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Evaluation of Risk Factors Affecting the Chance of Survival/Death Status among HIV Positive People Under the Anti Retroviral Treatment Program: The Case of Ottona Hospital

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Abstract
Back ground:HIV/AIDS is one of the most dangerous diseases of the developing and developed country. Therefore this research strives to the evaluation of a factor affecting the chance of survival/death status among HIV positive people under the anti-retroviral treatment program, in the cause of Ottona hospital. The objective of this senior research was to evaluate the pattern of HIV/AIDS diseases on the age difference, to determine the effect of HIV/AIDS on sex difference and to see the pattern of the distribution of HIV/AIDS diseases on marital status. **Methods:**The data were analyzed using descriptive statistics; bar chart, chi-square and binary logistic regression analysis. Throughout the study I have used Statistical Package for Social Science (SPSS) to analyze the data. **Results:** The results of statistics showed that among the whole sample (87) patients, 27were died. From the chance of survival/death status among HIV positive people under the anti-retroviral treatment program is affected by marital status, WHO's Stage, Functional status, CD4, TB. Whereas the other independent variables sex, age and weight have no risk on the chance of survival/death status among HIV positive people under the anti-retroviral treatment program by this research. **Conclusion:**I conclude that many of the patient's in this study registered are following up ART program. Following ART is the necessary to control the influence of HIV/AIDS and it necessary to survive for a patient who is HIV/AIDS positive.
Keywords: ART, Variables. SPSS, Binary logistic regression, Odds

Backgrounds

The human immunodeficiency virus (HIV) had created an enormous challenge worldwide. HIV is the dangerous major global health problem. In 2015 estimated 36.7 million peoples were living with HIV/AIDS (including 1.8 million children) a global HIV prevalence of 0.8%the vast majority of this number live in law and middle income countries in the year 1.1 people died of AIDS related illnesses. Since its recognition, HIV had infected close to 78 million people, and more than 35 million had died due to acquired immune deficiency syndrome (AIDS) more than 66% of the 40 million people living with HIV/AIDS were in Sub-Saharan Africa, where AIDS was the leading cause of death(from2015 global report of ART) .

The rates of spread of the HIV/AIDS and the damages accompanying it had reached a level which shock economists, health workers, politicians etc. That it had now become a worldwide issue in general and developing countries in particular. The disease being one without any cure was still accountable for economic, social and health crises especially in developing countries. Its high prevalence and/or distribution among the youth made things even more complicated. Since the first evidence of the HIV epidemic was detected in Ethiopia in 1984, AIDS had claimed the lives of millions and left behind an estimated 744,100 orphans. In 2003, the government of Ethiopia introduced its ART program with the goal of reducing HIV related morbidity and mortality, improving the quality of life of people living with HIV and mitigating some of the impact of the epidemic. (FHPC, 2007).

In WSUOH, this free ART program provided increase access to patient by taking service closer to more people, recording transport and related costs for patients and families, resulting in improving adherence and enrolment in care and treatment services early in the course of the disease.

Although the current HIV/AIDS Surveillance estimates indicate some encouraging signs in that the epidemic was stabilizing, the observed changes were not sufficient enough compared to the desired goals of the response against the epidemic. We still face a situation unlikely to give us respite in the near future. Despite all the challenges, both governmental and non-governmental organizations were working hard to contain the epidemic and the achievements so far are encouraging. The results found from these researches have contributed their own share in the prevention, care, support and treatment services around the epidemics. (Nuredin Ibrahim in 2007)

Most of the researches in our country focused on the prevention of the virus before a person are HIV positive. Unfortunately all prevention program would not realize their targets unless otherwise we give due consideration for people living with HIV/AIDS. It was the fact that little had been done on the factors that influence the survival /death status of person given he/she was already HIV positive and was under the follow-up of ART that motivate this study. The rationale behind such a research was to improve the achievements of ART

programs run by different health institutions of the country in order to minimize HIV related mortality. When patients drop out of ART programs they get sicker with severe opportunistic infections that were more expensive to treat us and difficult to manage; or they die. Those who stop taking Antiretroviral therapy due to various reasons that were not yet clearly elucidated; also stand the rise of developing resistance to the relatively cheaper and convenient first-line regimens. Treatment discontinuation raises some of the same concerns about drug resistance as adherence does and even worse, negates much of the benefit sought by those in treatment programs. Drug resistant strains may be spread to the general population.

The study aimde :

- To develop a statistical model that predicts the chance of survival/death status among HIV positives taking ART follow up.
- To get some information on the relative importance of factors associated ART follow- up.
- To provide an estimate of the probability of dying under certain predictor variables.
- To provide information for policy makers on the factors affecting survival/death status of HIV positives taking ART.

Methodology

The study area

This is retrospective studies, which reviews the patient intake forms and follow up charts of all HIV/AIDS patients taking combined antiretroviral therapy in Wolaita Sodo University Ottona Hospital ART clinic which is located at Wolaita Sodo city in SNNPR Region. The Wolaita Sodo University Ottona Hospital ART clinic started its service in 1997 E.C and it has currently one nurse, two data clerks and two information technicians attending HIV/AIDS patients regularly and filling the follow up charts more or less appropriately.

Wolaita zone is one of the southern nation nationalities and peoples reformed towns. Wolaita Sodo city which is located in southern part of Ethiopian southern nation nationality people region under Wolaita Zone. This city is invented before 1822 E.C and this town located 162Km away from Hawassa regional city and 390Km away from federal city Addis Abeba. The national road along Shashamane from Addis Ababa to Arbaminch divides the town in to two parts. And our study was carried out on Wolaita Sodo University of this town. The town had moderate air condition (wine degas). Geographically the town was located 19.75meters above sea level and annual rain fall distribution of the city is 930.8ml and the average temperature is 19.11 degree cellicius. The town was as the administrative capital city of the Wolaita zone

The Study Population

A total 968 patients have visited the ART clinic until November 2009 E.C. of which 124 have died. The patient charts include the patient in take forms and follow up cards, which are prepared by FMOH to be uniformly used by clinicians to early identify and document clinical and laboratory variables.

Sampling Frame

Intending our objective of the research project leads to the area of HIV positive patients who are found in Wolaita Sodo university Ottona hospital under the ART follow up. Considering all things on the ART program, the study focused or generated on the patients who are regularly registered, transferred in and died in the program from 2003-November 2009 E.C.

The target population for this study would be patients under the follow up of ART at Wolaita Sodo University Ottona hospital until November 2009 E.C.

Sample Size Determination

Based on the above information, there are several formulas developed for sample size
Calculations that were conform to different research situations. Accordingly, the sample size determination formula adopted for this study was:

$$n_o = \frac{z_{\frac{\alpha}{2}}^{\ 2} p(1-p)}{E^2}$$

Where $\mathbf{n_0}$ is the sample size, Z is the confidence interval, p is the proportion of patients who were retained in ART programs; q was the proportion of patients lost-to- follow up; and **E** was the margin of error for the 95% confidence interval. **E** is margin of error defined as $E = z_{\frac{\alpha}{2}} SE$, where SE is the standard error, Z is standard normal deviation usually set as 1.96

In this study the statistical level of significance (α =0.05) and margin of error (E=0.1).we chose the margin of error E=0.1 because the collected data is secondary type and there may be mistake in recording. The population proportion is estimated using the total of survival patient =844 and total of dead patients =124 in the given total population size of N=968 is calculated as and if sampling is from a finite population of size N, then

$$n = \frac{n_o}{\left(1+\frac{n_o}{N}\right)}$$

Further discussions on sampling methods are available in detail in (Colton T. 1974)
P=0.5 the value the P is the result of simple plot survey from the twenty respondents ten respondents are answer yes from yes or no questions.
When p=0.5, 1-p=0.5,
N=968, E=0.1

$$n_o = \frac{1.96^2 * 0.5 * 0.5}{0.1^2} = 96.04 \approx 96$$ Then n_o/N =96/968=0.099 It is greater than 5% or 0.05 so we use the formula $n = \frac{n_o}{\left(1+\frac{n_o}{N}\right)}$ is equal to

Thus, total of **87** patient charts have been visited in the data collection

Systematic Sampling

Systematic random sampling method was adapted as a sampling design for collected sample of patients based on their ART identification number and using the following procedures.

- ✓ Taking random sample from the given frame of the sample only for the first unit.
- ✓ Taking the total population and the sample size. Find the k value, k=N/n

After such calculation for k, automatically select the remaining units in a definite sequence at equal spacing k.(i.e. choose the i^{th} , i+k ,i+2k….(i+n-1(k))th element) where i=1,2,3….

Where n- is sample size taken
N- is population size
k- Is the constant for equal sampling
K=N/n= $968/87 = 11.12 \approx 11$
First we choose the 1st person next the 12th person, 23th person, and so on. Finally we put the person with HIV positive following up ART program.

Exclusion criteria:Here patients who were transferred to other health institutions or those lost to follow up cases are excluded from this study.

Data collection procedure

Thus, in this research secondary data which was collected from patient follow up records (ART clinic patient record) based on the questionnaire designed to extract only those variables are considered in this study.from the ART record variables such as age ,sex,weight, WHO clinical stage ,functional status ,CD4 level ,TB status and marital status were used.

Data Analysis procedures

The study stands to use both the descriptive and inferential analysis. In the study statistical soft- wares such as MINTAB and SPSS version 20,STATA 13 were used in the whole work.

Logistic regression model

Consider the collection of "k" independent variable in the logistic regression equation is given by

Logit $p_i=\log(\frac{pi}{1-pi})= \alpha+\beta_1x_1+ \beta_2x_2+\ldots\ldots\ldots \beta_kx_k$ i=1, 2, 3…, k

Where:-

- α, β_i are parameters or coefficients of the regression for explanatory variables
- X_i are the explanatory variables
- Pi is the success /survival probability or chance when X_i takes a value
- $1-p_i$ is the failure /death probability or chance when xi takes a value

Model Adequacy Checking

Testing the hypothesis that the model fits the data, the two common approaches are Pearson's X^2 statistic and the likelihood-ratio statistic (G^2) which is based on the comparison of the fitted and the observed counts. The large values of X^2 and G^2 indicate lack of fit of the model. When the fit is poor, residuals and other diagnostic measures describe the influence of individual observations on the model fit and highlight reasons for the inadequacy. (Agresti, A. (1996)).The likelihood-ratio statistic (G^2) is given by

$G^2 = -2\ln\left[likelihood_R \,/\, Likelihood_F \right]$ =-2ln (L_o - L_1)

The chi-square is used to statistically test whether including a variable reduces goodness-of-fit measures.

The Pearson's X^2 statistic is given by $\chi 2 = \sum \left[\frac{(observed - fitted)^2}{fitted} \right]$

The Hosmer-Lemeshow Test is another alternative in checking model fitness. If the Hosmer-Lemeshow goodness-of-fit test statistic is greater than 0.05, we will not reject the null hypothesis that there is no difference between observed and model predicted value implying that the model estimates are adequate to fit the data at an acceptable level. We conclude our discussion of model assessment by giving a diagnostic check for the Significance of individual model estimates-the Wald test. The Wald statistic is an alternative test which is commonly used to test the significance of individual logistic regression coefficients for each independent variable (that is, to test the null hypothesis in logistic regression that a particular Logit (effect) coefficient is zero, i.e. ,bi =0 against $\beta_i \neq 0$). For a dichotomous dependent variable, the Wald statistic (W) is the squared ratio of the un standardized logit coefficient to its standard error, that is z^2 = w

$$= \frac{\hat{\beta}^2_i}{\text{var}\left(\hat{\beta}_i\right)} \mathbf{C}$$

Results

Descriptive Statistics

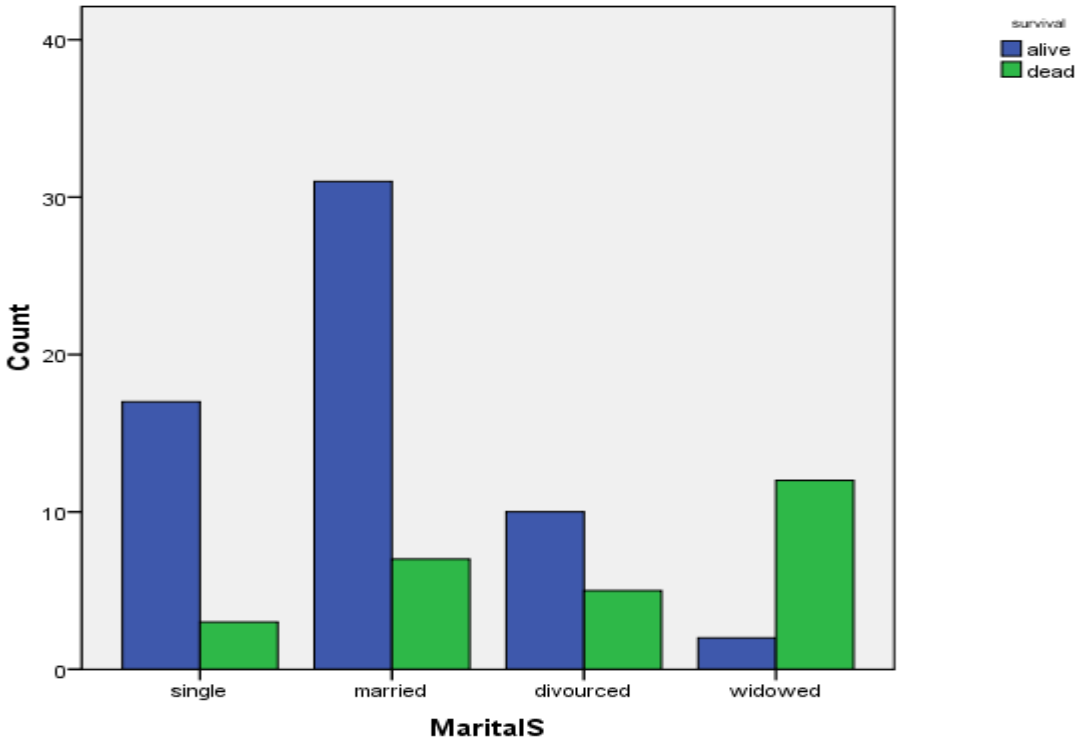
Demographic and Health Factors In Relation To HIV/AIDS Death

Death proportions appear to be different for all age groups among patients taking ART at WSUOH as shown by their percentage were 14.81, 3.7, 33.33 and 48.15 for the four groupings that coded as 0, 1, 2 and 3 where 0 represent's the respondent is below age 18, 1 represent's the respondent is age 18-24, 2 represents the respondent is between age 24-35 and 3 are represent the respondent who are above 35 age's were respectively used in this study. Male gender seems to have proportion of deaths (48.15%) and Female have (51.85%) this indicate that the females were at the risk of death under ART follow up. In the cause of functional status the respondent who was worker had at the high risk of death than that of the respondent who was Ambulatory/bed reddened in percent they were (77.78%) and (22.22%) receptively. On the WHO stage level stage 3rd and 4th have the risk of death than 1st and 2nd stage and (81.48%) and (18.52%) receptively. HIV-death also shows increasing effect on TB cases and those with widowed marital status and CD4 counts. All the results have been summarized in table 4.1 below

Table 1 Demographic and Health factors by HIV/AIDS death

Demographic and Health Factors	variable codes	No. of deaths	% of deaths
Age	(0) below 18	4	14.81
	(1) 18-24	1	3.7
	(2) 24-35	9	33.33
	(3) above 35	13	48.15
Sex	(0) Male	13	48.15
	(1) Female	14	51.85
TB status	(0) positive	13	48.15
	(1) Negative	14	51.85
Weight	(0)<40	0	0
	(1)41-49	6	22.22
	(2) 50-59	11	40.74
	(3) > 60	10	37.04
CD4 level	(0) <200	6	22.22
	(1)200-299	6	22.22
	(2) 300-399	9	33.33
	(3)<400	6	22.22
WHO clinical stage	(0)Stage I& Stage II	5	18.52
	(1)Stage III& Stage IV	22	81.48
Functional status	(0)Ambulatory & Bedridden	6	22.22
	(1)Workers	21	77.78
Marital status	(0)Single	3	11.1
	(1)Marred	7	25.93
	(2)Divorced	5	18.52
	(3)Widowed	12	44.45

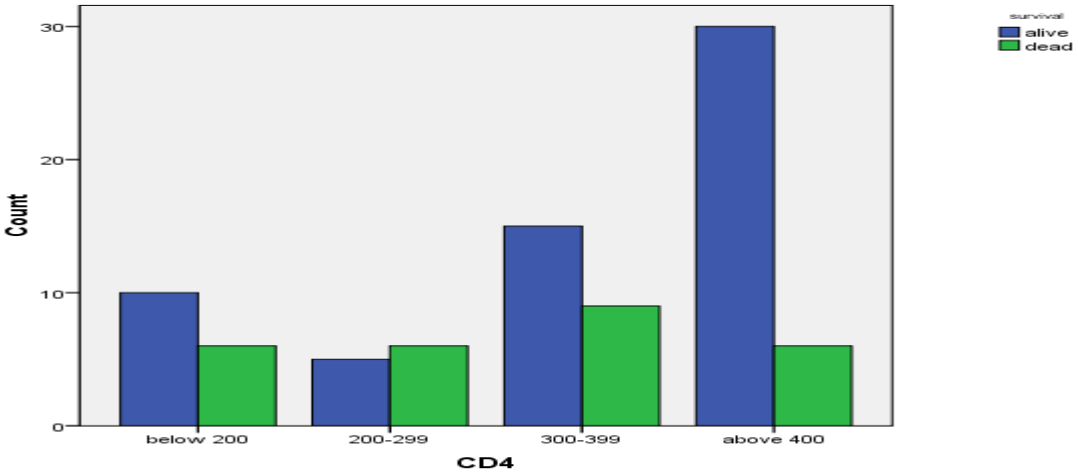
Figure 1 the graph of survival status under ART follow up described by marital status



Based on the above graph and table from 20 single persons 3 of them were died, from 38 married persons 7 of them were died, among 15 divorced respondents 5 of them were died and from 14 widowed respondents 12 of them were. Generally widowed respondents were at high risk of death than that of the single respondent .Or this is can be described in percent of death status. From the total status the death there were 11.1% of single, 25.93%

of married, 18.52% of divorced and 44.45 % of widowed respondents were dead under ART follow up program in WSUOH.

Figure 2; the graphical description of Survival status by CD4 level



Based on the above graph 16 persons are found to be have CD4 level below 200/mm^3, among these 6 of them are died. We can also describe this in percent which is 37.5% of them are died and 62.5% of them are alive, from the 11 persons who were found in CD4 level between 200/mm^3-299/mm^3, 6 of them are died or 54.54% of them are dead, and 45.45% are alive, from 24 respondents who have CD4 level between 300/mm^3-399/mm^3, 9 of them are dead or 37.5% are dead 62,5% or 15 persons are alive. And from 36 respondents who have above CD4 level 400/mm^3 6 of them are dead or 16.67%are dead and the rest of them 30 are alive or 83.33% of the respondents who are alive under follow up ART program.

Inferential Statistics and Data Analysis

Table 2 Chi square test

Variables	Pearson chi-square	Df	p-value
Sex	0.000	1	.183
Age	4.431	3	.172
Functional status	1.420	1	.010
Marital status	24.821	3	.000
WHO stage	38.278	1	.000
TB	6.232	1	.010
CD4	7.094	3	.000
Weight	3.119	3	.046

The above table shows a chi square test of association between death status of respondent and sex of respondents. The result reveals that the Pearson chi-square value is 0.000 (p value =.183) indicating that there is no association between death status and sex of respondents. And the result reveals that the Pearson chi-square value is 4.431 (p value =.172) indicating that there is no association between death status and age of respondents. The table shows that the chi-square test of association between death status and functional status of respondent, CD4 level of respondent marital status of respondent, WHO stage of the respondent and TB status has the Pearson chi-square 1.420,7.094,24.821,38.273 and 6.232 value respectively and has the p-value 0.010, 0.00, 0.000.0.000 and 0.010 respectively which are less than level of significance (0.05) and we conclude that there is association between death status and functional status , CD4 level TB WHO stage and marital status of respondents

Data Analysis of Binary Logistic Regression

The selection process was beginning with a careful analysis of each variable. It is known that the Wald test ratio chi-square test with 1 degree of freedom is exactly equal to the value of the Wald ratio test for the significance of the coefficients for the one design variable in a binary logistic regression model that contains that single dependent variable.

In binary analysis using the variables that are found to be significant are (Marital status (1,2,3)), WHO stage, Functional status CD4 and TB that is stronger associations (at α=0.05 level of significance) of HIV-death under ART follow up.

Binary logistic analysis is done using the significance variables in the logistic analysis. Forward in binary logistic regression proceeded by entering the variables are Age, Sex, TB status, Weight, WHO clinical stage, Functional status, Marital status and CD4 level. To facilitate computation and interpretation, the coding scheme

used in SPSS is given below in Table 4.3

The variables that are found to be significant in the binary analysis are, (Marital status (1, 2, 3)), Functional status, WHO Stage, CD4 and TB; these are effect in line with the results obtained from the binary analysis. The values of the Wald statistic for individual β coefficients support that the estimated values ($\hat{\beta}_i's$) are significantly different from zero at α=0.05 level of significance for all the above eight independent variable's. The estimated coefficients ($\hat{\beta}_i's$) for the predictor variable in the final model, their standard error and the odds ratio corresponding each estimated coefficient ($\hat{\beta}_i's$) is given in the following table.

Table 3 Variables in the Model

Variables in the Equation

	B	S.E.	Wald	Df	P-value	Odds Ratio	95.0% C.I.for EXP(B)	
							Lower	Upper
Sex(1)	3.151	1.786	3.112	1	.078	23.358	.705	774.250
Age	-1.524	.842	3.275	1	.070	.218	.042	1.135
Marital S			9.430	3	.024			
Marital S(1)	-11.306	4.142	7.452	1	.006	.000	.000	.041
Marital S(2)	-7.746	2.604	8.849	1	.003	.000	.000	.071
Marital S(3)	-5.605	2.009	7.781	1	.005	.004	.000	.189
Stage(1)	-7.123	2.018	12.464	1	.000	.001	.000	.042
Fustatus(1)	-3.278	1.650	3.947	1	.047	.038	.001	.957
CD4	-1.132	.630	3.231	1	.042	.322	.094	1.108
TB(1)	2.748	1.253	4.809	1	.028	15.618	1.339	182.166
Weight	-.433	.837	.267	1	.605	.649	.126	3.348
Constant	13.846	5.026	7.590	1	.006	1.031E6		

a. Variable(s) entered on step 1: Sex, Age, MaritalS, Stage, Fustatus, CD4, TB, and Weight.

Logistic Model

Logit (pi) =log (pi/ 1-pi) =$\beta o+\beta_{1X1}+\beta_{2X2}+\ldots.+\beta_{nXn}$

So from the SPSS output we have the following logistic model

The log odd logistic regression equation for success "p" is written in the form of;

$$\textbf{Logit } (p(Xi)/(1-p(Xi))=\beta_0+\beta_{3\text{Martial S(3)}}+\beta_{4\text{WHO stage(1)}}+\beta_{5\text{Fu status(1)}}+\beta_{6CD}+\beta_{7\text{TBstatus(1)}}$$

$$P(Xi)=\text{Logit}(p(Xi)/1-p(xi))=13.846-11.306_{D31}-7.746_{D32}-5.605_{D33}-7.123X_4-3.278X_5-1.132X_6+2.748X_7$$

β_{3d1}, β_{3d2}, β_{3d3}, β_4, β_5, β_6 and β_7 are the parameter estimators

X3=marital status (1,2,3), X4=WHO stage (1), X5=Functional status (1), X_6=CD4 and X7=TB

- Since the sig. (p) value of these independent variables are less than -value=0.05. From this we can conclude that each independent variable is significantly different from zero and they are important to predict the model or they are called factors that affect the chance of Survival/death status among hive positive people under ART.

Since the coefficient of the independent variable is positive hence, there is a positive relationship exists between survival/death status and independent variables.

- From the above output in table p-values of X_{3D1}, X_{3D2}, X_{3D3}, X_4,X_5,X_6 and X_7 are 0.027,0.006,0.003,0.005,0.000,0.047,0.042 and 0.028 respectively are less than α-value 0.05. From this, it can be concluded that the coefficients (β's) of these variables have significant effect on the chance of Survival/death status among hive positive people under ART.
- Insignificant variables are the variables that have no great influence on the chance of Survival/death status among hive positive people under ART.

Model checking

In our logistic regression analysis of the data by SPSS package, results of several goodness-of-fit tests

accompany the SPSS output if we check the appropriate options during the model fitting process. The goodness-of-fit tests discussed in the previous chapter are all available in the package output. We use some of them here below in order to check the adequacy of our model.

Table 4 Omnibus Tests of Model Coefficients

		Chi-square	Df	Sig.
Step 1	Step	77.026	10	.000
	Block	77.026	10	.000
	Model	77.026	10	.000

In the above of omnibus test of model coefficients indicates the overall significance of the model when we are considering all the influence variables included in the model. Therefore from the above result the binary logistic model is fitted, that means the model is statistical significant, so we conclude that at least one coefficient is different from zero.

Table 5 Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	30.746	.587	.827

a. Estimation terminated at iteration number 8 because parameter estimates changed by less than .001.

Cox & Snell R^2 indicates measures the proportion of the variance in the dependent variable that explained by variation in the independent variable which is 58.7% of the response variable which is the respondent's chance of survival/death under ART follow up is explained by the independent variables. And also Nagelkerke R Square indicates that 82.7% is the measure of the proportion of the variation in the response variable (the chance of survival/death status under ART follow up program) is explained by variation of the predictor variable.

NB *variation measures the proportion to which mathematical model accounts dispersions of given data set.*

Table 6 Hosmer and Lemeshow Test

Step	Chi-square	Df	P-value
1	5.672	8	.684

Since the p-value of Hosmer and Lemeshow test p-value =0.684 which means the Hosmer and Lemeshow implying that the model estimate are adequate to fit the data. A large p-value indicates a good match. A small p-value indicates a poor match, which tells us that we should look for some alternative ways to describe the relationship between this covariate and the outcome variable. In this study, the p-value is (0.684) indicates a good match**.** The Hosmer and Lemeshow goodness of test is greater than 0.05, we does not reject the null hypothesis that there is no difference between the observed model predicted value, implying that the model estimates are adequate to fit the data at acceptable level. The Wald statistic is also an alternative test which is commonly used to test the significance of individual logistic regression coefficient for each independent variable

- **The Likelihood ratio test**

Recall the **Likelihood ratio** statistic $-2LL0-\left(-2LL1\right)=-2\ln\left[\frac{likelihood\,0}{likelihood\,1}\right]$

Given in the previous chapter the $-2LL_0$ for the restricted (smaller) model is 107.771 and that of $-2LL_1$ for full (larger) model is 138.517 which imply a model chi square of 30.746 with p-value 0.001 which significant decrease in deviance there by implying a good fit of the model.

Interpretation

SPSS needs to assign one factor level as the reference level, meaning that the interpretation of the estimated coefficients is related to this level. For the given factor,

The reference level is the level with least numeric value or the lowest value as set by value ordering of coefficients. (Marital status (1,2.3)), WHO's Stage, Functional status, CD4, TB (-11.306,-7.746, 5.605, -7.123, -3.278, -1.132 and 2.748) respectively implies that these explanatory variables are more likely to describe alive or death status of patients than the reference factor.

The p-values test whether or not an observed relationship is statistically significant. This p-value tells if there is significant association between at least one predictor and the response by testing whether all slopes are equal to zero.

Thus, by compare this p-value to the α -level,

- If the p-value is less than or equal the α -level, then association is significant, and conclude that one predictor is significantly associated with the response.
- If the p-value is greater than α -level, then conclude that there are no significant associations.

Now look at the p-values for each predictor, since some of the variables such as Marital status, WHO's

Stage, Functional status, CD4, and TB included in the model, have small P-values, that is they are significant at 5% level of significance. But Age, Sex and Weight of patients have a p-value greater than 0.05 conclude that there is no significant association between these variables and the response variable life status.

The odds of chance of death for those respondent's who are in the WHO stage III&IV are 0.001 times less than for those patients who are in WHO stage I&II controlling the effects of sex, marital status, CD4, TB status, weight, age and functional status of the respondents

The odds of chance of death for those patients who are in the TB status positive are a factor of 15.618 times more than for those patients who are in TB negative controlling the effects of sex, marital status, WHO stage, age, weight, and functional status of the respondents. The odds of chance of death for those patients who widowed are a factor of 0.004 times more than for the proportion of the other's controlling the effects of sex, WHO stage, age, functional status, weight and TB status of the respondents.The odds chance of alive for HIV patients with who have more CD4 are 0.322 times alive than that of the patients who have less CD4 level controlling the effects of sex, marital status, WHO stage, age, functional status, weight and TB status of the respondents.The odds of chance of death for those patients who are worker are 0.038 times less than that of those patients who are bedridden and ambulatory controlling the effects of sex, marital status, WHO stage, age, CD4 weight and TB status of the respondents.

Conclusion

Since the aim of ART is to improve the health of HIV-positive individuals, it would be essential to study the factors that can improve the performance of ART. The people who are responsible, cares and treatment providers and ART programs service have been confronted with the question how to reduce and eliminate the death of HIV positive patients.

The paper analyzed the effect of, Sex, Age, Marital status, WHO's Stage, Functional status, CD4, TB and weight on the survival status of HIV positive patients on their alive. Using binary logistic regression analysis, two dimension of the survival (death status) of patients is extracted from the variables of patient's indicator.

The logistic regression analysis of the study from ART clinic of Wolaita Sodo University Ottona hospital gave results confirming that factors age, Marital status, WHO's Stage, Functional status, CD4 and TB use have statistically significant effects on the survival of patients. On the other hand, the Sex and weight were found to have no impact on survival of patients or statistical no significant.

Recommendation

From` the study results, I want to recommended that:

- Age: based on the data result the analysis shows older age respondents are more affected than a respondents who a younger age are. So;
  - I. Government should give them training so as to increase their awareness (knowledge) and in order to take care for their time to be live long.
  - II. Society should give them special care like controlling sexual harassment and give them advice in their home that their facilitates their so, they have to give care for themselves.
- CD4: persons having low CD4 have high chance of death. So, persons having low CD4 should eat some foods containing vitamins, proteins and other minerals. And they have to get advice from doctors and other related professionals how to increase their CD4 level.
- Functional status: persons morbidly affected like Ambulatory and Bedridden should net more protection by nurses, doctors and their relatives in order to increase their functional status to workers if possible.

Generally to recommend for statisticians who are the researchers in this area of study it is better to include the other variables that may be observed and recorded in the ART program in order to give decision about the chance survival of HIV patients. And also, we would like to recommend researchers should focus on this field of study i.e. in medical area of health centers and ART program. In addition to this all of the societies must remove discrimination and stigmatism on the people's who HIV positive and all of government sectors all health centers give services better adherence for those HIV positive people . Teaching the societies broadly about the ART because most of the does not understand about ART because of this most of the time the people who are HIV positive are does not follow up ART program.

Declarations

Ethics and consent to participate

Ethical approval was obtained from wolaita sodo University, college of natural and computational science,institutional review board (IRB). Once the ottona hospital Medical Directors Has permitted, Retrospective card review was conducted.

Consent for publication
Not applicable
Availability of data and materials
The data sets in which conclusion has taken is available on request.
Competing interests
The authors declare that they have no competing interests.
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Authors' contributions
TBJ has conceived the study, participated in the design of the study and performed statistical analysis, and drafting the manuscript for important intellectual content.
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