

2023-01-10

Determinants of Communityantiretroviral Therapy Model Utilization Among Hiv Positive Adults Attending at Bahir Dar Public Health Facilities, Northwest Ethiopia: an Institution Based Unmatched Case-Control Study

Tigist, Alemnew Ademe

<http://ir.bdu.edu.et/handle/123456789/14967>

Downloaded from DSpace Repository, DSpace Institution's institutional repository



**BAHIR DAR UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCES
SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF EPIDEMIOLOGY AND BIostatISTICS**

**DETERMINANTS OF COMMUNITY ANTIRETROVIRAL THERAPY
MODEL UTILIZATION AMONG HIV POSITIVE ADULTS ATTENDING
AT BAHIR DAR PUBLIC HEALTH FACILITIES, NORTHWEST
ETHIOPIA: AN INSTITUTION BASED UNMATCHED CASE-CONTROL
STUDY**

BY: TIGIST ALEMNEW ADEME (BSc.)

**A THESIS REPORT SUBMITTED TO THE DEPARTMENT OF
EPIDEMIOLOGY AND BIostatISTICS, COLLEGE OF MEDICINE AND
HEALTH SCIENCES, BAHIR DAR UNIVERSITY IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF PUBLIC HEALTH IN EPIDEMIOLOGY.**

ADVISORS:

WORKU AWOKE (MPH, Associate professor of Epidemiology)

ERGOYE MELESE (MPH, Assistant professor of Biostatistics)

February, 2023

BAHIR DAR, ETHIOPIA



BAHIR DAR UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCES
SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF EPIDEMIOLOGY AND BIOSTATISTICS

NAME AND ADDRESS OF INVESTIGATOR	TIGIST ALEMNEW ADEME (BSc) Tel: +251938246012 Email: - tigstalemnew26@gmail.com
NAME AND ADDRESS OF ADVISORS	Mr. WORKU AWOKE (MPH, ASSOCIATE PROFESSOR OF EPIDEMIOLOGY) Email:-workuawokekeyalew@gmail.com Ms. ERGOYE MELESE (ASSISTANT PROFESSOR OF BIOSTATISTICS) Email: - muhammedergoye8@gmail.com
NAME OF INSTITUTION	BAHIR DAR UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCES SCHOOL OF PUBLIC HEALTH DEPARTMENT OF EPIDEMIOLOGY AND BIOSTATISTICS
THESIS TITLE	DETERMINANTS OF COMMUNITY ANTIRETROVIRAL THERAPY MODEL UTILIZATION AMONG HIV POSITIVE ADULTS ATTENDING AT BAHIR DAR PUBLIC HEALTH FACILITIES, NORTHWEST ETHIOPIA, 2022: AN INSTITUTION BASED UNMATCHED CASE-CONTROL STUDY.
STUDY PERIOD	From October to November 2022
STUDY AREA	Bahir Dar, North west Ethiopia

Acknowledgement

First of all, I would like to thank my advisors Mr. Worku Awoke and Ms. Ergoye Melese for their undeserved support and advice from the beginning of topic selection up to thesis work. Next, I would like to give my deepest appreciation to the Bahir Dar zonal health department and public health facility. Finally I would like to thank Bahir-Dar University College of Medicine and Health Sciences, School of Public Health, department of Epidemiology and Biostatistics for giving me this opportunity to do this Research.

Abbreviations and Acronyms

AHR	Adjusted Hazard Ratio
AIDS	Acquired Immunodeficiency Syndrome
AOR	Adjusted Odds Ratios
ART	Antiretroviral Therapy
CAG	Community ART refill Group
CASG	Community Adherence and Support Groups
CCLAD	Community Client Led ART Delivery
CD4	Cluster of differentiation 4
CI	Confidence Interval
COR	Crude Odds Ratio
COVID-19	Coronavirus Disease 19
DIC	Drop-in Centers
DSDM	Differentiated Service Delivery Model
FSWs	Female Sex Workers
HC	Health Center
HIV	Human Immunodeficiency Virus
LTFU	Lost to Follow-up
OR	Odds Ratio
P	Probability value
PCAD	Pear Lead Community ART Distribution
PLHIV	People Living With HIV
PrEP	Pre-exposure Prophylaxis
PUP	Pick-up points
UNAIDS	United Nations Program on HIV and AIDS
VL	Viral Load
WHO	World Health Organization

Table of Contents

Acknowledgement	III
Abbreviations and Acronyms	IV
List of tables.....	VII
List of figures.....	VIII
Abstract	IX
1. Introduction.....	1
1.1. Background	1
1.2. Statement of the problem	3
1.3. Justification of the study	5
1.4. Significance of the study	5
2. Literature review	6
2.1. Magnitude of CAG utilization.....	6
2.2. Socio-demographic factors.....	6
2.3. Clinical factors	7
2.4. Treatment related factors.....	7
2.5. Personal factors	8
3. Conceptual framework.....	9
4. Objective	10
5. Method and materials.....	10
5.1. Study setting and period.....	10
5.2. Study design	11
5.3. Population.....	11
5.3.1. Source population	11
5.3.2. Study population	11
5.4. Inclusion and exclusion criteria.....	11
5.4.1. Inclusion criteria	11
5.4.2. Exclusion criteria	11
5.5. Sample size calculation and sampling procedure.....	11
5.5.1. Sample size calculation.....	11
5.5.2. Sampling procedure	12
5.6. Variables of the study.....	13
5.6.1. Dependent variable	13
5.6.2. Independent variables	13

5.7.	Operational definition	13
5.8.	Data Collection Procedure	14
5.9.	Data Quality assurance.....	14
5.10.	Data processing and analysis	14
5.11.	Ethical consideration	15
6.	Results.....	16
6.1.	Socio demographic characteristics.....	16
6.2.	Personal factors	17
6.3.	Clinical factors	17
6.4.	Treatment related factors.....	18
6.5.	Factors associated with CAG model Utilization.....	19
7.	Discussion	22
8.	Limitation of the Study	23
9.	Conclusion	24
10.	Recommendation	24
11.	References.....	25
12.	Annex	28

List of tables

Table 1 Socio-demographic characteristics of community ART model utilization among HIV positive adults on ART attending at public health facilities in Bahirdar Town, North West Ethiopia, 2022	16
Table 2 Personal factors of community ART model utilization among HIV positive adults on ART attending at public health facilities in Bahirdar Town, North West Ethiopia, 2022.....	17
Table 3 Clinical factors of community ART model utilization among HIV positive adults on ART attending at public health facilities in Bahirdar Town, North West Ethiopia, 2022.....	18
Table 4 Treatment related factors of community ART model utilization among HIV positive adults on ART attending at public health facilities in Bahirdar Town, North West Ethiopia, 2022	19
Table 5 Predictors of CAG model Utilization among adult HIV patients on ART at Bahir Dar public health facilities, Northwest Ethiopia, 2022.....	20
Table 6 Data Collection Checklist	29

List of figures

Figure 1 Conceptual framework of determinants of community ART model Utilization among HIV positive adults on ART attending at public health facilities in Bahirdar Town, Ethiopia, 2022(19, 25-37).....	9
Figure 2 Schematic presentation of the sampling procedure of community ART model Utilization among HIV positive adults on ART attending at public health facilities in Bahirdar Town, North West Ethiopia, 2022	12

Abstract

Background: The community based Antiretroviral Therapy model is part of the differentiated service delivery model strategies for stable ART clients who aim to provide a more client-centered service to Human Immunodeficiency Virus care and treatment delivery to improve quality of service. Even though high ART clients load in health facilities, the determinant factors for the community Antiretroviral Therapy model utilization in Ethiopia is still unknown. Therefore, this research clearly shows the determinants of community ART model utilization.

Method: An institution-based unmatched case-control study design was employed between October-November 2022, among adult HIV positive clients in Bahirdar public-health facilities. A 1:1 case to control ratio was used to calculate sample size with a 95% Confidence Interval and 80% power using Open Epi. The adult HIV clients aged ≥ 18 years who are currently on the CAG model were selected as cases ($n=146$), and the adult HIV clients aged ≥ 18 years who are on other models were selected as controls ($n=146$). A participant was selected using simple random sampling technique. Data was entered using EpiData 4.6 and then exported to STATA 14 for analysis. An assumption like multicollinearity and chi-square assumptions was checked. A simple binary logistic regression analysis was executed with a p-value of <0.25 was entered into a multiple binary logistic regression analysis, p-value of less than 0.05 was declaring statistical significance.

Results: Majority of cases 107 (73.29%) and controls of 129 (88.36%) were living in urban areas, clients living in rural areas were about 10 times more likely to be utilizers of the model (AOR=10.31, 95% C.I: (2.74, 38.80)). Clients who had no history of LTFU were about 3 times more likely to be utilizers of the model (AOR=3.91, 95% CI: (1.53, 9.97)). Those clients who had disclosed their HIV status were about 16 times more likely to be utilizers of the model (AOR=16.65, 95% CI: (5.04, 54.9)). Clients who had no sexual partner were about 3 times more likely to be utilizers of the model than their counterparts (AOR=3.56, CI: (1.35, 9.37)).

Conclusion: According to the results of this study, residence (rural), having no history of lost to follow-up, having no sexual partner, having disclosed their HIV status, having history of participation in an HIV support group, and living far from the health facility are factors associated with CAG model utilization.

Key words: Antiretroviral Therapy, Bahir Dar, HIV, Community ART model, DSDM, Ethiopia

1. Introduction

1.1. Background

There is presently no cure for Human Immunodeficiency Virus (HIV), which means that it cannot be entirely eradicated from the body. Human Immunodeficiency Virus is manageable with life-long antiretroviral therapy (ART), which is not a cure but does keep the infection under control (1). It indicates that HIV patients can live long and healthy lives. The objective of ART is to lower the viral load in people living with HIV (PLHIV) to undetectable levels, reduce morbidity and mortality, and reduce transmission(2). To attain these objectives, there has lately been a steady movement in ART delivery from hospitals to primary health centers and more recently to patient-centered approaches to ART delivery,a strategy termed as differentiated service delivery models(DSDM)(3).

A differentiated approach to HIV treatment and care is a strategic combination of approaches designed to meet the specific needs of a subset of PLHIV. It entails approaches that change client flow, schedules, and location of HIV treatment and care services in order to improve access, coverage, and quality of care (4). In a worldwide strategy to end HIV by 2030, the World Health Organization (WHO) is promoting and decentralizing from a central clinic-based approach to DSDM. The community-based ART model is one of the DSDM strategies for stable ART clients, who aim to provide a more client-centered approach to HIV care and treatment delivery in order to improve service quality (5).There are two kinds of community ART groups. Both Peer Lead Community ART Distribution and Urban Health Extension Professional managed group are used to minimize the frequency of client visits, improve retention in care, sustain viral load suppression, and reduce continuing HIV transmission (6, 7).

Under the community-based ART delivery model, there are designated sites in the community known as community-based ART group distribution points where PLHIV come twice to receive drug refills, clinical evaluation, and psychosocial support(4). Community ART refill groups (CAGs) are self-organizing groups of stable ART patients who live in the same geographic region and have agreed to join the group. Each group will consist of 6 to 10 individuals who will pick up their ART refill outside of a medical institution (5, 8, 9).

Human Immunodeficiency Virus infection has been turned from a progressive, usually deadly illness to a chronic condition that can last for decades. Differentiated models of ART delivery have been developed to accommodate the expanding number of stable patients on ART and improve health outcomes. Most incorporate community participation or increase community involvement (8). Differentiated care is also expected to increase the availability of facility-based services for patients with advanced and/or unstable conditions (10). The community-based ART delivery model has increased the efficiency and effectiveness of ART delivery for both the health system and PLHIV (11). Beside from that, the model provides PLHIV with proper assistance, which encourages their long-term retention (4).

The differentiated service delivery (DSD) models have been implemented in many countries for the last six years since the WHO(5) released new ART guidelines with DSD models. DSD models were originally conceived as a way to manage rapidly expanding populations of experienced patients who are clinically “stable” on ART (12). The DSD models are a client-centered approach that focuses on the preferences and needs of clients (13). The approach addresses the contexts and clinical characteristics of clients, and aims to individualize care for client populations using a public health approach(5).

1.2. Statement of the problem

Human immunodeficiency virus continues to be the most serious global public health problem (14). In 2019, there were 38 million people living with HIV globally, 24.4 million in Sub-Saharan African countries, and 72% of those receiving ART (15). According to global HIV statistics from 2020, approximately 1.7 million people were newly infected with HIV, 28.2 million were receiving ART, and 690,000 died from Acquired immunodeficiency syndrome (AIDS)-related illness (14). In Ethiopia, approximately 60% of PLHIV know their status. In addition to this, about 395,324 PLHIV are currently on ART in 2016 (8).

United Nations Program on HIV and AIDS launched an initiative in 2017 to recruit 2 million African community health workers to contribute to its 90-90-90 strategy of eradicating AIDS and ensuring sustainable health for all in Africa (16). As countries throughout the globe attempt to meet global HIV objectives, such as initiating and keeping 95 percent of persons diagnosed with HIV and on ART, one of the most promising recent methods has been the introduction of DSD treatment approaches. The DSD models are techniques of administering ART that change the location, time, provider, or service provided with the purpose of improving treatment results and making HIV programs more efficient(12).Differentiated care is a client-centered strategy that streamlines and adjusts HIV services across the cascade to better serve the needs of people living with HIV while reducing unnecessary demands on the health system(13).

The WHO recommendations from 2016 advocate for differentiated HIV service delivery, which is meant to promote the "Treat All" policy by adapting services to people' varying requirements. Differentiated care is also projected to increase the availability of facility-based services for patients with advanced and/or unstable diseases (10).It has been recommended that community-based ART delivery approaches be employed to enhance ART expansion and retention in resource-constrained areas(17, 18).The Patient-centered HIV Care Model improved viral suppression among participants by 15% (19).Community-based ART resulted in viral suppression in about three-quarters of HIV patients (20). According to observational studies, community-based ART may boost ART initiation and viral suppression(20).Although policy support for community-based approaches to ART delivery is expanding, implementation is still in its early stages. People living with HIV who are stable on ART should use the minimum necessary of health care services that can improve health outcomes while saving resources,

minimizing transportation costs and time, increasing client satisfaction and empowerment, reducing clinic visits, and lowering the risk of coronavirus disease 2019 (COVID-19) infection (6, 21).

Despite these advantages, people preferred to receive ART within a health center rather than in the community (22). After 20 months, CAGs in Tete, Mozambique found a 0.35 % loss to follow-up (23). Because of the easy of service access, lower transportation costs, the flexibility of working hours at drop-in centers (DICs), and the benefit of interacting with more friendly health workers in community-based DSD models, particularly DICs, there was huge interest in receiving care from community-based DSD models. Community-based models, on the other hand, were the least desired (24).

Finally, those living with HIV, particularly those with co-morbid and/or advanced HIV illness may be more vulnerable to COVID-19-related complications. In the current condition of the Corona virus disease-19 pandemic, the number of health-care visits should be minimized, and ART replenishment should be maintained at the community level. As a result, the purpose of this study is to examine the factors of community ART group model utilization among PLHIV attending public health facilities in Bahir Dar.

1.3. Justification of the study

HIV infection has been turned from a progressive, usually deadly illness to a chronic condition that can last for decades. For that reason, differentiated models of ART delivery have been developed to accommodate the expanding number of stable patients on ART and improve health outcomes. Many Sub-Saharan African nations, including Ethiopia, lack of adequate baseline data on CAG model utilization and determinants among adult HIV-positive patients. There is currently no established evidence addressing the use of CAG and its predictors among adult HIV positive patients in public health facilities in Bahir Dar, northwest Ethiopia. As a result, this study was done to address these gaps.

1.4. Significance of the study

This research has given crucial information regarding the underutilization of available services. This study also helps ART patients, ART providers, health extension workers, the community, and governmental and non-governmental organizations working on the CAG model by giving information regarding the determinants of using the CAG model. The study's findings may also help the HIV/AIDS programming department identify impediments to using CAG and develop DSD models that are relevant, suitable, and responsive to the requirements of PLHIV.

2. Literature review

This literature review focused on possible socio demographic, clinical and personal factors and treatment related factors associated with Community ART model Utilization.

2.1. Magnitude of CAG utilization

According to a study conducted in Uganda on adult HIV patients who are stable on ART and receiving ART from Mulago adult HIV clinic, the uptake of the Community Client Led ART Delivery (CCLAD) model was at 10%, with the majority of the participants being involved in the other models of care at the ART clinic(25).Over the course of 2020, the COVID-19 pandemic was associated with accelerated participation in DSD models in Zambia, though with uneven increases across the models(26).A single-arm study conducted in key populations had an overall uptake of 77%, but this varied across key population subgroups, with an uptake of 75% in female sex workers, followed by men who have sex with men (68%) and people who inject drugs (53%); partners of key populations in this study had generally high community ART uptake (93%) (27).

2.2. Socio-demographic factors

According to a matched retrospective cohort study in Mozambique on adult ART patients among the 129,938 patients at 68 facilities providing Community Adherence and Support Groups (CASG) services, females were significantly more likely to join CASG than males (adjusted odds ratio (AOR): 1.4; 95% confidence interval (CI): 1.3–1.5) (28).Compared with the full cohort of non-CASG members, CASG members were more likely to be female (74% vs. 68%)(28). Another study reported that Female participants were, however, more likely to take up CCLAD model compared to their male counterparts (Crude odds ratio(COR) = 1.7, 95% CI 0.60–4.63)(25).Compared with the youngest age group (15– 19), patients in older age groups had significantly higher odds of joining CASG (28).Community-based pick-up points (PUP) uptake was associated with younger age (AOR 1.18 per 10year decrease, 95% CI 1.05–1.33)(29).

According to studies on patient preferences for community- and clinic-based ART delivery, clinic-based treatments are preferred, particularly in urban settings. Acommunity-based Prep delivery model targeting been users in rural South Africa found that Prep delivery among this historically difficult-to-reach demography is both practical and acceptable(30). The only model

that had a proportionate rise in the proportion of customers enrolled in urban areas was home ART delivery(26). Those who were married or in a relationship were also more likely to take up CCLAD model (COR = 1.2, 95% CI 0.501–2.649)(25). When compared to patients with no formal education, patients with a secondary education were significantly less likely to join CASG (AOR: 0.8; 95% CI: 0.7-0.9) (28). When compared to patients with no formal education, patients with a university education were marginally less likely to join CASG (AOR: 0.6; 95% CI: 0.4-1.1) (28). Employed patients were less likely to join CASG than unemployed patients (AOR: 0.9; 95% CI: 0.8-1.0)(28). Furthermore, unemployed individuals were 1.5 times more likely to use the CCLAD model (OR 1.5, 95% CI 0.595-3.56) (25)(29).

2.3. Clinical factors

There was no difference in the rate of virologic failure by care setting community based model Vs. hospital based model (31). A study reported that 100% in the intervention and 97.6% in the control group had a viral load (VL), 1000 copies/ml after 12 months of follow-up(32). Compared with patients with WHO Stage I disease at ART initiation, patients with WHO Stage IV disease were marginally less likely to join CASG (AOR: 0.9; 95% CI: 0.8–1.0)(28). WHO staging was not significantly associated with attrition (33). Compared with the full cohort of non-CASG members, CASG members were more likely to be tended to have a lower median cluster of differentiation 4 (CD4) counts at ART initiation (183 cells/m³ vs. 200 cells/m³)(28). Specifically, Patients with CD4 cells counts of 200–499 cells/ul at ART initiation were significantly more likely to join CASG compared with patients with CD4 cell counts <50 cells/ul the time of ART initiation(28).

2.4. Treatment related factors

Overall, there was no significant difference in the proportions of person adherent to ART, pre- to post implementation (19). Of 1650 patients with attrition, 97.5% were LTFU (36). Community based model clients were more likely to interrupt antiretroviral therapy for at least one semester (40% versus 21%) and were more likely to be lost to care for at least one year (43% versus 30%,)(31). Non-CASG participants had higher LTFU rates (HR 2.356;) than matched CASG participants (28); LTFU among CASG and non-CASG patients was 7.2% and 15.9%, respectively(28). Compared with eligible CASG participants, eligible non-CASG participants had significantly higher LTFU (hazard ratio [HR]: 2.36; 95% CI: 1.54–3.17)(28). There was 1

hospitalization in the intervention group (32). However, there were no significant mortality differences between CASG and non-CASG participants (28). Hospitalization among CASG and non-CASG patients was 1.4% and 1.2%, respectively(28). Mortality in eligible and ineligible CASG participants was 0.8% and 4.0%, respectively(28).

Patients who were eligible for CASG based on age, CD4 cell count, and time on ART had significantly higher odds of joining CASG (AOR: 2.6; 95% CI: 2.4–2.8)(28). long duration in the clinic of more than 4 years was somehow associated with likely uptake of CCLAD model (COR = 1.3, 95% CI 0.539–3.369,) (25). The hazard of attrition was higher among participants among participants started on ART in the 2017 (adjusted hazard ratio(AHR) 1.68; 95% CI: 1.35–2.10) and 2018 cohort (AHR 1.56; 95%CI: 1.24–1.97) as compared to those who started ART 2019(33). the community multi month dispensing approaches including both CAGs and community ART distribution points have been shown and postulated to provide gains for patients by reduced defaulting and enhancing community participation (34). More than 65% encountered barriers to receiving their ARTs (34) and about 25% defaulted while abroad(34).

2.5. Personal factors

Findings indicate that HIV-related stigma was a prominent theme in the majority of interviews. Community-based participants expressed concerns that the community location of their club could lead to unintended disclosure of their HIV status (35).A greater number of lifetime sex partners predicted Pre-exposure Prophylaxis (PrEP) uptake among all shebeen patrons (30). Community HIV support group participation was low (17.7%), while nearly two-thirds of patients (63.8%) had treatment buddies (36). The community multi month dispensing approaches including both CAGs and community ART distribution points have been shown and postulated to provide gains for patients by increasing peer support for adherence (through clubs and CAGs)(34). HIV status disclosure was high (82.3%), with partner testing and HIV positivity rates of 45.1% and 46.6%, respectively. The commonest reason for HIV status non-disclosure was fear of stigmatization (76.9%)(36).However, participants' preferences were not significantly different between services at a clinic close to home (about 10 minutes travel time) and a clinic far from their home (travel time 45 minutes)(37).

3. Conceptual framework

The Conceptual Framework was adapted from different literature; classified as socio demographic factor, clinical factor, personal factors and treatment related factors associated with Community ART model Utilization.

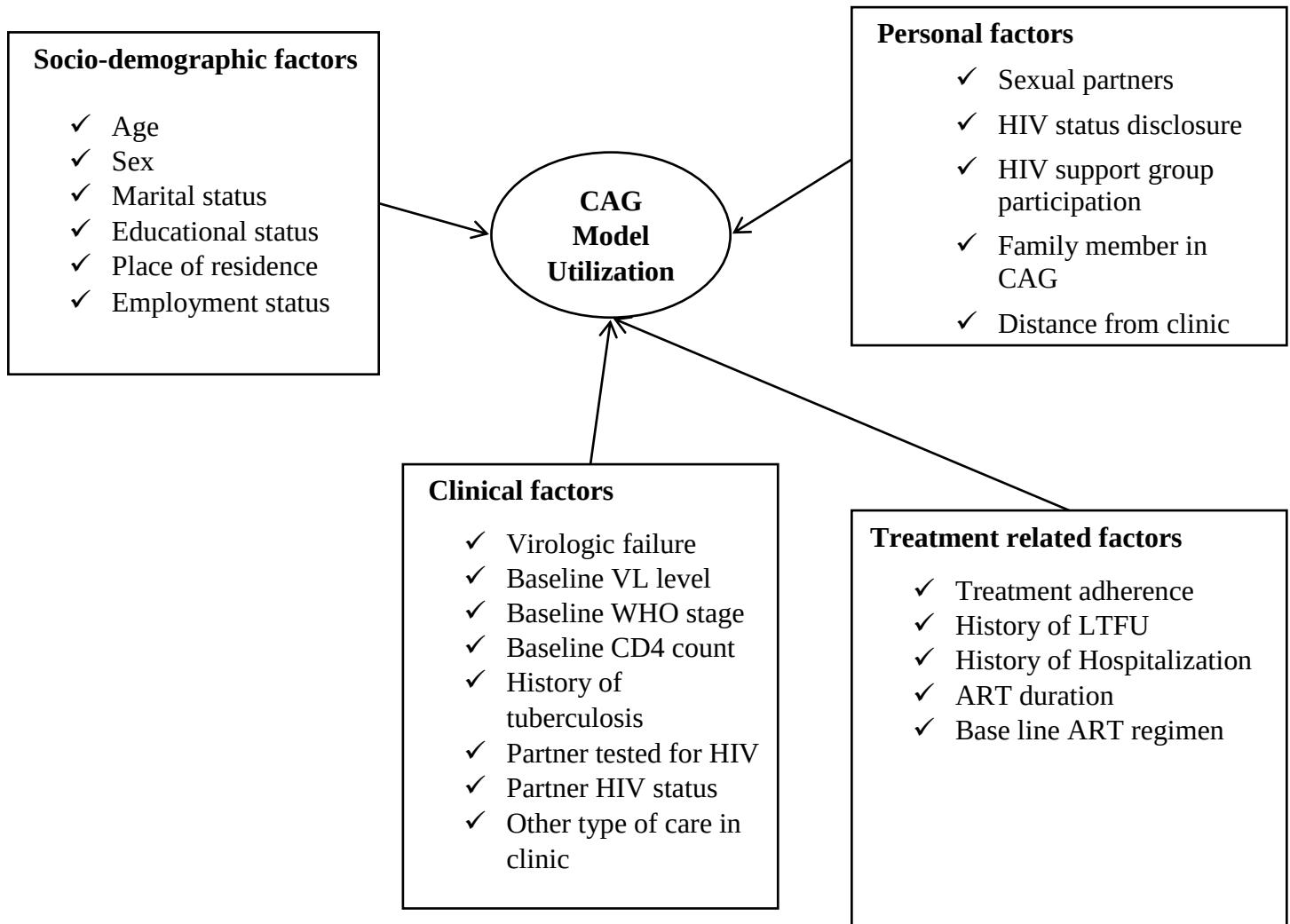


Figure 1 Conceptual framework of determinants of community ART model Utilization among HIV positive adults on ART attending at public health facilities in Bahirdar Town, Ethiopia, 2022(19, 25-37).

4. Objective

The objective of this study was to identify the determinants of community ART model utilization among Adult ART clients at public health facilities in Bahir Dar town, Northwest Ethiopia, 2022

5. Method and materials

5.1. Study setting and period

The study was conducted in Bahir Dar City at public health facilities from October to November; 2022. Bahir Dar is the capital city of the Amhara region in North-West Ethiopia, located 484 kilometers away from Addis Ababa, the capital city of Ethiopia. The city is situated at an elevation of 1,800 meters (5,900 feet.). The average temperature and humidity of Bahir Dar city are 26°C and 31%, respectively. According to the report of Bahir Dar City Municipality, the total population of Bahir Dar City in 2022 was 445,084. Of this population, 222,097 (49.9%) are males and 222,987 (50.1%) are also females (Source: Bahir Dar town administration office population profile).

There are two public hospitals (Addis-Alem primary hospital and Felege-Hiowt specialized and comprehensive hospital) and five health centers (HC) (Bahir Dar HC, Shimbt HC, Han HC, Abay HC and Tisabay HC), all providing the Community ART Refill Group model for PLHIV. Currently, there are 12,418 PLHIV adults on ART medication at the seven public health facility. Of these, 11,543 clients are on first-line ART drugs. The Bahir Dar HC is providing the ART service for 1,886 clients, out of which 101 clients were enrolled in CAG. The Tisabay HC is providing the service for 153 ART clients, out of which 50 clients are on CAG. The Abay HC is providing the service for 1,042 ART clients, out of which 95 clients are on CAG; the Han HC is providing the service for 1,758 ART clients, out of which 146 clients are on CAG; the Shimbt HC is providing the service for 419 ART clients, out of which 35 clients are on CAG; Felege-Hiowt comprehensive and specialized hospital is providing the service for 5,907 clients, out of which 290 clients are on CAG; and Addis Alem hospital is providing the service for 378 clients, out of which 46 clients are on CAG. At the Tisabay HC, adults (44 males and 109 females) are on first-line ART drugs. Of these, 50 are under CAG and 153 are not enrolled under CAG (Source: Bahir Dar Zonal Department).

5.2. Study design

A facility-based unmatched case-control study design was employed to identify the determinants of community ART model Utilization among HIV positive adults on ART at public health facilities in Bahirdar City Administration, Northwest Ethiopia, in 2022.

5.3. Population

5.3.1. Source population

All HIV positive adults who are currently on ART at public health facilities in Bahirdar city

5.3.2. Study population

For cases: All HIV positive adult clients who are currently on ART and utilizing CAG at public health facilities in Bahir Dar city.

For controls: All HIV positive adult clients who are currently on ART but not utilizing CAG at public health facilities in Bahir Dar city.

5.4. Inclusion and exclusion criteria

5.4.1. Inclusion criteria

All stable HIV positive adult clients aged ≥ 18 years who are on ART follow up

- ✓ Cases: -cases are all stable HIV positive adult clients aged ≥ 18 years who have been on ART for at least 12 months and who have joined the Community ART model.
- ✓ Control:-Controls are all stable HIV positive adult clients aged ≥ 18 years who have been on ART for at least 12 months and have not joined in the Community ART model.

5.4.2. Exclusion criteria

- ✓ Having incomplete ART intake form and clinical data were excluded from the study.
- ✓ Clients who referred from other antiretroviral treatment health facility with incomplete base line information were excluded.

5.5. Sample size calculation and sampling procedure

5.5.1. Sample size calculation

The required sample size was calculated using OpenEpi online software with the following assumptions: An 82% proportion of female patients on CAG and a 66% proportion of female patients on non-CAG at Tisabay HC, 95% confidence level, 80% power, and a 1:1 ratio of

controls to cases, generated a sample size of 264. The final sample size required for this study with 10% contingency is 292 (146 cases and 146 controls). In this study, cases and controls wererecruited consecutively (data from Tisabay HC 2022, Bahir Dar).

5.5.2. Sampling procedure

A simple random sampling technique was used. Firstly, the calculated sample size wasproportionally allocated separately for cases and controls to each health facility based on the average number of HIV positive adult clients currently on ART. Secondly, a facility-to-facility survey was conducted in the selected facilities to construct a sampling frame based on patient medical record number from recorded documents of the health institution for cases and controls separately. Finally, a simple random sampling technique was used to select both cases and controls. Stable adult HIV positiveclients' participating in a CAG model was considered case, and stable adult HIV clients not participating in a CAG wasconsidered controls.

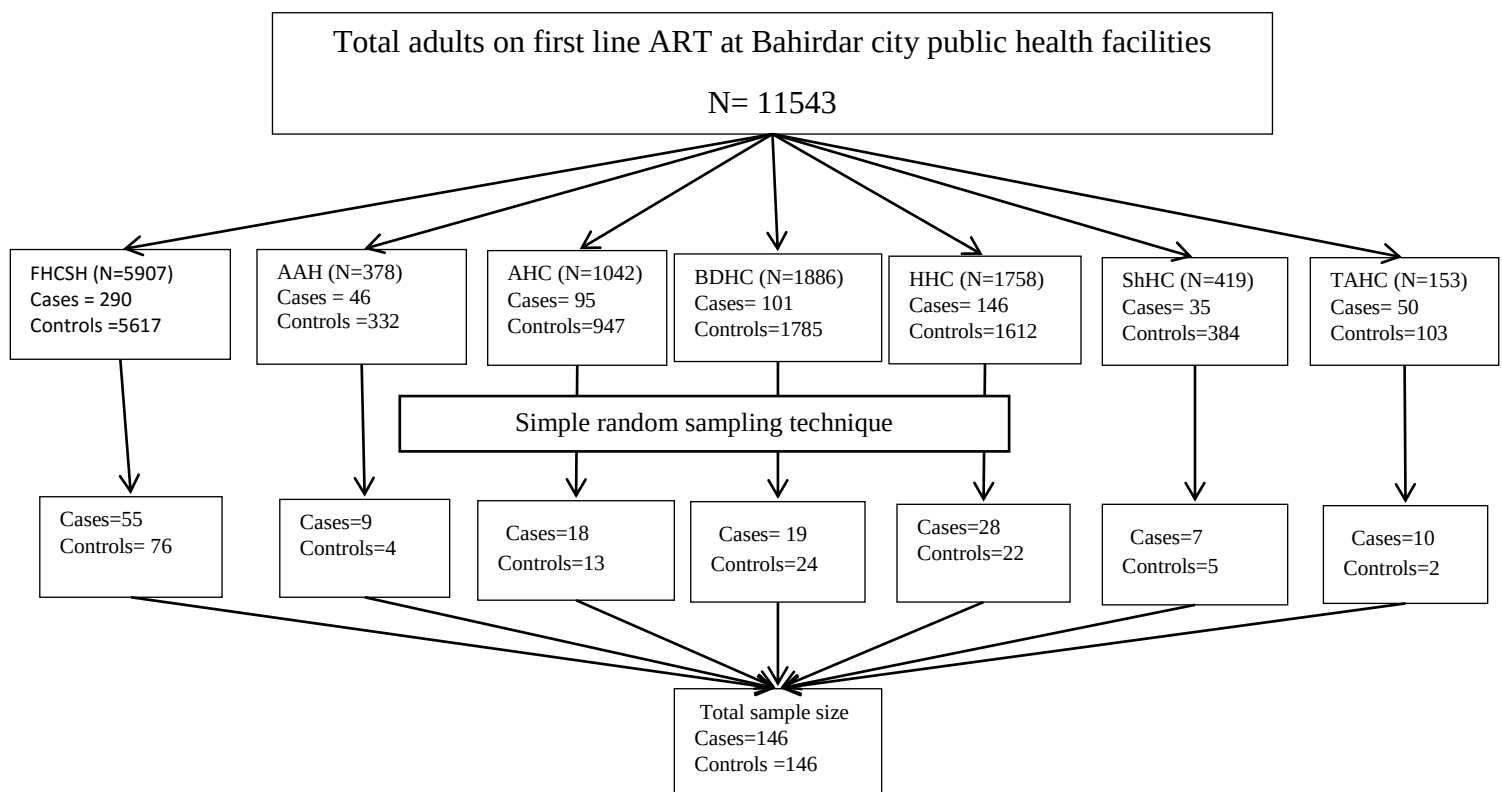


Figure 2 Schematic presentation of the sampling procedure of community ART model Utilization among HIV positive adults on ART attending at public health facilities in Bahirdar Town, North West Ethiopia, 2022

5.6. Variables of the study

5.6.1. Dependent variable

- ✓ Community ART model Utilization(1 = Yes, 0 = No)

5.6.2. Independent variables

Socio-demographic factors

- ✓ Age in years
- ✓ Sex
- ✓ Marital status
- ✓ Educational status
- ✓ Place of residence
- ✓ Employment status

Personal factors

- ✓ Sexual partners
- ✓ HIV status disclosure
- ✓ HIV support group participation
- ✓ Family Member in CAG
- ✓ Distance from clinic

Clinical factors

- ✓ Virologic failure
- ✓ Baseline VL level
- ✓ Baseline WHO stage
- ✓ Baseline CD4 count
- ✓ History of tuberculosis
- ✓ Partner tested for HIV
- ✓ Partner HIV status
- ✓ Other type of care in clinic

Treatment related factors

- ✓ Treatment adherence
- ✓ LTFU
- ✓ Hospitalization
- ✓ ART duration
- ✓ Base line ART regimen

5.7. Operational definition

- ✓ **Stable Clients:** The 2016 recommendations from the WHO defined clinical stability as being on ART for 12 months or more with evidence of treatment success, ideally through viral load monitoring(38).
- ✓ **CAG Utilization:**If a client is documented as a CAG member by a healthcare provider, he or she will be labeled “utilize CAG model”; otherwise, he or she will be labeled “not utilize CAG model”.

5.8. Data Collection Procedure

Data was extracted by document review using a pre-tested structured checklist prepared in English, which is adapted from different literatures. The questionnaire was contextualized and contain details of the ART follow-up information and intake form, including socio-demographic, personal, clinical and treatment related factors. Detailed reviews of patient records were conducted so as to identify cases and controls. Then, by using a structured check list, all the required information was collected.

5.9. Data Quality assurance

To assure the quality of data, data collectors and a supervisor was trained on the content of the questionnaire, issues of confidentiality, ethical conduct, and data collection techniques for one day. After confirming the data collectors' competency, three ART-trained nurse data collectors was perform the process. Corrections was made as necessary. The data collection processes was under the guidance and supervision of the researcher. The researcher was contact collectors on time and closely to resolve any questions or ambiguity about the procedures and provide guidance as needed. Collected data was checked daily by the principal investigator for completeness and consistency, and an early corrective measure was taken.

5.10. Data processing and analysis

Data cleaning was done by screening each questionnaire by the researcher. A data entry template was developed on Epi-data version 4.61 and data was entered and exported to STATA version 14 software for further analysis. The outcome variable is community ART model Utilization, which dichotomized by assigning '1' to those who are utilizing and '0' to those who are non-utilizing the model. A descriptive analysis was conducted to summarize variables through generating frequency tables and percentages according to the nature of variables. Binary logistic regressions was modeled; in the simple binary logistic analysis, candidate independent variables for multivariable analysis was selected at a P-value of less than 0.25. AOR with 95% confidence intervals estimated to assess the strength of the association, and a p-value less than 0.05 was used to declare the statistical significance in the multivariable analysis. The Hosmer-Lemeshow goodness-of-fit was checked to test for model fitness. The model was considered as good fit when the test is insignificant ($p > 0.05$). The independent variables was tested for multicollinearity

using the Variance Inflation Factor and the Tolerance tests. If multicollinearity occurs the study was consider which variable is worth considering in terms of biological and literature evidence.

5.11. Ethical consideration

The study was conducted after getting ethical clearance from the research and ethical committee of Bahir_Dar University, College of Medicine and Health Science, School of Public Health. A permission letter was also taken from Amhara Public Health Institute and Bahirdar zonal health department office and selected health institutions. The information was collected from the patient's medical record (card) and used only for research purposes and kept confidential. In addition to this, in order to maintain confidentiality, a study subject was not identified by name.

6. Results

6.1. Socio demographic characteristics

A total of 292 respondents, 146 cases and 146 controls, participated in the study making the response rate 100%. Among the total respondents, 104 (71.23%)cases and 83(56.85%) controls were females. Regarding the age of respondents, 53 (36.30%) cases and 48 (32.88%)controls were between 40 and 50 years ofage respectively. Regarding marital status, 60 (41.10%) cases and 38 (26.03%) controls were married. Regarding their educational status, 70 (47.95%) cases and 43 (29.45%) controls were completed primary school. Majority of cases, 107 (73.29%) and 129 (88.36%)controls, were living in urban areas respectively.Among the total respondents, 45(30.82%) cases and 16(10.96%) controls were daily laborers.Shown on table 1

Table 1Socio-demographic characteristics of community ART model utilization among HIV positive adults on ART attending at public health facilities in Bahirdar Town, North West Ethiopia, 2022

Variables	Category	Cases	Controls
		Frequency (%)	Frequency (%)
Sex	Male	42(28.77)	63(43.15)
	Female	104(71.23)	83(56.85)
Age in years	<30	20(13.7)	32(21.92)
	30-39	47(32.19)	52(35.62)
	40-50	53(36.30)	48(32.88)
	>50	26(17.81)	14(9.59)
Educational status	Unable to read and write	30(20.55)	23(15.75)
	Primary school	70(47.95)	43(29.45)
	Secondary school	38(26.03)	49(33.56)
	College and above	8(5.48)	31(21.23)
Marital status	Married	60(41.10)	38(26.03)
	Divorced	42(28.77)	46(31.51)
	Widowed	33(22.60)	16(10.96)
	Single	11(7.53)	46(31.51)
Residence	Urban	107(73.29)	129(88.36)
	Rural	39(26.1)	17(11.64)
Employment status	Unemployed	10(6.85)	3(2.05)
	Student	1(0.68)	17(11.64)
	Work at home/Housewife	26(17.81)	20(13.70)
	Farmer	1(0.68)	10(6.85)
	Government employed	20(13.70)	29(19.86)
	Self employed	29(19.86)	23(15.75)
	Daily laborer	45(30.82)	16(10.96)
	Merchant	7(4.79)	10(6.85)

	Other	7(4.79)	18(12.33)
--	-------	---------	-----------

Other: Includes Driver, Mechanic, NGO, Operator and Retired one

6.2. Personal factors

From the participants' cases 29(19.86%) and 66(45.21%) controls had sexual partner. Most of the participants 29(100%) cases and 61(92.42) controls had only one sexual partner. Regarding HIV status disclosure, 128(87.67%) cases and 64(43.84%) controls were disclosed their HIV status. Among the total respondents, 102(69.86%) cases and 28(19.18%) controls were a member of HIV support group. Shown on table 2

Table 2 Personal factors of community ART model utilization among HIV positive adults on ART attending at public health facilities in Bahirdar Town, North West Ethiopia, 2022

Variables	Category	Cases	Controls
		Frequency (%)	Frequency (%)
Sexual partner	Yes	29(19.86)	66(45.21)
	No	117(80.14)	80(54.79)
How many sexual partner	One	29(100)	61(92.42)
	Two	0(0.00)	5(7.58)
HIV status disclosure	Disclosed	128(87.67)	64(43.84)
	Not disclosed	18(12.33)	82(56.16)
HIV support group	Yes	102(69.86)	28(19.18)
	No	44(30.14)	118(80.82)
CAG member family	Yes	32(21.92)	16(10.96)
	No	114(78.08)	130(89.04)
Distance from clinic	<30 minutes	25(17.12)	74(50.68)
	>=30 minutes	121(82.88)	72(49.32)

6.3. Clinical factors

In terms of clinical factors, 12(8.22%) cases and 24 (16.44%) controls had virologic failure; 89(60.96%) cases and 86(58.90%) controls had baseline viral load <450 copies/ml; and cases 16(10.96%) and 25(17.12%) controls had history of TB. Regarding the participant's partner tested for HIV, 118(80.82%) cases and 106(72.60%) controls were their partner tested for HIV. Regarding the variable have other care in the health facility, 13(8.90%) cases and 26(17.81%) controls had other type of care in the health facility. Shown on table 3

Table 3 Clinical factors of community ART model utilization among HIV positive adults on ART attending at public health facilities in Bahirdar Town, North West Ethiopia, 2022

Variables	Category	Cases	Controls
		Frequency (%)	Frequency (%)
Virologic failure	Yes	12(8.22)	24 (16.44)
	No	134(91.78)	122(83.56)
Baseline viral load	<450 copies/ml	89(60.96)	86(58.90)
	>=450 copies/ml	57(39.04)	60(41.10)
Recent viral load level	<450 copies/ml	145(99.32)	142(97.26)
	>=450 copies/ml	1(0.68)	4(2.74)
Baseline CD4	<50	5(3.42)	4(2.74)
	50-500	135(92.47)	132(90.41)
	>500	6(4.11)	10(6.85)
History of TB	Yes	16(10.96)	25(17.12)
	No	130(89.04)	121(82.88)
Partner tested for HIV	Yes	118(80.82)	106(72.60)
	No	19(13.01)	29(19.86)
	Unknown	9(3.08)	11(7.53)
Partner status of HIV	Positive	73(50.00)	77(52.74)
	Negative	46(31.51)	30(20.55)
	Unknown	27(18.49)	39(26.71)
Have other care in the health facility	Yes	13(8.90)	26(17.81)
	No	133(91.10)	120(82.19)
WHO stage	Stage I	22(15.07)	18(12.33)
	Stage II	98(67.12)	87(59.59)
	Stage III	26(17.81)	41(28.08)

6.4. Treatment related factors

From the total participants, 134(91.78%) cases and 121(82.88%)controls had good treatment adherence; 18(12.33%) of cases and 44(30.14%) of controls had history of LTFU; and 22(15.07%) Cases,27(18.49) controls had history of hospitalization. Regarding duration on ART, 28(19.18%) cases and 30(20.55%) controls were on ART for about <=60months / 5 years.Regarding baseline ART regimen, 69(47.26%) cases and 48(32.88%) controls were on 1e regimen. Shown on table 4

Table 4 Treatment related factors of community ART model utilization among HIV positive adults on ART attending at public health facilities in Bahirdar Town, North West Ethiopia, 2022

Variables	Category	Cases	Controls
		Frequency (%)	Frequency (%)
Treatment adherence	Good adherence	134(91.78)	121(82.88)
	Poor adherence	12(8.22)	25(17.12)
History of LTFU	Yes	18(12.33)	44(30.14)
	No	128(87.67)	102(69.86)
Hospitalization	Yes	22(15.07)	27(18.49)
	No	124(84.93)	119(81.51)
ART duration in months	<=60months / 5 year	28(19.18)	30(20.55)
	>60 months/ 5 year	118(80.82)	116(79.45)
Baseline ART regimen	1a	3(2.05)	6(4.11)
	1b	3(2.05)	2(1.37)
	1c	29(19.86)	32(21.92)
	1d	13(8.90)	18(12.33)
	1e	69(47.26)	48(32.88)
	1f	12(8.22)	12(8.22)
	1j	17(11.64)	28(19.18)

6.5. Factors associated with CAG model Utilization

In this study, before fitting any model, assumptions in logistic regression like chi-square assumption, multicollinearity, and independence of observations were checked. In the bi-variable logistic regression model, partner status of HIV, history of hospitalization, employment status, baseline viral load, ART duration and CD4 count were variables not associated with CAG model utilization at 0.25 level of significance. In the multivariable logistic regression model, this study showed that residence, having history of LTFU, have sexual partner, disclosed their HIV status, participate in HIV support group and ≥ 30 minutes far from the health facility were independent predictors of CAG model utilization ($p < 0.05$).

Those clients living in rural areas were about ten times more likely to be utilizers of the model compared to those who were living in urban areas (AOR=10.31, 95% C.I: (2.74, 38.80)). Clients who had no history of LTFU were about three times more likely to be utilizers of the model than those having history of LTFU (AOR=3.91, 95% CI: (1.53, 9.97)). Clients who had no sexual partner were about three times more likely to be utilizers of the model than their counterparts (AOR=3.56, 95% CI: (1.35, 9.37)). Those clients who had disclosed their HIV status were about 16 times more likely to be utilizers of the model than their counterparts (AOR=16.65, 95% CI:

(5.04, 54.9). Clients who had participating in HIV support group were about 6 times more likely to be utilizers of CAG model than those not participating in HIV support group (AOR=6.18, 95% CI: (2.72, 14.01). Clients who had 30 minutes or more distance from the health facility were about 5 times more likely to be utilizers of the model than those who far less than 30 minutes from the health facility. (AOR= 5.81, 95% CI: (2.45, 13.79). Shown on table 5. Finally model fitness was checked using Hosmer and Lemeshow test of model fitness. As per this test the final model was good fitted which is evidenced with insignificant p-value ($p=0.4326$).

Table 5 Predictors of CAG model Utilization among adult HIV patients on ART at Bahir Dar public health facilities, Northwest Ethiopia, 2022.

Variables	Category	Cases	Controls	COR (95%CI)	P-value	AOR (95%CI)	P-value
Sex	Male	42(28.77)	63(43.15)	1		1	
	Female	104(71.23)	83(56.85)	1.87(1.15, 3.05)	0.011	1.28 (0.54, 3.05)	0.568
Age in year	<30	20(13.7)	32(21.92)	1		1	
	30-39	47(32.19)	52(35.62)	1.44(0.72, 2.86)	0.290	0.43 (0.11, 1.66)	0.225
	40-50	53(36.30)	48(32.88)	1.76 (0.89, 3.49)	0.102	0.39 (0.10, 1.54)	0.181
	>50	26(17.81)	14(9.59)	2.97(1.26, 7.00)	0.013	0.31 (0.06, 1.49)	0.147
Marital status	Married	60(41.10)	38(26.03)	1		1	
	Divorced	42(28.77)	46(31.51)	0.57(0.32, 1.03)	0.066	0.96 (0.34, 2.71)	0.947
	Widowed	33(22.60)	16(10.96)	1.30 (0.63, 2.68)	0.468	1.63 (0.50, 5.26)	0.410
	Single	11(7.53)	46(31.51)	0.15 (0.06, 0.32)	0.000	0.42 (0.09, 1.89)	0.261
Educational status	Illiterate	30(20.55)	23(15.75)	1		1	
	Primary school	70(47.95)	43(29.45)	1.24 (0.64, 2.42)	0.512	2.06 (0.73, 5.79)	0.166
	Secondary school	38(26.03)	49(33.56)	0.59 (0.29, 1.18)	0.139	0.94 (0.31, 2.86)	0.926
	College and above	8(5.48)	31(21.23)	0.19 (0.07, 0.51)	0.001	0.52 (0.11, 2.45)	0.414
Residence	Urban	107(73.29)	129(88.36)	1		1	
	Rural	39(26.71)	17(11.64)	2.76(1.48, 5.16)	0.001	10.31(2.74, 38.80)	0.001
Virologic failure	Yes	12(8.22)	24 (16.44)	1		1	
	No	134(91.78)	122(83.56)	2.19 (1.05, 4.58)	0.036	2.14(0.62, 7.40)	0.227
WHO stage	Stage I	22(15.07)	18(12.33)	1		1	
	Stage II	98(67.12)	87(59.59)	0.92 (0.46, 1.83)	0.816	0.82(0.29, 2.29)	0.716

	Stage III	26(17.81)	41(28.08)	0.51 (0.23, 1.14)	0.105	0.43(0.12,1.55)	0.203
History of TB	Yes	16(10.96)	25(17.12)	1		1	
	No	130(89.04)	121(82.88)	1.67 (0.85, 3.29)	0.132	2.61(0.87,7.83)	0.086
Partner tested for HIV	Yes	118(80.82)	106(72.60)	1		1	
	No	19(13.01)	29(19.86)	0.58 (0.31, 1.11)	0.102	2.27(0.71,7.27)	0.164
	Unknown	9(6.16)	11(7.53)	0.73 (0.29, 1.84)	0.511	3.81(0.76,19.16)	0.104
Have other care	Yes	13(8.90)	26(17.81)	1		1	
	No	133(91.10)	120(82.19)	2.21 (1.08, 4.50)	0.028	1.92(0.63,5.79)	0.245
Level of adherence	Good	134(91.78)	121(82.88)	1		1	
	Poor	12(8.22)	25(17.12)	0.43 (0.20, 0.90)	0.025	0.52(0.13,2.06)	0.356
LTFU	Yes	18(12.33)	44(30.14)	1		1	
	No	128(87.67)	102(69.86)	3.06 (1.67, 5.62)	0.000	3.91(1.53,9.97)	0.004
Have sexual partner	Yes	29(19.86)	66(45.21)	1		1	
	No	117(80.14)	80(54.79)	3.32 (1.97, 5.60)	0.000	3.56(1.35,9.37)	0.010
HIV disclosure status	Disclosed	128(87.67)	64(43.84)	9.11(5.04, 16.46)	0.000	16.65(5.04,54.9)	0.000
	Not disclosed	18(12.33)	82(56.16)	1		1	
Participate in HIV support group	Yes	102(69.86)	28(19.18)	9.76(5.67,16.81)	0.000	6.18(2.72,14.01)	0.000
	No	44(30.14)	118(80.82)	1		1	
Family member utilize CAG?	Yes	32(21.92)	16(10.96)	1		1	
	No	114(78.08)	130(89.04)	0.43(0.22, 0.84)	0.013	0.62(0.21,1.81)	0.385
Distance from health facility	<30 minutes	25(17.12)	74(50.68)	1		1	
	>=30 minutes	121(82.88)	72(49.32)	4.97 (2.90, 8.52)	0.000	5.81(2.45,13.79)	0.000

7. Discussion

This study was aimed to identifying factors associated with Community Antiretroviral Therapy refill Group model utilization among stable adult clients on Antiretroviral Therapy at public health facility in Bahir Dar town (Table 5).

Clients living in rural areas were about 10 times more likely than urban residents use the model. This could be because clients who live in rural areas are more likely to live far from the facility, which necessitates either long walks or expensive transportation costs. This conclusion supported by a study of a community-based model of Pre-exposure prophylaxis delivery among South African shebeen customers, which demonstrated that it is both practical and acceptable to give the medication to this typically difficult-to-reach community (30).

In comparison to HIV patients who has history of lost follow-up, those who has not history of LTFU were about 3 times more likely utilize Community Antiretroviral Therapy refill Group model. This might be because of the conditional management used by the medical staff. A patient may need to be closely monitored at the facility level if they have a history of being challenging to follow up, which will make them less likely to use the model. This result relates from a study done in Mozambique, which found that eligible non-CASG participants had considerably greater lost to follow-up than eligible Community ART Support Groups participants.(28).

A client who has not a sexual partner were about 3 times more likely to use the CAG model than those who has a sexual partner. This may be due to the fear that utilizing the model may expose the client's HIV status to their partners. This finding is contrary to the finding from South Africa, which showed a greater number of lifetime sex partners predicted HIV pre-exposure prophylaxis uptake among all shebeen patrons. (30).

Clients who had disclosed their HIV status were almost 16 times more likely than those who had not disclosed their HIV Status to the others to utilize the CAG model. This conclusion relates to the possibility that HIV-related stigma and discrimination are strongly associated with not disclosing one's HIV status. It is challenging to eliminate stigma associated with HIV/AIDS in the community because of the image that HIV/AIDS was associated with for prevention purposes during the time when anti-retroviral drugs had not yet been evolved and when treatment

and care were not well established in our country. This finding is supported by a study conducted in Kenya, which found that women who did not disclose their HIV status had lower maternity and prevention of mother to child transmission service utilization. Among HIV-positive women, the effect of disclosure to anyone on ARV drug use and facility birth remains large and significant (39, 40).

Clients who had history of HIV support group participation were 6 times more likely to be utilized of the CAG model than those who had not previously participated in HIV support groups. This could be because if a client has no experience working with or supporting others in groups, he or she is less likely to use the CAG model. This finding is conflict a study conducted in Sierra Leone found that community HIV support group participation had low utilization of the Model (36).

In comparison to patients who are less than 30 minutes away from the facility, patients who are 30 minutes or more away from a health facility were about 5 times more likely utilize the model. This might be as a result of the fact that patients pay for transportation and lose money when they access services. The provision of services should take into account cost, which was a key feature of preference structures. This should be done not only in terms of user fees but also when thinking about the costs associated with patients using these services. According to a study done in Zimbabwe, participants did not prefer a clinic close to their home over a community-based collection point for their medication, nor did they prefer a home-based delivery model over a clinic close to their home. Participants' preferences for services at a clinic near their house and a clinic distance from their home did not differ substantially in terms of location (37).

8. Limitation of the Study

The limitation of this study is that study focused only on the quantitative data; there was an absence of qualitative data. Additionally, this study was limited to ART patients having follow-up in Bahir Dar, Amhara region of Ethiopia. Further research is needed to understand factors associated with CAG model utilization among stable ART patients in other contexts.

9. Conclusion

According to the results of this study, residence (rural), having no history of lost to follow-up, having no sexual partner, having disclosed their HIV status, having history of participation in an HIV support group, and living far from the health facility are factors associated with CAG model utilization.

10. Recommendation

To maximize the impact of CAG model utilization in decongesting clinics, strategies to facilitate CAG model utilization should be tailored.

Regional Health and zonal health

- Strength PLHIV Association (Support Group)

Health provider

- Provide education about the importance of disclosure to the clients
- Encourage the clients to disclose their Status
- Enhance the retention on ART(Follow up)

PLHIV individual

- Should disclosed their HIV Status
- Participate in HIV Support Group (PLHIV association)

11. References

- 190-90-90: Treatment for all. AN AMBITIOUS TREATMENT TARGET TO HELP END THE AIDS EPIDEMIC 2020 [cited 2022 July 06]. Available from: <https://www.unaids.org/en/resources/909090>.
2. UNAIDS. 90-90-90: An ambitious treatment target to help end the AIDS epidemic. Joint United Nations Programme on HIV/AIDS. 2014.
 3. Republic of Uganda. Consolidated guidelines for prevention and treatment of HIV in Uganda. Kampala, Uganda: Ministry of Health; 2018.
 4. Okoboi S, Ssali L, Yansaneh AI, Bakanda C, Birungi J, Nantume S, et al. Factors associated with long-term antiretroviral therapy attrition among adolescents in rural Uganda: a retrospective study. *Journal of the International AIDS Society*. 2016;19(5 Suppl 4):20841.
 5. WHO. CONSOLIDATED GUIDELINES ON THE USE OF ANTIRETROVIRAL DRUGS FOR TREATING AND PREVENTING HIV INFECTION. World Health Organization. 2016.
 6. Government of Ethiopia. Implementation Guide for Community Based ART Delivery. 2020.
 7. Amstutz A, Lejone TI, Khessa L, Kopo M, Kao M, Muhairwe J, et al. Offering ART refill through community health workers versus clinic-based follow-up after home-based same-day ART initiation in rural Lesotho: The VIBRA cluster-randomized clinical trial. *PLoS Med*. 2021;18(10):e1003839.
 8. PEPFAR. Differentiated Care in Ethiopia: The way forward. 2017.
 9. Government of Malawi. Community ART Group (CAG) Toolkit, Lessons learnt from implementing CAGs in Thyolo, Malawi. 2013.
 10. Pathmanathan I, Pevzner E, Cavanaugh J, Nelson L. Addressing tuberculosis in differentiated care provision for people living with HIV. *Bull World Health Organ*. 2017;95(1):3.
 11. Adrawa N, Alege JB, Izudi J. Alcohol consumption increases non-adherence to ART among people living with HIV enrolled to the community-based care model in rural northern Uganda. *PloS one*. 2020;15(11):e0242801.
 12. Rosen S, Grimsrud A, Ehrenkranz P, Katz I. Models of service delivery for optimizing a patient's first six months on antiretroviral therapy for HIV: an applied research agenda. *Gates open research*. 2020;4:116.
 13. Grimsrud A, Bygrave H, Doherty M, Ehrenkranz P, Ellman T, Ferris R, et al. Reimagining HIV service delivery: the role of differentiated care from prevention to suppression. *Journal of the International AIDS Society*. 2016;19(1):21484.
 14. UNAIDS. Global AIDS Fact Sheet. 2021.
 15. WHO. World health statistics 2019: monitoring health for the SDGs, sustainable development goals. Geneva: World Health Organization; 2019. 2019.
 16. UNAIDS. 2 million African community health workers: Joint United Nations Programme on HIV/AIDS; 2017 [Available from: <https://www.unaids.org/en/resources/documents/2017/African2mCHW>].
 17. Grimsrud A, Sharp J, Kalombo C, Bekker LG, Myer LJ, JotIAS. Implementation of community-based adherence clubs for stable antiretroviral therapy patients in Cape Town, South Africa. *J Journal of the International AIDS Society*. 2015;18(1):19984.
 18. Grimsrud A, Lesosky M, Kalombo C, Bekker LG, Myer L. Implementation and Operational Research: Community-Based Adherence Clubs for the Management of Stable

- Antiretroviral Therapy Patients in Cape Town, South Africa: A Cohort Study. *Journal of acquired immune deficiency syndromes (1999)*. 2016;71(1):e16-23.
19. Byrd KK, Hou JG, Bush T, Hazen R, Kirkham H, Delpino A, et al. Adherence and Viral Suppression Among Participants of the Patient-centered Human Immunodeficiency Virus (HIV) Care Model Project: A Collaboration Between Community-based Pharmacists and HIV Clinical Providers. *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America*. 2020;70(5):789-97.
 20. Barnabas RV, Szpiro AA, van Rooyen H, Asimwe S, Pillay D, Ware NC, et al. Community-based antiretroviral therapy versus standard clinic-based services for HIV in South Africa and Uganda (DO ART): a randomised trial. *The Lancet Global health*. 2020;8(10):e1305-e15.
 21. Waldrop G, Doherty M, Vitoria M, Ford N. Stable patients and patients with advanced disease: consensus definitions to support sustained scale up of antiretroviral therapy. *Trop Med Int Health*. 2016;21(9):1124-30.
 22. Eshun-Wilson I, Mukumbwa-Mwenechanya M, Kim HY, Zannolini A, Mwamba CP, Dowdy D, et al. Differentiated Care Preferences of Stable Patients on Antiretroviral Therapy in Zambia: A Discrete Choice Experiment. *Journal of acquired immune deficiency syndromes (1999)*. 2019;81(5):540-6.
 23. Hagey JM, Li X, Barr-Walker J, Penner J, Kadima J, Oyaro P, et al. Differentiated HIV care in sub-Saharan Africa: a scoping review to inform antiretroviral therapy provision for stable HIV-infected individuals in Kenya. *AIDS care*. 2018;30(12):1477-87.
 24. Atuhaire L, Shumba CS, Nyasulu PS. "My condition is my secret": perspectives of HIV positive female sex workers on differentiated service delivery models in Kampala Uganda. *BMC health services research*. 2022;22(1):146.
 25. Kizito O, Sabiti L, Mo P. Factors associated with uptake of community client-led ART delivery model at Mulago adult HIV clinic _ Mulago National Referral Hospital. *Cogent Medicine*. 2021;8(1).
 26. Jo Y, Rosen S, Sy KTL, Phiri B, Huber AN, Mwansa M, et al. Changes in HIV treatment differentiated care uptake during the COVID-19 pandemic in Zambia: interrupted time series analysis. *Journal of the International AIDS Society*. 2021;24 Suppl 6(Suppl 6):e25808.
 27. Eshun-Wilson I, Awotiwon AA, Germann A, Amankwaa SA, Ford N, Schwartz S, et al. Effects of community-based antiretroviral therapy initiation models on HIV treatment outcomes: A systematic review and meta-analysis. *PLoS Med*. 2021;18(5):e1003646.
 28. Jobarteh K, Shiraishi RW, Malimane I, Samo Gudo P, Decroo T, Auld AF, et al. Community ART Support Groups in Mozambique: The Potential of Patients as Partners in Care. *PloS one*. 2016;11(12):e0166444.
 29. Bassett IV, Yan J, Govere S, Khumalo A, Ngobese N, Shazi Z, et al. Uptake of community- versus clinic-based antiretroviral therapy dispensing in the Central Chronic Medication Dispensing and Distribution program in South Africa. *Journal of the International AIDS Society*. 2022;25(1):e25877.
 30. Grammatico MA, Moll AP, Choi K, Springer SA, Shenoi SV. Feasibility of a community-based delivery model for HIV pre-exposure prophylaxis among bar patrons in rural South Africa. *Journal of the International AIDS Society*. 2021;24(11):e25848.
 31. Brito MO, Khosla S, Santana L, Lubrano A, Martinez T, Eugeni A, et al. A community-based model of HIV care for men who have sex with men and transgender women in Chicago. *International journal of STD & AIDS*. 2020;31(2):150-7.

32. Goodrich S, Siika A, Mwangi A, Nyambura M, Naanyu V, Yiannoutsos C, et al. Development, Assessment, and Outcomes of a Community-Based Model of Antiretroviral Care in Western Kenya Through a Cluster-Randomized Control Trial. *Journal of acquired immune deficiency syndromes* (1999). 2021;87(2):e198-e206.
33. Ibiloye O, Jwanle P, Masquillier C, Van Belle S, Jaachi E, Amoo O, et al. Long-term retention and predictors of attrition for key populations receiving antiretroviral treatment through community-based ART in Benue State Nigeria: A retrospective cohort study. *PloS one*. 2021;16(11):e0260557.
34. Faturiyele IO, Appolinare T, Ngorima-Mabhena N, Fatti G, Tshabalala I, Tukei VJ, et al. Outcomes of community-based differentiated models of multi-month dispensing of antiretroviral medication among stable HIV-infected patients in Lesotho: a cluster randomised non-inferiority trial protocol. *BMC public health*. 2018;18(1):1069.
35. Mudavanhu M, West NS, Schwartz SR, Mutunga L, Keyser V, Bassett J, et al. Perceptions of Community and Clinic-Based Adherence Clubs for Patients Stable on Antiretroviral Treatment: A Mixed Methods Study. *AIDS and behavior*. 2020;24(4):1197-206.
36. Lakoh S, Jiba DF, Vandy AO, Poveda E, Adekanmbi O, Murray MJS, et al. Assessing eligibility for differentiated service delivery, HIV services utilization and virologic outcomes of adult HIV-infected patients in Sierra Leone: a pre-implementation analysis. *Global health action*. 2021;14(1):1947566.
37. Strauss M, George G, Mantell JE, Mapingure M, Masvawure TB, Lamb MR, et al. Optimizing Differentiated HIV Treatment Models in Urban Zimbabwe: Assessing Patient Preferences Using a Discrete Choice Experiment. *AIDS and behavior*. 2021;25(2):397-413.
38. WHO Guidelines Approved by the Guidelines Review Committee. Consolidated Guidelines on the Use of Antiretroviral Drugs for Treating and Preventing HIV Infection: Recommendations for a Public Health Approach. Geneva: World Health Organization

Copyright © World Health Organization 2016.; 2016.

39. Sekhon M, Cartwright M, Francis JJBhsr. Acceptability of healthcare interventions: an overview of reviews and development of a theoretical framework. 2017;17(1):1-13.
40. Spangler SA, Onono M, Bukusi EA, Cohen CR, Turan JMJooids. HIV-positive status disclosure and use of essential PMTCT and maternal health services in rural Kenya. 2014;67(Suppl 4):S235.

12. Annex

Annex I information sheet

Title of the research: Determinants of community antiretroviral therapy model utilization among HIV positive adults attending at bahirdar public health facilities, northwest Ethiopia, 2022.

Name of Principal Investigator: Tigist Alemnew

Phone Number: +251938246012, Email: tigstalemnnew26@gmail.com

Name of organization: BahirDar university collage of health science department of public health.

Purpose of the research project: determinants of community antiretroviral therapy model utilization among HIV positive adults attending at bahirdar public health facilities, northwest Ethiopia, 2022: an institution based unmatched case-control study

Benefit: Has no direct benefit for one whose document/ record is included in this research

Risk: There is no risk since information is only from ART followed up form and patient's medical registration sheet no personal contact needed

Confidentiality: Name of patients will not be written in the format. All information will be kept strictly confidential and will be used only for the study purpose

Annex II Consent form

My name is.....I am a health professional at chronic care and follow up clinic in this facility. I am assigned as a data collector. The principal investigator wants to conduct the study determinants of community antiretroviral therapy model utilization among hiv positive adults attending at bahirdar public health facilities, northwest ethiopia, 2022: an institution based unmatched case-control study

Annex III Data Extraction Tool

This is patient information collection checklists intended to determinants of community antiretroviral therapy model utilization among hiv positive adults attending at bahirdar public health facilities, northwest ethiopia, 2022: an institution based unmatched case-control study

Data Collection Date..... Check list ID Number.....

Data collector Name.....

Table 6Data Collection Checklist

CAG Member 1.Yes 0.No

S/N	Variables	Category	Remark
Socio-demographic factors			
101	Age	-----	
102	Sex	1. Male	
		2. Female	
103	Marital Status	1. Married	
		2. Divorced	
		3. Widowed	
		4. Single	
104	Educational status	1. Unable to read and write	
		2. Primary school	
		3. Secondary school	
		4. College and Above	
105	Place of residence	1. Urban	
		2. Rural	
106	Employment status	1. Unemployed	
		2. Student	
		3. Work at home/housewife	
		4. Farmer	
		5. Gov. employed	
		6. Self-employee	
		7. Daily Laborer	
		8. Merchant	
		9. Other	
Clinical factors			

201	Viral load level	_____	
202	Virologic failure	1. Yes	
		2. No	
203	Baseline viral load level	-----	
204	Baseline WHO stage	1. Stage I	
		2. Stage II	
		3. Stage III	
		4. Stage IV	
205	Baseline CD4 count	-----	
206	History of Tuberculosis	1. Yes	
		2. No	
207	Partner tested for HIV	1. Yes	
		2. No	
		3. Unknown	
208	If yes to q 209, HIV status	1. Positive	
		2. Negative	
		3. Unknown	
209	Have other type of care in clinic	1. Yes	
		2. No	
Treatment related factors			
301	Treatment adherence	1. Good Adherence	
		2. Poor Adherence	
302	LTFU	1. Yes	
		2. No	
303	History of hospitalization	1. Yes	
		2. No	
304	ART duration in months	-----	
305	Baseline ART regimen	-----	
Personal factors			

401	Have sexual partner	1. Yes	
		2. No	
402	If yes to q 401, how many	-----	
403	HIV status disclosure	1. Disclosed	
		2. Not disclosed	
404	HIV support group participation	1. Yes	
		2. No	
405	Family member in CAG	1. Yes 2. No	
406	Distance from clinic in hour(minute)	-----	

የጥናቱርዕስ፡የማህበረሰብ አቀፍ የፀረኤችአይቪ መድሀኒት ስርጭት ተጠቃሚዎች በባህርዳር የህዝብ ጤና ተቋማት፣ሰሜንምዕራብኢትዮጵያ፣ 2022 የማህበረሰብአቀፍ የፀረኤችአይቪ መድሀኒት ህክምና ሞዴል አጠቃቀም።

ትዕግስት አለምነው

ስልክቁጥር፡ +251938246012፣

ኢሜል፡tigstalemnew26@gmail.com

የድርጅቱስም ፡የባህርዳር ዩኒቨርሲቲ የጤና ሳይንስ ትምህርት ክፍል የህዝብ ጤናየምርምር ፕሮጀክቱ ዓላማ፡ የማህበረሰብ አቀፍ የፀረኤችአይቪ መድሀኒት ስርጭት ተጠቃሚዎች በባህርዳር የህዝብ ጤናተቋማት ሞዴል አጠቃቀም።

ጥቅማ ጥቅሞች፡ በዚህ ጥናት ውስጥ ሰነዱ/ መዝገቡ ለተካተተ ሰው ቀጥተኛ ጥቅም የለውም ስጋት፡መረጃውከ ART ክትትል ቅጽ እና የታካሚ የህክምና መመዝገቢያ ወረቀት ብቻ ስለሆነ ምንም አይነት አደጋ የለም.

ሚስጥራዊነት፡ የታካሚዎች ስም አይጻፍምሁሉም መረጃዎች በጥብቅ ሚስጥራዊ ይሆናሉ እና ለጥናት ዓላማ ብቻ ጥቅም ላይ ይውላሉ።

አባሪ II የፍቃድቅጽ

ስሜ መረጃስብሳቢሆኜተመደብኩ።ዋና መርማሪው የማህበረሰብ አቀፍ ፀረኤችአይቪ ቴራፒ ሞዴል አጠቃቀምን የሚወስኑትን በባህርዳር የህዝብ ጤናተቋማት በሰሜን ምዕራብ ኢትዮጵያ 2022 በሚከታተሉት የኤችአይቪ ፖዘቲቭ ኅልማሶች ላይ ጥናት ማድረግ ይፈልጋል።

አባሪ III የውሂብ ማውጣት መሣሪያ

ይህ በባህርዳር ሰሜንም ዕራብ ኢትዮጵያ በባህርዳር የህዝብ ጤናተቋማት ለሚማሩ የማህበረሰብ አቀፍየፀረኤችአይቪ ቴራፒ ሞዴል አጠቃቀምን ለመወሰን የታለመየ ታካሚ መረጃ ማሰባሰቢያ ማረጋገጫዎች ነው፡በተቋም ላይ የተመሰረተ ተወዳዳሪ የሌለው የጉዳይ ቁጥጥር ጥናት

መሰብሰቢያ ቀን

የዝርዝር መታወቂያ ቁጥርን ያረጋግጡ.....

የመረጃስብሳቢ ስም

CAG አባል 1.አዎ 0.አይ

ተ.ቁ	ተለዋዋጮች	ምድብ	አስተያየት
ማህበራዊ-ስነ-ሕዝብምክንያቶች			
101	ዕድሜ	-----	
102	ጾታ	1. ወንድ 2. ሴት	
103	የጋብቻ ሁኔታ	1. ያገባ 2. የፋታ 3. የሞተባት 4. ያላገባ	
104	የትምህርት ደረጃ	1. ማንበብና መጻፍ የማይችል 2. የመጀመሪያ ደረጃ ትምህርት ቤት 3. ሁለተኛ ደረጃ ትምህርት ቤት 4. ኮሌጅ እና ከዛ በላይ	
105	የመኖሪያ ቦታ	1. ከተማ 2. ገጠር	
106	የሥራሁ ነታ	1. ሥራአጥ 2. ተማሪ 3. በቤት ውስጥ ይሰሩ /የቤት እመቤት 4. ገበሬ 5. መንግስት ተቀጠሪ 6. የራስ-ተቀጣሪ 7. የቀን ሰራተኛ 8. ነጋዴ 9. ሌላ	
ክሊኒካዊ ምክንያቶች			

201	የቫይረስ መጠን ደረጃ		
202	ቫይሮሎጂካል ውድቀት	1. አዎ 2. አይ	
203	የመጀመር የቫይረስ ጭነት ደረጃ		
204	መሰረታዊ የዓለም ጤና ድርጅት ደረጃ	1. ደረጃ I 2. ደረጃ II 3. ደረጃ III 4. ደረጃ IV	
205	መንሻሲዲ4 ብዛት		
206	የሳንባ ነቀርሳ ታሪክ	1. አዎ 2. አይ	
207	አጋር ለኤችአይቪ ምርመራ ተደረገ	1. አዎ 2. አይ 3. ያልታወቀ	
208	ለq 209 አዎ ከሆነ፣ የኤችአይቪ ሁኔታ	1. ፖዘቲቭ 2. ኒጋቲቭ 3. ያልታወቀ	
209	በክሊኒክ ውስጥ ሌላ ዓይነት እንክብካቤ አለዎት	1. አዎ 2. አይ	
ከህክምና ጋር የተያያዙ ምክንያቶች			
301	የመድሀኒት ቁርኝት	1. 1.ጥሩ 2. ደካማ	
302	LTFU	1. አዎ 2. አይ	
303	ሆስፒታል የመግባት ታሪክ	1. አዎ 2. አይ	
304	የ ART ቆይታ በወራት		
305	ቤዝላይን ART መድሀኒት		
ግላዊ ምክንያቶች			
401	የግብረሥጋ ጓደኛ ይኑሩ	1. አዎ 2. አይ	

402	አዎከሆነለባ 401፣ስንት		
403	የኤችአይቪ ሁኔታ ይፋ መሆን	1. ይፋሆነ 2. አልተገለጸም	
404	የኤችአይቪ ድጋፍ ቡድን ተሳትፎ አለዎት	1. አዎ 2. አይ	
405	የቤተሰብ አባል በCAG አለዎት	1. አዎ 2. አይ	
406	ከክሊኒክ በሰዓት (ደቂቃ) ርቀት		

Declaration

I, the undersigned, MPH in Student declare that this thesis is my original work in partial fulfillment of the requirement for the degree of Master of public health in Epidemiology.

Student's Name: _____ Signature: Tesfale Alemayehu _____

Place of submission: department of Epidemiology and Biostatistics, school of public health, college of Medicine and health science, Bahir Dar University.

Date of Submission: _____

This thesis work has been submitted for examination with my approval as university advisor(s).

Advisors, Name

1. Werku A. Signature: [Signature] Date: _____

2. Egoye M. Signature: [Signature] Date: Feb 2023

External examiner Name _____ Signature _____ Date _____

Internal Examiner Name _____ Signature _____ Date _____

Chair Person name Girachew T. Signature: [Signature] Date _____

Head of department Name Gobremichael Signature: [Signature] Date _____



EXAMINER'S APPROVAL FORM

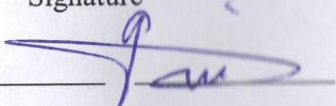
BAHIR DAR UNIVERSITY

College of Medicine and Health Sciences, School of Public Health Department
of Epidemiology and Biostatistics

Approval of thesis

I hereby certify that I have examined this thesis report entitled "determinants of community antiretroviral therapy model utilization among HIV positive adults attending at bahir dar public health facilities, Northwest Ethiopia: an institution based unmatched case-control study" by Tigist Alemnew. We recommend and approve the thesis report for a degree of "Master of Public Health in Epidemiology and Biostatistics".

Board of Examiners

<u>Prof. Getachew Degen</u>	<u></u>	
External examiner's name	Signature	Date
<u>G. Alemnew T.</u>	<u></u>	
Internal examiner's name	Signature	Date
<u>Chair person's name</u>	<u></u>	<u></u>
Chair person's name	Signature	Date

