 6 months ART initiation.

Current WHO treatment stage of HIV – clients of HIV positive taking ART for six months and assigned to treatment stage on their current clinical health status.

4.8. Data collection tools and techniques

The questionnaire consists of socio-demography, health service, patient behavior, personal health status and drug related determinants with patient's viral non-suppression. Data collection tool was developed based on topic related reviewed document listed under literature review during proposal writing process (6,26). The questionnaire was prepared in English, translated from English to study participant language (Afan Oromo), and re-translated back in to English by language expert to check the consistency of the tool. Prior to data collection, one-day training was given to two (health professional experienced on ART service and data collection) recruited data collectors and supervisors on data collection tool. Before undertaking the data collection, the instrument was tested by taking 20(5%) eligible respondents from comparable population of Ginchi health center for the consistency of the questionnaires and modifications was made based on pre-test finding. Primary data was collected by structured questionnaire directly from the sampled individuals at service exit point and secondary data were collected from patient chart, electronic medical record (smart care) and ART register. At least one viral load result with more than six months and currently on ART patient's data pulled from patients and records in the facility. Missed data were communicated with data clerk for completeness if not rejected from study units.

4.9. Data quality control and management

A one-day training was given to recruited data collectors on data collection tool, pre-test was done by taking 20(5%) respondents of the sample size and all necessary correction was performed based

on the pre-test collected data prior to the actual data collection. Secondary data was collected from smart care, register and patient chart. Every day, completeness, consistency, and missed data was supervised by supervisor and finally checked by the principal investigator for maintaining data quality.

4.10. Data Processing and Analysis

After data collection, each questionnaire was checked for completeness and code given before data entry. Data were entered in to Epi data version 3.1 and exported to SPSS version 26.0 for analysis. Descriptive summaries were used to describe count and percent of the study variables. Association between variables was identified using binary logistic regression. The bivariate analysis was carried out to calculate the crude odds ratio (OR) and a 95% confidence interval (CI). All variables having a P-value of < 0.25 in binary logistic regression were entered in to a multivariate logistic regression model. Variables with P-value < 0.05 and within 95% confidence interval (CI) in the final model were concluded as actual determinant factors for non-suppressed viral load and tables and graphs were used for result presentation.

4.11. Ethical considerations

Ethical clearance was obtained from Ambo University College of medicine and health sciences ethical review board. Official letters were submitted to Ambo town health office. Then letter of support collected and provided to Ambo General Hospital, and Ambo Health center.

The purposes and importance of the study explained & informed consent were secured from each study subject. Confidentiality was maintained at all levels of the study. Participant involvement in the study was on voluntary basis; those who are unwilling to participate in the study & those who wish to quit their participation at any stage were secured and informed to do so without any restriction. The interview was conducted at exit of health care setting.

4.12. Dissemination plan

The finding of this study is being presented to Ambo University, department of public health. It will be communicated to Ambo town health office and health facilities. Furthermore, efforts will

be made to present on conferences and publish the findings on reputable national or international journal.

Chapter five: Result

5.1. **Socio-demographic characteristics**

A total number of 376 (131 cases) and (245 controls) respondents were participated in the study. The mean age of study participant was 39.7 (SD ±10.0 years) of this, mean age of cases were 37.2 (SD ±10.8) and of controls were 40.9 (SD ±9.4 years). Among the study participants 83(63.4%) cases and 154 (62.9%) controls were Females. Residentially, 95(72.5%) of cases and 172(70.2%) of controls were urban. Respondents place of work 130(99.2%) cases and 235(95.9%) controls were works at in their permanent living residence. Ethnically, 118(90.1%) of cases and 227(92.7%) controls were Oromo. Of study participant 89(67.9 %) cases and 140(57.1%) controls were Orthodox in religion. From study participants, 58(44.3%) cases and 106(43.2%) controls had informal education. Occupationally, 46(35.1%) and 111(45.3%) cases and controls were self-employee respectively. Marital status of the participants 60 (45.8%) cases and 156(63.7%) controls were married (Table 1).

Table 1: Shows socio-demographic characteristics of viral load result status among adult HIV positive patients on antiretroviral therapy in public health facilities of Ambo town, West Showa, Oromia region, Ethiopia, January to March 2022.

Variable	Category	Cases N(%)	Controls N(%)
Age	<20	13(9.9)	5(2)
	20-24	6(4.6)	4(1.6)
	25-29	16(12.2)	20(8.2)
	30-34	13(9.9)	27(11)
	35-39	22(16.8)	48(19.6)
	40-44	25(19.0)	58(23.7)
	45-49	18(13.7)	40(16.3)
	50+	18(13.7)	43(17.6)
Sex	Male	48(36.6)	91(37.1)
	Female	83(63.4)	154(62.9)
Residence	Urban	95(72.5)	172(70.2)
	Rural	36(27.5)	73(29.8)
Educational status	Unable to read and write	12(9.2)	20(8.1)
	Informal education	22(16.8)	32(13.1)
	Primary	58(44.3)	106(43.2)
	Secondary	32(24.4)	54(22)
	College & above	7(5.3)	33(13.5)
Occupation	Student	24(18.3)	12(4.9)
	Self-employee	46(35.1)	111(45.3)
	Gov. employee	9(6.9)	29(11.8)
	Farmer	25(19.1)	51(20.8)
	Daily laborer	27(20.6)	42(17.1)
Work place	Outside the residence	1(0.8)	10(4.1)
	In the residence	130(99.2)	235(95.9)
Ethnic group	Oromo	118(90.1)	227(92.7)
	Amhara	11(8.4)	18(7.3)
	Gurage	1(0.8)	0(0)
	Tigre	1(0.8)	0(0)
Religion	Orthodox	89(67.9)	140(57.1)
	Protestant.	33(25.2)	98(40)
	Wakefata	8(6.1)	5(2)
	Muslim	1(0.8)	2(0.8)
Marital status	Single	34(25.9)	11(4.4)
	Married	60(45.8)	156(63.7)
	Separated/Divorce	23(7.6)	35(14.3)
	Widowed	14(10.7)	43(17.6)
Social support	Yes	4(3.1)	7(2.9)
	No	127(96.9)	238(97.1)

5.2. **Clinical characteristics**

In this study 50(38.2%) cases on third WHO stage during ART initiation and 109(44.5%) controls were on first WHO stage. Of the study participants 127(96.9%) of cases and 239(63.6%) controls were on WHO treatment stage one respectively. from the study participant 85(64.9%) cases and 172(70.2%) controls had normal (18.5-24.5kg/$m^{2)}$ body mass index. Lastly, among study participants 121(92.4%) cases and 243(99.2%) controls not infected with opportunistic infection (Table 2).

Table 2: Shows patient health characteristics of viral load result status among adult HIV positive patients on antiretroviral therapy in public health facilities of Ambo town, West Showa, Oromia region, Ethiopia, January to March 2022.

Variable	**Category**	**Cases N(%)**	**Controls N(%)**
Clinical stage of HIV during initiation	WHO stage I	38(29)	109(44.5)
	WHO stage II	38(29)	82(33.5)
	WHO stage III	50(38.2)	52(21.2)
Current WHO treatment stage of HIV	WHO treatment stage I	127(96.9)	239(63.6)
	WHO treatment stage II	4(3.1)	4(1.6)
	WHO treatment stage III	0(0)	1(0.4)
Body mass index	Normal	85(64.9)	172(70.2)
	Underweight	36(27.4)	53(21.6)
	Overweight	10(7.6)	20(8.1)
History of opportunistic infection	No OI	121(92.4)	243(99.2)
	Tuberculosis	7(5.3)	1(0.4)
	Diarrhea	2(1.6)	0(0)
	Other OI	1(0.8)	1(0.4)

5.3. ART characteristics

Among the study participants, 123(93.9%) cases & 218(88.9%) controls greater than five years on treatment. From study participants 83(63.4%) of cases and 234(95.5%) controls were used first line ARV treatment regimen. Adherence status of the study participants, 56(42.7%) of cases were fair and 190(77.6%) of controls were optimal adherence. Experiences of drug adverse effects among study participant 128(97.7%) cases and 231(94.3%) of controls had not faced with any history of drug adverse effect. Coming to treatment discontinuation, 82(62.6%) cases and 214(87.3%) controls had no a history of treatment interruption. This finding shows, 82(62.6%) and 230(93.9%) case and controls were taking one tablet daily respectively (Table 3).

Table 3: Shows ART characteristics of viral load result status among adult HIV positive patients on antiretroviral therapy in public health facilities of Ambo town, West Showa, Oromia region, Ethiopia, January to March 2022.

Variable	Category	Cases N(%)	Controls N(%)
Duration on ARV treatment	1-2 years	2(1.5)	6(2.4)
	2-5 years	6(4.6)	21(8.6)
	>5 years	123(93.9)	218(88.9)
Type of regimen used	First line	83(63.4)	234(95.5)
	Second line	46(35.1)	10(4.1)
	Third line	2(1.5)	1(0.4)
Adherence to ARV treatment	Poor	36(27.4)	6(2.4)
	Fair	56(42.7)	49(20)
	Good	39(29.8)	190(77.6)
History of adverse effect	Yes	3(2.3)	14(5.7)
	No	128(97.7)	231(94.3)
History of psychiatric	Yes	1(0.8)	1(0.4)
symptom	No	130(99.2)	244(99.6)
Treatment interruption	Yes	49(37.4)	31(12.6)
	No	82(62.6)	214(87.3)
Number of treatment type take	One tablet	82(62.6)	230(93.9)
daily	Two and above tablets	49(37.4)	15(6.1)

5.4. Health service characteristics

A patient clinical characteristic of the study participants indicates that: 49(37.4%) of cases and 110(44.9%) controls was started ART treatment more than a month after HIV positive confirmation. From the study participants, 68(51.9%) cases and 150(61.2%) controls were no did not know about their viral load schedule. From respondents 126(96.2%) cases and 234(95.5%) controls were disclosed their HIV status to their partner (Table 4).

Table 4: Shows health service and individual health characteristics of viral load result status among adult HIV positive patients on antiretroviral therapy in public health facilities of Ambo town, West Showa, Oromia region, Ethiopia, January to March 2022.

Variable	Category	Cases N(%)	Controls N(%)
ART initiation after HIV positive result confirmation	Same day	25(19.1)	50(20.4)
	Within five days	14(10.7)	19(7.8)
	Within two weeks	18(13.7)	28(11.4)
	Within a month	25(19.1)	38(15.5)
	More than a month	49(37.4)	110(44.9)
Information on VL schedule	Yes	63(48.1)	95(38.8)
	No	68(51.9)	150(61.2)
Disclosure	Disclosed	126(96.2)	234(95.5)
	Not disclosed	5(3.8)	11(4.5)

5.5. **Client behavior characteristics**

Characteristics of the study participants behavior, 111(84.7%) of cases and 130(53.1%) of controls have unscheduled follow up. The others 20(15.3%) and 115(46.9%) of cases and controls have scheduled follow up status respectively. In this study finding, among respondents 120(91.6%) cases and 222(90.6%) of controls never take an alcohol (Table 5).

Table 5: Shows patient behavior characteristics of viral load result status among adult HIV positive patients on antiretroviral therapy in public health facilities of Ambo town, West Showa, Oromia region, Ethiopia, January to March 2022.

Variable	**Category**	**Cases N(%)**	**Controls N(%)**
Follow up status	Scheduled	20(15.3)	115(46.9)
	Un scheduled	111(84.7)	130(53.1)
Alcohol in take	Never	120(91.6)	222(90.6)
	Occasionally	11(8.4)	21(8.6)
	Regularly	0(0)	1(0.4)

5.6. **Determinants of HIV viral non suppression**

In binary logistic regression analysis, determinants like educational status, occupational status, marital status, body mass index, adherence to ART treatment, ART treatment interruption, number of medications taken daily, viral load schedule information and follow up status of the study participants were showed an association to viral load non-suppression at p-value of <0.25. Therefore, those variables were candidate for multivariable logistic regression analysis (Table 6).

Table 6: Binary logistic regression analysis shows determinants of viral load result status among adults HIV positive patients on antiretroviral therapy in public health facilities of Ambo town, West Showa, Oromia region, Ethiopia, January to March 2022.

Variable	Category	Cases Count (%)	Controls Count (%)	COR(95% C.I)	P value
Sex	Female	83(63.4)	154 (62.9)	1.0229(0.658, 1.586)	0.924
	Male	48 (36.6)	91(37.1)	1.0	
Residence	Rural	36(27.5)	73 (29.8)	0.893(0.557, 1.43)	0.637
	Urban	95(72.5)	172 (70.2)	1.0	
Education *	College and above	22(16.8)	32(13.1)	1.0	
	Unable to read & write	58(44.3)	106(43.3)	0.796(0.424, 1.495)	0.478
	Informal education	32(24.4)	54(22)	0.862(0.429, 1.731)	0.676
	Primary*	7(5.3)	33(13.5)	0.309(0.116, 0.822)	0.019
	Secondary	12(9.2)	20(8.2)	0.873(0.355, 2.143)	0.766
Occupation *	Self-employee	46(35.1)	111(45.3)	1.0	
	Government employee	9(6.9)	29(11.8)	0.749(0.329, 1.706)	0.491
	Farmer	25(19.1)	51(20.8)	1.183(0.656, 2.132)	0.576
	Student*	24(18.3)	12(4.9)	4.826(2.227, 10.46)	0.00
	Daily laborer*	27(20.6)	42(17.1)	1.551(0.857, 2.807)	0.147
Marital status*	Single	34(25.9)	11(4.5)	1.0	
	Married	60(45.8)	156(63.7)	0.124(0.059, 0.261)	0.00
	Separate/divorced	23(17.6)	35(14.3)	0.213(0.09, 0.502)	0.00
	Widowed	14(10.7)	43(17.5)	0.105(0.042, 0.261)	0.00
ART initiation status after HIV positive	Same day	25(19.1)	50(20.4)	1.0	
	Within 5 days	14(10.7)	19(7.8)	1.474(0.636, 3.417)	0.366
	Within 2 weeks	18(13.7)	28 (11.4)	1.286(0.6, 2.756)	0.518
	Within a month	25(19.1)	35 (14.3)	1.316(0.656, 2.641)	0.44
	More than a month	49(37.4)	110 (44.9)	0.89(0.49, 1.60)	0.699
Body mass index *	Normal	85(64.9)	172(70.2)	1.0	
	Underweight*	36(27.5)	53(21.6)	1.374(0.836, 2.259)	0.209
	Over weight	10(7.6)	20(8.2)	1.012(0.454, 2.257)	0.977
Adherence level *	Good	39(29.8)	190(77.6)	1.0	
	Poor	36(27.5)	6(2.4)	0.19(0.074, 0.49)	0.001
	Fair	56(42.7)	49(20)	0.034(0.013, 0.087)	0.00
Treatment interruption *	Yes	49(37.4)	31(12.7)	4.125(2.46, 6.917)	0.00
	No	82(62.6)	214(87.3)	1.0	
Treatment uptake daily *	Two & above tablets	82(62.6)	230(93.9)	0.109(0.058, 0.205)	0.00
	One tablet	49(37.4)	15(6.1)	1.0	
VL schedule informed *	No	68(51.9)	150(61.2)	0.684(0.445, 1.049)	0.082
	Yes	63(48.1)	95(38.8)	1.0	
Disclosure status	No	5 (3.8)	11 (4.5)	0.844(0.287, 2.483)	0.758
	Yes	126(96.2)	234(95.5)	1.0	
Follow up*	Unscheduled	91(69.5)	85(34.7)	4.282(2.716, 6.753)	0.00
	Schedule	40(30.5)	160(65.3)	1.0	

5.7. Multivariate logistic regression analysis results

Variables that had association with HIV viral non-suppression in the bivariate analysis (P value < 0.25) were all interred in multivariable logistic regression model using backward likelihood ratio method (LR). So, by adjusting for confounders, multivariate analysis had shown that factors like marital status, number of treatment uptake per day, Treatment interruption, adherence and follow up status of study participants were statistically significant with HIV viral load non-suppression at p value <0.05 while other factors were not.

Married patients were 77% times less likely (AOR= 0.232, 95% CI =0.065, 0.830) to have HIV viral non-suppression compared to single marital status. Being widowed were 77% times less likely (AOR= 0.232, 95% CI =0.055, 0.984) to have HIV viral non-suppression than those single marital status.

The odds of HIV viral non suppression were 7 times more likely (AOR=7.33, 95% CI: 3.36, 16.02) among patients taking two & more tablets compared to those patients' uptake one tablet per day.

In this study the odds of HIV viral non-suppression were 2 times more likely (AOR= 2.29, 95% CI: 1.15, 4.61) among patients interrupt their treatment than those their counterpart. Being suboptimal adherence increases the odds of HIV viral non suppression by 16.5 (AOR=16.57, 95% CI: 5.59, 49.13) and 4.9 (AOR=4.93, 95% CI: 2.61, 9.32) among poor and fair treatment adherence than those good adherence to treatment respectively.

The odds of HIV viral non-suppression were 3 times more likely (AOR=3.72, 95%CI: 2.03, 6.81) among ART clients with unscheduled follow up than patients with appointment scheduled follow up status.

The rest; educational status, occupation and body mass index variables were had not statistical association with HIV viral non suppression at p value < 0.05 (Table 7).

Table 7: Multivariate logistic regression analysis shows determinants of viral load result status among adults HIV positive patients on antiretroviral therapy in public health facilities of Ambo town, West Showa, Oromia region, Ethiopia, January to March 2022.

Variables	Category	Cases Count (%)	Controls Count (%)	AOR (95% C.I.)	P-Value
Marital status*	Single	34(25.9)	11(4.5)	1.0	
	Married	60(45.8)	156(63.7)	0.232(0.065, 0.830)	0.025
	Separate/divorced	23(17.6)	35(14.3)	0.306(0.075, 1.256)	0.100
	Widowed	14(10.7)	43(17.6)	0.232(0.055, 0.984)	0.047
Current educational status	College and above	22(16.8)	32(13.1)	1.0	
	Unable to read & write	58(44.3)	106(43.3)	0.953(0.392, 2.315)	0.915
	Informal education	32(24.4)	54(22)	0.484(0.160, 1.461)	0.198
	Primary	7(5.3)	33(13.5)	0.399(0.085, 1.872)	0.244
	Secondary	12(9.2)	20(8.2)	1.255(0.384, 4.105)	0.707
Current occupation	Self-employee	46(35.1)	111(45.3)	1.0	
	Government employee	9(6.9)	29(11.8)	1.711(0.444, 6.599)	0.435
	Farmer	25(19.1)	51(20.8)	1.209(0.555, 2.637)	0.632
	Student	24(18.3)	12(4.9)	4.258(0.981, 18.473)	0.053
	Daily laborer	27(20.6)	42(17.1)	1.315(0.551, 3.139)	0.538
Treatment up take/day*	one tablet	82(62.6)	230(93.9)	1.0	
	two & more tablet	49(37.4)	15(6.1)	7.333(3.357, 16.017)	0.000
Treatment interruption*	Yes	49(37.4)	31(12.7)	2.298(1.146, 4.609)	0.019
	No	82(62.6)	214(87.3)	1.0	
Adherence level *	Good	39(29.8)	190(77.6)	1.0	0.000
	Poor	36(27.5)	6(2.4)	16.568(5.587, 49.129)	0.000
	Fair	56(42.7)	49(20)	4.932(2.610, 9.320)	0.000
Body mass index	Normal	85(64.9)	172(70.2)	1.0	
	Under weight	36(27.5)	53(21.6)	1.043(0.516, 2.107)	0.908
	Over weight	10(7.6)	20(8.2)	1.355(0.454, 4.041)	0.586
Follow up status *	Unscheduled	91(69.5)	85(34.7)	3.721(2.033, 6.812)	0.000
	Scheduled	40(30.5)	160(65.3)	1.0	

*Variables show significant association.

Chapter six: Discussion

The aim of the study was to identify determinants of viral load non-suppression among adult HIV positive patients on antiretroviral therapy in public health facilities of Ambo town. The result of this particular study showed that, marital status, number of treatment uptake per day, Treatment discontinuation history, suboptimal adherence to medication and unscheduled follow up status of study participants were statistically significant with HIV viral load non-suppression. Married & widowed marital status had inverse association to HIV viral non-suppression.

In this study, being married & widowed decreases the odds of HIV viral non-suppression compared to those who were single marital status. The finding of this study was supported with a cross sectional household survey conducted at Eswatini, Lesotho, Malawi, Zambia and Zimbabwe on prevalence of non-suppressed viral load and associated factors among HIV-positive adults receiving antiretroviral therapy (27). This similarity might be due to disclosing their status for their partners among married and this enhances their partner support in care and re-minding treatment uptake (46). And there is a decreased the odds of viral non-suppression among widowed than single marital status. But there is no clear phenomena why widowed marital status this study decreased in odds of viral non-suppression.

Taking two & more tablet per day statistically significant to viral non suppuration compared with those patients who uptake one tablet per day. This finding was in line with studies conducted on ART dosing frequency and pill burden (47). So the similarity between the two studies might be due to decreased in adherence to medication (6). This implies that pill burden reduce adherence to treatment and bad care and medication outcome.

Being patients having history of treatment discontinuation increase the odds of HIV viral non-suppression than those their counterpart. This finding was in line with study conducted impact of sub optimal adherence in Africa and on ART determinants in Italy (20,33). This similarity might be due to unemployment, poor health condition, study population personal behavior and failing to early tracing follow up. This supported by national guideline lost to follow up tracing program (13).

The odds of HIV viral non-suppression were more likely among poor & fair adherence to treatment compared with patient's good adherence to treatment. This result finding was consistent with

studies conducted at 25 African countries poor adherence to treatment were resulted in increasing the odds of viral non-suppression (20,31,34,39,40) and studied from Weldia and Dessie hospital (36), studies conducted in Ethiopia on socio economic conditions and luck of virological suppression among adults and adolescent (6,30). This similarity might be due to missing of clinic visit, and overall health condition, treatment dissatisfaction (6,20) and adherence support given to ART patients by care providers.

Many studies reveal that missing facility visit schedules statistically significant to viral non-suppression (6,43). Similarly in this particular study, the odds of HIV viral non-suppression were more likely among patients with unscheduled follow up compared with those scheduled appointment follow-ups (43). This similarity might be due to missing appointment schedule missing in daily taking pills. Pill missing might be result in giving a chance for viral replication, drug resistant and fail to achieve viral suppression (1).

6.1. **Strength and Limitation of the study**

The strength of this study was shows cause and effect relationships, addresses multiple exposures of the cases.

The target of this study is to address the determinants of HIV viral non-suppression among clients on anti-retroviral therapy. The limitation of this study was recall bias of the study participants.

6.2. Conclusions

This study revealed that martially married and widowed inversely significant to viral non-suppression. Whereas number of medications taken daily, poor and fair Adherence to ART, treatment interruption, and unscheduled follow up significantly associated to HIV viral non-suppression among adults on ART in Ambo town. Hence, these determinants resulted in enhancing HIV transmission and treatment failure among those patients which leads to morbidity and mortality. So, coordinated efforts needed through targeted intervention and implementing initiatives launched nationally like Undetectable = Un-transmittable, Enhanced adherence counseling by care provider, adherence supporter and case managers for those population groups like patients with suboptimal adherence to ART, lost to follow up and those clients with missed follow up appointment to be achieve HIV viral suppression among ART clients.

6.3. Recommendation

For facility

- Should provide intensive information on ART (duration of care and treatment, good adherence to treatment benefits) for all clients on ART.
- Should support (target-oriented counseling and electronic notification) the clients on treatment adherence to prevent missed clinic visit for collection of medication.
- Actively work on electronic early tracing of lost to follow up.
- Should enhance client's knowledge on ways of preventing viral non-suppression through scheduled follow up, good adherence to treatment without interruption.
- Intensive patient counseling will be mandatory when number of pills taken per day prescribed was more than or equal to two tablets.
- Prescribing combined ART medications to reduce pill burden and improve adherence.

Town health office

- Should deliver education information communication materials to health facility on treatment adherence, number of pills taken, Treatment interruption and follow up status.
- Support on early tracing lost to follow up by logistics
- Promote the "undetectable = un-transmittable" programs launched nationally and regionally that increase adherence of the client.

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Annexes

Ambo University, College of Medicine and Health Science Department of Public Health

Annex 1. **Information Sheet**

Graduate Studies

Dear participant!

Good morning/afternoon sir! My name is _____ I am working as data collector for the study being conducted at this health facility by Bedilu Hirpa who is studying for his master's degree at Ambo University, College of Medicine and Health Science Department of Public Health. Currently he is undertaking research on a topic entitled as "Determinants of viral load non-suppression among adult HIV positive patients on antiretroviral therapy in public health facilities of Ambo town, West Showa, Ethiopia." I kindly request you to give me your attention to explain you about the study and being selected as the study participant.

Purpose of the study: the purpose of the study aims to identify determinants of viral load non-suppression among adult HIV positive patients on antiretroviral therapy in public health facilities of Ambo town.

Participants to be included: All adult patients currently on ART at Ambo town public health facility with at least one viral load test result archived in their folder a minimum of six months of ART initiation.

Benefits: For your participation in the study no payment will be granted or has no any special privilege to you. Your responses to the following questions are beneficial to you and other patients as input in improvement of Viral load non-suppression and to identify the factors which affect viral suppression, so that recommendations will be made to responsible organizations to fill those gaps.

Risks: The study will be conducted through interviews and you are being asked for a little of your time, a maximum of 30 min, to help us in this study. There is no possible risk associated with participating in this study except the time spent for responding to the questionnaire.

Confidentiality: Your name will not be written in this form and any information you tell us will not be disclosed to third party. Your participation is voluntary and you are not obligated to answer any question you do not wish to answer. If you feel discomfort with the question, it is your right to drop it any time you want. If you have any questions regarding this study, or you would like to be informed of the results after its completion, please feel free to contact the principal investigator.

Address of the principal investigator:

Bedilu Hirpa

Cell Phone: +251912121310/+251904136677

E-mail: bedilu4@gmail.com

Are you satisfied with the information provided so far?

1. Yes…….. Continue to the next page

2. No …… I won't participate

Annex 2. Consent form

In undersigning this document, I am giving my consent to participate in the study entitled as "Determinants of viral load non-suppression among adult HIV positive patients on antiretroviral therapy in public health facilities of Ambo town, West Showa, Oromia, Ethiopia." I have been informed that the purpose of this study is to identify Determinants of viral load non-suppression among adult HIV positive patients on antiretroviral therapy in public health facilities of Ambo town, West Showa, Oromia, Ethiopia. I have understood that participation in this study is entirely voluntarily. I have been told that my answers to the questions will not be given to anyone else and no reports of this study ever identify me in any way. I have also been informed that my participation or non-participation or my refusal to answer questions will have no effect on me. I understood that participation in this study does not involve risks. I understood that Bedilu Hirpa is the contact person if I have questions about the study or about my rights as a study participant.

Participants Signature_____ date_____

Interviewer

Name_____Signature_____Date_____

Annex 3. English version Questionnaire

Remark: All questions with '*' symbol under remark will be filled from the patient/ study participant.

Questionnaire #	Variables	Response categories	Skip/Remark
Part I	**Socio demography of the study participants MRN: _____**		
101	Age of the study participants in years		
102	Sex of the study participant	1. Male 2. Female	
103	Residence of the study participant	1. Urban 2. Rural	
104	Current educational status of the study participant	1Informal education 2 Un able to read & write 3 Primary 4 Secondary 5 College and above	*
105	Current occupational status of the study participant	1. Self-employee 2. Government employee 3. Farmer 4. Student 5. Daily laborer	*
106	Work place of the study participant	1 In the residence 2 Outside the residence	*
107	Ethnic group of respondents	1. Oromo 2. Amhara 3. Gurage 4. Tigre 5. Other specify_____	
108	Religion of the study participant	1. Orthodox 2. Protestant. 3.Wakefata 4. Muslim	*
109	Marital status of study participants	1.Single 2. Married 3. Separated 4. Divorced 5. Widowed 6. other specify	*

110	Average annual income of the study participants in birr		*
111	Did you get social support?	1. Yes 2. No	*
Part two	**Patient health status**		
201	What was an advanced clinical stage of HIV during initiation?	1 WHO stage I 2 WHO stage II 3 WHO stage III 4 WHO stage IV	
202	What is current clinical stage of HIV?	1 WHO treatment stage I 2 WHO treatment stage II 3 WHO treatment stage III 4 WHO treatment stage IV	
203	Body mass index of the study participant	1 Normal 2 Under weight 3 Over weight	
204	A past history of opportunistic infection management	1 Tuberculosis 2 Diarrhea 3 Others specify ---------	
205	HIV viral load result status	1. <1000 copies/ml 2. ≥ 1000 copies/ml	
Part III	**ARV Treatment related**		
	How long on ARV treatment?	1. <1 year 2. 1-2years 3. 2-5 years 4. >5 years	
300	Adherence level of the study participant to ARV treatment	1. Poor 2. Fair 3. Good	
301	In the past 30 days, on how many days did you miss dose of any of your HIV medicines?	1. >4 doses 2. 2-4 doses 3. <2 doses	*
302	Type of regimen study participant used	1. First line 2 Second line 3 Third line	
303	Number of treatment type take daily	1. One tablet 2. Two and above tablets	
304	Is there history of adverse effect?	1. Yes 2. No	
306	Is there history of treatment interruption?	1. Yes 2. No	

Part IV	**Service-related factors**		
400	ART initiation status after HIV positive result confirmation	1 Same Day 2 Within five days 3 Within two weeks 4 Within a month 5 More than a month	*
401	Do you know VL examination schedule?	1. Yes 2. No	*
402	Disclosure status of the study participant	1 Disclosed 2 Not disclosed	*
Part V	**Patient Behavioral factors**		
500	The participant Follow up status	1 Scheduled 2 Un scheduled	*
501	Do you take alcohol?	1 Never 2 Occasionally 3 Regularly	*

This is the end of our interview. Thank you very much for taking time to answer our questions.

Interviewer name: _____ Supervisor Name: _____

Signature: _____ Signature: _____

Date of interview: _____ Date of interview: _____

Annex 4. Afan Oromo Version Questionnaire

Yuunivarsiitii Ambootti Kolleejjii Yaalii Fi Saayinsii Fayyaa Damee Fayyaa Hawwaasaa

Unka Ragaa qorannoo

Kabajamoo hirmaataa:

Akkam bultani/ ooltani! Ani maqaan koo _____. Ani ragaa qorannoo dhaabbata fayyaa kana keessatti Obbo Baddiluu Hirphaa barnoota digirii lammaffaaf Yuunivarsiitii Amboo qindoominaan gaggeefamu funaanaan jira. Mata-duree "Dhukkubsattoota ga'eessota HIV qabaatanii yaalii farra HIV irra jiran keessatti wantoota hangi vaayirasii akka gadi hin xiqqaatne taasisan dhaabbilee fayyaa hawaasaa magaala Amboo, Shawaa Lixaa, Oromiyaatti." Irratti adda baasuuf qorannoo gaggeeffamuudha. Kanaaf hirmaataa taatanii waan filatamtaniif waa'ee qorannoo kanaa akka hubattaniif xiyyeeffannoon akka na hordoftan kabajaan isin gaafadha.

Kaayyoo qorannoo:- Wantoota hangi vaayirasii dhukkubsattoota HIV qoricha irra jiranii akka gadi hin xiqqaanne taasisan dhaabbilee fayyaa hawaasaa magaala Amboo keessatti adda baasuudha.

Hirmaattota qorannichaa:- Ga'eessota qoricha farra HIV irra jiran hunda ta'ee ji'a ja'a dura kan qoricha eegalanii qorannoo hanga vaayirasii tokko fi isaa ol galmee keessaa kan qabanii fi qoricha Dhaabbilee fayyaa magaala Amboo keessaa fudhachaa jiran.

Faayidaa:- Hirmaattottaaf wanti kennamu /kanfalamu homtu hin jiru. Deebiin gaaffileedhaaf deebistan isiniifis ta'e dhukkubsattoota biroof galtee ittiin hanqinoota akka hangi vaayirasii ol ka'u taasisan adda baasuuf ni gargaara. Dabalataan dhaabbatichi hanqina jiru akka sirreessuuf ni tumsa.

Miidhaa:- Qorannichi gaafii waan qabuuf yeroo qabdan irraa daqiiqaa 30 aarsaa gochuu gaafata. Yeroo keessan nuuf kennuun alatti hirmaachuu keessaniif miidhaan isin irra gahu hin jiru.

Icitii:- Maqaan keessan unka kana irratti hin barreeffamu, akkasumas ragaan isin kennitan nama biroo kamiifuu dabarfamee hin kennamu. Hirmaannaan keessanis fedha keessaniini yoo ta'u yeroo kamittuu gaafficha addaan kutuu fi dhaabuu ni dandeessu. Yoo gaaffii qabaattanis gaggeessaa qorannoo kanaa kan ta'an karaa bilisaa fi ifa ta'een gaaffachuu ni dandeessu. Baddiluu Hirphaa

Bilbila : +251912121310/251904136677

Email: bedilu4@gmail.com

Ragaa isiniif kennametti quuftanii?

1. Eeyyee _____ itti haa fufnu

2. Lakki _____itti hin hirmaadhu

Unka waligaltee

Walii galtee koo kennuudhaan qorannoo mata dureen isaa “dhukkubsattoota ga’eessota HIV keessatti osoo qoricha irra jiranii wantoota hangi vaayirasii akka hin xiqqaanne taasisan dhaabbilee fayyaa hawaasaa magaala Amboo, Shawaa lixaa, naannoo Oromiyaa, Itiyoopiyaa irratti qorannoo gaggeeffamu” irratti hirmaachuudhaaf hubannoo fi faayidaa isaa beekuudhaan fedha kootiin hirmaachuuf murteesseera. Gaaffilee kana irraati hirmaachuu kootiif deebiin koo eenyuuf iyyuu dabarfamee akka hin kennamne fi hin gabaafamne, hirmaachuu fi hirmaachuu dhiisuu kiyyaaf rakkoon anarra gahu akka hin jirre hubadheen jira. Akkasumas hirmaachuu hafuu kootiifis hammeenyi ana quunnamu akka hin jirre anatti himameera. Akka hirmaataa qorannoo kanaattis gaaffii fi mirgan qabu Obbo Baddiluu Hirphaa gaafadhee hubachuu akkan danda’u beekeen jira.

Mallattoo hirmaataa _____ guyyaa _____

Maqaa fi mallattoo raga funaanaa _____ guyyaa _____

Gaaffilee Qo’annoo Afaan Oromootti hiikame

Hubachiisa: Bakki mallattoon ‘*’ kun jiru hundi gaaffii dhukkubsataa irraa guutamudha.

Questionnaire	Variables	Filannoo Deebii	Yaada
Part I	**Ragaa hawaasummaa Lakkoobsa galmee fayyaa _____**		
101	Umuriin keessan meeqa? (waggaadhaan)		
102	Saala nama hirmaatichaa	1. Dhiira 2. Dhalaa	
104	Bakka jireenyaa	1. Magaala 2. Baadiyyaa	*
105	Sadarkaa barnootaa	1 Barnoota ga’eessotaa 2 sadarkaa 1ffaa 3 sadarkaa 2ffaa 4 kolleejjii fi isaa oli 5 barreessuu fi dubbisuu hin danda’u	*
106	Gosa hojii ittiin jiraatan?	1. hojii dhuunfaa 2. hojii mootummaa 3. Qonnaan bulaa 4. barataa 5. Hojjetaa guyyaa	*
107	Bakka hojii itti hojjettan?	1 Naannoo keessa jiraatan 2 Naannoo keessa jiraataniin ala	
108	Sabummaa keessan?	1. Oromoo 2. Amaara 3.Guraagee 4. Tigree 5. Kan biro ibsi_____	*
109	Amantaa keessan?	1. Ortodooksii 2. Piroteestaantii 3.Waaqeffataa 4. Musliima 5. Kan biraa ibsi ___	*
110	Haala gaa’ela keessanii	1. Kan hin fuune /heerumne 2. Kan	*

		fuudhe/heerumte 3. Kan adda bahe 4. Kan hiike 5. Kan jalaa duute/du'e 6. Kan biro ---------	
111	Galii waggaadhaan argattan qarshiidhaan hangami?		*
	Deeggarsi hawaasa irraa argattan jira?	1. Eeyyee 2. Lakki	*
Part two	**Haala fayyaa tajaajilamaa**		
201	Sadarkaa dhukkuba HIV kan jalqabaa?	1 DFA sadarkaa I 2 DFA sadarkaa II 3 DFA sadarkaa III 4 DFA sadarkaa IV	DFA-Dhaabbata Fayyaa Addunyaa
202	Sadarkaa dhukkuba HIV kan ammaa	1 DFA sadarkaa I 2 DFA sadarkaa II 3 DFA sadarkaa III 4 DFA sadarkaa IV	
103	Indeeksii ulfaatina qaamaa hojjaa waliin	1 Ulfaatina sirrii 2 Ulfaatinaa gadi 3 Ulfaatinaa oli	
204	Dhukkuboonni cinaa HIV yaalamtan maaltu jira?	1 Dhukkuba TB 2 Garaa kaasaa 3 Others ibsi ---------	
205	Hanga qorannoo vaayirasii kan jalqabaa hangami?	1. Kan hin mul'anne 2. ≤150 copies/ml 3. 151-1000 copies/ml 4. > 1000 copies/ml	
206	Hanga qorannoo vaayirasii kan dhiyoo?	1. Vaayirasii <1000/ml 4. Vaayirasii >=1000 /ml	
Part III	**Qoricha farra HIV kan walqabatu**		
	Yeroo hangamiif yaalii farra HIV irra turtani?	1. Waggaa <1 2. Waggaa 1-2 3. Waggaa 2-5 4. Waggaa >5	
300	Haala hordoffii qoricha farra HIV?	1. Gadaanaa 2. Gahaa 3. Gaarii	

301	Guyyaa 30n darban keessa qoricha farra HIV dawwaa meeqa osoo hin fudhatiin haftani?	1. Dawwaa >4 2. Dawwaa 2-4 3. Dawwaa <2	*
302	Sadarkaan qoricha farra HIV fudhachaa jirtan?	1. Sadarkaa 1ffaa 2 Sadarkaa 2ffaa 3 Sadarkaa 3ffaa	
303	Lakkoobsa gosa qoricha guyyaatti fudhattanii?	1. Kiniina tokko 2. Kiniina lama 3. Kiniina sadii 4. Kiniina afurii oli	*
304	Seenaan miidhaa cinaa qorichaan dhufe jira?	1. Eeyyee 2. Lakki	
305	Rakkoon dhibee sammuu uumamee beekaa?	1. Eeyyee 2. Lakki	
306	Qoricha addaan kuttee beekta?	1 Eeyyee 2 Lakki	
Part IV	**Wantoota tajaajila fayyaa waliin wal qabatu**		
400	Eerga HIVn qaama keessa jiraachuu beektee booda guyyaa meeqatti qoricha farra HIV fudhachuu eegalte?	1. Guyyaa tokko keessatti 2. Guyyaa shan keessatti 3. Torban lama keessatti 4. Ji'a tokko keesatti 5. Ji'a tokkoo olitti	
401	Sagantaa qorannoon hanga vaayirasii keessanii itti gaggeeffamu ni beektu?	1. Eeyyee 2. Lakkii	*
402	Dhukkubni HIV dhiiga keessan keessa jiraachuu isaa namni itti himtan jiraa?	1. Eeyyee 2. Lakki	*
Part V	**Amala dhukkubsataa waliin kan walqabatu**		
500	Beellama guyyaadhaan hordofuu irratti	1 Sagantaadhaan 2 Al-sagantaa	
501	Alkoolii /dhugaatii gosa kamiyyuu ni fayyadamtu?	1. Tasuma 2. Darbee darbee 3. Yeroo hunda	*

Kuni dhuma gaafannooti. Yeroo keessan naaf kennitanii deebii waan naa kennitaniif baay'ee galatoomaa.

Maqaa nama gaafatee:_____ Maqaa nama hordofuu:_____

Mallattoo:_____ Mallattoo:_____

Guyyaa :_____ Guyyaa:_____