Survival Status and Time to Death among Adult HIV Patients Attending ART in Jimma University Medical Center, Jimma Zone, South-West, Ethiopia

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Jimma, Ethiopia

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ABSTRACT

Background: Despite the world has efforts, the reduce acquired immunodeficiency syndrome (AIDS) related mortality by giving antiretroviral therapy (ART), HIV/AIDS is still killing people while they are on ART. However, the current progress and associated factors of mortality among ART-taking patients are hardly available. Therefore, this study aimed to determine predictors of mortality and time to death among HIV-infected adult patients after starting antiretroviral therapy at Jimma University Medical Center, southwest, Ethiopia.

Methods: A retrospective cohort study was conducted involving all patients seen were reviewed between January,2017 to December, 2021. The study was conducted from May 18 to June 18, 2023, GC. The sample size was 642 and by using systematic sampling data were collected using questionnaires and secondary data... The data were entered in Epi-data, 3.1, and exported to SPSS version 25.0 for analysis. Kaplan-Meier and Log-rank test was used to compare the survival times of different groups of patients. In bi-variable analysis p-values <0.25 were candidates for multivariable analysis. Cox proportional hazards regression models were performed to identify the independent predictors for mortality. Variables those were statically significant at p-values < 0. 05 were concluded as predictors of mortality.

Results: From a total of 642 ART patients who participated in the study, 114(17.8%) were deaths and the median survival time for an event (dead) case was 34 months with mean (SD) age at baseline 36.8(3.56) years and median age 43 years with the death incidence rate of 1.69 per 1000 person- months. Poor ART adherent patients (AHR = 2.43: 95% CI: 1.33- 4.43), WHO Stage IV (AHR=5.32: 95%CI: (1.24, 12.49), baseline weight of less than 40kg (AHR=3.23: 95% CI: (1.35, 7.71) and HIV disclosure status (AHR=1.58: 95%CI: (1.08-2.43) were independent predictors of mortality among ART patients.

Conclusion and recommendation: The risk of mortality is increased if the HIV patient is at a lower baseline weight, WHO Clinical stage IV, and non-disclosure HIV patients, and who have had poor adherence. The researcher suggests that Strengthening ART care centers, improving community awareness of people living with HIV/AIDS, timely diagnosis, and early initiation for treatment may be necessary to increase patient survival.

Keywords: Survival, Cox-proportional, Predictors of death, antiretroviral therapy, Jimma

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Abbreviation and Acronyms

AHR _____Adjusted Hazard Ratio

AIDS _____Acquired Immune Deficiency Syndrome

ART _____ Antiretroviral Treatment

ARV_____ Anti-Retroviral

COP/ROP_____ Country/Regional Operational Plan

FMOH_____ Federal Ministry of Health

HAART_____ Highly Active Antiretroviral Treatment

HIV_____ Human Immunodeficiency Virus

HR _____Hazard Ratio

PH _____Proportional Hazard

PLHIV_____ People Living with HIV

RTI _____Reverse Transcriptase Inhibitors

TLC_____ Total Lymphocyte count

UN _____United Nations

UNAID_____ United Nations program for HIV/AIDS

SPSS _____Statistical Package for Social Science

1: INTRODUCTION

1.1 Background

HIV/AIDS continues to be a major global public health issue, having claimed almost 33 million lives so far (1). In spite of that, with increasing access to effective HIV prevention, diagnosis, treatment, and care, including for opportunistic infections, HIV infection has become a manageable chronic health condition, enabling people living with HIV to lead long and healthy lives. There were an estimated 38.0 million people living with HIV at the end of 2019 ((2). The main population groups and their sexual partners accounted for over 60% of all new HIV infections globally among the age group 15-49 years (an estimated 62%) in 2019(3).

It affects over 35 million people worldwide and HIV infection has progressed from a fatal disease to a chronic illness, owing primarily to the development of ART (2). The introduction of ART dramatically improved the survival and health quality of HIV-infected patients in the industrialized world and the survival benefit of ART has been well studied too. Globally, the number of people living with HIV receiving treatment in resource-poor countries has dramatically increased in the past decades, however, an estimated 12.6 million other people living with HIV (33% of the total) were still not accessing ART, Since the start of HIV / AIDS epidemic up to the end of 2019(4).

Globally, about 75.5 million people have been infected with HIV, and 32.7 million people have died from AIDS-related illnesses. Worldwide, an estimated 1.7 million people became newly infected with HIV, and nearly 0.7 million people died from AIDS-related illnesses in 2019 (5). As the HIV epidemic matures, increasing numbers of people are reaching advanced stages of HIV infection. Antiretroviral therapy (ART) has been shown to reduce mortality among those infected and efforts were being made to make it more affordable within low and middle-income countries(1).

In Ethiopia, HAART began in 2003, and free ART was launched in 2005. Recently, ART services were made available in more than 1,361 health facilities, of which around 909 were health centers. Based on the new spectrum estimate for 2017, ART coverage for adults (age ≥15) has reached the rate of 75%, (6). More than 473,000 patients were enrolled in HIV / AIDS care, and 268,934 individuals were started on HAART(7).

In 2016, the HIV / AIDS epidemic in Ethiopia was generalized with significant heterogeneity between urban and rural areas, with an estimated national prevalence of 0.9%. Urban prevalence was 2.9%, which was 7 times higher than that of rural (0.4%) (5). Globally, HIV incidence has declined from 0.40 per 1000 uninfected population in 2005 to 0.26 per 1000 uninfected population in 2016 (8).

By June 2021, 187 countries had already adopted this recommendation, covering 99% of all people living with HIV globally. In addition to the treat-all strategy, WHO recommends a rapid ART initiation to all people living with HIV, including offering ART on the same day as diagnosis among those who are ready to start treatment (8). By June 2021, 82 low and middle-income countries reported that they had adopted this policy, and approximately half of them reported country-wide implementation(8). The global ART coverage rate was 73% [56–88%] in 2020. However, more efforts are needed to scale up treatment for, those who were receiving ART at the end of 2020. For this reason, the present study investigated the survival status and predictors of mortality for adult HIV-positive patients on ART in Jimma University Medical Center Teaching Hospital Southwest Ethiopia (9).

1.2 Statement of the problem

Certain regions of the globe are disproportionately affected by HIV. In 2022, there were 6.5 million in Asia and the Pacific, and 2.3 million in Western and Central Europe and North America. 20.8 million People with HIV in eastern and southern Africa, 4.8 million in western and central Africa.

New global efforts have been mounted to address the epidemic, particularly in the last decade. The number of people who have newly acquired HIV has declined over the years. In addition, the number of people with HIV receiving treatment in resource-poor countries has dramatically increased in the past decade and dramatic progress has been made in preventing perinatal transmission of HIV and keeping pregnant people alive.

In 2022, 630,000 [480,000–880,000] people died from HIV-related causes globally. Since 2010, HIV-related deaths have been reduced by 51%, from 1.3 million [970,000–1.8 million]. The global HIV epidemic claimed 69% fewer lives in 2022 since the peak in 2004. HIV continues to be a major global public health issue, claiming 40.4 million [32.9–51.3 million] lives so far.

Despite the fact that sub-Saharan Africa contains only about 11 percent of the Earth's population, the region is the world's epicenter of HIV/AIDS. The Adult HIV prevalence is 1.2 percent worldwide (0.6 percent in North America), but it is 9.0 percent in sub-Saharan Africa.

Ethiopia has made remarkable strides in controlling the HIV/AIDS epidemic over the past decade. However, the prevalence remains relatively high in urban areas where estimates indicate a three percent rate compared to less than one percent nationally. Prevalence of HIV infection among adults in Ethiopia was 3.0% (women, 4.1%; men, 1.9%). This corresponds to approximately 384,000 adults living with HIV in urban Ethiopia.

Gambella region had the highest prevalence rate (4.8%) followed by the two city administrations Addis Ababa (3.4%) and Dire Dawa (2.5%). However, three fourths of people living with HIV in 2017 were from Amhara (30%) and Oromia (26%) regions, and Addis Ababa (18%) city administration. According to study conducted in Jimma zone the overall HIV prevalence among tested patients at government clinics in the Jimma zone in the period between September, 2018 to August 2019 was 22.1% in women and 24.3% in men.

In the age group 15–19 years, prevalence was 11.1% in women and 11.7% in men. HIV positive sero-status disclosure and its determinants among people living with HIV/AIDS following ART clinic in Jimma University Specialized Hospital indicates that age, sex, educational status and marital status had significant association with HIV sero-status disclosure.

Globally an estimated 21.7 million people are receiving antiretroviral therapy (ART) of which the World Health Organization (WHO) African Region accounts for 60% (4). Currently, there are an estimated 37.7 million people living with HIV (PLWH) globally. In Thailand, there were an estimated 500,000 PLWH, and 12,000 people died of AIDS-related illnesses in 2020. As such, Thailand was considered to be one of the countries with a high HIV burden in Asia and the Pacific regions, accounting for 9% of the region's total number of PLWH(10).

African Region an estimated 20.9 million people were receiving antiretroviral therapy in 2022. Region of the Americas an estimated 2.7 million people were receiving antiretroviral therapy in 2022. South-East Asian Region an estimated 2.6 million people were receiving antiretroviral therapy in 2022(2) In East and Southern Africa, the average Adult ART coverage is 66% (5). In Ethiopia, the overall ART coverage is 54% of which the Adult ART coverage accounts for 58% (15). Antiretroviral therapy has significantly reduced mortality and improved the life expectancy of HIV-infected patients but the success still critically depends on regular patient follow-up (16). Even among regions with larger populations, ART coverage was 63% in Amhara (with 181,500 PLHIV) while it was 43% in Oromia (with 204,000 PLHIV (13).

According to the current evidence, rapid scaling of HIV treatment with quality assurance was essential to end the AIDS epidemic. It can improve the quality of life of PLHIV, reduce the number of AIDS-related deaths, and prevent the spread of HIV infection in the community(10). According to the 'United Nations Declaration to Scale-up to Wards Universal Access to HIV Treatment, care, and Prevention, there was a misunderstanding among the patients who do not follow up on ART on time experiencing a decreased quality of life and survival time. The incomplete or dropout of ART in the patients causes fast death as compared to those who follow up with ART properly(10).

Moreover, the research problems include: assessing and measuring survival/death status; determining the risk factors of survival/death of HIV patients, looking at implications of observing significant risk factors, and evaluating the impacts of influential or risk factors on survival/death. Survival was defined as the length of time required by the patient since the diagnosis of PLWHA to death(11).

The survival of patients with AIDS may depend on a variety of factors that were socio-demographic and clinical factors(12) The survival of HIV/AIDS patients on antiretroviral therapy (ART) was determined by a number of factors, including economic, demographic, behavioral, and institutional factors(10).

Understanding the survival experience of AIDS patients, the survival time and its trend as well as the factors that influence survival, was critical for increasing understanding of the pathophysiology of the disease, developing policies that would result in changes, clinical decision-making, and planning health service interventions(2). Moreover, even though ART treatment has proven to be clinically significant, a number of deaths occur that could be avoided with appropriate interventions on certain socio-economic, demographic, behavioral, and institutional factors. HIV/AIDS survival time (measured in months), the primary outcome variable of this study, would be estimated from the date of HIV/AIDS diagnosis to the date of HIV/AIDS-related death or censoring(14).

A better knowledge of prognostic factors would allow closer follow-up of and more targeted interventions in high-risk patients, thus reducing excess mortality. Therefore, the main aim of this study was to determine the survival and predictors of survival of patients after the initiation of ART at Jimma University Medical Center. The finding will provide empirical evidence for program planner, and decision-makers to design a new and/or strengthen the existing intervention that improves survival and reduce the high probability of death in HIV patients, for ART program implementer at different level by enabling them to access a baseline data on predictors of survival of patients on ART.

1.3 Significance of the study

Identification of determinant factors that affect the survival status of ART patients under follow-up was a critically important component for intervention and treatment outcomes. Hence, investing in this critical issue and analyzing the possible factors that could affect the survival rate of ART patient's follow-up were vital for the long-term management of patients on ART.

Thus, this study will provide evidence-based information concerning the determinant factors that affect the survival status of ART patients follow-up in the study area. The finding will also help the decision-makers, managers, and program planners in making decisions and taking action for evidence-based intervention contextually which in turn improves service provision.

Finally, this study will create the best opportunity for health professionals to focus on and provide appropriate health services to prevent the determinant factors. In the end, this study had a great contribution to the end users who were ART user patients and Health workers who were caregivers by the reduction of negative outcomes which happened.

2: LITERATURE REVIEW

2.1 Incidences of Mortality

Globally, about 75.5 million people have been infected with HIV, and 32.7 million people have died from AIDS-related illnesses. (31) Worldwide, an estimated 1.7 million people became newly infected with HIV, and nearly 0.7 million people died from AIDS-related illnesses in 2019(32). Most countries have a rate of less than 10 deaths per 100,000, often much lower, below 5 per 100,000. Across Europe, the death rate is less than one per 100,000. Across Sub-Saharan Africa, the rates are much higher. Most countries in the South of the region had rates greater than 100 per 100,000(32).

Globally, 39.0 million [33.1–45.7 million] people were living with HIV at the end of 2022. An estimated 0.7% [0.6-0.8%] of adults aged 15–49 years worldwide are living with HIV, although the burden of the epidemic continues to vary considerably between countries and regions(32).

Women Every week, around 5000 young women aged 15–24 years become infected with HIV in sub-Saharan Africa (Six in seven new HIV infections among adolescents aged 15–19 years are among girls, and Young women aged 15–24 years are twice as likely to be living with HIV as men. (30).

In 2019, 1.7 million people were newly infected with HIV, contributing to a total of 38 million people living with HIV, worldwide. (22) Two-thirds of new infections occurred in sub-Saharan Africa; one-third among young people aged 15 to 24 years.

The WHO African Region remained the most heavily impacted by HIV, with an incidence rate of 1.24 per 1000 uninfected population in 2016 (9). HIV disease can be managed by treatment regimens composed of a combination of three or more antiretroviral (ARV) drugs. Current antiretroviral therapy (ART) does not cure HIV infection but highly suppresses viral replication within a person's body and allows an individual's immune system recovery to strengthen and regain the capacity to fight off opportunistic infections and some cancers. Since 2016,

WHO has recommended that all people living with HIV be provided with lifelong ART, including children, adolescents, adults, and pregnant and breastfeeding women, regardless of clinical status or CD4 cell count (8). This Region remains most severely affected, with nearly 1 in every 25 adults (3.2%) living with HIV and accounting for more than two-thirds of the people living with HIV worldwide(29).

2.2 **Predictors of mortality**

Age, educational status, family size, alcohol consumption, tobacco and chat usage, baseline and current weight, baseline CD4 cell count, baseline hemoglobin, and tuberculosis (TB) diseases were all significant predictors of survival of HIV/AIDS patients(13).

Several predictors of mortality among PLWH have been previously described. A study in Tanzania conducted from 2003 to 2006, identified moderate and severe anemia and severe malnutrition as predictors(19), whereas in a Kenyan cohort of PLWH initiating ART, predictors included low body mass index (BMI) and low CD4 counts(35). In a Ugandan study conducted between 2004 and 2013, identified predictors included male gender, older age, low education status, unemployment, and advanced immunodeficiency(39).

In 2020, around 680,000 [480,000–1 million] people died from AIDS-related illnesses worldwide (17). AIDS-related mortality has declined by 53% among women and girls and by 41% among men and boys since 2010 (18). Globally, 39.0 million [33.1–45.7 million] people were living with HIV at the end of 2022. An estimated 0.7% [0.6-0.8%] of adults aged 15–49 years worldwide are living with HIV, although the burden of the epidemic continues to vary considerably between countries and regions. The WHO Africa created an enormous challenge worldwide(17). The human immunodeficiency virus (HIV) had since the beginning of the epidemic, 85.6 million [65.0–113.0 million] people have been infected with the HIV virus, and about 40.4 million [32.9–51.3 million] people have died of HIV.

A couple of decades ago, the chances of surviving more than ten years with HIV were slim. Today, thanks to antiretroviral therapy (ART), people with HIV/AIDS can expect to live long lives (36).

Most of these studies examined baseline predictors at the start of ART without incorporating longitudinal data to reflect the viral suppression and immune reconstitution that occur with successful ART(39). There is a paucity of information on factors associated with mortality in cohort studies that conduct activities in a public health setting in the context of the UNAIDS 90-90-90 and 95-95-95 strategies.

Understanding predictors of mortality may inform patient management by focusing clinicians on key factors that require attention. In addition, these same factors can be useful for prioritizing program activities toward decreasing mortality(39).

All-cause mortality and its predictors in a cohort of PLWH followed between 2013 and 2020, the majority of whom were virally suppressed at the time of analysis and also characterized the most common causes of death in this population(38).

2.3 Socio-Demographic

Globally, 28.2 million people were accessing antiretroviral therapy as of 30 June 2021. There were 37.7 million [30.2 million–45.1 million] people living with HIV in 2020 (1). Thirty-six million [28.9 million–43.2 million] adults (Age ≥15) and among this 53% of all people living with HIV were women and girls whose residences were urban. Eighty-four percent [67–98%] of all people living with HIV knew their HIV status in 2020. About 6.1 million [4.9 million–7.3 million] people did not know that they were living with HIV in 2020(17).

Key populations and vulnerable groups of the socially marginalized and criminalized, detained and incarcerated, the excluded, including transgender and poorer populations continue to bear a disproportionate burden and risk of HIV across settings. Another goal of ART was to reduce the risk of HIV transmission to sexual partners (21).

ART was recommended for all individuals with HIV to reduce the morbidity and mortality associated with HIV infection and to prevent HIV transmission to sexual partners. ART should be initiated as soon as possible after HIV diagnosis (21).

When initiating ART, it was important to educate patients about the goals and benefits of ART and to identify and address barriers to care engagement and treatment adherence Patients should also understand that currently available ART does not cure HIV and Non-adherence to antiretroviral treatment is the condition of missing doses completely, not following information given by physician, as well as taking drugs inappropriately whereas adherence to antiretroviral treatment is taking 95% or more of the prescribed doses on time and in the correct way, either with or without food(17). To improve and maintain immunologic function and maintain viral suppression, ART should be continued indefinitely without interruption(17).

2.4 Medical and ART Outcome

Medical and ART treatment outcome is measured by a gain in body weight/BMI, decreased occurrence and severity of opportunistic infections (OI), increase in total lymphocyte count (TLC) & CD4+ count, or decrease in plasma HIV RNA level. Among these, a measure of viral load is the best predictor of treatment success(39)

Other indicators used to measure ART treatment outcomes include patient functional status, disease stage as classified by WHO clinical staging, loss to follow-up (LTFU), and patient survival(40). Lost to follow-up is calculated differently by different researchers as they may study over various durations of treatment Total lymphocyte count is used as a proxy indicator for CD4 count where the CD4 count technology is unavailable. Total lymphocyte of 1200 cell/ml approximate the CD4 count of about 200cells/ml (41)

Initiating ART early was particularly important for patients with AIDS-defining conditions, those with acute or recent HIV infection, and individuals who were pregnant; delaying therapy in these sub-populations had been associated with high risks of morbidity, mortality, and HIV transmission. Acquired immune deficiency syndrome (AIDS) is a medical condition caused by the human immunodeficiency virus (HIV) and is a major concern worldwide (16).

ART is a long-term medical treatment for HIV/AIDS. It works by suppressing the virus from multiplying in the body. This keeps the infection under control and helps to prevent the disease from progressing. ART is essential in progressing against HIV/AIDS because it saves lives, allows people with HIV to live longer, and prevents new HIV infections (36).

Millions of lives are saved by ART Since the first version of ART was introduced in the late 1980s; the treatment has saved millions of lives. Globally, 850,000 people died from HIV/AIDS in 2016, but even more deaths – 1.2 million – were averted due to ART. Without ART, more than twice as many people would have died from HIV/AIDS (36).

In the 1980s, the average life expectancy following an AIDS diagnosis was approximately one year(19). Today, with combination antiretroviral drug treatments starting early in the course of HIV infection, people living with HIV can expect a near-normal lifespan (20).

The primary goal of antiretroviral therapy (ART) was to prevent HIV-associated morbidity and mortality. This goal was accomplished by using effective ART to achieve and maintain plasma HIV-1 RNA (viral load) below the quantification limits of commercially available assays. Durable viral suppression improves immune function and overall quality of life, lowers the risk of both AIDS-defining and non-AIDS–defining complications, and allows persons with HIV to live a lifespan approaching that of persons without HIV (21).

The discovery of HIV as the causative body of AIDS, and the inability of modern medicine to find a cure for the disease, have placed HIV as one of the most dreaded pathogens of the 21st century. Expansion of the epidemic had now become a burning issue globally, and this was even more in developing countries, especially in sub-Saharan Africa (23).

Today, it is one of the largest public health crises endangering the human race. In almost three decades since the first HIV cases were recognized, it had claimed the lives of millions of people making, it one of the most devastating epidemics. The disease, being without any cure, was still responsible for economic, and social, crises worldwide (24).

Globally, the number of people living with HIV receiving treatment in resource-poor countries has dramatically increased in the past decades(30). At the end of 2019, an estimated 38 million people globally were living with HIV / AIDS, of whom around 25.4 million people living with HIV (67% of the total) were accessing antiretroviral therapy (29).

However, an estimated 12.6 million other people living with HIV (33% of the total) were still not accessing ART. Since the start of the HIV / AIDS epidemic (end of 2019), the Clinical benefit of ART for AIDS patients, in terms of mortality reduction and improved quality of life, has been well-established in developing countries (17).

Moreover, the survival rate of HIV / AIDS patients on HAART and the risk factors of mortality of these patients have been very well understood. However, in resource-poor countries, like Ethiopia, there are higher mortality rates, with poorly understood contributing factors(33). In other words, even if ART treatment has shown significant clinical importance by meeting the goal of therapy, there are still deaths, which can be avoided by appropriate interventions with certain socioeconomic, demographic, behavioral risk, and health factors (30).

Therefore, a better knowledge of prognostic factors would allow for closer follow-up and more targeted interventions in high-risk patients, leading to reducing excess mortality (28). Antiretroviral drugs introduced in 1996 were a turning point for hundreds of thousands of people with access to health care systems (34).

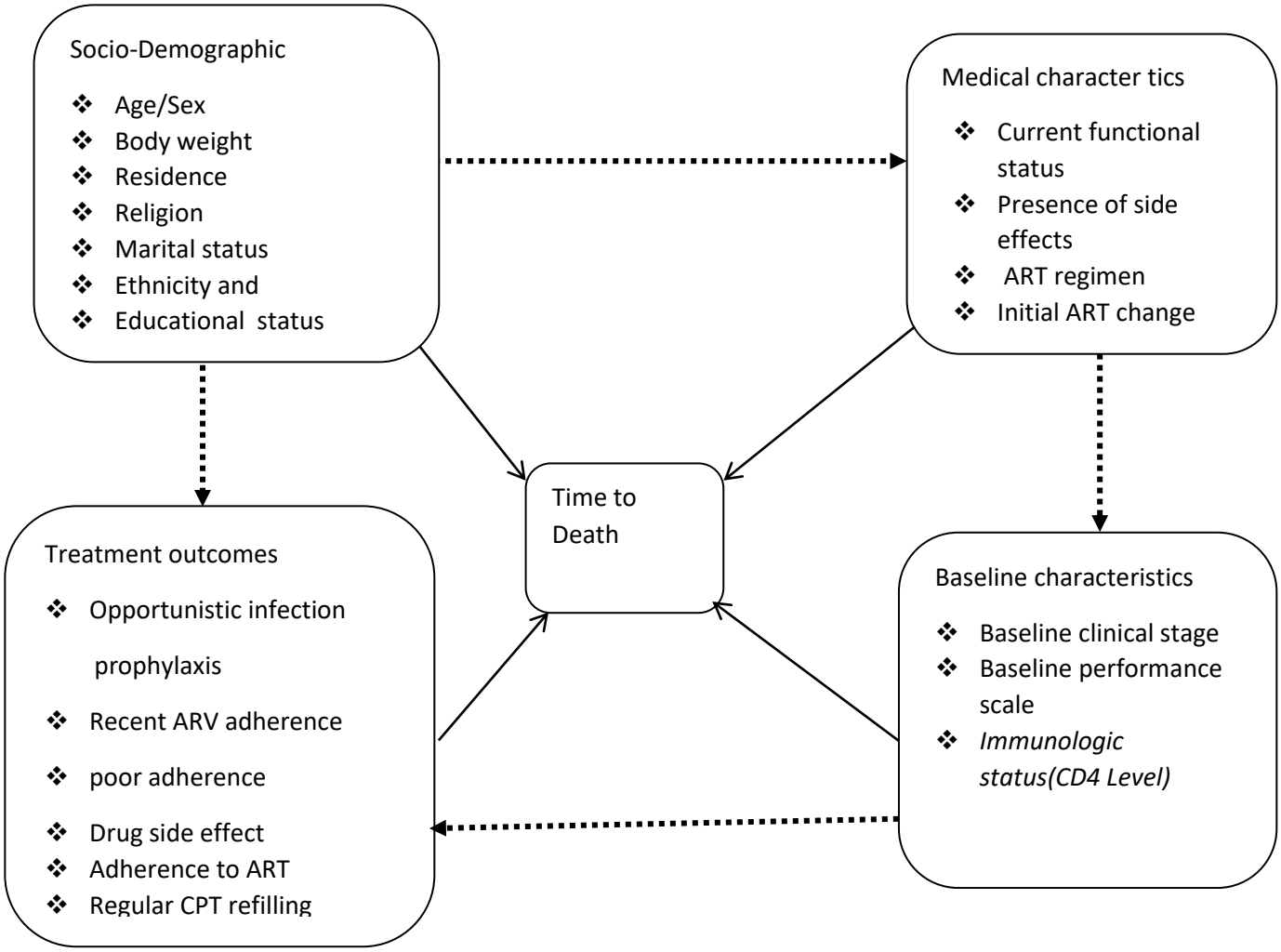
The coverage of HAART averted 2.5 million deaths in low- and middle-income countries since 1995(35). In these countries the estimated mortality after initiation of HAART ranged from 5% to 40.7%, the majority of these deaths occur soon after initiation of HAART as a result of advanced illness or immune reconstitution syndrome (35).

In Ethiopia, HAART started recently in 2005. At the end of June 2010, 550 health facilities were providing ART programs (148 hospitals and 402 health centers). More than 473 thousand patients were enrolled in HIV/AIDS care and 268,934 patients were started on highly active antiretroviral therapy (33).

Although the relationship between survival and its predictors such as low CD4 count, anemia, and advanced disease stage has been described elsewhere, the independent predictors of survival as well as the interaction of these identifiers in the general HIV-infected population after the advent of HAART remain poorly characterized in Ethiopia (34).

2.5. Conceptual framework

This is a conceptual framework for the survival status of adult ART patients admitted with HIV-positive patients. The covariate variables were classified into socio-demographic variables, Medical factors, Adherence to ART and regular CPT refilling, and Health care facility factors, which were adapted and modified after reading different literature (36–45)



Show a direct relationship between independent and outcome variable

Show an indirect relationship between the independent variable

Figure 1: Conceptual framework of patients on ART in Jimma university medical Center, July, 2023

3: OBJECTIVES

3.1. General Objective

To assess Survival status and time to death among adult HIV patients attending on art in Jimma University Medical Center, Jimma zone, south-west, Ethiopia, 2023

3.2. Specific Objectives

To determine the survival status of the adult ART patients on the treatment in Jimma University Medical Center Southwest, Ethiopia, 2023

To determine the time to death of adult HIV-infected patients on ART in Jimma University Medical Center Southwest, Ethiopia, 2023

4: METHODS AND MATERIALS

4.1 **Study area and period**

The study was conducted at Jimma University Medical Center (JUMC) from May 18 to June 18, 2023 GC. JUMC is found in Jimma town in southern Ethiopia about 352 kilometres from Addis Ababa. It is the only tertiary and Referral hospital in south-west Ethiopia serving about 15 million people. ART Clinic is served for ART patients from the town and the nearest district. In addition to this, it provides service for ART patients referred from different health institutions found in southern, Ethiopia. Currently, Eighteen staff (1 Dr for consultant, 6 ART BSc Nurses 3 ART pharmacists 2 TB BSc Nurses, 3 lab technicians, and 3 data cleric IT diplomas) are providing care for four thousand HIV-positive ART patients at Jimma University Medical Center and referred from other health institutions as per the protocol of the current Ethiopian federal ministry of health recommendation for ART.

The ART Clinic had a Lab room that had a standard CD4 counting machine, viral load measuring machine, Organ function test machine, and CBC machine, two OPDs one for ART and one for Tb Treatment. There is also a standard waiting room for patients with teaching materials like TV, a standard guideline from the federal minister of health and microphone, and a standard meeting hall.

4.2 Study Design

An Institutional retrospective Cohort study was conducted between January 2017 to December 2021 in Jimma University Medical Center to assess survival in PLWHA and those who are on ART

4.3 Population

4.3.1 Source population

All adults living with HIV / AIDS and who started antiretroviral therapy in Jimma University Medical Center ART clinic from, 2017 to 2021, G C.

4.3.2 Study populations

All eligible PLWHA (age ≥15 years) who attended Jimma University Medical Center ART clinic and started treatment between January 2017 to December 2021 GC were included in the study.

4.4. Eligibility criteria

4.4.1 Inclusion criteria

All HIV-infected patients ≥ 15 years old who started ART, Not pregnant women, HIV patients with complete intake forms, registers, and follow-up form**s** who were admitted to the ART clinic of Jimma University Medical Center from 2017 to 2021GC whose medical record number was found in ART registry logbook.

4.4.2. Exclusion criteria

HIV-positive adults whose record was incomplete in the record center (for date of admission) Patients started ART in other places, Diagnosis was made outside of health institutions, and Women who were pregnant at the time of ART initiation and lactating mothers were excluded from the study.

A total of 4000 PLWHA were obtainable from the JUMC ART clinic that started ART in the accrual period. Eight hundred Eighty-seven individuals did not fulfill the inclusion criteria and, therefore, were excluded from the study.

4.5. Sample size determination

The sample size was computed by Epi-info version 7 by considering the following assumption a ratio of non-adherent cases to adherent controls of 1:1, power 80, 95% confidence interval (CI), and odd ratio=2.67 considering factors that have association with none adherence from recent study conducted in Deberemarkos General Hospital North Ethiopia (4). and Southern Ethiopia in Yiregalem Hospital (34).

$$n=\frac{[Z\alpha_{/2}\sqrt{(1+\frac{1}{r})P(1-P)}+\frac{Z_{\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}}{r}]^2}{(p_1-p_2)^2}$$ Where, $p=\frac{p_1+rp_2}{r+1}$ $if\ r=1$ then $p=\frac{p_1+p_2}{2}$

So, the calculated sample for this study was 642.

4.6. Sampling technique

Study participants were selected by using a systematic sampling method using commands in Excel all 3113 records of patients receiving ART in Jimma University Medical Centre were listed in an Excel spreadsheet, and randomly selected 642 patients were studied.

4.7. Dependent and independent variables

The main outcome measure was time to death in a month. The time of survival for ART patients was calculated in months by using the time between the dates of ART treatment initiation and the date of the event or censoring. The independent determinant variables were Socio-demographic characteristics and baseline clinical, laboratory, and ART information, The ART patients were followed to the date of death, lost to follow-up, transferred out, or to the end of the study. Patients were considered as censored if they were lost to follow-up or transferred out.

4.8. Data collection procedure and quality control

A data collection form was developed from ART entry and follow-up forms, paper questionnaires, and checklists being used in the ART clinic. The data was collected by reviewing pre-ART register secondary data, laboratory requests, and follow-up forms. The most recent laboratory results before starting ART were used as a baseline value.

Data was collected by three ART BSC-trained nurses. Data quality was controlled by designing the proper data collection materials and through continuous supervision. All completed data collection form was examined for completeness. The collected data were checked for completeness and records with incomplete basic information were excluded from the entry. The overall activities were controlled by the principal investigator.

4.9. Data Processing and Analysis

The cleaned and coded data were entered into Epidata version 3.1. An analysis was done based on a 5-year cohort follow-up. Finally, data was exported to SPSS version 25.0 for analysis. Descriptive statistics of numeric variables were presented in medians with interquartile range (IQR), and categorical variables were presented using frequency and percentages. Survival time was estimated by applying the Kaplan-Meier, Log-rank test to estimate the Occurrence time of explanatory variables. Bivariate and multivariable Cox proportional hazards regression models were performed on the independent determinants.

4.9.1 Cox Proportional Hazard Model Assumption

The proportional hazards assumption asserts that the hazard ratios are constant over time and it, is important to use the fitted proportional hazards model. The risk of recovery must be the same no matter how long subjects have been followed. In order to test this assumption GLOBAL test and schonfield residual were used. Table 5.4 in APPENDIX showed a test of the proportionality assumption of the Cox proportional hazard model. P-values of the coefficient terms are not significant at a 5% level of significance. This ascertains the validity of the assumption of the proportional hazards. The overall proportionality test is also not significant. Therefore the proportionality assumption is not violated.

This study also used standardized marginal residuals plot and Cox-Snell residual to assess the proportionality assumption of the Cox proportional hazard model. In order to check these model assumptions, the study used standard types of residual plots to validate the assumptions behind Cox proportional hazard models when they are separately fitted. In order to validate the Cox proportional hazards model assumption of the survival model, a graph of the Cox-Snell residual was displayed to check the overall goodness of fit for survival models.

(Appendix B) Figure 3 shows that the scaled Cox-Snell residual residuals are randomly distributed and a loess-smoothed curve does not exhibit much departure from the horizontal line suggesting that the proportional hazards assumption is not violated.

4.10. Operational definition

Lost to follow-up: if a patient discontinued ART for one to three months as recorded by the ART physician

Event: PLWHIV on ART, who died during the study period

Survival: lack of experience of death Ethical considerations

Follow-up outcomes: Lost to follow-up, transfer out, adherence

ART Regimen*:* Types of first line, second line, change in regimen

Transfer out*: A* patient was referred to another health facility for care evidenced by his/her document.

Time-to-death: A time during which ART Patients developed an event of interest measured in days from the date of admission to ART Clinic to the date of death.

Functional Status: Working or able to perform usual work in or out of the house; Ambulatory: able to perform activities of daily living; Bedridden: not able to perform activities of daily living

Survival: when the patient is known to be alive as evidenced by his/her clinical follow-up till the end of the study period.

Survival time*:* The period that a patient stays in life after starting ART.

4.11. Ethical Considerations

Ethical clearance for the study would be secured from the Institutional Review Board of Jimma University Public Health Faculty. Following this, letters of permission were written to respective facilities from the zone Health Office (to the Hospital) and the Zonal Health Office. Permission would be also received from the Medical Director of the Hospital and respective heads of Zone health Offices before starting data collection

4.12. Dissemination plan

The result of the study was presented and submitted to the Department of Epidemiology faculty of the Public Health of Jimma University. The pertinent findings will be informed to Jimma University Medical Center, Jimma Zone Health Bureau, and local NGOs. In addition, it will be published in an international journal.

5: RESULTS

5.1 Socio-demographic characteristics of participants

A total of 642 HIV-positive individual records were reviewed. Of these, 114(17.8%) deaths, and 528(82.2%) were censored. The median survival time for an event (dead) case was 34 months with a mean (SD) age at baseline of 36.8(3.56) years and a median age of 43 years. More than half of the patients, 380(59.2%) were male. Among them, 63(16.6%) died, while 51 (19.5%) deaths occurred among the male patients. It was also observed that 352(82.8%) patients were living in Jimma city, of whom 73 (17.2%) were died. In addition, 143(22.3%) HIV-positive patients were non-educated, of these 32(22.4%) of them died during the study period, while 28(16.2%) deaths occurred among patients having higher educational status. Furthermore, 84(13.1%) HIV-positive patients had no previous treatment history at baseline, of whom 8(9.5%) have died (Table 5.1).

Table 5.1 Socio-demographic characteristics of HIV/AIDS patients treated under ART follow-up, Jimma University Medical Center, Southwest Ethiopia, 2023

Variables	**Category**	**Follow up Status**		**Frequency (%)**
		Censored (N, %)	**Death (N, %)**	
Age(in years)	18-29	147(88.0)	20(12.0)	167(26.0)
	30-39	173(80.1)	43(19.9)	216(33.6)
	40-49	155(80.3)	38(19.7)	193(30.1)
	greater than 50	53(80.3)	13(19.7)	66(10.3)
Sex	Male	317(83.4)	63(16.6)	380(59.2)
	Female	210(527)	51(19.5)	262(40.8)
Residence	In Jimma town	352(82.8)	73(17.2)	425(66.2)

	Outside Jimma town	176(81.5)	40(18.5)	217(33.8)
Educational status	No formal education	111(77.6)	32(22.4)	143(22.3)
	Primary	129(82.2)	28(17.8)	157(24.5)
	Secondary	143(84.6)	26(15.4)	169(26.3)
	Tertiary	145(83.8)	28(16.2)	173(26.9)
Marital status	Single	76(90.5)	8(9.5)	84(13.1)
	Married	325(82.1)	71(17.9)	396(61.7)
	Separated/divorced	82(78.8)	22(21.2)	104(16.2)
	Widowed	45(77.6)	13(22.4)	58(9.0)
Religion	Orthodox	236(84.9)	42(15.1)	278(43.3)
	Muslim	180(79.6)	46(20.4)	226(35.2)
	Catholic	48(82.8)	10(17.2)	58(9.0)
	Protestant	62(79.5)	16(20.5)	78(12.1)
Occupational status	Day laborer	135(78.5)	37(21.5)	172(26.8)
	Employees	222(84.1)	42(15.9)	264(41.1)
	Others	170(82.9)	35(17.1)	205(31.9)
Ethnic group	Oromo	218(80.1)	54(19.9)	272(42.4)
	Gurage	77(86.5)	12(13.5)	89(13.9)
	Welayta	52(80.0)	13(20.0)	65(10.1)
	Amhara	139(85.3)	24(14.7)	163(25.4)
	Others	41(78.8)	11(21.2)	52(8.1)

5.2. Clinical characteristics of study participants

The HIV disclosure status of the study participants was 511 (79.6%) disclosed, while the rest 131(20.4%) were non-disclosed. Among these 86(16.9%) disclosed HIV patients, and 28(21.4%) non-disclosed patients died. It was also observed that of 444(69.2%) good ARV adherence HIV patients 56(12.6%) of them died and 38(5.9%) poor ARV adherence HIV patients, 30(78.9%) of them were died. The baseline functional statuses of the study participants were 436(67.9%) functional, 169 (26.3%) ambulatory, and 37 (5.8%) bedridden. Concerning the presence of drug side effects in the study participants, 191 (29.8%) had experienced drug side effects (Table 5.2).

Table 5.2 Clinical characteristics of HIV/AIDS patients treated under ART follow-up, Jimma University Medical Center, Southwest Ethiopia, 2023

Variables	Category	Follow up time		Frequency (%)
		Censored (N, %)	Death (N, %)	
HIV disclosure status	Disclosed	454(89.4)	54(10.6)	508(79.1)
	Not disclosed	74(55.2)	60(44.8)	134(20.9)
ARV adherence	Good	390(89.7)	45(10.3)	435(67.8)
	Fair	132(84.1)	25(15.9)	157(24.5)
	Poor	6(12.0)	44(88.0)	50(7.8)
Baseline functional status	Functional	387(88.8)	49(11.2)	436(67.9)
	Ambulatory	132(78.1)	37(21.9)	169(26.3)
	Bedridden	9(24.3)	28(75.7)	37(5.8)
Current functional status	Functional	464(87.2)	68(12.8)	532(82.9)
	Ambulatory	60(69.8)	26(30.2)	86(13.4)
	Bedridden	4(16.7)	20(83.3)	24(3.7)
CD4 current	less than 200	114(54.3)	96(45.7)	38(5.9)
	200-350	275(94.5)	16(5.5)	120(18.7)
	greater 350	139(98.6)	2(1.4)	484(75.4)
CD4 status	less than 200	5(13.2)	33(86.8)	210(32.7)
	200-350	67(55.8)	53(44.2)	291(45.3)
	greater 350	456(94.2)	28(5.8)	141(22.0)
OIS prophylaxis	Not given	94(87.0)	14(13.0)	108(16.8)
	Cotrimoxazole	181(87.4)	26(12.6)	207(32.2)
	INH	252(77.8)	72(22.2)	324(50.5)
	Others	1(33.3)	2(66.7)	3(.5)
WHO	Stage I	63(96.9)	2(3.1)	65(10.1)
	Stage II	100(92.6)	8(7.4)	108(16.8)
	Stage III	318(96.1)	13(3.9)	331(51.6)
	Stage IV	47(34.1)	91(65.9)	138(21.5)
Drug side effect	Yes	145(75.9)	46(24.1)	191(29.8)
	No	383(84.9)	68(15.1)	451(70.2)
Baseline Weight	<40	9(33.3)	18(66.7)	27(4.2)
	40.1-50	152(70.0)	65(30.0)	217(33.8)
	50.1-60	220(91.7)	20(8.3)	240(37.4)
	>60	147(93.0)	11(7.0)	158(24.6)

5.4 Survival status after initiation of ART

Out of 642 HIV/AIDS patients treated under ART follow-up, 528 (82.2%) were censored and 114 (17.8%) were died. The median follow-up time was 34 months. The overall incidence rate of mortality during ART treatment was 5.79 per 1000 person-month observations with a 95% confidence interval of 4.8 to 6.9. About half (48.2%) of the deaths occurred within the first 33 months of ART initiation which gives a mortality incidence of 1.69 per 1000 person-months. The probability of death was estimated to be 2%, 25%, and 70% at 20, 40, and 60 months after initiation, respectively.

The cumulative probabilities of survival at 20, 40, and 60 months of ART initiation were found to be 98%, 75%, and 30%, respectively (Figure 1).

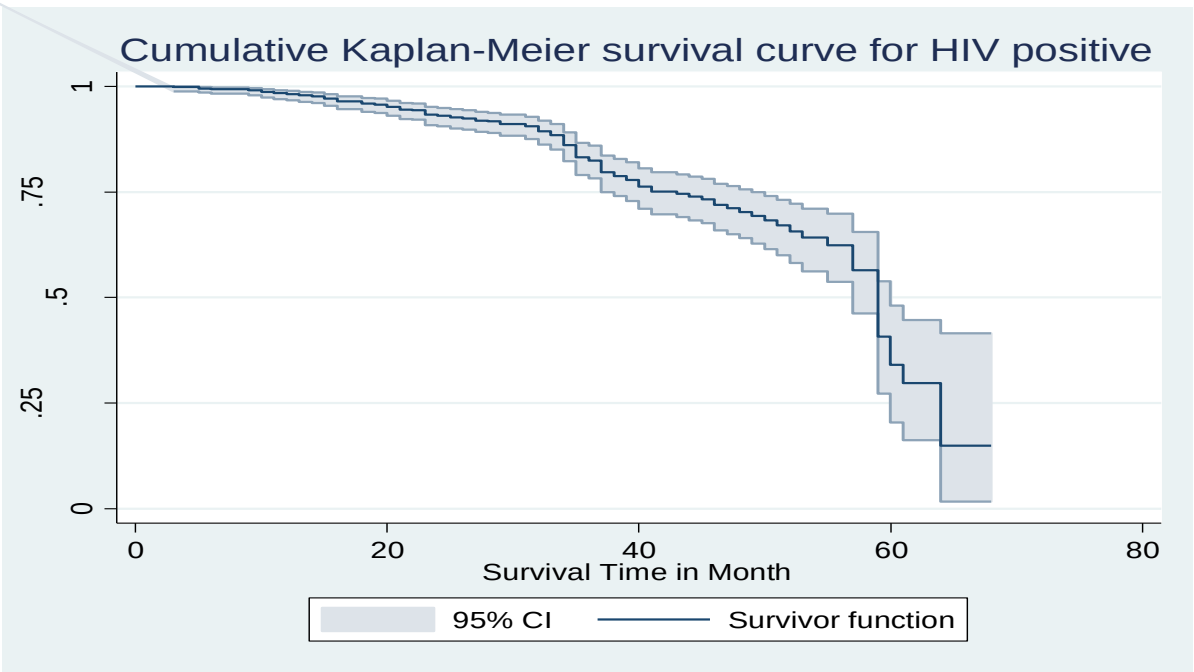


Figure.**1.** Cumulative Kaplan–Meier survival curve with 95% confidence intervals of HIV/AIDS patients treated under ART follow-up at Jimma University Medical Center, 2023.

5.5. Predictors of mortality of patients on ART

To reveal the independent predictors of early mortality after initiation of ART under follow-up in Jimma University Medical Center, Bivariate and multivariate Cox regression models were used. Among different baseline variables incorporated in the bivariate Cox regression model, baseline weight, drug side effect, OIS prophylaxis, CD4 baseline cells, baseline functional status, WHO clinical stage, HIV disclosure, and recent ART adherence were associated with time to death at 25% significant level in the bivariate Cox regression analysis. Then these variables were entered into a multivariate Cox regression analysis.

In multivariate Cox regression analysis baseline weight, CD4 cells, WHO Clinical stage, HIV disclosure, and recent ART adherence were statistically significant for death in HIV patients at $P < 0.05$. Therefore, baseline weight, CD4 cells, WHO Clinical stage, HIV disclosure, and recent

ART adherence were identified as a predictor of early mortality after initiation of ART under follow-up at Jimma University Medical Center.

The result showed that patients with poor ART adherence had the highest risk of death with 2.43 times more likely to die than good adherent patients (AHR = 2.43: 95% CI: 1.332- 4.430). Similarly, this study found that patients with non-disclosure status were 1.58 times more likely to have a risk of death compared to patients with disclosure status (AHR=1.58: 95%CI: (1.08-2.43)

Baseline advanced WHO clinical stages (Stage IV) at the initiation of ART was found to be 5.32 times more likely predictor of mortality among HIV-positive on ART as compared to Stage I (AHR=5.32: 95%CI: (1.24, 12.49). This indicates the hazard of HIV patient mortality was higher with the advanced WHO clinical stage compared with WHO clinical stage 1 at the initiation.

This study also showed the weight of patients less than 40kg at baseline of ART was found to be 3.23 times more likely to predict mortality among HIV-positive on ART as compared to baseline weight of more than 60kg (AHR=3.23: 95%CI:(1.35,7.71). Likewise, patient's weight with 40.1- to 50 at baseline of ART was found to be 2.95 times more likely to predict mortality among HIV-positive on ART as compared to baseline weight of more than 60KG (AHR=2.95: 95%CI: (1.40, 6.25). This indicates patients with a lower baseline weight had a lower chance of survival; baseline weights had a statistically significant effect on AIDS patients' chances of survival (Table 5.3).

Table 5.3: Bivariate and multivariate Cox regression among HIV-positive patients attending ART under follow-up in Jimma University Medical Center, South West Ethiopia, (N=642), 2023

Variables	**Category**	**Follow up Status**		**CHR(95%CI)**	**AHR(95%CI)**	**p-value**
		Censored (N, %)	**Death (N, %)**			

HIV disclosure status	Disclosed	454(89.4)	54(10.6)	1		
	Not disclosed	74(55.2)	60(44.8)	4.305(2.97,6.22)	1.58(1.03,2.43)	.037*
ARV adherence	Good	390(89.7)	45(10.3)	1		
	Fair	132(84.1)	25(15.9)	2.30(1.39,3.81)	1.56(.819,2.97)	.176
	Poor	6(12.0)	44(88.0)	9.03(5.92,13.78)	2.43(1.33,4.43)	.004*
Baseline functional status	Functional	387(88.8)	49(11.2)	1		
	Ambulatory	132(78.1)	37(21.9)	2.55(1.64,3.96)	1.03(.598,1.69)	.981
	Bedridden	9(24.3)	28(75.7)	6.70(4.19,10.710)	1.03(.538,1.98)	.922
CD4 current	less than 200	96(45.7)	114(54.3)	1		
	200-350	16(5.5)	275(94.5)	.395(.255, .613)	.612(.333, 1.12)	.612
	greater 350	2(1.4)	139(98.6)	.051(.030, .085)	.304(.140, .661)	.304
OIS prophylaxis	Not given	14(13.0)	94(87.0)	1		
	Cotrimoxazole	26(12.6)	181(87.4)	1.599(.819,3.12)	.670(.329,1.36)	.270
	INH	72(22.2)	252(77.8)	3.30(1.79,6.06)	1.01(.495,2.02)	.998
	Others	2(66.7)	1(33.3)	12.80(2.84, 27.0)	.738(.131,4.147)	.730
Drug side effect	Yes	46(24.1)	145(75.9)	1		
	No	68(15.1)	383(84.9)	.386(.261, .570)	1.59(.922,2.76)	.095
Baseline Weight	<40	9(33.3)	18(66.7)	12.62(5.89,27.1)	3.23(1.35,7.71)	.008*
	40.1-50	152(70.0)	65(30.0)	6.69(3.46,12.9)	2.95(1.40,6.25)	.004*
	50.1-60	220(91.7)	20(8.3)	1.46(.700,3.05)	1.19(.560,2.54)	.649
	>60	147(93.0)	11(7.0)	1		
WHO stage	Stage I	63(96.9)	2(3.1)	1		
	Stage II	100(92.6)	8(7.4)	2.29(.487,10.80)	2.36(.49,11.30)	.281
	Stage III	318(96.1)	13(3.9)	1.24(.278,5.56)	1.07(.237,4.85)	.927
	Stage IV	47(34.1)	91(65.9)	17.96(4.42,26.07)	5.32(1.24,12.49)	.024*

*indicates significance at 5% level

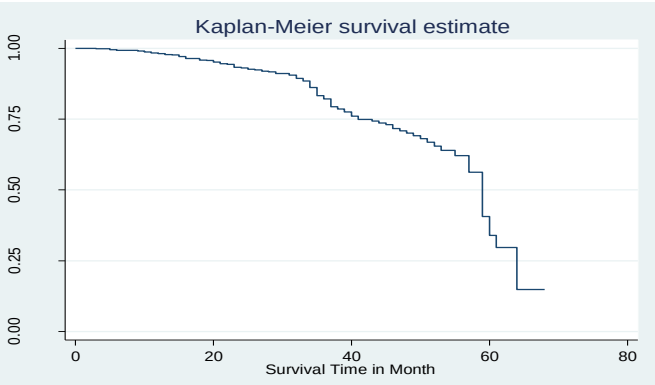
5.6. Comparison of Survival Curves

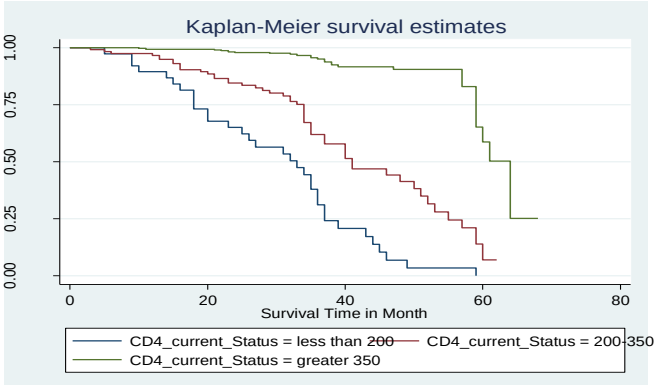
The survival distributions of time to death of the HIV patients were estimated for each group using the Kaplan–Meier (KM) method to compare the survival curves of two or more groups. The Kaplan–Meier estimated survival curves in Figure 1a highlight the overall estimated survival function using different groups of covariates. In addition, the survival curves of HIV patients were different for Current CD4 count, ART adherence, WHO Clinical stage, and HIV disclosure baseline weight (see Figure 1b–f), whereas among gender, age, marital status, educational

status, and place of residence were not clear differences because of the crossing of the curve and not included in the analysis (figure in APPENDIX).

According to the Kaplan-Meier survival function, patients with good ART adherence had a higher survival experience than patients with poor ART adherence as follow-up time increased (Fig. 1c). HIV patients' survival rates were determined by their WHO Clinical stage. Patients with Stage IV had a lower chance of survival for longer survival times as compared to Stage I, II, and III (Fig. 1d). The Kaplan-Meier survival plot also revealed that patients with non-disclose HIV patients, lower baseline weight, and lower CD4 count had a lower survival probability as survival time increased (Fig. 1b,e and f).

The Kaplan-Meier survival plot also revealed that patients non-disclose HIV patients, with lower baseline weight, and lower CD4 count had a lower survival probability as survival time increased (Figure. 2b, e and f).





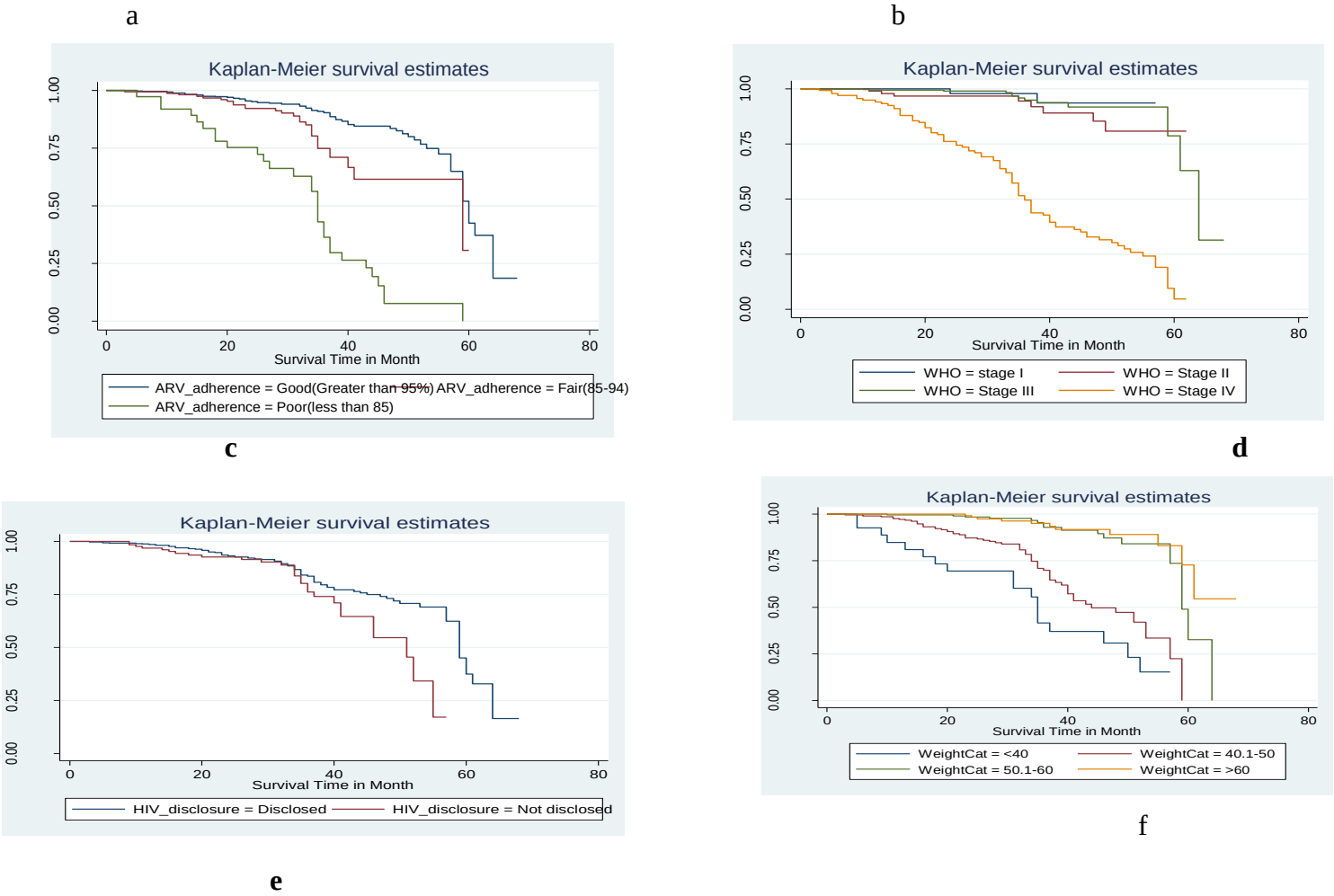


Figure 2: The Kaplan–Meier estimated survival curves

6. DISCUSSION

In 2022, around 630,000 people died from AIDS-related illnesses worldwide, compared to 2 million people in 2004 and 1.3 million in 2010 in sub-Saharan African countries including Ethiopia (28). This retrospective cohort study aimed to assess survival status, time to death, and its predictors among HIV-positive adults who were admitted to the ART clinic of Jimma University Medical Center from January 1/ 2017 to December 30/2021GC, where data were extracted from May 18 to June 18, 2023.GC. The survival probability of AIDS patients increased by the advent of ART despite challenges like low asymptomatic screening and early treatment of HIV/AIDS cases. The socio-demographic and clinical characteristics of study participants were consistent with many other studies conducted in poor resource settings.

In this historical cohort study, we found that the independent significant predictors of lesser survival in patients living with HIV/AIDS after initiation of ART were, advanced WHO staging IV, the baseline and current weights, non-disclosure status, and adherence to ART.

The main objective of this study was to determine predictors of mortality and time to death among HIV-infected adult patients after starting antiretroviral therapy in Jimma University Medical Center, south-west, Ethiopia. The findings from the registered cohort showed that there were 114(17.8%) deaths, providing an incidence density of mortality during ART treatment of 5.79 per 1000 person-month observations with 95% confidence interval of 4.8 to 6.9 which was higher compared to other studies conducted in Ethiopia [(22), (21)] but lower than other studies conducted in Arbaminch, Ethiopia (22), Debremarkos Referral Hospital, Northwest Ethiopia (42) and Cameroon (9) 16.7 and 52 per 100 person year observation, respectively.

This study showed that the majority of deaths have occurred in the first 33 months of ART initiation which was higher as compared to the previous study [(23),(9)]. The estimated mortality in the study period was 2%, 25%, and 70% at 20, 40, and 60 months of follow-up period, respectively. This finding was higher than the study done in Nekemte referral hospital (23).

Patients with poor ART adherence had the highest risk of death with 2.43 times more likely to die than adherent patients. Similarly, a study conducted in Ethiopia showed that non-adherent participants had a mortality of 2.7 times compared to adherent ART patients (42). Another comparable study from Ethiopia showed that the risks of death in non-adherent patients were 4 times higher compared to adhered patients (40). The non-adherence to HAART leads to virologist, immunologic, clinical failure, and failure to suppress viral replication, thus increasing the likelihood of developing HIV mutations that could lead to the development of drug-resistant viral strains. Adherence to HAART is critical to the survival of HIV/AIDS-infected people because poor adherence is the main reason for poor treatment outcomes among people receiving antiretroviral therapy [(32), (23)].

This study found that patients with non-disclosure status were at a higher risk of death compared to patients with disclosure status. This finding is comparable to the study conducted in other parts of Ethiopia (42). This may be due to the psychological readiness of the patients to receive social support from their partner in adapting to the disease and taking the drug correctly. Consequently, non-disclosure has negative health impacts associated with distress, loneliness,

and medical non-adherence as a means of hiding the presence of disease from others, and these factors may lead to a higher rate of mortality than those who have disclosed their HIV status.

The baseline and current weights had a statistically significant effect on AIDS patients' chances of survival. This finding is consistent with those of other studies (28). The effect of weight gain on HIV mortality can be justified in that weight gain may be associated with good nutrition and higher BMI. Studies in people living with HIV infection have demonstrated that higher BMI is associated with higher CD4+ cell count, lower HIV viral load, reduced risk of opportunistic infections, slower progression to AIDS, and reduced mortality[(31),(41)], and that weight loss is associated with accelerated disease progression contributing to increased mortality (42).

Baseline advanced WHO clinical stages at the initiation of ART were found to be a significant predictor of mortality among HIV-positive patients on ART. The hazard of patient mortality was higher among adults with advanced WHO clinical stages compared with WHO clinical stages 1 and 2 at the initiation. This finding is supported by other studies conducted in China (HR = 2.4) sub-Saharan Africa, Adama, Mekelle, and Zambia (WHO stage 4 (AHR = 4.8) [1.9-14] compared to WHO stage 1 and 2) (20). The mortality is high when the disease is advanced more because the viral load is high and it destroys body defense mechanisms and exposes to several opportunistic infections. It finally results in death.

6.1 Strengths and limitations of the study

6.1.1. Strengths of the study

The study has better strength to identify multiple and variety of factors for non-adherence to ART treatment specifically socio-demography, Nutritional related factors, and HIV clinical factors. In addition, the data was collected by using different tools like structured questionnaires, by using the checklist by the standard measuring scale, and using data abstraction format which increased internal validity.

6.2.2. Limitations of the Study

Due to Incomplete records being eliminated from the data, it affected the strength of associations, so the death rate could be underestimated or overestimated. The study was retrospective, and there was a risk of bias due to uncertainty on previous data.

7: CONCLUSION AND RECOMMENDATION

7.1. Conclusion

The median follow-up time was 34 months with the overall incidence rate of mortality during ART treatment being 5.79 per 1000 person-month. This study identified independent significant predictors of survival in patients living with HIV/AIDS after the initiation of HAART. These factors include patients with baseline weight, Recent ART adherence to treatment, initial WHO Clinical stage, and HIV disclosure. The risk of mortality is increased if the HIV patient is at a lower baseline weight, WHO Clinical stage IV, and non-disclosure HIV patients, and who have had poor adherence

7.2. Recommendation

- Lower baseline weight, WHO Clinical stage IV, and non-disclosure HIV patients, and who have had poor adherence were found to be the identified independent significant predictors of survival in patients. Therefore, healthcare providers should give serious attention to the identification of HIV opportunistic infections during initiation of ART which could contribute.
- The Jimma University Medical Center in association with supporting stakeholders, should endowed with longitudinal clinical and CD4 cell count monitoring to facilitate timely initiation of ART; and should strengthen long-term HIV care services for patients prior to ART eligibility.
- Health workers and data clerks in ART centers should be supported to appreciate the importance of properly recorded information.
- The Jimma University Medical Center in association with supporting stakeholders, should endowed with longitudinal clinical and CD4 cell count monitoring to facilitate timely initiation of ART; and should strengthen long-term HIV care services for patients prior to ART eligibility.
- Health workers and data clerks in ART centers should be supported to appreciate the importance of properly recorded information
- For Researchers Further study should be carried out in a longitudinal study in order to improve factors towards survival time like non-adherence because ART adherence is dynamic and its factors are modifiable from time to time.

- For Health Professionals Substantial efforts need to be made to move patients into care earlier in their disease progression in order to obtain the maximum benefit from ART.

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Appendix

Assumption of Cox hazard model

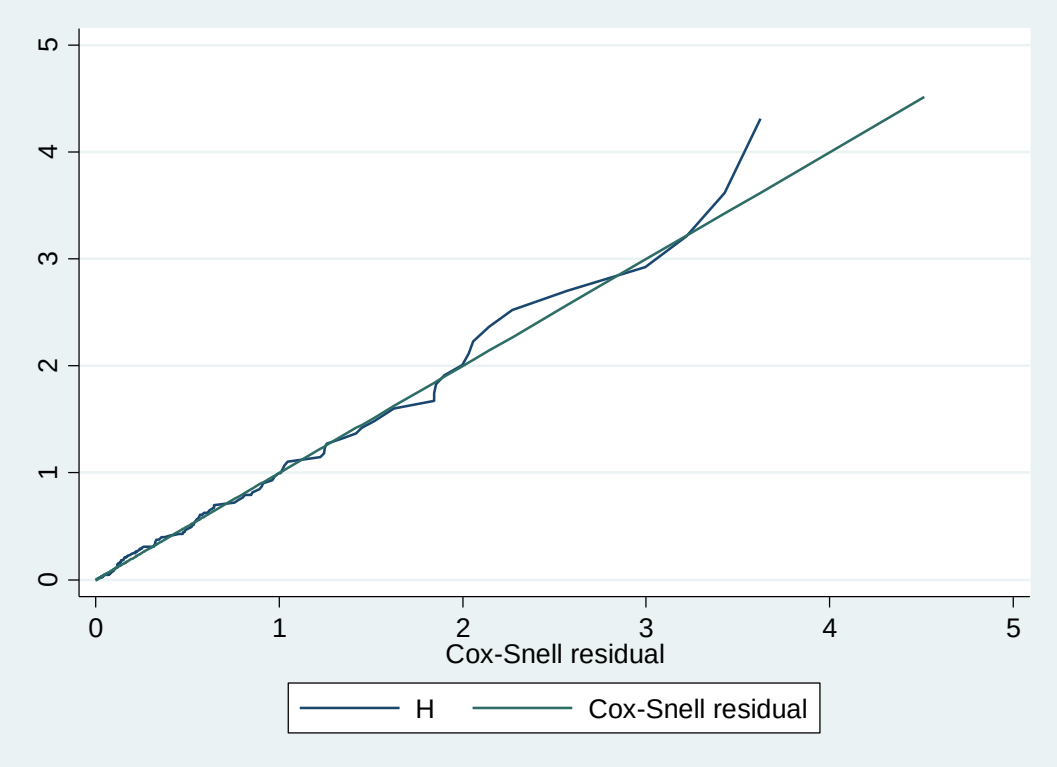
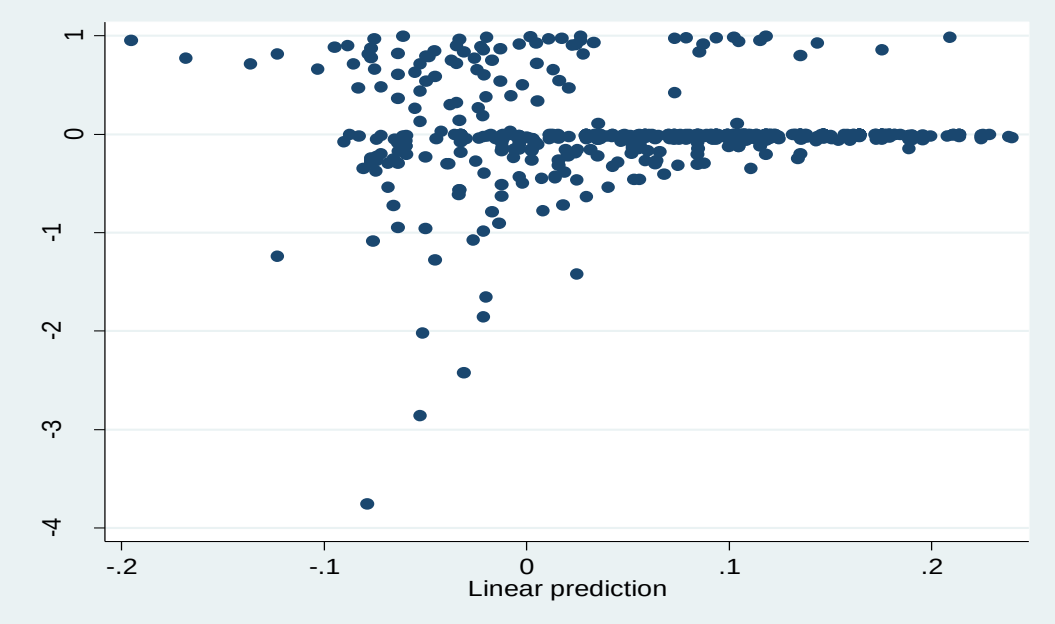


Fig 31: Cox Snell residuals



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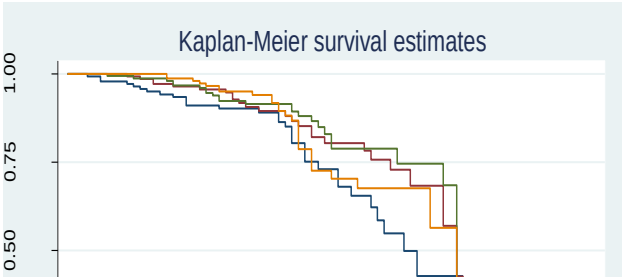
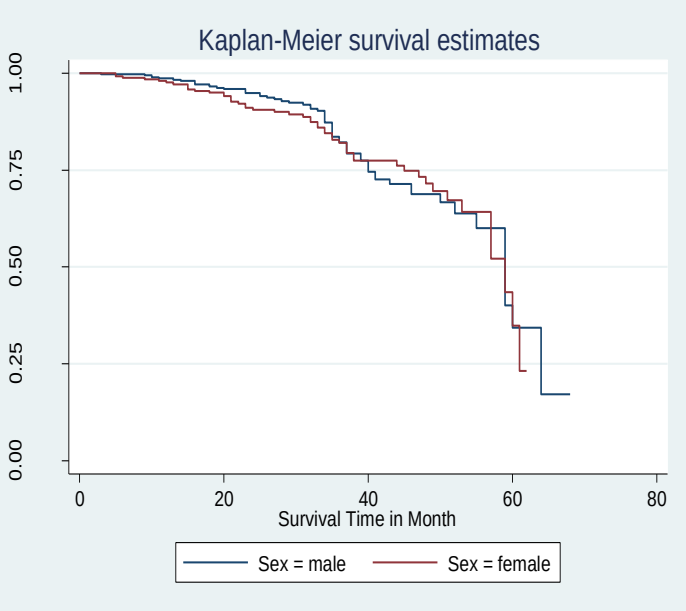
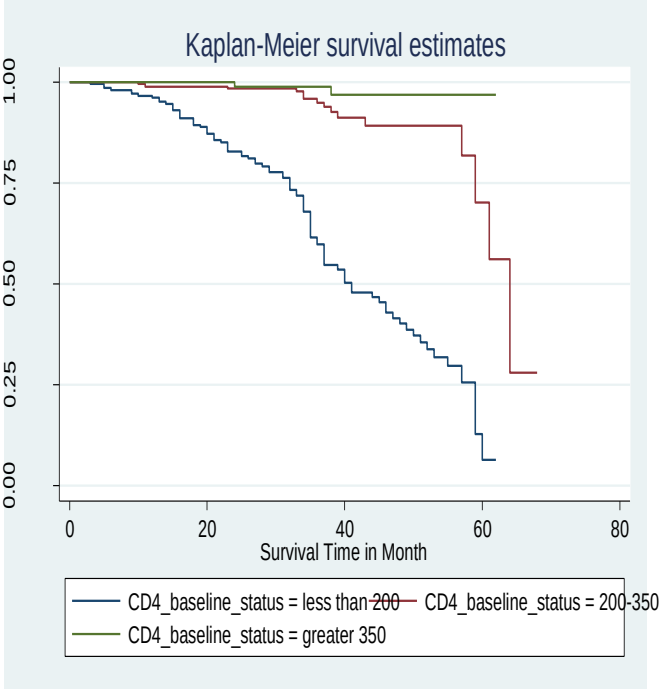
	rho	**chi2**	**df**	**Prob>chi2**

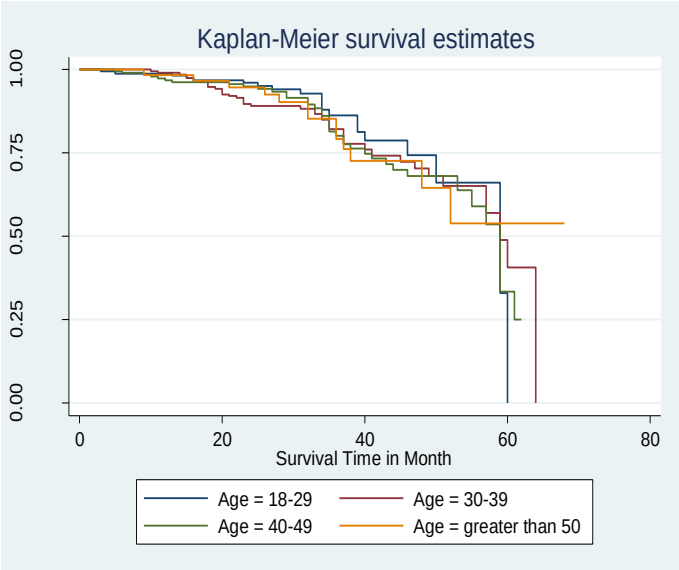
----------+----------				
ARV	0.01629	0.04	1	0.8414
WHO	-0.05280	0.49	1	0.4829
HIV	-0.03480	0.15	1	0.6976
Weight Cat	0.16114	3.15	1	0.0760
CD4_curren~s	0.12370	2.02	1	0.1553
Drug Side~t	-0.13945	2.91	1	0.0879
Functional Baseline	0.16315	3.47	1	0.0623
OIS	0.19345	5.42	1	0.0899
----------+----------				
Global test	14.48	8	0.0701	

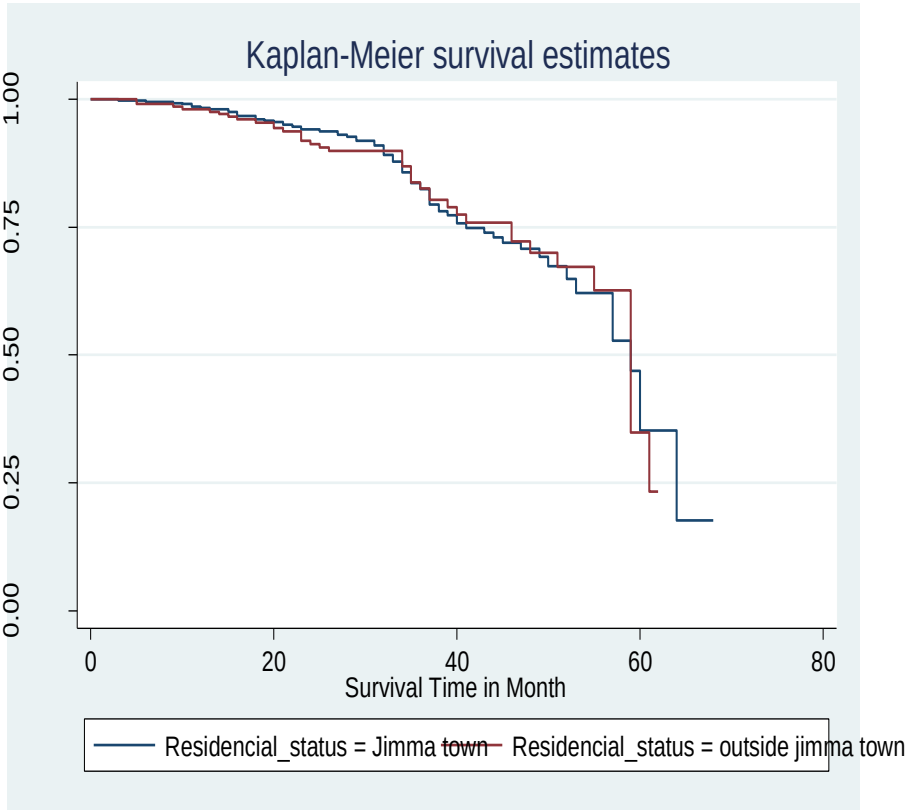
KM curve




Kaplan-Meier survival estimates
1.00
0.75
0.50
0.25
0.00
0
20
40
60
80
Survival Time in Month
Sex = male
Sex = female


Kaplan-Meier survival estimates
1.00
0.75
0.50
0.25
0.00
0
20
40
60
80
Survival Time in Month
CD4_baseline_status = less than 200
CD4_baseline_status = 200-350
CD4_baseline_status = greater 350


Kaplan-Meier survival estimates
1.00
0.75
0.50
0.25
0.00
0
20
40
60
80
Survival Time in Month
Age = 18-29
Age = 30-39
Age = 40-49
Age = greater than 50


Kaplan-Meier survival estimates
1.00
0.75
0.50
0.25
0.00
0
20
40
60
80
Survival Time in Month
Residencial_status = Jimma town
Residencial_status = outside jimma town

Annexes

Annex 1. Checklist

Jimma University College of Public Health & Medical Sciences Department of Epidemiology Checklist for collecting information on survival status and determinates of art patients under follow-up in Jimma University Medical Center. Predictors of mortality, on art patients under follow-up in Jimma University Medical Center ART clinic from 1 January 2017 to 30 December 2021 Jimma, Ethiopia.

I am conducting a study on survival status and predictors of mortality in survival status and determination of art patients under follow-up in Jimma University Medical Center ART clinic in collaboration with the School of Post Graduate Study, College of Public Health and Medical Sciences, Jimma University. Therefore, this checklist is prepared for collecting information on survival status and determinates of art patients under follow-up in Jimma University Medical Center ART clinic from 1 January 2017 to 30 December 2021 Jimma town Information was collected from art patients under follow-up registries and records. The information collected was used only for academic purposes and the improvement of patient care.

1. Data collector's Name_____

Signature_____

Date _____

2. Checked by supervisor: Name _____

Signature_____

Date_____

DECLARATION SHEET

The undersigned, MPH/GMPH student, acknowledges this thesis was my original work. All information obtained from other sources was properly acknowledged and cited. I agree to accept responsibility for the scientific ethical and technical conduct of the research and for the provision of required progress reports as per the terms and conditions of the facility of public health.

Name of the student Abdela Nega

Signature _____Date 26/ 09/2023

Place of submission to Health Institute, Faculty of Public Health Department of Epidemiology, Jimma University.

Date of submission: 20/10/2023

This Research work has been submitted for examination with our approval as university advisor (s)

Advisor's name

1. Name of the first advisor: MR Zerihun Kura

   Sign_____

2. Name of the second advisor: MRS. Yenealem Gezehagn

   Sign_____

Study Information Sheet

Title of the project

Antiretroviral Treatment outcomes in Jimma University Specialized Hospital located at Jimma Town South West Ethiopia,

Background of the study

HIV/AIDS has been one of the most serious public health problems in the world for over half a decade. Our country is among the highly affected countries where more than two people per hundred are estimated to live with HIV and there are different efforts being made to mitigate the challenge among which is the provision of ART to infected individuals. ART service is expanding from time to time which is also the case in Jimma University Specialized Hospital located in Jimma Town South West Ethiopia. As a result, task shifting from higher medical care level to mid-level is going on. This study will help the policymakers and program implementers to understand the difference in treatment outcome as task shifting and decentralization goes on.

Objective

This study is designed to compare the survival rate and antiretroviral treatment (ART) outcome among ART patients in Jimma University Specialized Hospital located at Jimma Town South West Ethiopia,

Significance of the study

The result of this study helps in planning service improvement activities and may also serve as a baseline for other studies in the country. Patients will benefit from the study indirectly.

Study site and period of the study

This study is underway in Jimma University Specialized Hospital located at Jimma Town South West Ethiopia, in health facilities providing ART service for the last more than five years. Medical records of all consented patients would be reviewed once to collect the data required for the study. Potential risks/Benefits associated Patients whose medical records were included in this study would not get any direct benefit or harm as a result of their involvement. However, the overall result of the study is believed to help in the improvement of ART service in the Zone.

Confidentiality/Justice/Privacy

All information used in the study will be kept strictly confidential. Medical records of all consented patients who were receiving ART in the selected health facilities for the duration of at least three months would be included and declined patients would be treated as usual regardless of their decision.

The data would be collected by data clerks who were already managing the medical records in respective facilities and they would hand over the filled log books to the principal investigator for analysis using codes hence patient privacy will be maintained.

Rights of participation (Voluntary Participation)

Records of all adult patients who receive ART service from facilities would be reviewed unless the patient declines.

Questions rights and complaints (Specify the address of the contact person)

If the patient who took part in the study has any concerns regarding the study, they can feel free to communicate with the principal investigator Ato Abdela Nega (Mobile: 0911894016) in Jimma University Specialized Hospital located at Jimma Town South West Ethiopia, (Jimma).

ANNEX C: PATIENT RECORD REVIEW FORM

JIMMA UNIVERSITY MEDICAL FACULTY SCHOOL OF PUBLIC HEALTH

Log-Book for Patient Record Review

Facility code_____ log-book code_____ No Questions Coding categories

Part I. Socio-demographic Characteristics

Serial Number	Socio-demographic Characteristics	Coding classification	Skip
1	Age (in years)	1. 15-29 2. 30-39 3. 40-49 4. >50	
2.	Sex	1. Male 2. Female	
3.	Residence	1. In Jimma town 2. Out of Jimma town	
4.	Marital status	1. never married 2. married 3. divorced 4. widowed	
5.	Religion	1. Orthodox 2. Muslim 3. Catholic 4. Protestant 5. Others specify-----	
6.	Level of education	1.No education 2. Primary 3. Secondary 4. Tertiary	

7.	Occupation	1. Day laborer 2. Employee 3. Others	
8.	Family monthly income	----------in ETB	
9.	Distance of ART clinic	----------km from home	
10.	HIV disclosure status	1. Disclosed 2. Not disclosed	
11.	Partner's HIV status	1. Known 2. Unknown	
12.	Ethnic group	1. Oromo 2. Garage 3. Wilayat 4. Amhara 5. Other (specify)_____	

PART- II. Clinical/medical characteristics of patient's variables (from clinical monitoring chart)

No Questions/variables. Coding categories/responses

Serial Number	Clinical characteristics	Coding classification	Skip
13.	Body weight in kilogram	----------Kg	
14.	CD4 count at baseline	----------Cells/mm^3	
15.	Recent CD4 count	---------- Cells/mm^3	
16.	OIS prophylaxis	1. Not given 2. Cotrimoxazole 3. INH 4. Others specify------	
17.	Baseline functional status	1. Functional 2. Ambulatory	

		3. Bedridden	
18	Current functional status	1. Functional 2. Ambulatory 3. Bedridden	
19.	Presence of side effects	1. Yes 2.No	
20.	ART regimen	1. TDF/3TC/EFV 2. Others	
21.	Initial ART change	1. Yes 2.No	
22.	If yes Reason for changing the regimen	1. Side effect 2. TB treatment 3. ART failure	
23.	Stigma	1. Yes 2.No	

Part- III ART treatment and Patient follow-up information

Serial Number	Characteristics	Coding classification	Skip
24.	Date confirmed HIV positive	(--------/----------/----------)	
25.	Starting date of ART	(--------/----------/----------)	
26.	Last, follow up date	(----------/----------/----------)	
27.	Initial WHO Clinical stage	1. clinical stage I 2. clinical stage II 3. clinical stage III 4. clinical stage IV	
28.	Duration since initiation of ART	(----------months)	
29.	Opportunistic infections during follow-up	1. No	

		2. Herpes zoster 3. Pneumonia 4. TB 5. Oral thrush 6. Diarrhea 7. Others specify------	
30.	Recent ARV adherence to treatment	1. Good (≥95%) 2. Fair (85-94%) 3. Poor (<85%)	
31.	Reason for fair/poor adherence	1. Toxicity/side effects 2. Forgot 3. Felt better 4. Too ill 5. Stigma 6. Travelling problem 7. Others specify-----	
32.	Drug side effect	1. Yes 2. No	
33.	Current status	1. Alive 2. Dead 3. Lost follow up 4. transfer to another health facility	
34.	If lost to follow up after initiation of ART	(----------) month	
35.	If dead or transferred to other facilities after initiation of ART?	(----------) month	
36.	Date of record review	Date_____	