ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

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Assessment of Antiretroviral Therapy Adherence and Associated factors Among Adult HIV-Infected Persons in Oromia Special Zone Surrounding Finfine, 2017

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ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Research Publications Office in effect at the time of Grant is forwarded as the result of this application.

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Table of Contents

List of tables

Page

List of figures

Acronyms & Abbreviation

AIDS	Acquired Immune Deficiency Syndrome
AOR	Adjusted Odds Ratio
ART	Anti-Retroviral Therapy
ARV	Anti- Retroviral
BMI	Body Mass Index
CDC	Center for Disease Prevention & Control
CD4	Cluster of Differentiation Cell Count
COR	Crude Odds Ratio
CI	Confidence Interval
FBO	Faith Based Organization
FBP	Food By Prescription
FMOH	Federal Ministry Of Health
HAART	Highly Active Antiretroviral Therapy
HCs	Health Centers
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HPs	Health Posts
IGA	Income Generating Activity
IRIS	Immune Reconstitution Inflammatory Syndrome
OIs	Opportunistic Infections
PLHIV	People Living with HIV
REC	Research Ethical Committee
SPSS	Statistical Package of Social Sciences
TCD4+	Total Cluster of Differentiation Cell Count
UNAIDS	United Nation report on AIDS
WHO	World Health Organization

Abstract

Background: The introduction of combination ART has resulted in striking reductions in HIV related mortality. Numerous reports have documented that the key to success of the HAART is the ability and willingness of HIV-positive individuals to adhere to ART regimens, and at least 95% adherence is required for the prescribed ART doses to be fully effective. However, pertinent data regarding the issue has been lacking in the study area.

Objectives*:* The main aim of this study was to assess the level of adherence and associated factors among adult HIV patients who were receiving ART from health centers of Finfine Surrounding Oromia Special Zone.

Methods: A facility based retrospective cross-sectional study was conducted from October 2016 to May 2017 on 389 patients' selected using systematic sampling technique. The study focused on assessment of ART adherence & its associated factors among Adult on ART whose ages were greater than 18 years & above. A pre tested & structured questionnaire was used to collect the necessary data & the collected data were entered into Epidata version 3.1 & analyzed using SPSS version 21. Then the magnitude of association between the different variables in relation to the adherence to ART was assessed through chi square test & then further analysis done using multivariate regression to confirm the effects of independent variables. During analysis, the significance level was set at 95% CI and P-value of <0.05 & the results were presented using tables containing frequency and percentage.

***Results*:** The adherence rate of the study patients was 80.5%. Majorities were females (66.3%), their median age was 36 and mean duration of treatment 3.3 years. Disclosing own status to sexual partners or others [(AOR 6.6, 95% CI 3.58,8.32)], doing assessment & counseling on adherence [(AOR 13, 95% CI 5.94,15.13)] & presence of regular ARV drug supply [(AOR 5.4, 95% CI 3.91,9.72)] were significantly associated with ART adherence.

Conclusion: The self-reported ART adherence level in this study is low compared to the expected standard. Disclosing own status to sexual partners or others, doing assessment & counseling on adherence , & regular ARV drug supply were associated with patients' adherence status.

1. Introduction

The increased availability of treatment has dramatically lowered the incidence of opportunistic infections, reduced rates of morbidity and mortality, and improved the quality of life & survival of people living with HIV/AIDS despite the fact that the treatment is not a cure and presents new challenges with respect to side-effects and drug resistance (1-3).

Antiretroviral therapy is administered in the form of highly active antiretroviral therapy (HAART), which is a combination of at least three different classes of drugs to suppress the HIV and stop the progression of HIV disease(4). In order to achieve the benefits of HAART, high levels of adherence to the ART are required. Non-adherence to ART may result not only in reduced treatment efficacy, but also in the development of viral resistance and increased progression to AIDS(4) .

Over half a million PLHIV have ever enrolled for chronic care & HIV related deaths were reduced by 50% as a result of significant improved access to care & treatment(5). However, further maximizing utilization of available services is needed to sustain adherence & improve quality to retain clients in care. In early 2014, the Ministry of Health developed strategic frame work for improving adherence & retention care(5). Among the strategies articulated in the frame work to make the ART effective are: preparation counseling before treatment, sustained ARV drug supply, improve the availability, prevention & management of opportunistic infections, use peer supporters , FBO (involve in adherence education) , strengthening family role in care & treatment following disclosure , strengthening tracing mechanism & nutritional support in food in-secure settings to improve patient adherence & retention in care (5, 6). Though different interventions are available, optimal adherence is not still achieved.

1.1. Background

Acquired immunodeficiency syndrome (AIDS) is a chronic disease & it has been a threat to humankind. Currently, there are an estimated 37 million people living with HIV/AIDS who are eligible for ART (but 41% ART coverage by March 2015) worldwide, of which 70% of them live in Sub-Saharan African countries that made it heavily affected by HIV/AIDS than any other regions of the world and out of 1.2 million deaths due to AIDS in the world, 66% occurred in Sub-Saharan Africa (7) .

UNAIDS has set a the three 90 target by the year 2020 to accelerate reaching epidemic control, which is '*90% of PLHIV know their status , 90% of those that know their status shall be adherent on ART & 90% of those on ART shall be virally suppressed' (8)* .

In Ethiopia, the disease was first detected in 1984 & free ART treatment began in 2005 (9) . In 2014, there were 769,000 people living with HIV and the overall prevalence rate was 1.2 % with heterogeneous distribution across regions & towns , 20,158 annual new infections , 23, 000 annual deaths , 542,121 ART needs (adults) , 367,000 on ART treatment & 62% overall ART coverage (6, 9).

In Oromia Region, there were 204, 000 (90 % adult) PLHIV in 2014 which is the highest compared to other regions in the country & the overall prevalence rate was 0.8% (2.1 % in urban & 0.5 in rural) & heterogeneous across its zones & towns (8). The annual new infections, deaths & the overall ART coverage were 8,900, 7,500 & 41 % respectively. Currently, 173,342 PLHIV are in need of ART, of which 94, 888 (May 2016 Regional HMIS report) of them are using the treatment in the Region (8).

According to the May 2016 Regional HMIS Report, in Finfine Surrounding Oromia Special Zone, currently there are 5213 PLHIV taking ART treatment (currently on ART) at HCs (no functional hospital yet in the Zone).

1.2. Statement of the problem

Sustaining adherence to antiretroviral therapy over the long term requires accurate and continuous monitoring, and this is a particular challenge for countries in sub-Saharan Africa(10). Inadequate adherence to ART causes treatment and virological failures, recurrent development of opportunistic infections (OIs) & ultimately deaths among People Living with HIV under ART(11).

The average rate of adherence to ART is approximately 84.6%, which is suboptimal compared to the standard (>=95%), despite the fact that long-term viral suppression requires near-perfect (almost full dose) adherence (2-4, 10-16) .

Finfine Surrounding Oromia Special Zone is one of the 18 zones in the Region with the highest HIV prevalence ranging from 0.27 % in Berek Woreda to 2.69% in Sululta Town & hence high number of clients are taking ART currently & following chronic care at Health Centers especially in the towns surrounding the country's Capital City, Addis Ababa, according to the May 2016 Regional HMIS report. There are various factors which could increase the risk of HIV infection to the surrounding community, among those: the presence of different small scale & mega industries which hire thousands of laborers, heavy truck drivers, recreational areas, military camps, educational institutions, high population migration from different parts of the country, especially into the zone's towns etc., according to HIV mainstreaming 6 month 2008 E.c report of Finfine Surrounding Oromia Zone Health Office. Though few studies were conducted in the country as well as in Oromia Region, no study was conducted about adherence in this Zone, where majority of the cases are using ART treatment.

Therefore, this study aims at assessing the adherence level & determinant factors of adult ART users in selected health facilities of Finfine Surrounding Oromia Special Zone, Oromia Region, Central Ethiopia.

1.3. Significance of the study

This study may contribute evidence (identify gaps) for program implementers, policy makers and organizations working in this area to develop appropriate interventions for ART adherence among adults to improve the HIV/AIDS chronic care services.

2. Literature review

Suboptimal (low) adherence to ART users could predispose them to various health consequences. The low adherence level to prescribed ARV medication brings increase viral multiplication, drug resistance, lowering CD4 count, treatment failure, worsening of clinical conditions & eventually death (15) .

Magnitude of suboptimal adherence

The average rates of adherence to ART in Africa & other countries of the world (Asia, South America ...) were reported to be 89.9% & 82.4% respectively (2, 4, 11, 16, 18,22-25). On the other hand, the rate of adherence in Ethiopia averagely 84.3% which is low compared to the standard (>=95%) despite variations existing between study areas ranging from 73.3-95.5% (1-3, 12-15, 17, 19-21). The variation of adult patients practicing adherence could be partially due to the study settings.

Factors affecting adherence

There are various factors which could affect the adherence status of ART patients. Among them, individual factors, provider factors (consistent adherence counseling), medication related factors & health system factors are the majors (6, 17).

Individual factors

Evidence from developing countries documented that the individual factors that are associated with suboptimal adherence include: educational status, low disclosure of HIV sero-status & treatment to the sexual partner & others, delayed in taking ART, irregular follow up, younger age, felt sick, baseline CD4 status & occupational status (13-16, 18-21).

Low socioeconomic level is also found to be a factor for patient adherence as indicated by a study in Brazil (22). In this study, among non-adherent patients, unemployed (those with lack of a fixed income) account for 43%.

Generally, better educated persons have access to information and are more likely to make better informed decisions(13). Similarly, the study of Togo showed that level of adherence is increased with patient's educational status (19).

However, there are mixed results (conflicting findings) regarding the educational status of patients taking ART& adherence level (13, 15, 19). A study conducted at Afar Region reveals no significant association between the adherence rate and the educational status of ART patients (13).

To the contrary, two studies from Nekemt Town & Togo revealed that tertiary education was found to be a negative predictor of ART adherence & those who had college education and above were 10 times less likely to be adherent than those who were unable to read and write (15, 19).

The variation in proportion of adults practicing adherence could due to be the study settings. In Afar Region, educational opportunity might not be accessible especially to rural site due to desert climatic conditions which could lead them to be illiterate. On the other hand, less educated people would tend to respect their providers advice and could be more likely to adhere to ART drugs. The probable reasons of more educated people experiencing less adherence of the Nekemt & Togo study may be relaxation & involvement in many activities (become busy), which may have contributions to miss the ART doses. In addition, those more educated may be more knowledgeable about the drug side effects and the fact that there is no cure for HIV/AIDS that may encourage them to be non-adherent (15, 18, 19). This could again warrant the need for further study.

Malnutrition emerged as a major barrier to medication adherence since nutrition can affect drug metabolism, absorption, and efficiency & hence malnourished patients may suffer frequently from opportunistic infections due to reduced immunity which could lead to non-adherence according to the study of Nekemt Town (15). Two studies from Ethiopia have indicated that the adherence status of ART was low among malnourished patients (13, 15).

Though disclosure of HIV status is not an easy issue (associated with complex process & varying degree of consequences) , without disclosure it becomes difficult to use medication in the presence of other people & get adequate social support. Studies reported that disclosure of HIV status is an important facilitator of ART adherence (2, 19). For example, two studies in Togo & Dubti (Afar Region) indicated that PLHIV who disclosed their HIV status to their sexual partners were seven times more likely to have good adherence to ART & 81.6% of them disclosed their sero status to their partners and other close relatives respectively (13, 19) .

On the other hand, two studies in Nepal & Ethiopia showed that non-disclosure of HIV status was found to be a factor for non-adherence (12, 16).

Provider related factors

There is a significant association between patient- service provider relationships for the success of ART adherence(14). Study done in Addis Ababa showed that those who had good relationship with health care providers were 3.15 times more likely to adhere to ART compared to those who had poor relationship (23).

Medication related factors

ART drugs are associated with side effects, including metabolic complications that can impact patient adherence levels (2). Studies revealed that patients who had side effects were more likely to be non-adherent (2,16, 22, 24).

Health system factors

Health system factors such as lack of accessible treatment & longer travel distance to ART sites are also identified barriers to adherence (2 , 12 , 13 , 16 , 24). Studies also reported that closeness to ART health facilities (distance) determines patient adherence status. Three studies from Asia indicated that the adherence level of ART patients was found to be low for those who travel longer distance to collect their medication (2, 16, 24).

In addition to those, social factors such as absence of supporters & presence of stigma (discrimination) (2, 24) , biological factors like being a female (16) & time factors like longer time on ART (13, 25) are known to be the influencing factors of adherence to ART.

Although ART is a lifelong commitment, the first months of therapy are important & also early initiation of ART improves survival by reducing mortality & morbidity as indicated by evidence & programmatic experience (6). Clinical and immunological improvement and viral suppression are expected when individuals adhere to ART despite opportunistic infections and/or immune reconstitution inflammatory syndrome (IRIS), & early adverse drug reactions may develop especially in the first three months of treatment (7). In this period, the risk of early treatment failure & rapid development of drug resistance is associated with poor adherence.

ART significantly decreases overall mortality, but late presentation for treatment is associated with advanced HIV disease, with severe immunodeficiency and existing co-infections and/or co-morbidities, low body mass index (severe malnutrition) and very low CD4 cell counts which challenge optimal adherence in many settings (6). A study from Ethiopia indicated that 82.2% of patients with median CD4 count 169 cells/ mm3 came on the late stage of the disease (13) .

Another study from Brazil also showed that 64.4% of patients with TCD4+ lymphocyte count < 200 cells/ mm3 (50%) initiate ART at late stage which reveals the existence of access barriers for a timely diagnosis and treatment of AIDS. It also revealed asymptomatic patients & those with TCD4+ cell count < 200 cells/mm3 tend not to adhere to the drug (22) .

Opportunistic infections are widely occurring & found to be the causes of morbidity & morality among PLHIV, & hence their presence or absence can influence the adherence status of ART(7). Study conducted at Nekemt Town reported that absence of opportunistic infections found to be predictors of good adherence (15). In that study, those who did not have opportunistic infections were about 7 times more likely to be adherent than their counterparts.

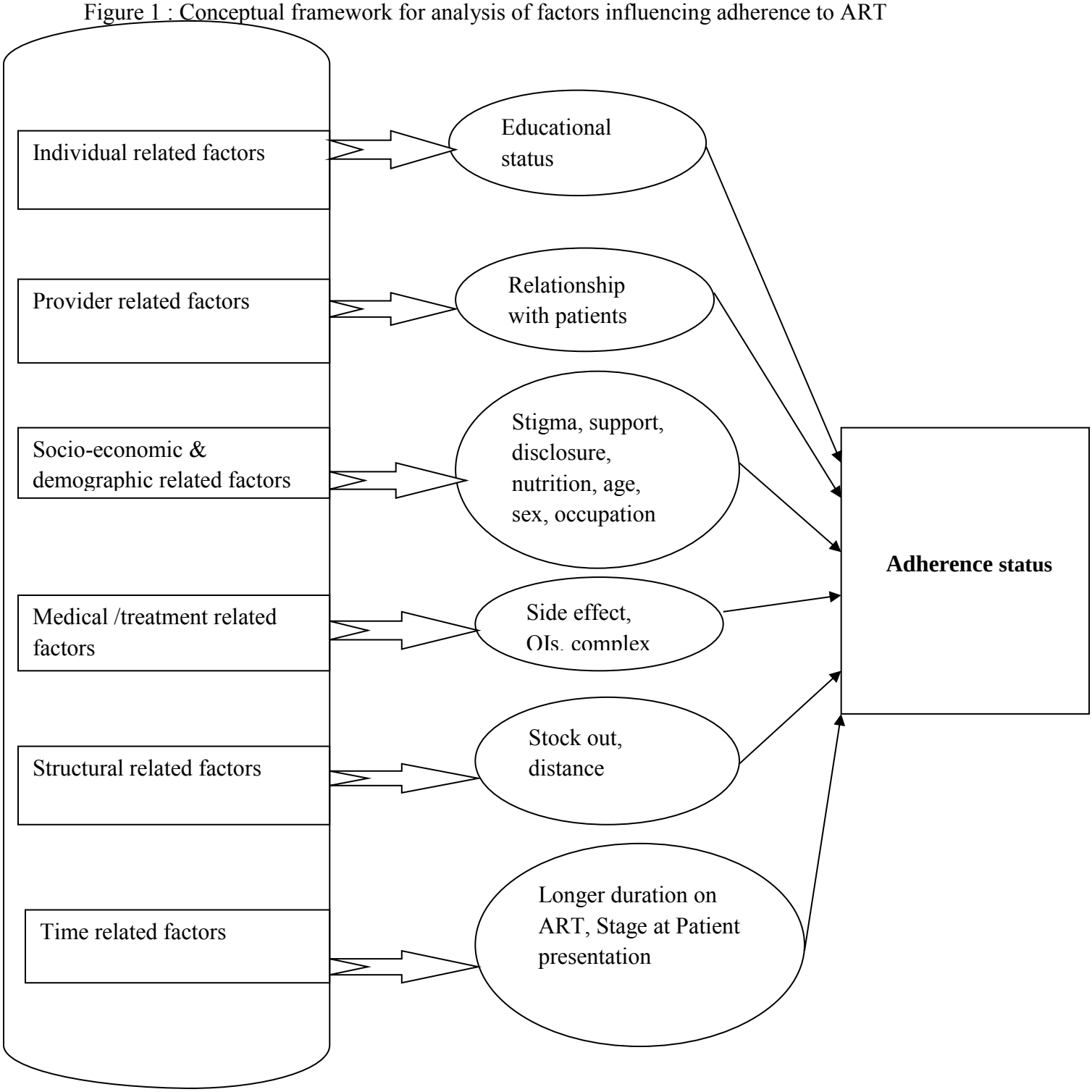
Relevance of ART adherence

Maintaining optimal adherence ensures suppression of viral multiplication, increase CD4 cells, delay progression to AIDS & symptom free quality of life (20). Taking greater than 95% of

prescribed doses is recommended for optimal virologic suppression and to minimize the rate of treatment failure. (13 (15, 18, 19). Virologic failure rate of greater than 50% is associated with less than 95% adherence rate (1, 3). Therefore, optimum adherence is highly essential for sustainable success to highly active antiretroviral treatment.

Nowadays, the number of patients enrolled to ART treatment is growing. So, determination of factors associated with this treatment & ensuring optimal adherence is crucial. However, this issue is not well addressed especially at Health Center level (where majority of patients are taking ART), particularly in Finfine Surrounding Oromia Special Zone. Therefore, this study will serve as a base line & bridge the gap related to knowledge about ART adherence in the Zone by assessing adherence status & its associated factors among Adult ART users.

Figure 1 : Conceptual framework for analysis of factors influencing adherence to ART



3. Objectives of the study

3.1 General Objective:

- To assess patient adherence status to ART in Finfine Surrounding Oromia Special Zone

3.2 Specific objectives:

- To determine the adherence status of ART users in Finfine Surrounding Oromia Special Zone
- To assess factors that influence the adherence status of ART users in Finfine Surrounding Oromia Special Zone

4. Methods

4.1. Study Area and Period

The study was conducted in Finfine Surrounding Oromia Special Zone at selected ART Health Centers from October 2016 to May 2017. The Zone is situated in Addis Ababa whereas the study Health facilities are located 25 – 72 km away from the Zone in all directions. ART service was started in 2006 at some Health centers & then expanded gradually. There were 5213 patients taking ART treatment at HCs (no functional hospital yet in the Zone) in May 2016.

4.1.1 Source Population

All HIV infected persons taking ARV drugs in Finfine Surrounding Oromia Special Zone were the source population.

4.1.2 Study Population

HIV infected patients 18 years and above who were attending the ART Health centers in the zone and who had complete registration; intake form and follow-up form during the study.

4.2 Inclusion & Exclusion Criteria

4.2.1 Inclusion Criteria

Adults 18 years and above who were actively using the treatment between December 5-26, 2016 were included in the study.

4.2.2 Exclusion Criteria

- Lost to follow-up (drop, lost), transfer out, died & stopped treatment patients, pregnant women & children less than 18 years during the study period were excluded.
- Those ART Health centers which started ART service for less than a year were excluded from the study.

4.3 Study design

- A facility based retrospective cross-sectional study design was conducted in Health Centers of Finfine Surrounding Oromia Special Zone. The study was focused on assessment of ART adherence & its associated factors among Adult HIV-infected persons.

4.4 Sample Size & Sampling Procedure

4.4.1 Sample Size

Sample size was determined using single proportion formula by taking adherence prevalence rate 81.1% from similar study (13), 5% margin of error, 95 % confidence interval of certainty and the estimation of population proportion (p), where p was the proportion of adults greater than or equal to 18 years who had started & were using ART during the study period.

The following formula was used for sample size calculation:

n= (z_/2)2 * p (1-p)

d² (0.05)2

Whereas:-

n= sample size

p= assume stabilized adherence rate, 0.81

Zx/2= 1.96, the standard normal variable at 95% confidence interval

d= 0.05 (Margin of error or precision)

n= (0.81)(0.19) (1.96)2 = 236 ART users and a 1.5 design effect was applied for minimize sampling error. Finally 10% of the calculated value was added to compensate the possible missing records. The sample was 1.5x236= 354, & to compensate missing records 10% = 35. Finally, the total sample size was 354 +35= 389.

Table 1 : ART Health Centers Finfine Surrounding Oromia Special Zone, July 2016

S.n	Woreda/ Town	Name of ART Hc	Currently on ART till Ginbot 2008	Allocated S/Size	Remark
1	SebetaAwas	Awash	46	4	
		Tefki	44	4	
2	SulultaWoreda	Chancho	424	32	
		Derba	6	–	Started ART service less than a year
3	Welmera	Menagesha	131	10	
4	Akaki	Abusera	23	–	Started ART service less than a year
5	Mulo	Hojedure	107	8	
6	Berek	Siregoyo	10	–	Started ART service less than a year
7	Holota Town	Holota	852	64	
8	Sendafa Town	Sendafa	426	32	
9	Sebeta Town	Sebeta	1113	83	
		Alemgena	32	–	Started ART service less than a year
10	Burayu	Burayu	783	58	
11	Sululta	Sululta	280	21	
12	Dukem	Dukem	607	45	
13	Legetafo	Legetafo	296	22	
14	Gelan	Gelan	33	5	
Total			**5213**	**389**	

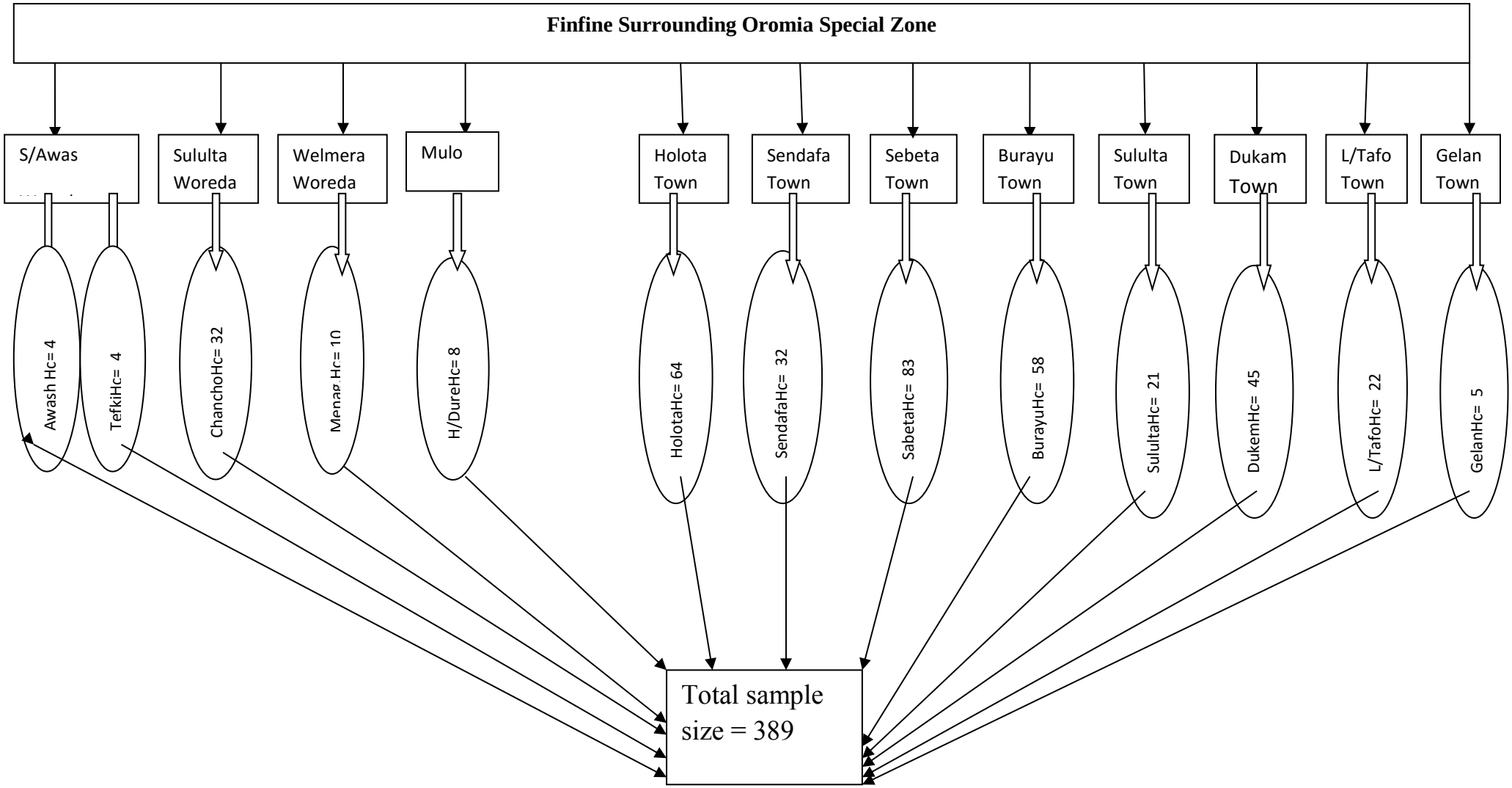


Figure 2 : Sampling frame of ART adherence & associated factors among adult PLHIV in Finfine Surrounding Oromia Special Zone

4.4.2 Sampling Procedure

Systematic sampling technique was used to select the record of study participants. The calculated sample was proportionally allocated to each selected health facility based on the currently on ART cases they had. Then after the first sample drawn, the rest selected using interval based on the value obtained until the allocated sample achieved.

4.5 Data Collection Procedures

The data were collected from the patients' records from ART room that has been managed by trained provider or data clerk using structured checklist (English version questionnaire) based on the necessary variables (basic information about clinical, laboratory, and demographic record) that were developed from ART intake form, follow-up form & other relevant data which were developed by the Ministry of Health. The data were collected by previously untrained on ART three BSc Nurses who were trained for two days on the way of data collection, handling & coding. Additionally, one Health Officer was involved as a supervisor.

4.6 Study Variables

4.6.1 Dependent variable

- ART adherence status

4.6.2 Independent variables

- Socio-demographic characteristics (age, sex, residence, educational status, employment status, and marital status), clinical characteristics (WHO staging, CD4 count), duration of treatment, disclosure status ….

4.7 Operational definitions

- ART adherence is the regular & sustainable lifelong use of HIV medications to suppress viral multiplication.
- Adherence is considered Good in this study if a patient is adhered to a minimum of 95% to the prescribed doses of medication based on missed appointment which is self-report from the patient's record (not missing any daily dose, missing < 2 daily dose for a month 30 doses & missing <=3 daily doses for 2 months 60 doses). Patients missed more than the above stated daily doses considered as non-adherent (HIV care/ART follow up form, FMOH).
- Body Mass Index (BMI) is a measure of body fat based on height & weight that applies to adult men & women. It is a person's weight in kilograms divided by the square of height in meters & shows the nutritional status of adults.
- Highly Active Anti-Retroviral Therapy (ART) is a combination of three or more Antiretroviral medicines used to slow the rate at which HIV makes copies of itself (multiplies) in the body.
- Immune Reconstitution Inflammatory Syndrome (IRIS) is a collection of inflammatory disorders seen in some AIDS or immune suppression after ART medication in which the immune system begins to recover & responds to previously acquired OIs with an overwhelming inflammatory response.

4.8 Data Quality Management

The data were evaluated & checked for its completeness & consistency through pretest on data collection format. The supervisor & principal investigator performed immediate supervision on daily basis, & every completed questionnaire was checked for completeness & consistency. Finally, the completed data were cleaned before entering into Epidata version by the principal investigator.

4.9 Data Analysis Procedures

Data were entered into Epidata version 3.1 & then it was exported to SPSS version 21.0 for analysis. Then bivariate logistic regression analysis was performed to check whether each independent predictor had a significant association with the outcome variable after the fitness of the model for the variable was checked by Hosmer and Lemeshow test. Finally, those predictors that had a p value of < 0.25 & those shown significant associations were entered into multivariable logistic regression for further analysis. Then the relevant findings were presented using tables containing frequencies & percentages.

4.10 Ethical Consideration

Ethical clearance was obtained from the Addis Ababa University College of Health Sciences School of Public Health & then permission was obtained from the Oromia Regional Health Bureau, Finfine Surrounding Oromia Special Zone Health Office & the study areas' Woreda or Town Health Offices. Then, collections of data were started by trained data collectors. During the process of data collection & then after, its confidentiality was assured & kept properly.

4.11 Strategy for Dissemination of the Study Finding

Formal report of each copy will be submitted to the Addis Ababa University, College of Health Sciences, School of Public Health as partial fulfillment of degree of master of public health, Finfine Surrounding Zone Health Office & the Investigator. During the formal final presentation of the research report, all concerned bodies will be invited to attend & after communication with Zonal CDC team, the result will also be presented to the study ART Health facilities during program review meeting.

5. Result

5.1. Socio-demographic characteristics of the Patients

A total of 389 HIV-infected persons' records on antiretroviral regimen were selected from ART Health Centers in Finfine Surrounding Oromia Special Zone. Among those, the largest age groups belonged to 35-44 years. The median age of the patients was 36. Two third 258 (66.3%) were females & most of them 297 (76.3%) live in urban. More than half 214 (55%) of them were married & the majority 316 (81.2%) were Orthodox Christians. Concerning educational status, 155 (39.8%) & two third 142 (36.5%) of them were educated primary level up to grade 1-8 & had no formal education respectively. The occupational status of the patients was unemployed 118 (30.3 %) followed by daily laborers 72(18.5%) (Table2).

Table 1 Socio-demographic characteristics of Adult People Living with HIV/AIDS in Finfine Surrounding Oromia Special Zone, Central Ethiopia, 2017: A facility based study (n=389)

Variables		Frequency	Percent
Age	25-34	26	6.7
	35-44	363	93.3
Sex	Male	131	33.7
	Female	258	66.3
Place of residence	Urban	297	76.3
	Rural	60	15.4
	Out of the Zone	15	3.9
	Out of the Region	17	4.4
Marital status	Single	41	10.5
	Married	214	55
	Divorced	85	21.9
	Widowed	43	11.1
	Not recorded	6	1.5
Religion	Orthodox	316	81.2
	Muslim	25	6.5
	Protestant	46	11.8
	Others	2	0.5
Educational status	No formal education	142	36.5
	Primary (1-8)	155	39.8
	Secondary (9-2)	71	18.3
	Tertiary (Diploma, …)	21	5.4
Occupation	Employed (Gov., NGO, Private)	80	20.7
	Unemployed	118	30.3
	Daily laborer	72	18.5
	Housewife	65	16.7
	Farmers	27	6.9
	Others	27	6.9

5.2 Adherence status of the patients

Three hundred thirteen (80.5%) of patients adhered to the prescribed doses of ARV medication (Table 3).

Table 2 : Adherence status of Adult People Living with HIV/AIDS in Finfine Surrounding Oromia Special Zone, Central Ethiopia, 2017: A facility based study (n=389)

Variable		Frequency	Percent
Adherence category	Adherent (good)	313	80.5
	Not adherent (fair or poor)	76	19.5

5.3 Other characteristics related to the patient

5.3.1. Medication and time related factors

Half of the patients 197 (50.6%) took their ART drugs for more than four years including prophylactic OI drugs, Cotrimoxazole 234 (60.2%) & Isoniazid 16 (4.1%). Regarding drug side effect, 16 (17%) of them reported the presence of drug side effect during their last visit. More than three fourth 297 (76.3%) of the patients started TDF +3TC+EFV- 1e (original regimen) & 284 (73%) of them still taking this regimen. The number of patients not missed any doses of the prescribed medication during their last visit were 220 (56.6%), whereas 93 (23.9%) of them missed < 2 days of a month doses or < = 3 days of two month doses given. The rest 76 (19.5%) of the patients missed >=2 days of 30 doses & >=4 days of 60 doses given respectively (Table 4).

Table 3 : Medication and time related factors of Adult People Living with HIV/AIDS in Finfine Surrounding Oromia Special Zone, Central Ethiopia, 2017: A facility based study (n=389)

Variables	Frequency	Percent
Duration of ART taken (months)		
1-6	5	1.3
7-24	70	18
24-48	117	30.1
49+	197	50.6
Presence of drug side effect		
Yes	16	17
No	323	83
Original regimen (patient started)		
TDF +3TC+EFV (1e)		
TDF +3TC+NVP (1f)	297	76.3
AZT+3TC+NVP (1c)	60	15.4
AZT+3TC+EFV (1d)	15	3.9
Others	17	4.4
Treatment change?		
Yes	105	27
No	284	73
Number of days missed the appointment		
< 2 days missed (for 30 doses given)	66	17
> =2 days missed (for 30 doses given)	34	8.7
<=3 days missed (for 60 doses given)	27	6.9
>=4 days missed (for 60 doses given)	42	10.8
Not missed	220	56.6
Current OI prophylaxis taking (Cotrimoxazole)		
Yes	234	60.2
No	155	39.8
Current OI prophylaxis taking (Isoniazid)		
Yes	16	4.1
No	373	95.9

5.3.2. Disease related factors

Most of the patients 377 (96.9%) had no opportunistic infections & more than half of them 208(53.5%) had base line CD4 count < 200 cells/mm3 (Table 4). On the other hand, their current CD4 count 121 (38.6 %) was >500 cells/mm3. More than half of the patients 208 (53.4 %) enrolled at the late stage of the disease, more than three fourth 318 (81.7%) of them were in WHO Stage 1 & almost all of them had working functional status currently (Table 5).

Table 4 : Disease related factors of Adult People Living with HIV/AIDS in Finfine Surrounding Oromia Special Zone, Central Ethiopia, 2017: A facility based study (n=389)

Variables	Frequency	Percent
Current opportunistic infections (OIs)		
Yes	12	3.1
No	377	96.9
CD4 cells /mm3 at base line		
>500	8	2.1
350-500	40	10.3
200-350	108	27.8
<200	208	53.8
Not recorded	25	6.4
Current CD4 cells /mm3 (within 6-8 month)		
>500	121	38.6
350-500	65	20.7
200-350	49	15.6
<200	51	16.6
Not recorded	27	8.5
WHO clinical stage at enrollment		
WHO Stage 1	92	23.7
WHO Stage 2	89	22.9
WHO Stage 3	182	46.8
WHO Stage 4	26	6.6
Current WHO clinical stage		
WHO Stage 1	318	81.7
WHO Stage 2	28	7.2
WHO Stage 3	35	9
WHO Stage 4	8	2.1
Current patient functional status		
Working	385	99
Ambulatory	4	1

5.3.3 Individual (patient) related factors

The HIV status of 377 (96.9%) patients' family was known (Table 5). More than half 220 (56.6%) of the patients visited health facility on the scheduled date & majority 308 (79.17 %) of them disclosed their sero status to their partners or others. Regarding the nutritional status of the patients, two third of them 206 (66.8%) were categorized as well nourished (Table 6).

Table 5 : Individual (patient) related factors of Adult People Living with HIV/AIDS in Finfine Surrounding Oromia Special Zone, Central Ethiopia, 2017: A facility based study (n=389)

Variables		Frequency	Percent
Family member HIV Status	Known	377	96.9
	Unknown	12	3.1
Patient came on appointment scheduled?	Yes	220	56.6
	No	169	43.4
Disclose HIV sero-status to sexual partner/other	Yes	308	79.17
	No	81	20.83
Nutritional status (BMI)	Undernourished	103	26.5
	Well nourished	206	66.8
	Obese	26	6.7

5.3.4 Provider & Health system related factors

Majority of the patients, 337 (86.6%) were assessed & counseled on adherence by providers & or adherence supporters & almost all (97.9%) of the patients' subsequent visit was written & followed using appointment calendar. ARV drugs & Food by Prescription Service were available at the health facilities for 96.4% & 78.1% of the patients without interruption during & three months prior to the study time respectively (Table 7).

Table 6: **Provider & health system** related factors of Adult People Living with HIV/AIDS in Finfine Surrounding Oromia Special Zone, Central Ethiopia, 2017: A facility based study (n=389)

Variables	Frequency	Percent
Assessment & counsel on adherence done		
Yes	337	86.6
No	52	13.4
Presence of adherence supporter &/or data clerk in the HC		
Yes	358	92
No	31	8
Presence of appointment calendar (registered on book) in the HC		
Yes	381	97.9
No	8	2.1
Availability of ARV medication at least 3 months before the study time		
Yes	375	96.4
No	14	3.6
Availability of Food by Prescription (FBP) service		
Yes	304	78.1
No	85	21.9

5.4 Bivariate and Multivariate analysis of socio-demographic characteristics

Among adherent, 293 (93.6%) of the patients' ages belonged to 35-44 years whereas 6 (7.9%) of the non-adherent were between 25-34 years. Regarding sex, 203 (64.9%) of the adherent patients were females while 55 (72.4%) of them were non-adherent. 234 (74.8%) of the adherent patients live in urban, & more than half 167 (53.4%) of them & 47 (61.8%) of the non-adherent were single (not married). The educational status of 128 (40.9%) adherent patients was primary level (Grade 1-8) followed by those had no formal education 110 (35%). Those adherent & non-adherent patients who had secondary and above educational level comprise 75 (24 %) and 17 (22.4 %) respectively. On the other hand, the majority of adherent patients' occupational status was unemployed 93 (29.7%) followed by daily laborers 58 (18.5%) (Table 8).

Table 7 : Bivariate & multivariate analysis of socio demographic characteristics of ART users in Finfine Surrounding Oromia Special Zone, Central Ethiopia, 2017 (n=389).

Variables		Adherence status			
		Adherent n (%)	Non adherent n (%)	COR at 95 % CI	AOR at 95 % CI
Age	25-34	20 (6.4%)	6 (7.9%)	0.79 (0.19,1.73)	0.71 (0.27,1.92)
	35-44	293 (93.6%)	70 (92.1%)	1	1
Sex	Male	110 (35.1%)	21 (27.6%)	1.42 (0.97,1.77)	1.41 (0.8, 1.95)
	Female	203 (64.9%)	55 (72.4%)	1	1
Place of residence	Urban	234 (74.8%)	63 (82.9%)	1	1
	Rural	51 (16.3%)	9 (11.8%)	1.52 (0.14,3.91)	1.32 (0.52,1.51)
	Out of the zone	13 (4.2%)	2 (2.6%)	1.75 (0.14,14.01)	1.42(0.8,16.21)
	Out of the region	15 (4.7%)	2 (2.7%)	2.01 (0.17,6.88)	1.09 (0.15,6.31)
Marital Status	Married	167 (58.4%)	47 (61.8%)	1	1
	Single	35 (11.1%)	6 (7.9%)	1.64 (0.65,4.13)	1.53 (0.66,1.76)
	Divorced	68 (21.7%)	17 (22.4%)	1.13 (0.60,2.09)	1.10 (0.58,1.96)
	Widowed	37 (11.8)	5 (6.6%)	1.74 (0.69,4.36)	1.62 (0.58,4.21)
	Not recorded	6 (2.0%)	1 (1.3)	1.68 (0.74,4.22)	1.45 (0.44,3.22)
Educational status	No formal education	110 (35.1%)	32 (42.1%)	1	1

	Primary (1-8)	128 (40.9%)	27 (35.5%)	1.38 (0.16,2.7)	0.87 (0.14,1.18)
	Secondary (9-12)	58 (18.5%)	13 (17.1%)	1.3 (0.25,3.94)	1.19 (0.23,2.66)
	Tertiary (college , university)	17 (5.5%)	4 (5.3%)	1.24 (0.18,3.24)	1.12 (0.15,2.98)
Religion	Orthodox	258 (82.4%)	58 (76.3%)	1	
	Muslim	17 (5.5%)	8 (10.5%)	0.48 (0.19,1.16)	
	Protestant	34 (10.8%)	8 (10.5%)	0.96(0.47,2.41)	
	Others	4 (1.3)	2 (2.7%)	0.45(0.17,1.13)	
Occupational status	Employed (Gov., NGO, Private)	63 (20.2%)	17 (22.4%)	1	1
	Unemployed	93 (29.7%)	25 (32.9%)	1.03 (0.12,2.11)	0.91 (0.10,2.07)
	Daily laborer	58 (18.5%)	14 (18.4%)	1.15 (0.2,2.9)	0.97 (0.1,2.3)
	Housewife	54 (17.3%)	11 (14.5%)	1.36 (0.16,2.64)	1.12 (0.10,2.35)
	Farmers	22 (7%)	5 (6.5%)	1.22 (0.22,3.99)	1.06 (0.15,3.46)
	Others	23 (7.3%)	4 (5.3%)	1.59 (0.12,3.78)	1.62 (0.09,3.52)

The above table shows socio demographic variables in this study were not statistically significant associated factors with patients' adherence status.

5.5 Bivariate & Multivariate analysis of other factors associated with ART Adherence

One hundred forty three (45.7%) of adherent patients initially enrolled to ART at early stage (WHO stage1 & 2) of the disease and more than three fourth 250 (79.9%) of them are in WHO treatment stage (T- stage) 1 currently. The baseline CD4 of more than half 169 (54%) adherent patients was < 200 cells/mm3. On the other hand, 121 (38.6%) of the adherent patients had > 500 cell/mm3 current CD4. Regarding the presence of current opportunistic infections, only 8 (2.6%) & 4 (5.3%) of the adherent and non-adherent patients had OIs during their last visit respectively. The last visit functional status of almost all adherent patients 310 (99%) & non adherents 75 (98.7%) was in a 'working' state.

About 80 % (250) of the adherent patients took ART for two or more years. Among the adherent patients, 256 (81.8%) of them had no drug side effects. One hundred fifty seven (50.2%) & 44 (57.9%) of the adherent & non adherent patients started TDF+3TC+EFV (1e) first line original regimen respectively & none of them switched to second line regimen currently despite 85 (27.2%) of the adherent & 20 (26.3%) of the non-adherent patients changed their treatment to different regimens of first line drugs due to various reasons such as drug side effect, program change, etc. Concerning OI prophylaxis, 192 (61.3%) & 15 (4.8%) of the adherent patients took Cotrimoxazole & Isoniazid drugs as a preventive therapy whereas 42 (55.3%) and only 1 (1.3%) of the non-adherent received these drugs respectively.

Two hundred seventy five (87.9%) of the adherent patients disclosed their status to their sexual partners or others. Regarding family member HIV status, 233 (74.4%) of the adherent patients known their status, &19 (25%) of the non-adherent not recognized yet. Two hundred twenty (70.3%) of the adherent patients kept their scheduled visit & more than two third 214 (68.4%) of them had a category of well-nourished nutritional status.

Assessment & adherence counseling was done for 300 (95.8%) adherent patients whereas more than half 39 (51.3%) of the non-adherent were not provided it by trained health care providers or others. On the other hand, 290 (92.7%) of the adherent patients were following their care where adherence supporters are available. Three hundred eight (98.4%) of the adherent patients' subsequent visits were following using appointment calendar at majority of the health facilities, but 5 (6.6%) of the non-adherents were not registered using this tracing aid.

Food by prescription service for undernourished PLHIV was available where 247 (78.9%) adherent patients followed their care whereas 18 (25%) of the non-adherents were following their treatment where this service is absent. Concerning ARV drug, 308 (98.4%) of the adherent patients were regularly supplied the medication compared to the non-adherent 68 (89.5%) (Table 9).

Table 8 : Bivariate & multivariate analysis of factors associated with ART adherence in Finfine Surrounding Oromia Special Zone, Central Ethiopia, 2017 (n=389).

Variables		Adherence status			
		Adherent n (%)	Non adherent n (%)	COR at 95 % CI	AOR at 95 % CI
Clinical WHO stage at enrollment	Stage I	71 (22.7%)	21 (27.6)	1	1
	Stage II	72 (23%)	17 (22.4%)	1.25 (0.61,2.57)	0.95 (0.7,1.3)
	Stage III	148 (47.3%)	34 (44.7%)	1.29 (0.69,2.37)	0.84 (0.58,2.12)
	Stage IV	22 (7%)	4 (5.3%)	1.62 (0.50,5.25)	0.82 (0.25,4.91)
Base line CD4 count (cells/mm3)	>500	6 (1.9%)	2 (2.6%)	1	
	350-500	33 (10.5%)	7 (9.2%)	1.57 (0.26,9.47)	1.11 (0.80,1.53)
	200-350	86 (27.5%)	22 (28.9%)	1.30 (0.25,6.9)	1.01 (0.12,5.33)
	<200	169 (54%)	39 (51.3%)	1.44 (0.28,7.43)	0.97 (0.32,8.55)
	Not recorded	19 (6.1%)	6 (8%)	1.06 (0.17,6.68)	0.87 (0.08,5.99)
Current CD4 count (cells/mm3)	>500	121 (38.6%)	29 (38.2%)	1	1
	350-500	65 (20.7%)	22 (28.9%)	0.63 (0.31,1.26)	0.59 (0.83,1.18)
	200-350	49 (15.6%)	10(13.3%)	1.10 (0.46,2.66)	0.75 (0.32,2.35)
	<200	51 (16.6%)	8 (10.6%)	1.55 (0.59,4.06)	1.21 (0.47,3.22)
	Not recorded	27 (8.5%)	7 (9.2%)	0.87 (0.45,1.69)	0.61 (0.51,2.99)
Current OIs	Yes	8 (2.6%)	4 (5.3%)	1	1
	No	305 (97.4%)	72 (94.7%)	2.2 (0.62,7.3)	2.13 (0.57-7.89)
Duration on ART (in months)	1-6	4 (1.3%)	1 (1.3%)	1.03 (0.11,9.37)	1.07 (0.05,6.33)
	7-24	59 (18.8%)	11 (14.5%)	1.37 (0.66,2.84)	1.12 (0.36,2.41)
	24-48	93 (29.7%)	24 (31.6%)	0.98 (0.56,1.74)	1.01 (0.44,1.68)
	>=49	157 (50.2%)	40 (52.6%)	1	1
Drug side effect	Yes	57 (18.2%)	9 (11.8%)	0.66 (0.35,1.25)	0.7 (0.32-1.54)
	No	256 (81.8%)	67 (88.2%)	1	1
Original regimen (patient started)	TDF+3TC+EFV (1e)	157 (50.2%)	44 (57.9%)	1	
	TDF+3TC+NVP (1f)	8 (2.6%)	2 (2.7%)	1.21(0.23-5.47)	
	AZT+3TC+NVP (1c)	54 (17.2%)	8 (10.5%)	1.89 (0.84-4.27)	
	AZT+3TC+EFV (1d)	26 (8.3%)	7 (9.2%)	1.04 (0.42-2.56)	
	Others	68 (21.7%)	15 (19.7%)	1.27 (0.66-2.44)	

Current regimen	TDF+3TC+EFV (1e)	190 (60.7%)	47 (61.8%)	1	
	TDF+3TC+NVP (1f)	8 (2.6%)	2 (2.7%)	0.99 (0.20-4.81)	
	AZT+3TC+NVP (1c)	82 (26.2%)	19 (25%)	1.07 (0.59-1.93)	
	AZT+3TC+EFV (1d)	33 (10.5%)	8 (10.5%)	1.02(0.44-2.35)	
Current OI prophylaxis (Cotrimoxazole)	Yes	192 (61.3%)	42 (55.3%)	1.3 (0.88-4.1)	
	No	121 (38.7%)	34 (44.7%)	1	
Disclosure HIV-status to sexual partner /others	Yes	275 (87.9%)	32 (71.1%)	9.95 (1.35,14.1)	6.6 (3.58,8.32)**
	No	38 (12.1%)	44 (28.9%)	1	1
Nutritional status (BMI)	Undernourished	77 (24.6%)	26 (34.2%)	0.64 (0.47,2.35)	0.63 (0.32,1.91)
	Well nourished	214 (68.4%)	46 (60.5%)	1.57 (0.91,2.71)	1.48 (0.93,2.35)
	Obese	22 (7%)	4 (5.3%)	1	1
Assessment & counsel on adherence done	Yes	300 (95.8%)	37 (48.7%)	24.3 (1.95-29.4)	13 (5.94,15.13)**
	No	13 (4.2%)	39 (51.3%)	1	1
Presence of adherence supporter/data clerk	Yes	290 (92.7%)	68 (89.5%)	1.48 (0.88,1.35)	1.4 (0.49,3.96)
	No	23 (7.3%)	8 (10.5%)	0.67 (0.4,1.4)	1
Presence of (registered on) appointment calendar	Yes	308 (98.4%)	71 (93.4%)	1.63 (1.07,3.1)	1.01 (0.86,2.9)
	No	5 (1.6%)	5 (6.6%)	1	1
Availability of food by prescription	Yes	247 (78.9%)	57 (75%)	1.64 (0.59,4.6)	1.11 (0.54-2.3)
	No	66 (21.1%)	18 (25%)	0.84 (0.53,1.33)	1
Availability of ARV drug supply to the patient	*Yes*	308 (98.4%)	68 (89.5%)	7.25 (1.68,11.7)	5.4 (3.91,9.72)**
	No	5 (1.6%)	8 (10.5%)	1	1

Remark: 1- Reference , P-value - < 0.05* has association , P-value - < 0.01** has significant association

The table (8) indicates factors related with patients, providers & health systems were significantly associated with patient adherence to ART which could be explained as follows:

The characteristics of the people living with HIV AIDS that significantly associated with ART adherence were Disclosing own status to sexual partner or others (P value <0.001) , doing assessment & counseling on adherence (P value < 0.001) & regular supply of ARV medications (P value < 0.001).

Factors associated with ART adherence were tested using Chi-squared test to compare characteristics of PLWHA who were adhered to ART with those were not. In this study, socio demographic variables were not significantly associated with ART adherence.

6. Discussions

This study assessed the level of ART adherence and its associated factors among adult PLHIV & analysis was done to see whether the socio demographic variables & other factors were associated with patient adherence status or not. In this study , socio demographic variables such as age, sex, place of residence, religion, occupation; educational status and marital status were not significantly associated with the level of patients ART adherence. The result is consistent with some studies done in Ethiopia in which they remained insignificant (14, 17).

The finding of this study indicated females were less adhered to their treatment compared to their males' counterparts. It is similar to the study of Nepal, that indicated being a female is a factor for poor adherence due to socio-cultural and economic restrictions put up on them (16) .

The study shown urban residents were found less adherent compared to the others despite they live where the treatment is easily accessible. This finding is different from the study of Nekemt that indicated closeness to ART health facilities associated with patients' adherence (15). The variations could be due to the high number of patients from urban in this study & the settings where it conducted. To the contrary, lack of accessible treatment & longer travel distance to ART sites are identified barriers to patients adherence as indicated by studies of Bale Robe, Dubti ,Vietnam & Nepal (2, 12, 13, 16, 24).

Non adherence was more prevalent among those had 'no formal education' & then became decline. Similarly, the study of Togo showed that level of adherence is increased with patient's educational status (19). The low educational level may help explain the difficulties of patients to understand adherence. In contrast, study conducted at Afar Region reveals no significant association between the adherence rate and the educational status of ART patients (13). This could be less educated people would tend to respect their providers advice and may be more likely to adhere to ART drugs. However, the variation of this finding could be due to the study setting.

The study revealed the adherence level of the patients was 80.5%. The finding is lower compared to the study done in Nekemt which was 89.3% (15). The variation could be the method used which is direct interview with multi method approach such as pill count while this study conducted from the existed data. The adherence level of this study was similar to the study finding in Afar region where the level of adherence was 81.1 % (13). The similarity of finding may be the method used (record review). On the other hand, it is higher than couple of studies done in Brazil, Togo & Tepi in which adherence to ART medication was 75%, 78.4 % & 78.6% respectively (25, 18, 19) .The variations might be, this study involved many health facilities which could increase representativeness whereas they limited to single health facility & conducted in different settings.

The finding of this study indicated patients adherence status was slightly declined as treatment duration increased. This finding is similar to the studies done by Bekele in Afar Region & Tsion in Mizen Teferi (Tepi) that shown longer duration on ART found to be the influencing factors of adherence to ART (13, 25).

The study revealed more adherence among patients had no OIs .This is similar with the finding of Nekemt town study that reported absence of opportunistic infections found to be predictors of good adherence (15). In that study, those who did not have opportunistic infections were about 7 times more likely to be adherent than their counterparts. In addition to this, the presence or absence of OIs can influence the adherence status of ART patients according to WHO 2016 guideline (7).

Similarly, the baseline CD4 count of more than half non-adherent patients was < 200cells/mm3. The finding is comparable to the study from Brazil that showed patients with total CD4 count < 200 cells/ mm3 (50%) initiate ART at late stage which reveals the existence of access barriers for a timely diagnosis and treatment of the disease (22). The similarity of these findings could be the methods used (both retrospective study).

Among the non-adherent patients, half of them came to the treatment at the late stages of the disease. Late presentation to the treatment could be associated with advanced HIV disease with severe immunodeficiency and existing co-infections and/or co-morbidities, low body mass index (severe malnutrition) and very low CD4 cell counts which challenge optimal adherence in many settings according to National Guidelines for Comprehensive HIV Prevention, Care And Treatment 2014, Federal Ministry of Health (6).

The result of the study also indicated the adherence level of the patients was low where adherence supporters are not available. The finding agrees with the study of Vietnam that indicated social factors such as absence of supporters associated with patients' adherence status (2, 24).

The factors that significantly associated with adherence among ART users were disclosing own status to sexual partner or others & doing assessment & counseling.

There was statistically significant difference between patients who were disclosed their status their status to their sexual partners or other & who didn't it. Disclosing own status help using the prescribed medication regularly & getting different kinds of supports (for example, social support) which needed for PLHIV patient to adhere to the treatment. PLHIV are more likely to adhere to ART if they disclose their HIV status to their partners or others. The study shown patients who were disclosed their status to their sexual partners & or others were 6.6 times more likely adhered to their treatment compared to those didn't. This finding is similar with the studies of Togo & Afar region that indicated PLHIV who disclosed their HIV status to their partners or others were seven times more likely to have good adherence to ART (13, 18). In contrast, the studies done in Bale Robe, Debrebirhan & Nepal (12, 16, 20) shown non-disclosure was a factor for poor adherence. The variations of these studies could be due to the settings.

Good assessment & counseling before ART initiation & on follow up bases believed to have a smooth interaction between provider & patient, hence paves the way for good adherence. The study also revealed that patients assessed & counseled about their medication & related issues were 13 times more adhered to their medication compared to those not assessed & counseled. This is similar with National HIV Guideline for Comprehensive HIV Prevention, Care and Treatment 2014, WHO Consolidated Guidelines on the use of Antiretroviral Drugs for treating and preventing HIV infection Recommendations for a Public Health approach 2016 & the study of Nepal (6, 7, (16).

Availability of regular ARV drug supply was a factor for patients' adherence. The study revealed patients who were supplied continuous ARV medication were 5.4 times more likely adhered to their medication compared to those supplied interrupt. This finding is in line with the Guideline set by Federal Ministry of Health in 2014 & the study of Nepal (6,(16). However, it is different from the findings of Goba & Debremarkos Hospitals (14, 17). The existence of variations among the studies could be due to the settings.

7. Strength & Limitations of the Study

7.1. Strength

The strength of this study was covering majority of ART Health Centers in the Zone which could increase representativeness. The study could as well serve as baseline for subsequent studies.

7.2. Limitations of the study

Generally, this study has some limitations: First, in this study, only dose adherence of the patient's record was assessed. Secondly, since it is record review, quality of data (registering all required information) on entry & follow up form depends on provider's commitment & attention and some of the variables were not filled. Time & financial constraints were factors for not assessing other aspects of adherence status. On the other hand, the cross-sectional nature of the study by itself is a limitation.

However, to minimize errors procedures such as training of data collectors & supervisors, pretesting & ongoing supervision were conducted.

8. Conclusions

- The ART adherence level of this study is suboptimal compared to the expected standard (>= 95%).
- Unemployed patients less adhered to the medication compared to others.
- Some variables remained unrecorded.
- Disclosing owns status to sexual partners or others, doing assessment & counseling on adherence & regular ARV supply were associated with patients' adherence.

9. Recommendations

- The health sector at each levels & other organizations working on this area should access , promote early testing & prompt treatment as well as the benefits of adherence to ART treatment so as to achieve better enrollment , sustained adherence , keep patients retention in care & ultimately improve their survival.
- Involving unemployed individuals especially women in IGA could help them not to practice risky sexual behaviors, improve their livelihood to care themselves & consequently help them retain in care.
- Health care providers in particular & other adherence supporters at facility level have to focus on & strengthen patient centered adherence counseling & follow up as well as encourage them to disclose their status in order to enhance patients' capacity to solve barriers of disclosure & adherence on the course of their treatment & get various supports needed for PLHIV.
- Periodic monitoring of patients' treatment status using laboratory investigations (CD4 count & viral load testing) based on the set guideline is vital to assess their progress & take appropriate measures accordingly as some of the patients had no recorded CD4 status. This issue needs attention.
- Proper recording & keeping of patients' data is valuable for evidence based decisions. So, the health facilities have to improve their data management practice.
- Further study is also recommended to strengthen the findings of this study and to fill the identified gaps so as to have a broader view of the study objectives.

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11. Annexes

Annex 1. Questionnaire

No.	Variable	Response (please encircle it)	Remark
1	Name of Health Facility	----------	
2	Age (in completed year)	1. 18-24 2. 25-34 1. 35-44 2. 44+	
3	Sex	1. Male 2. Female	
4	Place of residence	1. Urban 2. Rural 3. Out of the Zone 4. Out of the Region	
5	Marital status	1. Married 2. Single 3. Divorced 4. Widowed 5. Not recorded	
6	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Other	
7	Educational Status	1. No formal education 2. Primary (1-8) 3. Secondary (9-12) 4. Tertiary (Diploma , Degree & above	
8	Occupation	1. Employed (Gov., NGO, Private) 2. Unemployed 3. Daily laborer 4. Housewife 5. Farmers….Drivers, merchants 6 . Others/Specify ----------	

9	Date of HIV confirmed written?	Yes , if yes write the date ------- No
10	Unique ART No. written?	Yes. If yes write it ---------- No
11	Date of ART Started written?	Yes, if yes write the date ---------- No
12	Disclose HIV sero-status?	Yes. No
13	Current opportunistic infections (OIs)	Yes , if yes (Pulmonary/ Extra Pulmonary TB, Candidacies (oral /pharyngeal / esophageal), PCP, Others/specify ---------- No
14	Current opportunistic illness (OIs) prophylaxis /treatment	1. Cotrimoxazole (CPT) 2. Isoniazide (IPT) 3. Others/Specify ----------
15	Anthropometry done (BMI)	Yes. If yes, write the no. BMI--,Wt.---, Ht---- No
16	Current patient functional status	1. Working 2. Ambulatory 3. Bedridden
17	WHO clinical stage at enrollment	1. WHO Stage 1 2. WHO Stage 2 3. WHO Stage 3 4. WHO Stage 4
18	Current WHO clinical stage	1. WHO Stage 1 2. WHO Stage 2 3. WHO Stage 3 4. WHO Stage 4
19	CD4 cells /mm3 at base line	1. >500 2. 350-500 3. 200-350 4. <200 5. Not recorded
20	Current CD4 cells /mm3 (within 6-8 month)	1. >500 2. 350-500 3. 200-350 4. <200 5. Not recorded

21	Duration of ART taken	1. 1-6 month 2. 7-24 month 3. 24-48 month 4. 49 month & above
22	Original regimen (when patient starts taking ART)	1. TDF +3TC+EFV (1e) 2. TDF +3TC+NVP (1f) 3. AZT+3TC+NVP (1c) 4. AZT+3TC+EFV (1d) 5. Others/Specify ----------
23	ART regimen taken currently	1. TDF +3TC+EFV (1e) 2. TDF +3TC+NVP (1f) 3. AZT+3TC+NVP (1c) 4. AZT+3TC+EFV (1d) 5. Others (substitution, 2nd line) /specify ----------
24	Number of days missed the appointment	1. < 2 days missed (for 30 doses given) 2. > =2 days missed (for 30 doses given) 3. < =3 days missed (for 60 doses given) 4. > =4 days missed (for 60 doses given)
25	Adherence category	1. Adherent (good) 2. Not adherent(fair & poor)
26	Presence of adherence supporter &/or data clerk in the HC	Yes No
27	Availability of ARV medication at least 3 months before the study time (for each patient)	Yes No
28	Availability of Food By Prescription (FBP) at least 3 months before the study time	Yes No
29	Presence of appointment calendar(registered on book) in the HC	Yes No
30	Pt came on appointment scheduled?	Yes No
31	Family member HIV Status	Known Unknown
32	Assessment & counsel on adherence done	Yes No

Name of data collector ---------- Name of supervisor ----------
Signature ---------- Signature ----------
Date ---------- Date ----------

Annex 2. Amharic Version Questionnaire

በፊንፊኔ ዙሪያ ኦሮሚያ ልዩ ዞን ለጸረ ኤች አይቪ መድኃኒት ተጠቃሚዎች አድሄራንስ ጥናት የተዘጋጀ መጠይቅ
አኔክስ 2

ቁጥር	ጥያቄ	መልስ	መግለጫ
1	የጤና ጣቢያ ስም	----------	
2	ዕድሜ (ሙለ ዓመት)	1. 18-24 3. 35-44 2. 25-34 4. 44 እና ከዚያ በላይ	
3	ጾታ	1. ወንድ 2. ሴት	
4	የመኖሪያ ቤት	1. ከተማ 3. ከዞኑ ውጪ 2. ገጠር 4. ከክልሉ ውጪ	
5	የትደር ሁኔታ	1. ያገባ 3. የፈታ/የፈታች 5. አልተመዘገበም 2. ያላገባ 4. የሞተበት/የሞተባት	
6	ሀይመኖት	1. ኦርቶዶክስ 3.ፕሮቴስታንት 2. ሙስሊም 4. ሌሎች	
7	የትምህርት ደረጃ	1. ምንም ያልተማረ 3.ሁለተኛ ደረጃ 2. አንዳኛ ደረጃ (1-8) 4.ኮሌጅ ትምህርት እና ከዚያ በላይ (ዲፕሎማ፣ድግሪ…ወዘተ)	
8	የሥራ ሁኔታ	1. ቋሚ ሠራተኛ (የመንግስት፣የግል፣ወዘተ) 2. ያልተቀጠረ 3. የቀን ሠረተኛ 4. የቤት እመቤት 5. ኦርሶኦደር፣ሹፌር፣ነጋዴ 3. ሌሎች/ጥቀስ----------	
9	ኤች አይቪ በደም ውስጥ መገኘቱ የተረጋገጠ ቀን የተጻፈ	1.አዎ፣አዎ ከሆነ ቀኑ ይጠቀስ---------- 2. አይደለም	
10	ዩኒክ ኤ አረቲ ቁጥር ተጽፏል	1. አዎ፣ አዎ ከሆነ ቀኑን ጥቀስ---------- 2. አይደለም	
11	ኤ አርቲ የጀመረበት ቀን ተትፏል	1. አዎ፣ አዎ ከሆኑ ቀኑ የጠቀስ 2. አይደለም	
12	ቪይረሱ እንደለበት/ባት ለሌለ ሰው ተነግራል	ነ. አዎ 2. አይደለም	
13	በአሁኑ ጊዜ ተጎዳኝ በሽታዎች ስለመኖራቸው?	1.አሉ፣ካሉ (ቲቢ፣ካንዲደሲስ፣ፒሷፒ፣ሌሎችይጠቀስ 2.የለም	
14	በአሁኑ ጊዜ ተጎዳኝ በሽታዎች ምን አይነት መከላከያ መድኃኒት እየወሰዱ እ ደሆነ	1. ኮትራምክሳዞል 2. አደሰኒያዚድ 3. ሌሎች/ይጠቀስ----------	
15	አንትሮፓሜትሪ/ቢኤሞአይ/ክብደት/ቁመት ተሰርቷል?	1.አዎ፣ አዎ ከሆነ ቁጥር ቢም አይ ክብደት-----ኪግ፣ ቁመት፣ሰ.ሜ---- 2. የለም	
16	በአሁኑ ጊዜ መድኃኒት እየወሰደ/ች የለው ሰው የሚገኝበት ሁኔታ/ፈንክሺናል ስታተስ/	1. ሥራ እየሰራ ያለ 2. በራሱ መንቀሰቀስ የሚችል 3. የአልጋ ቁራኛ	

17	መጀመሪያ ለህክመና ስመዘገብ ያ ው የ ደብለው ኤች ኦ. ደረጃ	1. ደብሊው ኤች ኦ. ደረጃ 1 2. ደብሊው ኤች ኦ. ደረጃ 2 3. ደብሊው ኤች ኦ.ደረጃ 3 4. ደብሊው ኤች ኦ. ደረጃ 4	
18	ህመምተኛው መድኃ ት ከጀምረ በኃላ; ወይም በአሁኑ ጊዜ የለበት/ባት ደረጃ	1. ደብሊው ኤች ኦ. ደረጃ 1 2. ደብሊው ኤች ኦ. ደረጃ 2 3. ደብሊው ኤች ኦ.ደረጃ 3 4. ደብሊው ኤች ኦ. ደረጃ 4	
19	የመጀመሪያ የ ሲዲፎር መጠን	1. ከ500 በላይ 3. ከ200-350 2. ከ350-500 4. ከ200 በታች 5. አልተመዘገበም	
20	በአሁኑ ጊዜ ያለው የ ሲዲፎር መጠን	1. ከ 500 በላይ 3.ከ200-350 2. ከ350-500 4. ከ 200 በታች 5. አልተመዘገበም	
21	መድኃኒት ላይ የቆየበት /ት ጊዜ	1. ከ1-6ወራት 3. ከ24- 48 ወራት 2. ከ7-24 ወራት 4. 49 ወራት ና ከዚያ በላይ	
22	ህመምተኛ መድኃኒቱን ስጀምር/ስትጀምር የተወሰዱ ሬጅምን	1. ቲዲ ኤፍ፣3ቲሲ እና ኤፍቪሬንዚ/ዋን ኢ/ 2. ቲዲ ኤፍ፣3ቲሲ እና ኔቬራፒን (ዋን ኤፍ/ 3. ኤዚቲ ቲዲ ፣3ቲሲ እና ኔቬራፒን /ዋንሲ) 4. ኤዚቲ ቲዲ ፣3ቲሲ ኤፋቪሬንዝ /ዋንዲ/ 5. ሌሎች(ይጠቀስ)	
24	ከቀጠሮ የቀረበት/የቀረችበት ቀን ብዛት	1. ከሁለት በታች(30 ዶዝ ለተሰጠ) 2. ሶስትና ከዚያ በላይ(30 ዶዝ ለተሰጠ) 3. ሶስትና ከዚያ በታች(60 ዶዝ ለተሰጠ) 4. አራትና ከዚያ በላይ (60 ዶዝ ለተሰጠ)	
25	ለአድሄራንስ ያለባት/ያለችበት ደረጃ	1.አድሄራንት የሆነ/የሆነች (ጥሩ) 2. አድሄራንት ያልሆነ /ያልሆነች(መጠናኛ/ ዝቅተኛ)	
26	አድሄራንስ ሳፖርተር በጤና ጣቢያው ውስጥ መገኘት	1. አለ 2. የለም	
27	የፀረ ኤች አይ ቪ መድኃኒት ቢያንስ ጥናቱ ከመካሄዱ 3ወራት በፊት አንስቶ መኖሩ /ለእያንዳንዱ ህመምተኛ/	1. አለ 2. የለም	
28	በምግብ እጥረት ለተጉዱት ህምምተኞች ማከሚያ የምሆን የተዘገጀ ምግብ መኖሩ	1. አለ 2. የለም	
29	የቀ ሮ መከታተያ መዝገብ በጤና ጣቢያው ውስጥ ለአገልግሎት መዋሉ/መኖሩ	1. አለ 2. የለም	
30	ህመምተኛው በቀጠሮ ቀን መጥቷል/መጥታለች	1. አዎ 2. አይደለም	
31	የህመምተኛው ቤተሰብ የኤች አይቪ ሁኔታ	1.ታውቋል 2. አልታወቀም	
32	የህመምተኛው የአድራንስ ሁኔታ መዳሰሱና የምክር አገልግሎት ማግኘቱ	1. አዎ 2. አይደለም	

የመረጃ ሰብሳቢ ስም ---------- የሱፐርቫይዘር ስም ----------

ፊርማ ---------- ፊርማ ----------

ቀን ---------- ቀን ----------