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RESEARCH ARTICLE

SURVIVAL AND PREDICTORS OF MORTALITY AMONG HIV-INFECTED ADULTS RECEIVING ART IN HAWASSA COMPREHENSIVE SPECIALIZED HOSPITAL, SIDAMA REGIONAL STATE, ETHIOPIA

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ABSTRACT

Background: Having claimed lives, HIV/AIDS is still a significant global public health concern. Antiretroviral therapy (ART) is now widely available, and this rapid expansion of access is dramatically improving HIV epidemic survival rates worldwide.

Objectives: The purpose of this study was to identify the mortality risk factors and survival status of ART patients attending Hawassa Comprehensive Specialized Hospital in 2020.

Methods: All patients seen between January 2015 and December 2019 were examined in a five-year retrospective cohort study. SPSS 25.0 was used to analyze the data. Based on explanatory variables, the Kaplan-Meier Log-rank model was used to assess the survival time of ART patients. To find the independent determinants of mortality, bivariate and multivariate Cox proportional hazards regression models were used.

Result: Overall survival probability of ART patients was 74%. The death incidence rate of 0.135 per 100 person-years with medial survival of 34 months. Hemoglobin level (HR=2.38;95% CI= 3.3-6.3); WHO clinical stage III and IV (HR=3; 95% CI= 2.2-9.5, p=0.04); Age >=60 (HR=1.6; 95% CI=1.3–2, p=0.04); Functional status bed ridden (HR=3.1; 95% CI=1.2-9.4, p=0.04) were independent predictors of mortality among RVI patients.

Conclusion: In this study, the survival rate of ART patients was low in comparison to trials done in rich countries. Close follow-up and monitoring should be given to patients who are anemic; WHO advanced clinical stage; old age, functional status bed ridden needs special attention.

KEYWORDS: Antiretroviral therapy, Human Immunodeficiency virus, Mortality, Survival, Ethiopia

INTRODUCTION

HIV/AIDS remains a major global public health concern, having claimed nearly 33 million lives to date. Despite this, with increased access to effective HIV prevention, diagnosis, treatment, and care, including for opportunistic infections, HIV infection has become a manageable chronic health condition, allowing people living with HIV to live long and healthy lives. At the end of 2019, there were an estimated 38.0 million people living with HIV.(1)(2). In 2019, the main population groups and their sexual partners accounted for more than 60% of all new HIV infections worldwide (an estimated 62%) among the age group 15-49 years.

These groups accounted for over 95% of new HIV infections in each of these regions, including Eastern Europe and Central Asia, Asia and the Pacific, Western and Central Europe and North America, and the Middle East and North Africa. The WHO African Region is home to more than two-thirds of all HIV-infected people (25.7 million)(1)(3)(4). Ethiopia is one of the most severely affected Sub-Saharan African countries by the HIV

pandemic. HIV affects an estimated 738,976 Ethiopians. (5). According to the Ethiopian Demographic and Health Survey 2016 (EDHS 2016), the national HIV prevalence is 0.9%; the urban prevalence is 2.9%, which is seven times higher than the rural (0.4%).

According to the 2016 EDHS, HIV prevalence varies by region, ranging from less than 0.1% in Ethiopia Somali to 4.8% in Gambella. Furthermore, the 2018 spectrum HIV estimate indicates that the 2017 HIV prevalence in regions ranges from 0.16% to 4.34%.(6)(7).

The 2016 World Health Organization guidelines recommending early ART for all PLHIV, regardless of CD4 cell count, were based on a growing body of evidence demonstrating the increased risk of AIDS or death associated with delaying treatment.(8).

Rapidly expanding access to antiretroviral therapy (ART) is significantly increasing global HIV epidemic survival, and AIDS-related mortality rates are rapidly declining. So far, increased use of ART has reduced an estimated 6.6 million HIV/AIDS-related deaths worldwide, primarily in underdeveloped and developing countries. (3)(9). As a result of coordinated international efforts to combat HIV, service coverage has steadily increased. In 2019, 68% of adults living with HIV worldwide were receiving lifelong antiretroviral therapy (ART). At the end of 2019, 25.4 million people had access to antiretroviral therapy.

Antiretroviral therapy (ART) reduces HIV replication and infection of new cells while also improving immune system function. As a result, ARV therapy improves the quality of life and survival of HIV carriers. (1)(10). Antiretroviral therapy (ART) was introduced in Ethiopia in 2005. There are an estimated 738,976 Ethiopians living with HIV who all require antiretroviral therapy (ART), but only 426,000 are currently receiving ARV.(5)(11).

A small number of studies on the mortality of HIV adults conducted in Ethiopia and other countries show that timely initiation of ART among HIV/AIDS adults reduces mortality and has a positive impact on the survival of those specific study groups. Furthermore, CD4 count, WHO clinical stage, baseline hemoglobin, cotrimoxazole prophylaxis therapy (CPT), older age, male sex, and HAART use are used as predictors.(8) (11) (2). However, no studies on survival and predicting factors have been conducted. The goal of this study was to identify predicting factors associated with HIV/AIDS patient survival at Hawassa Comprehensive Specialized Hospital.

MATERIALS AND METHODS

Study setting and Period

The study was conducted in Hawassa University Specialized Hospital providing ART and IPT service in Hawassa City Administration. It is located 273 km south of Addis Ababa. The hospital gives services for approximately two million people and a teaching Hospital with basic facilities for HIV care and treatment and with established clinical set up and highly trained medical personnel. The hospital has started pre-ART and ART services since July 2006.

Study design

Institutional based retrospective study was conducted between January ***2015 to December 2019*** in Hawassa comprehensive specialized hospital to assess survival in PLWHA and who are on ART.

Population

Source population

Person living with HIV/AIDS, age ≥15years and started ART treatment in Hawassa comprehensive specialized hospital.

Study population

Those patients fulfilling the following criteria

Inclusion criteria

- HIV positive adults aged 15yrs or older who started ART
- HIV patients with complete intake form, registers and follow up form

Exclusion criteria

- Diagnosis is made outside of health institution
- Women who were pregnant at the time of ART initiation and lactating mother

4.5 Sample Size Determination

the sample size was determined using double population proportion formula by considering CD4, functional status and WHO stage as the major predictor variables(12). Moreover, CD4 is considered as independent predictor since it gives the maximum sample size. Sample size was calculated by using open Epi info version 7 statistical packages.

$$n_1 = \frac{\left[Z_{\alpha/2}\sqrt{\left(1+\frac{1}{r}\right)P(1-P)} + Z_{\beta}\sqrt{\frac{P_1(1-P_1)+P_2(1-P_2)}{r}}\right]^2}{(P_1-P_2)^2}$$

$$where, p = \frac{p1+rp2}{r+1}, if\ r=1\ then\ p = \frac{p1+p2}{2}$$

P1: is percent of completed with the outcome

P2: is percent of non-completers. with the outcome

Z α/2: is taking CI 95%: 80% power

r: is the ratio of non-completers to completers1:1

Sample size calculation was done by considering determinant factors.

S.N	Variables	CI	Assumptions	Total sample size	Reference
1.	**CD4**	95%	**P1=54% P2=7.5%**	**483**	(13)
2.	WHO stage	95%	**P1=65% P2=34%**	**92**	(14)
3.	**Bedridden functional status**	95%	**P1=66% P2=33%**	**88**	(14)

P1: is percent of completed with the outcome
P2: is percent of non-completed with the outcome
Z α/2: is taking CI 95%
: 80% power

- r is the ratio of non-completers to completers 1:1
  ✓Then the largest sample size (n= 483).

Sampling technique

Study participant were selected by using systematic random sampling method using commands in Excel all 464 records of patients receiving ART in Hawassa comprehensive specialized hospital were listed in an excel spreadsheet, and a randomly selected 483 patients were studied.

Dependent and Independent variables

The main outcome measure was time to event in month. The time of survival 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 Base line clinical data's. 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.

Data collection procedure and quality control

A data collection form was developed from ART entry and follow up from being used in the ART clinic. The data was collected by reviewing pre-ART register, laboratory request and follow up form. The most recent laboratory results before starting ART was used as a base line value. Data quality was controlled by designing the proper data collection materials and through continuous supervision. All completed data collection form was examined for completeness.

Entry and Analysis

The cleaned and coded data were entered into Epidata version 4.6.2. An analysis was done based on 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), categorical variables are presented using frequency and percentages. TB-free survival time was estimated by applying the Kaplan–Meier Log-rank model to estimate the Occurrence time of TB based on explanatory variables. Bivariate and multivariable Cox proportional hazards regression models were performed to the independent determinants.

Operational Definition
Lost to follow up: if a patient discontinued ART for at one to three month as recorded by ART physician

Event: - PLWHIV on ART, who died during the study period
Survival: lack of experience of death

Ethical Considerations

Ethics approval and consent to participate

Ethical clearance was obtained from research and ethics committee (REC) of School of Nursing and Midwifery, College of Health Sciences, Addis Ababa University. Permission letter to access patients' data was obtained from the hospital outpatient authorities. As we are reporting a retrospective study of medical records, all data were fully anonym zed before we accessed them and the ethics committee waived the requirement for informed consent.

RESULTS

A total of 483 participants were surveyed, of whom 262(54.2%) were male. The mean age of respondents was 32.8 ± 12.8 years (Mean ± SD), with a range from 18 to 68 years. More than half 271(56.1%) of the respondents were married. In regards to participant's education, 271(56.1%) of the respondents were secondary and above education while the rest 212 (43.9 %) was lower than

primary. Only 26 (25.50%) of population attended higher education. Almost half 247(51.1%) of the respondents have history of substance use.

By occupation, 123(25.5%) of respondents were government employed. Most of the participants were, from Urban area, and only 186(38.5%) were from the rural area. Regarding religion majority was Orthodox religion follower 225(46.6%). (Table. 1)

TABLE 1- Socio-demographic characteristics of HIV patients who were enrolled for ART care at Hawassa University Comprehensive specialized Hospital Sidama, Ethiopia, from January 2015 to December 2020 (n=483).

Characteristics	Status at last contact		Total
	Death	**Censored**	
Age in years [mean=32.8, SD=12.8]			
18-39	8(2.5%)	313 (97.5%)	321(66.5%)
40-59	5 (3.5%)	138(96.5%)	143(29.6%)
>=60	13(68.4%)	6(31.6%)	19(3.9%)
Sex			
Male	10(4.5%)	211(95.5%)	221(45.8%)
Female	16(6.1%)	246(93.9%)	262(54.2%)
Marital Status			
Never Married	4(3.7%)	103(96.3%)	107(22.2%)
Married	15(5.5%)	256(94.5%)	271(56.1%)
Separated	3(8.6%)	32(94.1%)	35(7.2%)
Widowed	1(4.8%)	20(95.2%)	21(4.3%)
Divorced	3(6.1%)	46(93.9%)	49(10.1%)
Residence			
Urban	15(5.1%)	282(94.9%)	297(61.5%)
Rural	11(5.9%)	175(94.1%)	186(38.5%)
Religion			
Protestant	10(5.9%)	159(34.8%)	169(35%)
Orthodox	12(5.3%)	213(94.7%)	225(46.6%)
Muslim	3(5.8%)	49(94.2%)	52(10.8%)
Catholic	1(3.8%)	25(96.2%)	26(5.4%)
Other	0	11(100%)	11(2.3%)
Substance Use			
Yes	16(6.5%)	231(93.5%)	247(51.1%)
No	10(4.2%)	226(95.8%)	236(48.9%)
Educational Status			
No education	5(8.1%)	57(91.9%)	62(12.8%)
Primary	12(8%)	138(92%)	150(31.1%)
Secondary	6(3.4%)	171(96.6%)	177(36.6%)
More than Secondary	3(3.2%)	91(96.8%)	94(19.5%)
Occupation			
Farmer	10(17.5%)	47(82.5%)	57(11.8%)
Merchant/Trader	3(2.7%)	108(97.3%)	111(23%)
Government Employed	2(1.6%)	121(98.4%)	123(25.5%)
Non-Government	3(7.1%)	39(92.9%)	42(8.7%)
Day Laborer	1(2.3%)	43(97.7%)	44(9.1%)

Jobless	2(6.3%)	30(93.8%)	32(6.6%)
Driver	2(5.1%)	37(94.9%)	39(8.1%)
	3(8.8%)	32(91.4%)	34(7%)

More than half 356(73.7%) of study participants were WHO clinical Stage I/II and medium of current CD4 count=456cells/µL. Seventy six (76.2%) of respondents were in CPT prophylaxis and (93.8%) were IPT completed. Three hundred six (69.7%) of respondents functional status was working and more than half of respondents BMI were less than 18kg/m^2 (Table 2)

TABLE 2- Clinical characteristics of HIV patients who were enrolled for IPT care at Hawassa University Comprehensive Specialized Hospital, Sidamma, Ethiopia from January 2015 to December 2020 (n=483).

Characteristics	Status at last contact Death **Censored**		Total
WHO clinical Stage	1		
I and II	6(1.7%)	350 (98.3%)	356(73.7%)
III and IV	20 (15.7%)	107(84.3%)	127(26.3%)
CD4 cell count (**Cells/µL)**			
< =200	12(17.4%)	57(82.6%)	69(14.3%)
>200	14(3.4%)	400(96.6%)	414(85.7%)
Medium of current CD4 count=456cells/µL, (IQR, 314-661) and 231 cells/ µL (IQR, 105-400)			
BMI			
<18kg/m^2	19(7.1%)	248(92.9%)	267(55.3%)
>18kg/m^2	7(3.2%)	209(96.8%)	216(44.7%)
Medium BMI= 20.29 kg/m^2 (IQR, 18.49-22.36)			
CPT use			
Yes	18(4.9%)	350(95.1%)	368(76.2%)
No	8(7.0%)	107(93%)	115(23.8%)
IPT use **Yes** **No**	 23(5.1%) 3(10.0%	 430(94.9%) 27(90%)	 453(93.8%) 30(6.2%)
HIV/TB co-infection			
Yes	7(13.5%)	45(86.5%)	52(10.8%)
No	19(4.4%)	4106(95.6%)	429(89.2%)
Chronic illness			
Yes	11(47.8%)	12(52.2%)	23(4.8%)
No			
Hemoglobin			
>=11mg/dl(Normal)	16(4.1%)	374(95.9%)	390(80.7%)
< 11mg/dl(Anemia)	10(10.8%)	83(89.2%)	93(19.3%)
Functional status			

Working	3(0.9%)	333 (99.1%)	336(69.7%)
Ambulatory	7 (6.9%)	99(93.4%)	106(22%)
Bed ridden	16(40%)	24(60%)	40(8.3%)

Survival experience among different groups of ART patients in log rank test

During the follow up time, 26 (5.4%) patients were deceased and death incidence rate of 0.135 per 100 person-years. The survival probability at eleventh month of ART initiation was 99.8 %. This proportion reduces to 99.6, at the 14th months and preceded with 99.4%, 97.9%, 91.6%, and 76.4 % at 2nd, third, fourth and the end of follow-up period, respectively (Figure 1). Base line WHO clinical stages (Log rank, p **p≤0.01**), functional status (Log rank, p **≤0.001**), age (Log rank, p **≤0.001**base line hemoglobin (Log rank, p **≤0.001**), and CD4 count (Log rank, p **p≤0.01**) were variables that showed the significant association with the survival of patients on ART with in Log rank test (Figure 2).

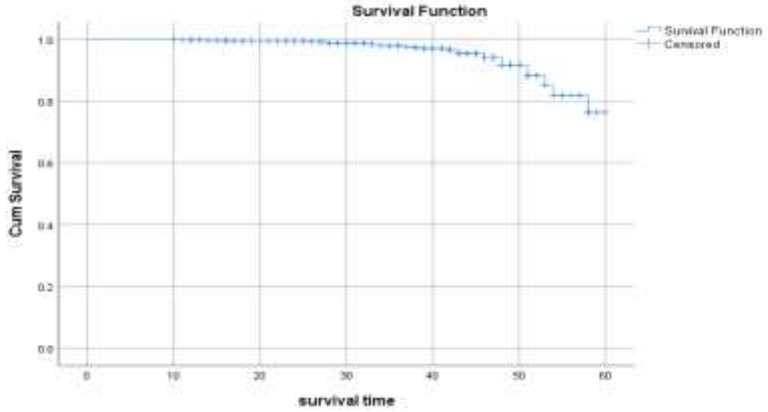

FIGURE 1- *shows overall survival probability of patients on ART starting from initiation of ART until the end of the study period among PLWHA, Hawassa town, Southern Ethiopia, November 2020 .*

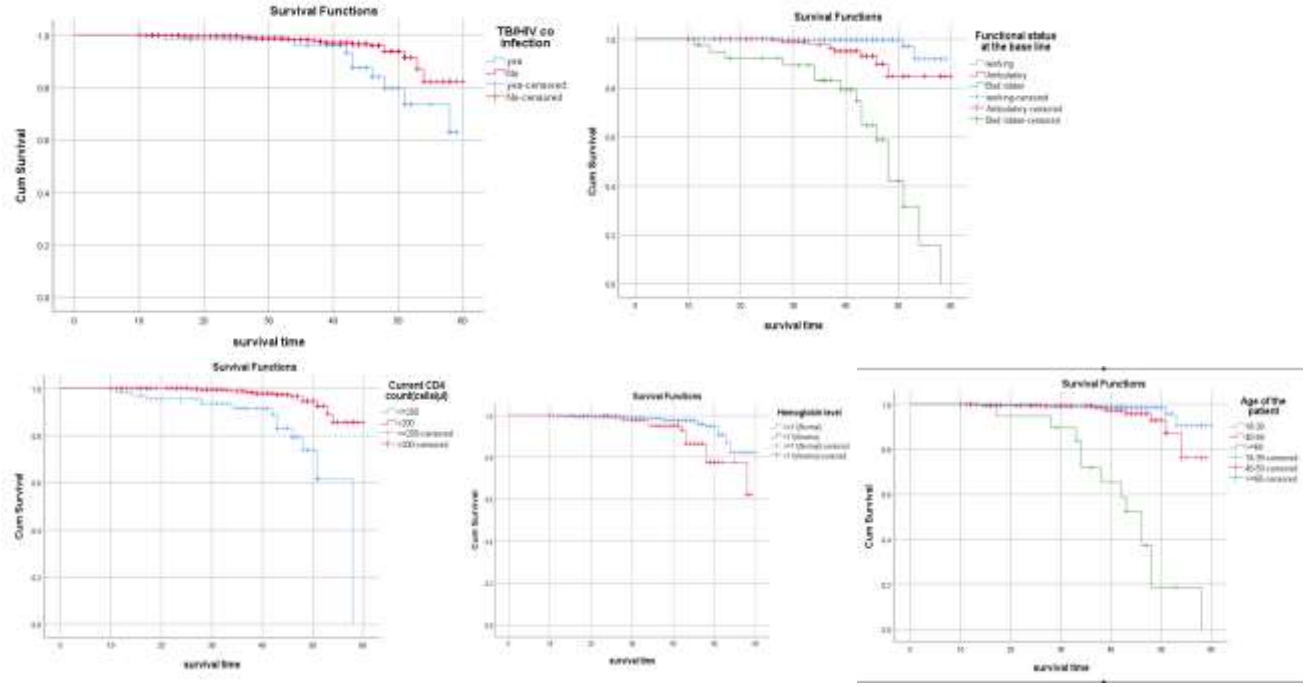

FIGURE 2- *Kaplan-Meier survival curves shows for comparison of (A) TB/HIV co infection ,(Log rank test; p≤0.01); (B) Functional status, (Log rank test; p ≤0.01) (C) CD4 Cell count status, (Log rank test, p ≤0.01); (D) Hemoglobin count , (Log rank test; p ≤0.01) and (E) Age of the patients , (Log rank test; p ≤0.01) at base line among PLWHA, Hawassa town , Southern Ethiopia, November 2020 .*

TABLE 3*- Baseline characteristics and probability of ART survival during 5-year of follow-up (Kaplan-Meier method) of HIV patients receiving ART, Hawassa University Comprehensive specialized Hospital, Sidama, Ethiopia from January 2015 to December 2019. (n=483).*

Characteristics **(Variables)**	Mean survival time/Probability in month over 5 yr (95% CI)	**Log rank test**	**P-value**
Age in years [mean=32.8,SD=12.8]			
18-39	58.89 (57.95,59.85)		
40-59	56.68 (55.01,58.36)	141	p≤0.001
>=60	42.99 (37.68,48.31)		
WHO clinical stage			
I & II	58.97(58.11,59.84)		
III &IV	51.61(49.50,53.72)	40	p≤0.01
CD4 cell count			
(Cells/µL)	51.81 (48.41,55.22)	29.5	
<=200	54.95 (52.32, 57.59)		p≤0.001
>200	39.85 (35.43, 44.26)		
Functional status			
Working	58.37(57.62, 59.11)	120	
Ambulatory	57.34 (55.43,59.26)		p≤0.001
Bed ridden	55.52 (41.14,49.91)		
HIV/TB co-infection			
Yes	54.69(52.01, 57.38)	6.10	
No	57.88 (56.79,58.97)		p≤0.01
Hemoglobin			
>=11g/dl(Normal)	57.94 (56.86,59.01)		
<11g/dl(Anemia)	55.11(52.99,57.23)	8.32	p≤0.01

Modeling of risk factors which are effective in survival rate of patients on ART by using Cox regression model

To identify the independent predictors of survival after initiation of ART, Bivariate and multivariate Cox regression models were used. Bivariate Cox regression model, base line WHO clinical stage, CD4, age, hemoglobin, and functional status and HIV/TB co-infection showed significant association with early mortality after initiation of ART (Table 2). After multivariate analysis, four baseline factors could be independently identified: **hemoglobin level (HR=**2.38;95% CI= 3.3-6.3); WHO clinical stage III and IV (HR=3; 95% CI= 2.2-9.5, p=0.04)**; Age** >=60 (HR=1.6; 95% CI=1.3–2, p=0.04)**;** Functional status bed ridden (HR=3.1; 95% CI=1.2-9.4, p=0.04)**;** were independent predictors of mortality among RVI patients (Table 4).

TABLE 4*- Cox regression analysis of the determinants of the incidence of TB among adults, who completed IPT care at Hawassa university comprehensive specialized hospital in sidamma Regional State, January 2015 to December 2019 (n=483)*

Characteristics **(Variables)**	**CHR (95% CI)**	**p-value**	**AHR (95% CI)**	**P- Value**

Age in years [mean=32.8, SD=12.8] 18-39	1.00 (Ref)		1.00 (Ref)	
40-59	0.03 (0.11-0.074)	p≤0.01	0.11(0.03–0.4)	0.061
>=60	2.3 (0.3-15)	p≤0.01	1.6(1.3–2)	0.04
WHO clinical stage I &II III&IV	1.00 (Ref) 10.75 (4.3-26.8)	p≤0.01	1.00 (Ref) 3(2.2-9.5)	p≤0.01
CD4 cell count (**Cells/µL)** <=200	1.00 (Ref)	p≤0.01	0.59 (0.15-.2.26)	0.44
>200	0.15 (0.07-0.33)	p≤0.01	1.00 (Ref)	
Functional status Working	1.00 (Ref)	p≤0.01	1.0 (Ref)	
Ambulatory	0.01 (0.005-0.065)	p≤0.01	0.05(0.01-0.23)	p≤0.01
Bed ridden	1.4 (1-3.5)	p≤0.01	3.1(1.2-9.4)	p≤0.01
HIV/TB co-infection Yes	2.73(1.19-6.26)	0.02	0.96(0.35-2.6)	0.93
No	1.00 (Ref)	p≤0.01	1.00 (Ref)	
Hemoglobin >=11g/dl(Normal)	1.00 (Ref)	p≤0.01	1.00 (Ref)	
<11g/dl(Anemia)	3.34(0.15-0.73)	0.26	2.38(3.3-6.3)	p≤0.01

DISCUSSION

In this historical cohort study, we discovered that hemoglobin functional status, advanced WHO staging (III and IV), and CD4 cell count=200 (Cells/L) were independent significant predictors of lower survival in patients living with HIV/AIDS after ART initiation. Patient survival on ART was significantly associated with clinical AIDS stage at start, baseline CD4 count, hemoglobin, age, HIV/TB co-infection, and functional status in univariate analysis. Only hemoglobin 11g/dl (Anemia), WHO clinical stage, and functional status remained significantly associated with survival in multivariate analysis.

In our study, there were 26 deaths (5.4%) in 19194 PYO, for a rate of 0.135 per 100 person-years. At 1, 2, 3, 4, and 5 years, the cohort's estimated survival probability was 99.8%, 99.4%, 97.9%, 91.6%, and 76.4%, respectively. This finding indicates that ART patients had a higher rate of survival when compared to other findings in Africa.

According to the same study, the likelihood of being alive on ART at 6, 12, and 18 months was 89.8%, 83.4%, and 78.8%, respectively. **(7). On the other side, the mortality rate was comparable to most studies, especially, in the 1st six months(15)(16)(17). This could be explained by the fact that the majority of the patients in this study were in advanced stages of the disease (57(82.6%) had CD4 200 Cells/L and 107(84.3%) were in WHO stage III & IV).**

Our findings confirm the relationship between WHO staging (III and IV) and mortality after controlling for confounding variables, which is consistent with studies conducted in north and west Ethiopia, which show similar results of high mortality among advanced WHO clinical stage and respectively. (10)(2)(8).

Another study, conducted in south Ethiopia and Debremarkos referral hospitals, found that people with WHO stages II and IV at baseline had a higher risk of death than people with WHO stages I and II who were ambulatory or bedridden. A five-year retrospective cohort study in Tanzania's Kagera Region yielded the same results as the previous study.(18)

A study conducted in Cameroon's Far-North Province discovered that patients with low hemoglobin levels at diagnosis had nearly twice the risk of death as patients with high hemoglobin levels 2.38(3.3-6.28). (0.0478)(19). Our study results also show a similar progression, which could be due to hematologic issues, with patients progressing to AIDS at a faster rate and patients with

hemoglobin numbers less than 11g/dl (Anemia) having a higher mortality rate in response to viral killing. A study conducted in South Africa found that a lower hemoglobin concentration of 8 g/dl was one of the main indicators of increased mortality in HIV/AIDS patients. (20), This result is similar to the current study. Similarly, a meta-analysis study in Adults Starting Antiretroviral Therapy (ART) in Low- and Middle-Income Countries found that being anemic was another determining factor for HIV/AIDS patient mortality, which was also supported by a thesis completed in France at the University of Bordeaux.(21) (22).

The functional status of the patients was used to determine the patients' survival status in this study. The patients' bedridden and ambulatory status was identified as the primary determinant factor. This is similar to the research done in the Somali region with the result of a bedridden functional status. Other African studies show that one of the survival status determinants of ART patients was functional status, particularly bedridden and ambulatory status.(10)(23)(24)(25)(26)(27).

A similar study conducted in the Far East and India explains that the functional status of ART patients was a major determinant of mortality and survival during the study period. (28)(29).

Declarations

Acknowledgement

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Consent to publish: Not applicable.

Availability of data and materials: For those who are interested the datasets analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

Ethics Approval and Consent to Participate

Ethical clearance was obtained from research and ethics committee (REC) of School of Nursing and Midwifery, College of Health Sciences, Addis Ababa University. Permission letter to access patients' data was obtained from the hospital outpatient authorities of Hawassa university specialized hospital. As we are reporting a retrospective study of medical records, all data were fully anonym zed before we accessed them and the ethics committee waived the requirement for informed consent.

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Authors Contribution: BB, AF, conceived, designed and developed the data collection instruments. BB and AF performed the statistical analysis and wrote all versions of the manuscript. All authors critically revised and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests

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Figure 1: shows overall survival probability of patients on ART starting from initiation of ART until the end of the study period among PLWHA, Hawassa town, Southern Ethiopia, November 2020.

Figure 2: Kaplan-Meier survival curves shows for comparison of (A) TB/HIV co infection ,(Log rank test; $p \leq 0.01$); (B) Functional status, (Log rank test; $p \leq 0.01$) (C) CD4 Cell count status, (Log rank test, $p \leq 0.01$); (D) Hemoglobin count , (Log rank test; $p \leq 0.01$) and (E) Age of the patients , (Log rank test; $p \leq 0.01$) at base line among PLWHA, Hawassa town , Southern Ethiopia, November 2020 .