



**TIME TO ATTRITION AND ASSOCIATED FACTORS AMONG
ADULTS ENROLLED TO PRE-ART CARE IN TEPPI DISTRICT
HOSPITAL, SHEKA ZONE, SOUTH WEST ETHIOPIA**

By:

Tamirat Shewanew (BSc.)

A RESEARCH THESIS SUBMITTED TO JIMMA UNIVERSITY, COLLEGE
OF PUBLIC HEALTH AND MEDICAL SCIENCES, DEPARTMENT OF
EPIDEMIOLOGY; IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTERS OF PUBLIC HEALTH IN EPIDEMIOLOGY

JUNE, 2014

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Advisors:

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¹Abstract

Background: *Pre-Antiretroviral care starts with patients testing positive for Human Immuno Virus and continuing until the first antiretroviral drugs are dispensed. High pre-ART attrition is signal of poor uptake of interventions. Historically, strategies to address attritions have focused on the ART period, with greatest attention and resource prioritization but, that of Pre-ART period attrition was over looked and given lesser attention.*

Objectives: *This retrospective study assessed time to attrition and associated factors among adults enrolled to pre-ART care from September 1, 2010 to August 31, 2013 in Teppi District, Hospital, Sheka Zone, South West Ethiopia*

Methods: *The study has examined data on all adult pre-ART patients who were enrolled in to care during the year 2010-2013 at Teppi District Hospital. Cox proportional hazard model was used to assess the association of predictor variables with attrition (mortality and loss to follow-up). Kaplan-Meier survival table was used for comparison of the pre-ART care attritions of patients segregated by predictor variables at enrolment.*

Results: *Patients were followed for 337.6 person years from enrolment to pre-ART outcomes, with an overall attrition of 216(33.13%) and the highest attritions, 194 (89.8%) and 203 (94%) occurred within the 6 months and one year of follow-up period respectively. The median follow-up period was 8.9 (interquartile range, 4.57-13.23) months. The independent predictors of attrition included not having been started with cotrimoxazole prophylaxis (AHR=1.51, 95%CI, 1.02-2.25), being positive for tuberculosis (AHR=2.16, 95%CI, 1.35-3.45), living in ≥ 10 km from the service provision area (AHR=1.44, 95%CI, 1.07-2.0) and undisclosed HIV status at all (AHR=3.04). The risk of attrition for clients who did not start cotrimoxazole prophylaxis at pre-ART care during enrolment was higher when compared to those who did (AHR=1.51). The difference in attrition time between these two categories of patients was statistically significant.*

Conclusion: *Pre-ART attrition was highest with in the first year of pre-ART care follow up time due to not having been started with cotrimoxazole prophylaxis, being positive for tuberculosis, living in ≥ 10 km and having no HIV status disclosure at all. Thus, close monitoring of pre-ART patients and improving uptake of CPT prophylaxis during this period is highly recommended.*

¹ **Keywords:** *Retention, Attrition, Loss to follow-ups, Death, Ethiopia*

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Table of Content

Contents	page
Abstract	I
Acknowledgment	II
Table of content	III
List of figures.....	V
List of tables	VI
Abbreviation and Acronyms.....	VII
1 INTRODUCTION.....	1
1.1 Back ground	1
1.2 Problem statement	2
2 LITERATURE REVIEW	4
2.1 Overview	4
2.2 Linkages to care, attrition and retention during pre-ART period	4
2.3 Factors associated with patient attrition	6
2.4 Conceptual frame work.....	9
2.5 Significance of the Study	10
3 OBJECTIVES.....	11
3.1 General objective	11
3.2 Specific objectives	11
4 METHODS AND MATERIALS.....	12
4.1 Study area and period.....	12
4.2 Study design	12
4.3 Population	13
4.3.1 Source population.....	13

4.3.2 Study population	13
4.3.3 Inclusion and exclusion criteria	13
4.4 Sample size determination and sampling procedures	13
4.4.1 Sample size determination	13
4.4.2 Sampling technique	13
4.4.3 Study variables	13
4.5 Data extraction tools and procedure	14
4.5.1 Data extraction tools	14
4.5.1 Data extraction procedure	14
4.6 Operational definitions	14
4.6.1 Assessment of attritions among pre-ART patients	15
4.9 Ethical consideration	16
4.10 Dissemination plan	16
5 RESULTS	18
5.1 Socio-demographic characteristics of the patients	18
5.2 Patient related characteristics of the patient	19
5.3 Health service related characteristics of the patient	21
6 DISCUSSION	29
7 CONCLUSIONS AND RECOMMENDATION	32
7.1 Conclusion	32
7.2 Recommendation	32
7.3 Strength of the study	33
7.4 Limitations of the study	33
REFERENCE	34
DATA EXTRACTION FORMAT	38

List of figures

Figure 1 Conceptual frame work on time to attritions and associated factors among adults enrolled to pre-ART care in Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013 (Developed after reviewing other similar studies)	
Figure 2 Baseline characteristics of 652 adult pre-ART patients enrolled to pre-ART care with respect to service in the catchment area and referral information at Teppi District Hospital Sheka Zone South West Ethiopia, during 2010-2013	22
Figure 3 Patient attrition experiences segregated by baseline cotrimoxazole provision, among adult pre-ART patients enrolled to pre-ART care at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013	27
Figure 4 Patient attritions segregated by baseline disclosure status among adult pre-ART patients enrolled to pre-ART care at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013.....	27
Figure 5 Patient attrition experiences segregated by baseline service availability among adult pre-ART patients enrolled to pre-ART care at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013.....	28

List of tables

Table 1 Baseline socio-demographic characteristics of 652 adult pre-ART patients enrolled to pre-ART care at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013.19

Table 2 Baseline patient related characteristics of 652 adult pre-ART clients enrolled to pre-ART care at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-201321

Table 3 Baseline disclosure status of 652 adult Pre-ART clients enrolled to pre-ART care at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013.....22

Table 4. The estimated attrition of adult pre-ART patients at the end of 3, 6, 12, 24 and 36 month’s observation periods at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013.....23

Table 5 Comparisons of pre-ART attritions segregated by CPT status and disclosure at enrolment, Kaplan Meir Survival Table.....24

Table 6 cox regression analysis for independent predictors of time to attrition.....26

Abbreviation and Acronyms

AIDS	Acquired Immuno-Deficiency Syndrome
ART	Anti-Retroviral Therapy
ARV	Anti-Retroviral Drugs
BMI	Body Mass Index
B.Sc	Bachelor of Sciences
CI	Confidence Interval
CD4	Cluster of Differentiation 4
CPT	Cotrimoxazole Prophylaxis
FMOH	Federal Ministry of Health
HCT	HIV Counseling and Testing
HIV	Human Immuno-Deficiency Virus
IQR	Inter-Quartile Range
IPT	Isoniazid Preventive Therapy
LTC	Loss to Care
LTFU	Lost to Follow Up
M.SC	Master of Sciences
MSH	Management Science for Health
OIs	Opportunistic Infections
PLHIV	People Living With HIV/AIDS
SSA	Sub-Saharan Africa
SPSS	Statistical Package for Social Sciences
TB	Tuberculosis
UNAIDS	United Nations Program on HIV/AIDS
VCT	Voluntary Counseling and Testing
WHO	World Health Organization

1 INTRODUCTION

1.1 Back ground

Globally, 35.3 million people were living with HIV at the end of the year 2012 of which 9.7 million people had started antiretroviral therapy (ART) worldwide (1,2) . More than two-thirds of the global cases are located in sub-Saharan Africa (2 , 3).

The Ethiopian Ministry of Health (MOH) introduced ART in 2003 on subsidized, fee-based scheme, and ART became freely available since 2005. Further, ART was decentralized to health centers in 2006(4). By mid 2006, health centers in different regions, started to provide treatment as part of up-scaling ART care continuum (5).

Not all patients who present at earlier stage of their illness are eligible for ART. Even when they are eligible for ART, prompt initiation of treatment will depend on several factors including availability of medicines and trained health workers. It is therefore likely that in settings with high disease burden and limited resources, some patients will either default from treatment or will even die before they are started on ART (3,5) .

A review literature of patient retention in SSA showed that less than one-third of patients remain continuously in care between testing HIV-positive and starting ART (6)

Ethiopian Demographic and Health Survey (EDHS 2011) show that national adult HIV prevalence of 1.5% which ranges from 0.9% in SNNP and 1.0% in Oromiya region to 5.2% in Addis Ababa and 6.5% in Gambella region, *however*, in some regions 40% of patients who were enrolled to care dropped out from treatment; a situation that requires serious attention (7).

The 2010 WHO guidelines for adults and adolescents recommended initiating ART for all individuals (including pregnant women) with a CD4 count ≤ 350 cells/mm³ regardless of WHO clinical stage and for those with severe or advanced HIV disease (WHO clinical stages 3 or 4) regardless of CD4 count. For people with active TB disease or HBV co-infection requiring HBV treatment, 2010 guidelines recommended initiating ART regardless of CD4 cell count(7, 8).

1.2 Problem statement

Although, AIDS remains one of the world's most serious health challenges, the burden of the epidemic continues to vary considerably between continents and countries (1). Sub-Saharan Africa remains most severely affected, with nearly 1 in every 20 adults (4.9%) living with HIV and accounting for 69% of the people living with HIV worldwide (2). Regarding gender issues, in sub-Saharan Africa, women represent 58% of the people living with HIV and bear the greatest burden of care (1, 2).

Attritions of patients enrolled in HIV care is a persistent challenge in sub-Saharan Africa and end up with large numbers of patients to early mortality at ART but, patients who are not yet eligible for ART are less likely to have died. However, they remain at risk of late ART initiation and, consequently, increased risk of early mortality after starting ART (4).

Retention in pre-ART care poses challenges in Ethiopian ART hospitals, because of high LTFUs (3). Pre-ART patients who are neither engaged in care nor on ART are more likely to transmit HIV to sex partners than those who engage in care and initiate early ART(4 , 6).

Poor pre-ART retention in care, or the failure to link patients from HIV testing to HIV care and retain them until they are eligible for ART, is a problem that has only recently begun to be recognized in the literatures. Patients starting ART with CD4 counts below 25 cells/mm³ faced a more than 3-fold increased risk of death compared to those with baseline CD4 counts above 50 cells/mm³ (4). Those who survive suffer more morbidity and utilize more medical care resources than would otherwise have been necessary(6).

Less than one third of Ethiopia's HIV-positive patients are currently enrolled in comprehensive care and support services. Of those who need ART, only 62% are receiving it (6,10).

High pre-ART attrition is signal of poor uptake of interventions. Historically, strategies to address attritions have focused on the ART period, with greatest attention and resource prioritization but, that of Pre-ART attrition was over looked and given lesser attention(11). A study from Malawi indicated that, attrition rates were 31 times higher among pre- ART patients compared with those started on ART (adjusted hazard ratio, 31.0, 95% CI, 22–44)(12).

There are many causes of attrition along the continuum, including patient costs (transportation, loss of income), service delivery factors (prolonged waiting times, high frequency of clinic visits, poor linkage between services, lack of or poor patient monitoring systems, poor integration, stock-outs) patient factors and beliefs (limited perception of treatment issues, denial, alternative health beliefs, lack of disclosure to partner/family), and most importantly, overburdened, understaffed healthcare systems (11).

According to a cohort analysis and quality assessment of ART program conducted in Ethiopia between the years 2007 and 2010, of individuals receiving a positive diagnosis, there was evidence that 73.2% had been referred to care, but only 47% of those had registered for care, and 53% of registrants were found to be eligible for ART (7, 11).

Facility based annual reports of HIV progress in Teppi District Hospital indicated that, the challenges posed from the epidemic of HIV and poor patient linkage to care and follow-ups remained unresolved. The prevalence of getting new infections per the estimated catchment population is increasing by disproportionately affecting the productive age groups and women. Patients who diagnosed positive are also failed from linkage to care continuum and linked ones are also lost during the continuum with observable patients' morbidity and mortality during the early periods of ART initiation (13) .

According to a study from northern Ethiopia, compared to patients who have started ART, less emphasis has been given to the follow-up of pre-ART patients, making them a neglected group of population and thus has opened a door for high patient attrition during pre-ART period (14).

The major problem that driven to conduct a study in Teppi District Hospital was, previously no studies have been conducted and no solutions have been attempted to solve the problem in the area. The aim of this study was therefore to estimate time to attrition, in facility level Pre-ART clinic of Teppi District, Hospital and to identify the major determinant factors believed to be associated with patient attrition based on information's collected from registries (ART follow up form, ART clinic intake form and registration log book), for the provision of information to decision makers and health care providers to develop relevant intervention strategies targeted to reduce morbidity and mortality of HIV diagnosed patients .

2 LITERATURE REVIEW

2.1 Overview

During the pre-ART period, a number of interventions can improve the health of people living with HIV and provide an effective pathway to ART for those who require it. Pre-ART care spans the period between a person testing positive for HIV and needing ART. The period can be very short, just the time for assessment, or otherwise can span to a period of years (2).

More recently, attrition has emerged as a key indicator of HIV program effectiveness, and there is a growing emphasis on monitoring programs to improve long-term retention in care (3).

It is found that the median rates of attrition (stage completion) for patients in sub-Saharan Africa were 48% in Stage 1, 54% in Stage 2, and 44% in Stage 3 (6).

Synthesis of available literature from sub-Saharan Africa showed that 54% of those who are not yet eligible for ART were lost to follow-up before becoming eligible, while 32% of the people living with HIV who were eligible for ART were lost before initiating treatment (6, 9).

Attrition at 1, 2, 3 and 6 months for those in the pre-ART stage in a rural setting of Malawi was 75%, 82%, 91% and 96% vs. 1%, 3%, 5% and 10% for patients who started ART (11). Available limited data suggest that the losses of pre-ART eligible patients are significant (15).

2.2 Linkages to care, attrition and retention during pre-ART period

A study conducted in Arbaminch Hospital showed that the median time between HIV diagnosis and pre-ART enrolment was 1 day with 49% of the patients being enrolled within the same day of testing. The median time from enrolment to initiation was 16 days. A quarter of the patients were LTFUs. The pre-ART mortality rate was 13.1 per 100 PYO, with the highest mortality being during the early phase 25.9 per 100 PYO during the one year of follow-ups period (4).

In another study of pre-ART patients followed up for 512.6 person-years, 88.0% of LTFUs occurred in the first one year of pre-ART care and all cases of death occurred in the first 6 months of pre-ART care. The retention rates on pre-ART care at 1, 2, 3, 4 and 5 years observation period were 36.1 cases per 100 PYs, 17.4 cases per 100 PYs, 9.6 cases per 100 PYs, 3.7 cases per 100 PYs and 0.6 cases per 100 PYs respectively. Regarding patient attrition, particularly in step 1 resulted in 20–33% loss of those initially identified as HIV-positive(6).

A pre-ART tracking study in Uganda found that attrition rates were significant after being eligible, with approximately 21% attrition 12 months after becoming ART eligible by CD4 count. Up to 80% of patients diagnosed with HIV infection may be LTFU between enrolment and initiation. A young people also have substantial rates of LTFU from pre-ART care with approximately 52% being retained at 12 months, as demonstrated by 2010 ICAP data from 13 sub-Saharan African countries. Pregnant and young women have poorer retention than older pregnant women at 50% and 63% respectively at 12 months following diagnosis (11).

A study here in Ethiopia shows, from a total of LTFU cases, 86% had less than one month of follow-up time, 10.4% had between one and six months, and 3.6% had more than seven months of follow-up time in the clinic, but only 84.8% failed to return since their first clinic visit or did not show up after the date of enrollment. (14).

According to a study conducted in Mozambique at 12 months for ART ineligible patients, 41% were lost at a median 137 days after enrolment. The median CD4 count last documented for LTC patients was 482 cells/ml with the distribution of last known WHO stages 47% stage I, 28% stage II and 25% stage III. Male sex was associated with a significantly higher risk of LTC [AHR=1.48] and youngest age group of 15-25 years old [AHR= 0.55] (16). A retrospective study of pre-ART clients at a district hospital in southern Ethiopia found pre-ART attrition was high; one quarter was lost to follow-up during pre-ART care (17).

A study from Uganda shows, from a follow up study of pre-ART clients, overall attrition was 42.94% of which 37.61% were LTFU and 5.34% of patients died (overall incidence of attrition was 14.4 per 100 PYOs of which LTFU and death comprises of 12.6 and 1.8 per 100 PYOs respectively) (18).

According to a study from Kenya, of 18% patients lost due to attrition before starting ART, LTFUs constituted the largest part of this attrition (85%) with median time to attrition of 1.1 months(19).

Another finding from Mozambique showed that patient attritions occurred to nearly 50% of all patients enrolled to care and among these 80% of attritions happened during the first year(20).

2.3 Factors associated with patient attrition

2.3.1 socio-demographic and economic factors

Different literatures have indicated that socio-demographic and economic factors do have an association with patient attritions (3). According to a study conducted in Arbaminch Hospital, being from a rural community (AHR=1.8) was independent predictor of loss to follow-up (4).

In another study it is indicated that, male patients had increased risk of attrition from pre-ART care 1.266 times that of female patients (6).

Another study pointed that, fear of side effects of treatment, pill burden, and denial of disease, work commitments, transportation costs and health/treatment illiteracy are significant causes of LTFU; some patients are too unwell to attend a healthcare facility (9)

A study from Gondar Hospital showed that, male gender (AOR = 2), higher baseline CD4 cell count ((251–300 Cells/ μ l (AOR = 2.64), 301–350 cells/ μ l (AOR = 5.21) and >350 cells/ μ l (AOR = 12.10) compared to CD4 cell count of \leq 200 cells/ μ l)) and less advanced disease stage (WHO stage I (AOR = 2.81) compared to WHO stage IV) were independently associated with patient attrition, especially LTFUs. Married patients (AOR = 0.39) had reduced odds of being LTFU(14).

According to a study in Mozambique, among the ART ineligible patients, male sex and being pregnant at enrolment were associated with a higher risk of lost to care(16).

Another study showed that, there appeared a 60 percent increased likelihood of discontinuing treatment among those with no education compared with those having 9–12 or more years of schooling. 7th and 8th graders also exhibited a significantly higher risk of discontinuing from the care(21).

2.3.2 Health service related factors

According to literatures health service related factors do play a significant role in patient attritions. In a cross-sectional study conducted in Uttar Pradesh, India, 24% of pre-ART clients were lost from the continuum of care. Attrition was common among females & patients with rural background. Distance \geq 10km from the health facility was found to be associated with attrition (22). According to WHO guideline service availability is defined within the distance of 10 km (21, 23).

A study in Durban, South Africa, indicated that, nearly half of HIV infected patients (45%) enrolled in to pre-ART care was lost from care due to attritions. From important factors studied, patients who lived ≥ 10 km from the service provision area had significantly associated with patient attrition (ARR=1.37, 95% CI: 1.11– 1.71)(24). Similarly a study from India indicated that, patients who lived near the service area retained on care compared to those living abroad (ARR=1.09)(25)

2.3.3 Patient related factors

As it is shown in many literatures patient related factors can also be attributed for high patient attritions from care continuum. According to a study from Ethiopia, patients in advanced WHO stage and those having total lymphocyte count less than or equal to the median value were more likely to die, a quarter of the patients were lost to follow-up (4).

The mean estimate of attrition time for patients who started CPT at enrolment was 2.4 years whereas for those who not started CPT was 0.9years. The difference in attritions between these two categories of patients was statistically significant ($P = 0.000$). The cumulative proportion of patients surviving/retained at the time of attrition were higher for patients who started CPT compared to those who did not receive CPT at pre-ART care enrolment. There was a 15.3% reduction in risk of attrition among patients who presented with at pre-ART care enrolment compared to those without OIs (6).

A study from northern Ethiopia reveals that, higher proportion of LTFU patients (42.2%) had a CD4 count >350 cell/ml when compared to those who were in care (9.1%). Similarly, higher proportions of LTFU patients (34%) were in WHO stage I compared to those who were in care (19.1%) (14). According to a study from Kenya, active pulmonary tuberculosis (AOR 1.9) and severe bacterial infections (including severe bacterial pneumonia) (OR 1.6) were significantly associated with pre-ART attrition (19).

A study from Durban, South Africa indicated that, nearly half of HIV infected patients (45%) enrolled in to pre-ART care was lost from care due to attritions. From important factors studied, patients with history of tuberculosis (ARR=1.26, 95% CI: 1.00–1.58) was significantly associated with attrition(24). In this typical study, 44.9% patients returned for a subsequent CD4 count within 13 months of these, 72.3% returned once and 27.7% returned more than one

occasion. The proportion retained in care was highest amongst the group with lower initial CD4 cell count: The median time to return was 201 days (IQR 127-274). The time was shortest for the group with lower initial CD4 count. Higher initial CD4 count & Male sex was associated with lower odds of retention while older age also associated with increased retention (24).

Concerning the effect of free CPT in retention, a study from Kenya revealed that, pre-ART 12-month retention was significantly higher in clients enrolled in the period following CPT provision (84%) than those who were enrolled in the period prior to CPT availability 63% (26). In Kenya, patients with CD4 > 200/mm³ were 3.5-fold more likely to never make a second visit than patients with lower CD4 counts. In Malawi, over 3 years 52.5% of pre-ART patients not distinguished by ART eligibility criteria failed to be retained compared to 16.1% of patients who had initiated ART. Among 2483 patients with CD4-based indications for ART in Uganda, 88% returned for a second visit and overall 74% returned for a third visit and started ART (27).

A study from district of South Africa indicated that from patients on HIV care continuum, those not treated with cotrimoxazole showed attrition of nearly 1.2 times earlier than compared to those treated with (AHR=1.18)(28).

2.3.4. Behavioral related factors

Recently emerging evidences point out that, behavioral factors are also good predictors of attrition. According to a study Gondar Hospital, out of lost patients from the care continuum during pre-ART follow ups, 53.2% have disclosed to their family members, 10.2% to other relatives and 36.6% have never disclosed at all(14).

A qualitative approach study from Ethiopia indicated that HIV positive people experience both discriminatory exclusion and isolation from society, which further discouraged their disclosure behavior about HIV status. This is also explained that status disclosure and health-seeking behavior are negatively affected as a result; patients were dying or defaulting without taking appropriate care. The interviewed pre-ART patients pointed that, 50% of them had not disclosed their HIV status due to fear of rejection from house hold members, thus they attrited from care(29).

2.4 Conceptual frame work

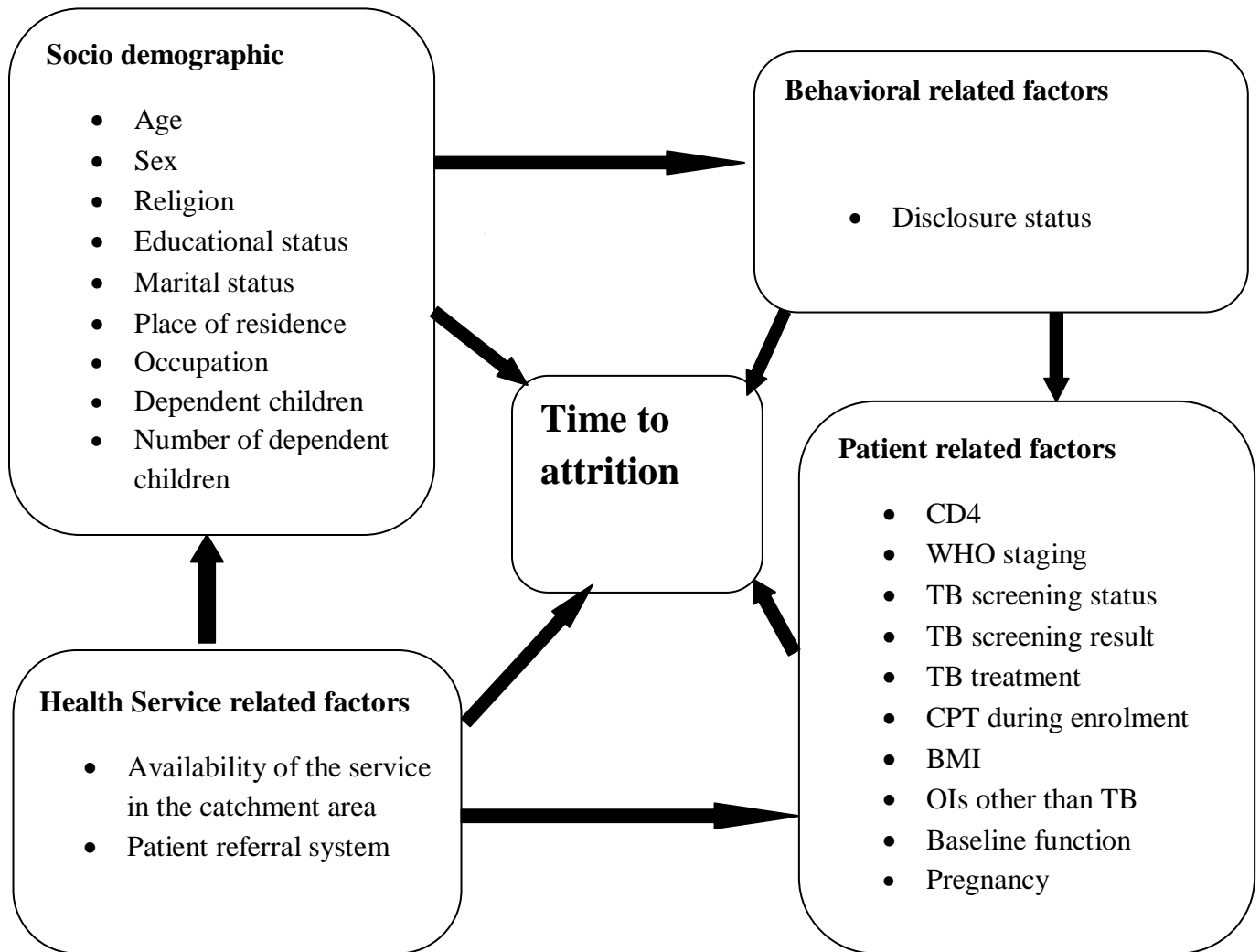


Figure 1 : Conceptual frame work on time to attritions and associated factors among adults enrolled to pre-ART care in Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013 (Developed after reviewing other similar studies)

2.5 Significance of the Study

Conducting this typical research do have significance by providing information to decision makers and health care providers to develop time relevant intervention strategies targeted to reduce attritions of HIV diagnosed patients from care before initiation of ARVs.

Furthermore, understanding where, when and why patients attrite early or late from care during pre-ART period helps for monitoring and tracking of attritting patients from care continuum, since no previous study attempts to address the shortcomings of care and follow ups given to HIV positive patients during pre-ART follow up period in the aforementioned study area.

3. OBJECTIVES

3.1 General objective

- To assess time to attrition and associated factors among adults enrolled to pre-ART care in Teppi District Hospital, Sheka Zone, South West Ethiopia from September 1, 2010-August 31, 2013.

3.2 Specific objectives

- To determine time to attrition among adults enrolled to pre-ART care in Teppi District Hospital, Sheka Zone, South West Ethiopia.
- To identify factors associated with attrition among adults enrolled to pre-ART care in Teppi District Hospital, Sheka Zone, South West Ethiopia.

4. METHODS AND MATERIALS

4.1 Study area and period

The study was conducted in Teppi district Hospital, SNNP Regional state, Sheka zone, south west Ethiopia, which is located at 235 Km from Jimma and 580 Km from Addis Ababa. The estimated catchment population was 96,000 and sub-divided into 19 rural and 3 urban Kebele's from which 7 rural and 3 urban Kebele's are located within 10 km distance from the Hospital when measured from the center. The institution started providing ART in 18/10/2006 with financial support from the MSH (management science for health) and JHU (John Hopkins University) TSEHAI. The institution delivers other services related to HIV programs like VCT, PMTCT, PICT and condom promotion. Concerning the way of testing and linking patients to pre-ART care, clients are counseled and tested by trained professionals and patients diagnosed positive from different wards within the institution are linked to pre-ART care using internal referral system supported by triages and those diagnosed positive from outreach services are linked using urban health extension professionals and case managers.

CD4 measurement of the linked patients takes place as early as possible, in the same day of testing depending up on the patient load. All the patient information's are registered and kept confidentially both in hard and electronic formats. Patients are appointed for care and follow-ups at every three months as per the national and WHO guide line irrespective of the patient's clinical urgency. The institution delivers all its activities by 77 health professionals and 21 supportive staffs. Regarding the integration of services to ART clinic, those HIV screened positives by PICT are linked to lifelong ART service by internal referral systems. Those linked ones are counseled and examined about their current health status by trained health professionals. While their first visit to ART clinic, all the patient information's are taken by adherence supporters and case managers. At the end all the patient related data are coded, entered and analyzed by data clerks trained by MSH and JHU TSEHAI. Ever enrolled pre-ART patients since the service started were 2170 till the time of data collection. Data were collected from February 1 to 30, 2014.

4.2 Study design

A retrospective follow-up was applied.

4.3 Population

4.3.1 Source population

All adult HIV positive clients enrolled into Pre-ART care in Teppi District Hospital.

4.3.2 Study population

All adult HIV positive clients enrolled into pre-ART care from 01, 2010 to August 31, 2013.

4.3.3 Inclusion and exclusion criteria

4.3.3.1 Inclusion criteria

Adult patients ≥ 15 years and above

Enrolled to Pre ART care during the study period

4.3.3.2 Exclusion criteria

Those incomplete registries missing important predictor variables as per literatures

Those who started treatment with same day of enrolment to care (no follow-up time)

4.4 Sample size determination and sampling procedures

4.4.1 Sample size determination

The data of all adult HIV positive patients enrolled into pre-ART care in Teppi District Hospital from September 1, 2010- August 31, 2013 was retrieved.

4.4.2 Sampling technique

Enumeration of all adult HIV positive patients enrolled into pre-ART care in Teppi District Hospital from September 1, 2010- August 31, 2013.

4.4.3 Study variables

4.4.3.1 Dependent variable

Time to attrition

4.4.3.2 Independent variables

Socio-demographic and economic factors

Age, sex, pregnancy, religion, educational status, marital status, dependent children in the household, number of children, place of residence, occupation

Behavior related factors

Disclosure

Clinical background of the patient

CD4 cells count, WHO clinical stage, Cotrimoxazole (CPT), opportunistic infections other than TB, TB screening status, TB screening result, TB treatment and BMI, baseline function of the patient

Service related factors

Availability of the service within the catchment area (<10km)

Patient referral system

4.5 Data extraction tools and procedure

The pre-ART care follow up data including the data of three years cohort used by this study were kept both in electronic format (developed by ICAP) and standard registries. But, during the transportation of data from standard registries to electronic data base, data with some missing variables on standard registries were also left incomplete on electronic data base.

4.5.1 Data extraction tools

Secondary data were extracted from standard registries (ART follow up form, ART clinic intake form and registration logo) using the data extraction format which is modified from pre-ART care follow-up checklist developed by WHO and national treatment guideline (10).

4.5.1 Data extraction procedure

Objectives of the research were briefed to the administrators of the Hospital, using letter of co-operation from Jimma University. Having permission to proceed, data collectors and supervisors were selected and trained. The role of researcher was supervision of the overall activity, facilitation of the process and checking for consistency and completeness of data extraction formats on daily basis.

4.6 Operational definitions

Time to attrition from pre-ART care: The time spent by patients who were enrolled to pre-ART care until attrition from care.

LTFUS event date for a lost patient: 90 days after the last documented visit date (30).

Time to event: the difference between enrolment and pre-ART outcome dates.

Attrition from pre-ART care: Proportion of patients enrolled to pre-ART care being positive for HIV and attired before the first dispense of ARVs, due to death or LTFUs. It is calculated by dividing the total number of clients attired before the first dispense of ARVs to the sum of clients who were enrolled to pre-ART care during the 3 years follow-up period.

Active patients: patients who were enrolled to pre-ART care continuum and still on pre-ART follow-up at the end of observation time.

Censored: Active clients, Transfers to other facilities and treatment initiated at the end of observation period

LTFUs: 90 days after the last scheduled appointment (as per Ethiopia /drop/) (11, 31).

Defaulter: if they are more than 30 days, but less than or equal to 90 days, late to their expected appointment/Lost /as per Ethiopia/ (FMOH, HIV care intake form)(31).

Death: all recorded deaths on registries, except cause of death is other than HIV/AIDS related and if recorded.

Transfers: patients with recorded document and date of transfer.

Early stage presenter: A person who tested HIV-positive and documented as WHO clinical stage I or II at the time of enrolment to the pre-ART care.

Late stage presenter: A person who tested HIV-positive and documented as WHO clinical stage III or IV at the time of enrolment to the pre-ART care.

Time lost from follow up: is the 91st day after the appointment after which the patient fails to show up for more than 90 days

4.6.1. Assessment of attritions among pre-ART patients

Electronic files of patients which were enrolled to pre-ART care between September 1, 2010 to August 31, 2013 was reviewed to identify those who failed to keep scheduled appointments for more than 90 days during the course of 3 years of cohort. A list of these “LTFUs” patients was generated from medical register by observing the last appointment date. Those who come back to care after 90 days of the last scheduled appointment were LTFUs and treated as restarts.

Regarding assessment of death, those recorded as dead by treatment providers were recorded as dead and otherwise reported as LTFUS.

4.7 Data quality management

Data was collected by trained data collector nurses from pre-ART clinic and supervision was held by trained health officers. To assure data quality continuous and supportive supervision was given. Furthermore, there was consistency and completeness check of data extraction formats on daily basis.

4.8 Data processing, analysis and interpretation

Data was checked manually for its completeness and consistency /electronic vs. the mother document/ and was entered, cleaned and rechecked for its completeness, and consistency again by Epi-Data version 3.1 and then was exported to SPSS window versions 16.0 for analysis.

Explanatory variables were examined in the univariate models.

Multivariable Cox proportional hazard model analysis was used to see the association of predictor variables with attrition (mortality and loss to follow-ups). Kaplan-Meier survival table was used for comparison of the pre-ART care attrition rates of patients segregated by significant predictor variables at enrolment.

Incidence density was calculated for mortality and LTFUs using person years of contribution to the cohort.

All variables from the univariate models with p-value ≤ 0.25 were included in the final multivariable model. Associations was examined at a $p < 0.05$ significance level.

Patients who started ART, transferred to other facility or active at the end of observation period were censored from the analysis.

4.9 Ethical consideration

The study protocol was approved by institutional review board of Jimma University.

Confidentiality was assured by use of data collector nurses and supervisors working in ART clinic and patients' identifiers were excluded during the analysis.

4.10 Dissemination plan

Findings of this typical study will be disseminated to Jimma University College of public health and medical science and department of epidemiology, Sheka zone, and to all health institutions

under it in provision of the service. Finally effort will be made to present in various seminars and workshops and for publication in international journals.

5 RESULTS

Data was reviewed for a total of 764 clients enrolled to pre-ART care during the period from September 01, 2010 to August 08/2013 and 652 clients were included to the study. The remaining 112 clients were excluded from the study due to being illegible by age (43 clients' were children below 15 years), started treatment in the same day of enrollment to care (16 clients) and incomplete registries for known important predictor variables like WHO clinical stage, CPT, CD4, OIs, being screened for TB, TB screening result (53 clients)

5.1 Socio-demographic characteristics of the patients

The mean age of participants was 30.59 (95% CI, 20.71 – 40.47) years old and the highest number of study participants were in age the group 25 - 34 years (45.6%). When categorized by sex 59.4% were female. From the total study participants, 34.4% of the clients had dependent children below 15 years and 121 (54%) had only 1 dependent children in their households, the rest had 2 and above. Of the study participants, 39.3% had primary level education followed by secondary and tertiary (**Table 1**).

Regarding marital status, the highest percentage(58.0%) corresponds to married clients and about one third 186 (28.5%) were yet unmarried, but those who either get separated, divorced or widowed sum up to below 15% of the total cohort.

During the time of enrolment to care, extremely highest number (67.2%) of participants were followers orthodox Christian, followed by 16% and 13.5%, followers from Muslims and protestants respectively but, the religion of 3 individuals was missing from the record.

However, the residency status of 2 clients was missing during enrolment, more than half (50.8%) of the cohort members were from the rural communities.

The ethnic groups of Amhara (34.4%) and Oromo (12.9%) were relatively the highest and the lowest extremes respectively, without the knowledge of ethnicity of 1 study participant at the time.

Table 1 Baseline socio-demographic characteristics of 652 adult pre-ART patients enrolled to pre-ART care at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013

Socio-demographic variable		n	Percent
Age (in years) (n=650)	15-24	161	24.8
	25-34	296	45.5
	35-44	124	19.1
	44+	69	10.6
Sex	Male	265	40.6
	Female	387	59.4
Occupation (n=650)	employed	124	19.1
	Unemployed	280	43.1
	Merchants	110	16.9
	Other	135	20.9
Educational status (n=651)	No education	112	17.2
	Primary	254	39.0
	Secondary	149	22.9
	Tertiary and above	136	20.9
Religion (n=649)	Orthodox	428	67.5
	Muslim	104	16.0
	Protestant	88	13.6
	Other	19	2.9

*** Pre-ART; pre-Antiretroviral Therapy*

5.2 Patient related characteristics of the patient

Of 652 study participants enrolled to pre-ART care, the rate of enrolment has dramatically increased over the three years of follow up time. Almost half 329(50.5%) were enrolled to care during the last year of observation as compared to 29% and 20.6% during the second and first observation periods respectively. Regarding the WHO clinical staging of the clients, 385(59.0%) were early stage presenters to care, of which female accounts for 230 (59.7%). More than one third 247 (37.9%) of the study participants were in WHO clinical stage III at enrolment. The

baseline CD4 category of the clients indicated that about two third 428 (65.6%) of the clients were linked to care with baseline CD4>350 cells/ml. During their visit for linkage, exactly 79.9% of clients had experienced at least one type of opportunistic infections and common OIs were minor mucocutaneous manifestations 271 (41.6%), persistent generalized lymphadenopathy 157 (24.1%), recurrent upper respiratory tract infections 153 (23.5%) and 149 (22.9%) had diarrhea. From those who experienced at least one type of OI, 55.2 % were treated with CPT Prophylaxis (**Table 2**).

According to the national guideline for HIV/AIDS and nutrition cut off points, from the total study participants during their enrolment to care, 237(36.3%) were underweight (BMI <=18.5), 392(60.1%) were normal (BMI=18.5<BMI<24.9), 6 (0.9%) were overweight and no client was found being obese. But, the BMI data was missing for 17 (2.6%) patients (**Table2**).

From a total of 652 pre-ART patients enrolled to care, almost all patients 651(99.8%) were screened for TB and from those who were screened for TB, 108 (16.6%) were positive for TB. Concerning the baseline functional status of the cohort at the entry point to care, 604(92.6%) were at working conditions and the rest 3.8% and 3.2% were at ambulatory and bedridden condition respectively, despite the functioning category of 2 patients (0.3%) unknown at enrolment. When categorized by pregnancy, 17(4.4%) of female clients were pregnant.

Table 2 Baseline patient related characteristics of 652 adult pre-ART clients enrolled to pre-ART care at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013

Baseline variable	N (%)	
Baseline OI except TB	No OI at all	131 (20.1)
	At least one OI	92 (14.1)
	OI \geq 2	429 (65.8)
BMI category (n=635)	<18.5	237 (37.3)
	18.5-24.9	392(61.7)
	24.9-29.9	6 (0.9)
WHO clinical stage	I	176 (27.0)
	II	209 (32.1)
	III	247 (37.9)
	IV	20 (3.1)
CPT provision at enrolment	Yes	360 (55.2)

* *OI, Opportunistic Infection; TB, Tuberculosis; BMI, Body Mass Index*

5.3 Health service related characteristics of the patient

Regarding the availability of the service with in less than or equal to 10 km distance, 444 (68.1%) of the clients were from distance within the catchment area according to WHO standard for service availability (WHO 2008 defines service availability, if the service is within 10km distance) . Concerning to patient referral information, 553(84.8%) of patients were linked to pre-ART care from different wards (departments) within the institution and the rest were from outside, either from government or private health institutions but, the referral status of 6 patients (0.9%) was unknown (**Figure 2**)

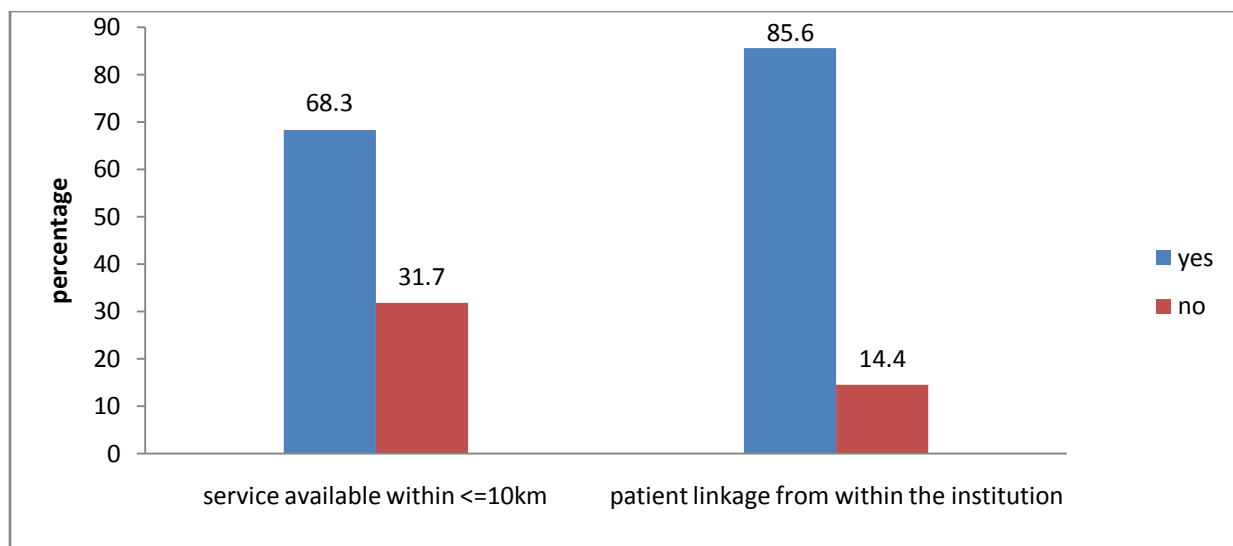


Figure 2 Baseline characteristics of 652 adult pre-ART patients enrolled to pre-ART care with respect to service in the catchment area and referral information at Teppi District Hospital Sheka Zone South West Ethiopia, during 2010-2013

5.4 Behavior related characteristics of the patient

During their presentation to care, 53.7% (349) of clients have disclosed their HIV status. Of which 90.6% (349) did so to their family members and 40.8% (265) had not disclosed at all for any one (**Table 3**)

Table 3. Baseline disclosure status of adult Pre-ART clients enrolled to pre-ART care at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013

Behavioral factor	N (%)
Disclosure status (n=250)	
Family members	349 (53.7)
To other relatives	36 (5.5%)
Not at all	265 (40.8%)

Patient attritions during follow up period

Patients were followed up in pre-ART care from September 01/ 2010 to August 31/2013 for 4051.267 person months (337.6 person years). Of the patients who were enrolled to pre-ART care, 22(3.4%) were transferred to other facility, 282(43.3%) had initiated treatment, 179(27.5%)

lost to follow up, 37(5.7% died and 132(20.2%) were found to be active on pre-ART at the end of the observation period. Overall patient attrition was 216(33.13%).

The attrition rates on pre-ART care were different by the year of enrolment. The incidence rates of attrition from pre-ART care at 1, 2 and 3years of enrolment were 19, 24 and 21 cases per 100 person years respectively.

5.5 Survival Analysis of Time to Attrition

Since attrition is lost to care (LTC) due to LTFUs and death, a total of 652 patients were followed for median of 8.9 (IQR, 4.57-13.23) months for the event time to pre-ART outcomes. The minimum follow up time was 2 day and the maximum was 1080 days (36 months). From the overall 216 (31.13%) attritions, the highest attritions 194 (89.8%) occurred within 6 months follow-ups period and it grew up to 203 (93.98%) at the end of 1 years observation period starting from the period of enrolment (**Table 4**).

Table 4. The estimated attrition of adult pre-ART patients at the end of different time periods at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013

Observation period in months	Attrition		Total	Cumulative attritions	Cumulative attritions in %
	LTFUs	death			
At 3	137	16	153	153	70.83
At 6	30	11	41	194	89.8
At 12	5	4	9	203	93.98
At 24	7	5	12	215	99.54
At 36	0	1	1	216	100
Total	179	37	216		

The mean estimate of attrition time for patients who started cotrimoxazole prophylaxis (CPT) at pre-ART care during enrolment was 25.43 (95% CI, 22.80-28.06) months whereas for patients who were not started on CPT was 13.94 (95% CI, 12.06-15.83) months. The difference in attrition time between these two categories of patients was statistically significant ($P < 0.001$).

Similarly, the mean estimate of attrition time for patients who disclosed their HIV status to their family members was 27.07 (95% CI, 24.82-29.33) months where as for patients who did not

disclose their HIV status at all to any one during enrolment to care was, 10.83(95% CI, 8.94-12.72) months. The difference in attrition time between different categories of disclosure status was also statistically significant ($P < 0.001$).

The cumulative proportions of patients surviving/retained were higher for patients who started CPT at enrolment and patients who disclosed their HIV status for their family at enrolment compared to those who did not receive CPT at enrolment and patients who did not disclose their HIV status at all during enrolment.

Table 5 Comparisons of pre-ART attritions segregated by CPT status and disclosure at enrolment, Kaplan Meir Survival Table

Baseline variable	Time in month	Status	Cumulative proportion surviving at time T	N of cumulative attritions	N of remaining cases
CPT provision					
Yes	At 3 month	Attrition	0.90	36	324
	At 6 month	Attrition	0.82	46	104
No	At 3 month	Attrition	0.60	117	175
	At 6 month	Attrition	0.46	148	104
Disclosure					
Family	At 3 month	Attrition	0.92	28	321
	At 6 month	Attrition	0.86	37	120
Not at all	At 3 month	Attrition	0.56	117	148
	At 6 month	Attrition	0.40	145	71

CPT, cotrimoxazole prophylaxis

Factors associated with time to attrition

Before proceeding to associated factors analysis, covariates were checked for cox proportional hazard assumption using log minus log (LML) method and no covariates were found to be time dependent.

During the bivariate analysis of time to attrition, eight explanatory variables with p-values <0.25 were selected for Cox regression. These variables included baseline function of the patient (HR=2.04, 95%CI, 1.14-3.67, p, 0.02), CPT, HR=2.28, 95%CI, 1.67-3.14, p, 0.000), service availability, (HR=2.05, 95%CI, 1.57-2.68, p, 0.000), CD4 category(\geq 350cells/ml), HR= 2.23, 95%CI, 1.14-3.54, p, 0.001, TB screening result (positive for TB), HR=1.30, 95%CI, 0.84-2.00, p, 0.238, opportunistic infections (at least one opportunistic infection, HR=1.60, 95%CI, 1.19-2.16, p, 0.002, opportunistic infections \geq 2, HR=1.19, 95%CI, 0.82-1.74, p, 0.354, dependent children in the home, HR=1.20, 95%CI, 0.90-1.61, p, 0.214, and disclosure status of the client at baseline (,disclosed to other relatives, HR=2.00, 95%CI, 1.09-3.67, p, 0.025, no disclosure at all, (HR=4.05, 95%CI, 2.86-5.72, p, 0.000) were selected for multivariate Cox regression analysis and four predictor variables; CPT prophylaxis at enrolment, being positive for TB screening test, living in the distance of 10km and above from the District Hospital and disclosure status (no disclosure at all) were found to be independent predictors of time to attrition (**Table 6**).

Table 6 Cox regression analysis for independent predictors of time to attrition

Variables	Crude HR	95%CI	p-value	AHR	95.0%CI AHR
CPT at enrolment					
CPT provided **				1.0	
CPT not provided	2.28	1.67-3.14	0.000	1.51	1.02--2.25
Baseline function					
Working**				1.0	
Ambulatory	0.69	0.33-1.47	0.337	0.73	0.33-1.62
Bedridden	2.04	1.14-3.67	0.016	1.68	0.91-3.12
CD4 category					
<350**				1.0	
>=350	2.23	1.41-3.54	0.001	1.45	0.87-2.42
Disclosure status					
To Family members**				1.0	
To other relatives	2.00	1.09-3.67	0.025	1.60	0.86-3.00
No disclosure at all	4.05	2.86-5.72	0.000	3.04	2.07-4.45
TB result					
positive	1.30	0.84-2.00	0.238	2.16	1.35-3.45
negative**				1.0	
Service availability					
Within <10km**				1.0	
>=10km	2.05	1.57-2.68	0.000	1.44	1.07-2.0
OI category					
No OI at all**				1.0	
At least one OI	1.60	1.19-2.16	0.002	1.13	0.75-1.71
>=2 OI	1.19	0.82-1.74	0.354	0.83	0.59-1.17
Dependent children					
Yes	1.20	0.90-1.61	0.214	1.20	0.89-1.62
No **				1.0	

**Reference category CPT cotrimoxazole prophylaxis, AHR, adjusted Hazard Ratio, CI Confidence Interval

Attrition by cotrimoxazole (CPT) provision status at baseline

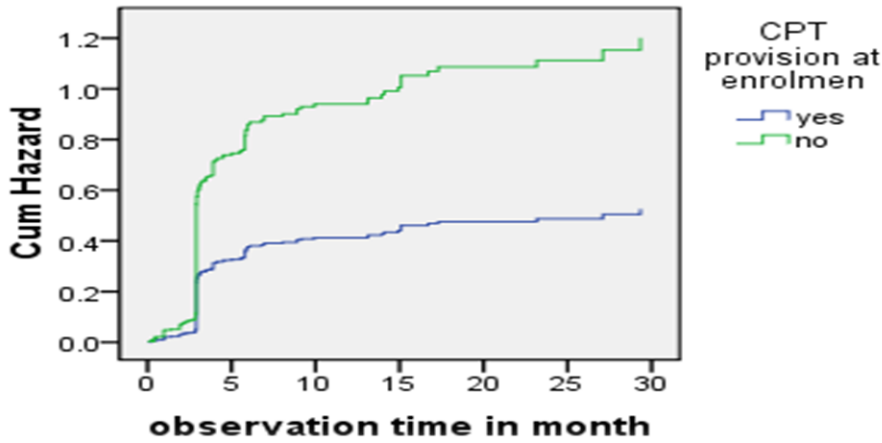


Figure 3 Patient attrition experiences segregated by baseline cotrimoxazole provision, among adult pre-ART patients enrolled to pre-ART care at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013

Attrition by disclosure status at baseline

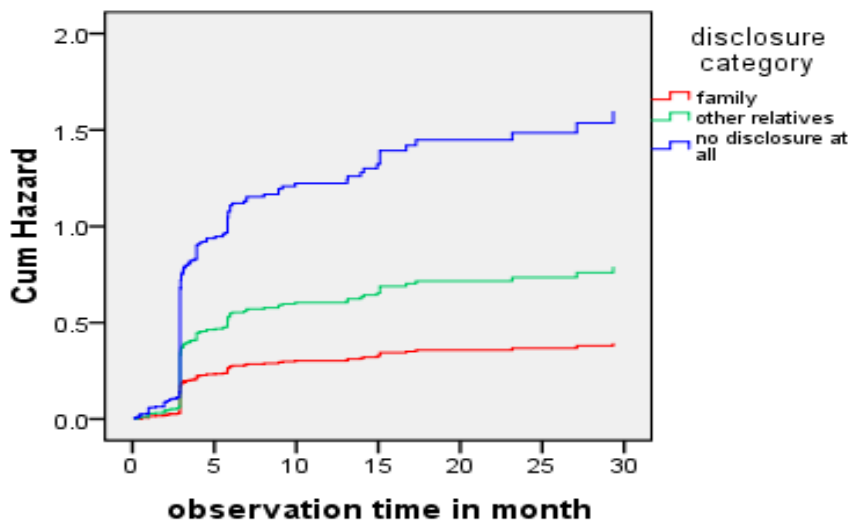


Figure 4 Patient attritions segregated by baseline disclosure status among adult pre-ART patients enrolled to pre-ART care at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013

Attrition by service availability within <10km or >=10km at baseline

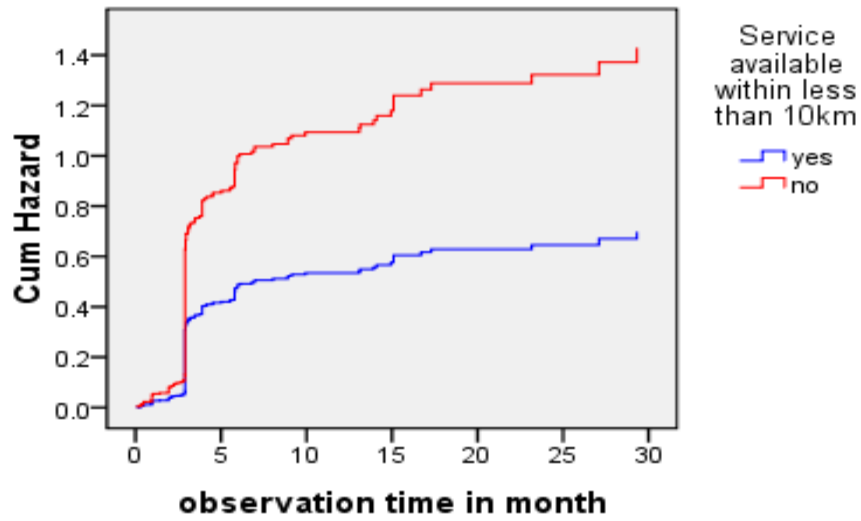


Figure 5 Patient attrition experiences segregated by baseline service availability among adult pre-ART patients enrolled to pre-ART care at Teppi District Hospital, Sheka Zone, South West Ethiopia, during 2010-2013

6 DISCUSSION

The pre-ART patients loss to care (attrition) was 216(33.13%) which included mainly those that were loss to follow up 179(82.9%) and few others that were reported dead 37(17.1%) at the end of observation period. When compared to findings from other settings, it is 15% higher from that of a much lower level of 18% in Kenya (19) and nearly 10% lower when compared to a relatively higher level of 42.94% patient attrition in Uganda from which 37.6% were LTFU and 5.34% death(18). These differences may be due to variations in study design, definitions and patient follow-ups.

According to a study conducted in Mozambique at 12 months for ART ineligible patients, 41% were attrited at a median of 137 days after enrolment. But, patients in this study setting were attrited at a median of 8.9 months (267) days after enrolment to care. When compared to the Mozambique cohort, this cohort had longer time to attrition, but shorter compared to Ugandan cohort of median time to attrition 11.7 months (351 days) (33).

The finding from this study showed that, the incidence rate of pre-ART attrition was highest in the first year of study period. 172(96.1%) loss to follow ups occurred in the first one year and 27(73.0%) cases of death occurred in the first 6 months. It is higher nearly by 10% and 3% for LTFUs and death, when compared to the finding from Nigeria that, 88.0% of LTFUs occurred in the first one year of pre-ART care and all cases of death occurred in the first 6months of pre-ART care (6).

In this historical longitudinal study, from 33.13% patient attritions 94% occurred at the end of 12months of which 89% occurred within 6 months observation time. The early patient attrition is high by 10% when compared to the finding from Mozambique that, patient attritions occurred to nearly 50% of all patients enrolled to care and among these 80% of attritions happened during the first year.

Over three-quarter of pre- ART patients (83.8%) who did not commence CPT at enrolment were loss to follow up compared to about 16% loss to follow up reported among those who started CPT at enrolment. The time to attrition for patients who were started on cotrimoxazole prophylaxis (CPT) at pre-ART care enrolment was nearly 2-fold higher than those patients who were not started on CPT. Furthermore, the patients on CPT had over 35% reduction in risk of attrition at 6 month and increased retention time after adjustment for the other explanatory variables compared to those who did not start CPT at enrolment; and the difference was

statistically significant. In another study from Kenya, treatment of ART ineligible patients with cotrimoxazole improved the 12-month retention in care from 63% to 84%; this can suggest that patients may have perceived more benefit from cotrimoxazole treatment. These data indicate that the provision of free medicines or nutrition can improve the usefulness perception of the visits to the clinic and, therefore, the retention in pre-ART care (26).

In this study, pre-ART patients with TB disease at enrolment to care were at high risk of attrition from care (AHR=2.16) compared to those TB negative at enrolment to care. This is in line with the high mortality observed in HIV patients with tuberculosis in a study cohort from India(33). Another perspective can be patients are dying being reluctant to take both ART and anti-tuberculosis as indicated from Soweto, South Africa (34). This may be also explained from, according to 2013 global TB report, even though Ethiopia has met TB incidence rate falling, 82% of HIV positive TB patients are on HIV care continuum and only 38% of people living with HIV and enrolled in to care were given isoniazid preventive therapy (IPT) (34). But, in this study setting no data was found about patients' treatment status with IPT.

Regarding to the patient attrition in connection with service availability, patients who lived ≥ 10 km from the center had higher risk of early attrition (AHR=1.44) when compared to those who lived within 10km. This study is consistent with finding from Durban, South Africa that, nearly half of HIV infected patients (45%) enrolled in to pre-ART care was lost from care due to attritions and patients who lived ≥ 10 km from the service provision area had higher risk of early attrition (ARR=1.37). But, the time to attrition is a little bit late in this cohort.

Similarly a study from India indicated that, patients who lived near the service area were retained more on care as compared to those living abroad (ARR=1.09)(25).

Concerning the disclosure of patients HIV status, disclosing HIV status to no one is significantly associated with time to attrition of patients' .Compared to those patients who disclosed their HIV status to their family members, those who did not disclose their HIV status at all had nearly 3 times higher risk of early attriting from care. Even though, little literatures were found about time to attrition and disclosure status, in some literatures disclosure status had never showed significant associations(14). This can be explained by difference emanating from methodological variation. But, a qualitative study from Ethiopia indicated that HIV positive people experience

both discriminatory exclusion and isolation from society, which further discouraged their disclosure behavior about HIV status. This also explains that status disclosure and health-seeking behavior are negatively affected, as a result; patients were dying or defaulting without taking appropriate care. The findings of interviewed pre-ART patients from Addis Ababa showed that, 50% of them had not disclosed their HIV status due to fear of rejection from household members, thus they attrited from care (29).

In general, findings from this typical study may direct us to recommend conducting of supportive studies like prospective cohort and qualitative studies. But, generalizing is questionable as some predictors of attrition in other studies like BMI were not considered due to missing and WHO clinical stage, important predictor variable of attrition in other studies didn't show us any significant association in this study.

7 CONCLUSIONS AND RECOMMENDATION

7.1 Conclusion

The findings from this typical study pinpoint that, in the continuum of care given for pre-ART patients from the time of enrolment to care to the first dispense of ARVs, more than one third of patient attrition was observed with the highest attrition being in the first year of pre-ART care. Analysis of predictor variables indicated that, these high and early patient attritions were associated with no cotrimoxazole uptake, being TB patient, living 10km and above from the center and minimal disclosure status.

7.2 Recommendation

To Teppi District Hospital and Service Providers

To alleviate high patient attritions at early care continuum, close monitoring and tracking of pre-ART patients is highly recommended to reduce attrition and enhance earlier ART eligibility and eventual initiation.

Furthermore, the patients on CPT had over 35% reduction in risk of attrition at 6 month and increased retention time after adjustment for the other explanatory variables compared to those who did not start CPT at enrolment; and the difference was statistically significant. Therefore, this preventive intervention should be scaled up in a manner that all CPT- eligible pre-ART patients get this intervention promptly.

Moreover, patient attritions are also due to death from TB and lack of support and family guide due to fear of disclosing their HIV status to their family members. To solve problems of patient attritions due to TB, early case detection and management should be assured in a manner all TB cases are identified and treated.

Regarding disclosure, counseling should be given to family members so as to increase intimacy among family members and thus get appropriate care irrespective of fear of disclosure.

To Sheka Zonal Health Department

Service availability should be addressed in a manner that all patients seeking the service should get in their catchment area and supportive supervisions should be held timely and optimal.

7.3 Strength of the study

Retrospective longitudinal study

Can give an insight for researchers especially in carrying out prospective study

7.4 Limitations of the study

Using Secondary data with incomplete information

Selection bias is possibly introduced during exclusion of incomplete registries.

Death might be underestimated due to lost to follow up of patients probably dying at home without being reported

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DATA EXTRACTION FORMAT

Patient's card number _____

Name of data retriever _____ sig _____ Name of supervisor _____ sig _____

Facility name _____ date of retrieval ____/____/2014

Part I socio-demographic factors

s. no	question	response	Skip
101	Age of the patient	_____	
102	Sex of the patent	A. Male B. Female	
103	occupation	a. Government employee b. merchant c. not employed d. other	
104	Weight of the patent at presentation to care	_____ kg	
105	Height of the patient in meter		
106	Educational status of the patent	a. No education b. Primary(1-8) c. Secondary(9-12) d. Tertiary (college and above)	
107	Marital status of the patent	a. never married d. divorced b. married e. widowed c. separated	
108	Religion	a. orthodox c. Protestant b. Muslim d. Other	
109	Functional status at the baseline	a. Working b. Ambulatory	

		c. Bed ridden	
110	Place of residence	a. Urban b. Rural	
111	Ethnicity	a. Amhara d. Oromo b. Keffa e. others c. Sheka	
112	Dependent children	A. Yes B. No	
113	If yes to Q#113, No of dependent children	_____	

Part II Patient related factors

s/no	question	response	Skip
114	Date of enrolment to care	___/___/_____	
115	WHO stage at enrolment	a. Stage I c. stage III b. stage II d. stage IV	
115	Event of outcome at Pre-ART	a. TOs b. active on pre-ART c. death d. lost to follow up e. treatment initiated	
116	date the outcome of event occurred	___/___/_____	

117	CD4 at enrolment	_____	
118	CPT provision at enrolment	a. yes b. no	
119	OI at enrolment	a. Yes b.	

		no	
120	If OI present ,specify	_____	
1121	TB screening at enrolment	a. Yes b. no	
122	TB screening result	a. +ve b. -ve	
123	If yes to Q# 11 treatment given	a. yes b. no	

Part III Health service related factors

s/no	question	skip	skip
124	Service available in the catchment area(<=10km)	a. Yes b. no	
125	Referral system	a. From within b. From outside	

Part IV Behavioral related factors

s/no	question	Result	skip
126	Disclosure status	a. family b. friend c. Other d. Not at all	

DECLARATION

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in this or any other university and that all sources of materials used for the thesis have been fully acknowledged.

Name: Tamirat Shewanew

Signature: _____

Name of the institution: JIMMA UNIVERSITY

Date of submission: _____

This thesis has been submitted for examination with my approval as University advisor:

Name and Signature of the first advisor: Mr. Henock Asefa

Signature: _____

Name and Signature of the second advisor: Mr. Hailay Abrha

Signature: _____