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Survival Rate Analysis of Heart Failure Patients at Arbaminch General Hospital, Southern Ethiopia, 2022

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ABSTRACT

Chronic heart failure happens when the heart's muscle is incapable of circulate sufficient blood to satisfy the requirements of the body for both oxygen and blood. In other sense, the heart is overwhelmed by its load. The goal of this study is to pinpoint the risk variables accountable for the variability in congestive heart failure patients' survival times from January 2017 to December 2021 at ArbaMinch General Hospital in South Ethiopia. Utilizing cox proportional hazard models, the data was examined. A retrospective investigation was conducted. Data was gathered from the cards of 199 congestive heart failure patients who were being followed up on using a straightforward random sampling approach. We discovered that 21.6 percent of the 199 patients with congestive heart failure investigated died, while the remaining 78.4% were censoring. Patients' mean baseline left ventricular ejection fraction was 43.18 percent (with a standard deviation of 13.928 percent), implying that each pulse expels 43.18 percent of the blood in the left ventricle. Patients with heart failure who tested positive for tuberculosis had a substantially increased chance of death. Left ventricular ejection fraction, tuberculosis, diabetes militias, etiology of heart failure, type of congestive heart failure, smoking status, and chorionic kidney disease were originate to be significant risk factors for death in patients with congestive heart failure. As a result, physicians are encouraged to pay greater attention to heart failure patients.

INTRODUCTION

Heart failure (HF) is a chronic, neurological disorder which occurs when the heart muscle is incapable of circulates enough circulation to fulfill the body's oxygenated blood necessities. In simply, the heart has difficulty keeping up with its responsibility. It's one of the most prevalent reasons people end up in the hospital. Long in-patient stays, tall in as well as post-discharge death and illness and whether or not the left ventricular ejection fraction is reduced are all major determinants to consider"(Carson *et al.*, 2015).

It's a major health issue all around the world, with high rates of re-hospitalization and death. After a year, the global re-hospitalization rate in patients with HF is over 50%(2). As a result, 33 million people globally, or 26.4 percent of the adult population, suffer from heart failure. Adults in the industrialized world make up 65.73 percent of the population, while those in developing countries make up 34.27 percent. It is expected that by the end of the year, there would have been a 60% growth since 2000 (Barbey *et al.*, 2010).

Heart failure has long been recognized as a major contribution to the burden of cardiovascular disease in Sub-Saharan Africa. Early twentieth-century case reports and case series offered critical information about heart failure in the region, identifying viral, dietary, and idiopathic causes as the most common (Ibrahim *et al.*, 1991). The range of causes of heart failure has expanded as a result of increased urbanization, changes in lifestyle habits, and population aging, resulting in a considerable burden of both communicable and non-communicable etiologies. The wide range of etiologies that exist, as well as the healthcare environment characterized by inadequate resources, weak national healthcare systems, and a scarcity of national level data on illness patterns, distinguish Sub-Saharan Africa (Bloomfield *et al.*, 2013).

It can, however, manifest itself in the form of pulmonary edema or even cardiogenic shock within 24 hours. Dickstein claims that Heart failure was formerly thought to be caused by the heart's inability to pump enough blood into the circulation due to ventricular a systolic dysfunction (LVEF 40% to 50%). (HF with depressed ejection fraction [HFDEF]). Patients with no diminished left ventricular ejection fraction (LVEF) can develop HF if higher filling pressures are required to achieve a normal end-diastolic ventricular volume (HFPEF) (Shah *et al.*, 2015).

This disorder is more frequent in women, the elderly, and persons with long-standing high blood pressure (HBP), and it has a similar prognosis as HFDEF. Right and left heart failure are conditions that are characterized by systemic or pulmonary congestion, resulting in jugular venous gurgitation and pulmonary edema, respectively. Many papers have been written addressing various elements of the general population's burden of heart failure. Cardiac societies, most notably the heart failure association arm of the European Society of Cardiology (ESC) and the American Heart Association, are addressing issues associated with this wide-ranging they need to publish consensus statements regarding this important topic (Pazos *et al.*, 2011). However, it is the last stage of all cardiac illnesses and could represent a significant source of morbidity and mortality (Davis *et al.*, 2000).

Over the years, cardiologists and cardiac associations

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have presented their own definitions of heart failure. The European Society of Cardiology (ESC) task force published guidelines on the diagnosis of heart failure, which specify the presence of symptoms and objective evidence of cardiac dysfunction, as well as symptom reversibility with appropriate treatment. Heart failure was one of the major causes of mortality in Ethiopia in 2013, according to health and health-related data and the American Heart Association, approximately a respiratory rate of more than 24 breaths per minute can identify 50% of patients at risk (Organization *et al.*, 2015).

According to the American Heart Association, an increase in Respiration Rate might be an indication of developing pulmonary edema, or fluid in the lungs, which is a common and deadly symptom of congestive heart failure (CHF) (Baddour *et al.*, 2015).Patients must estimate their health and survival time by assessing the burden of congestive heart failure. The investigator's motivation for exploring this topic stems from concerns about the survival time of individuals with congestive heart failure. The majority of research focuses exclusively on longitudinal data. However, it is critical to evaluate the survival time of individuals with congestive heart failure (Hickey *et al.*, 2018).

Heart failure (HF) is the fastest-growing cardiovascular illness in the world, putting enormous demand on healthcare systems worldwide (Ziaeian *et al.*, 2016). Congestive heart failure has risen to the top of the list of leading causes of mortality among individuals with a worse quality of life and a shorter lifespan. In the United States alone, 960,000 new cases of congestive heart failure (CHF) were discovered in 2017, and this figure is predicted to climb year after year as the population ages. The global prevalence is expected to grow by 8 million persons by 2030(Heidenreich *et al.*, 2013). Low- and middle-income nations have a higher rate of heart failure-related mortality than high-income ones. The Ministry of Health states (Seid *et al.*, 2019). According to health-related data (2014-2015), heart failure was one of Ethiopia's major causes of death in 2013(Kitzman *et al.*, 2016).

It is, however, more than just a significant public health concern; it will have a massive economic impact when a large portion of the productive age group population becomes chronically ill and remains at home, quits their jobs, and dies, leaving their families in poverty.

The risk factors for congestive heart failure have grown considerably as a result of a lack of understanding regarding the risk factors and management of heart failure. Previous studies found predictors of congestive heart failure without taking survival time into account (Beck *et al.*, 2016). Furthermore, the study focused on survival time and overlooked significant confounders. To cover the holes, this study examined the risk factors for the survival time to death of congestive heart failure patients using conventional cox proportional modeling. In general, the motivations for this work address the following important research questions:

1. What variables influence the survival time of congestive heart failure patients after they begin treatment?
2. What is the median survival time for patients with congestive heart failure at ArbaMinch General Hospital?

The crucial goal of this study was to recognize risk variables associated with survival time to death of congestive heart failure patients at Arba Minch General Hospital in Southern Ethiopia in 2021.

Significance of the Study

By evaluating patient survival time, the findings of this research will reveal data regarding risk variables for the death of heart failure patients. To perform statistical analysis, uncover potential factors linked to the survival time of patients with congestive heart failure, and develop a better approach for addressing heart failure difficulties faced by patients.

In order to design and promote the good health and long-term well-being of congestive heart failure patients, the results of this research are anticipated to provide necessary suggestions for relevant stakeholders, governmental organizations at various levels, and non-governmental organizations that work in the field of congestive heart failure. This will be done by determining the key factors encompassing the clients under follow-up.

METHODS AND MATERIALS

Study Area and period

Arba Minch is a town in southern Ethiopia, 505 kilometers south of Addis Abeba, located at a height of 1285 meters above sea level inside the Gamo Zone of the Southern Nations, Nationalities, and Peoples Region. Because it is the most important town in the region, it acts as the Gamo Zone's capital. Arba Minch and Zuria Woreda surround it.

This study was lead at Arba Minch General Hospitals from January 2017 to December 2021, and this hospital assists as a referral hospital for people who came from numerous surrounding areas, as well as providing healthcare to their districts and exercise for students from various health institutions, including ArbaMinch University.

Study Design

Because of occurrences of exposure had already occurred once during the follow-up time in the past on the evaluation of the patient's cards, information sheets, and registration books, a retrospective cohort research design was used. Patients were tracked on pulse and respiratory rate every three months at Arba Minch General Hospital from January 2017 to December 2021, and those aged 18 or older were eligible.

Source Population and Target Population

The population was derived from totally health registers of patients diagnosed with congestive heart failure in Arba Minch General Hospital who attended follow-up, and the study's target population includes all congestive heart failure patients below continuation at

Arba Minch General Hospital Ethiopia from January 2017 to December 2021, who had at least three pulse and respiratory rate measurements after the first report of congestive heart failure. According to the study's insertion measures, all congestive heart failure patients at Arba Minch General Hospital who received diagnosis and treatment within a predetermined timeframe, and whose pulses and respiratory rates were measured at least three times, were comprised. Patients, whose medical registers were missing information, couldn't be located, or who had a previous judgment of heart failure and registered during the data collection period was excluded.

Sampling Technique and Sample Size Determination

The most fundamental probability sampling technique is simple random sampling, in which each independent unit of the population has an equal opportunity (possibility) of being taken into the sample, which is the scientific technique of selecting a representative of the target population to provide the required estimation. As a consequence, the sample technique was the standard random sampling approach. Using the simple random sampling method, we recruited 199 patients from a total of 424 congestive heart failure patients under follow-up (Cochran *et al*., 2007).

Choosing a sample size is one of the first steps in creating a sample survey. The sample size decision is crucial since a large sample suggests more precision, but a small sample restricts the precision of estimate of demographic characteristics or the usability of the results. As a result, determining the appropriate sample size is preferred. Concerns include the research's objective, its compatibility with the available resources, such as cost, labor, time, and materials, and the margin of error (Cochran *et al*., 2007).

Method of Data Collection

To meet the study's aims, data were collected from a secondary source of congestive heart failure patients under follow-up at Arba Minch general hospital between January 2017 and December 2021. The data was taken after the patient's registration diagram and postcards, as well as epidemiological, laboratory, and clinical evidence from the patients who were being followed up on. Following data extraction, the data was entered, edited, coded, and organized before being analyzed with R software version 4.2.

Study Variables

Response Variables

The response variables addressed in this study were survival outcome variables, and the survival outcome variable was the time to death of the patient under follow-up in Arba Minch General Hospital.

Explanatory Variables

The explanatory variables considered in this study where patients age (in year), weight(in kilogram), body temperature, left ventricular ejection fraction in percent, patient gender, place of residence, smoking status of patients ,diabetes status of patients (present , absent), tuberculosis status of patients (positive, negative), chronic kidney status of patients (present ,absent), alcohol intake (yes, no), pneumonia status of patients (present , absent),etiology of heart failure (VHD, HHD, IHD, Other),and type of congestive heart failure patient (Left Ventricular, Right Ventricular, Biventricular) (see table 1).

Table 1: Congestive heart failure patient data from January 2017 to December 2020 at ArbaMinch General Hospital in South Ethiopia was analyzed using categorical variable coding.

No	Variables Description	Categories and codes
1	Gender of CHF patients	Female (0)
		Male (1)
2	Residence of CHF patients	Rural (0)
		Urban (1)
3	Presence of DM on CHF patients	Absent (0)
		Present (1)
4	Presence of TB on CHF patients	Negative (0)
		Positive (1)
5	Presence of Smoking on CHF patients	No (0)
		Yes (1)
6	Presence of pneumonia on CHF patients	Absent (0)
		Present (1)
7	Alcohol intake in CHF patients	No (0)
		Yes (1)
8	Presence of CKD on CHF patients	Absent (0)
		Present (1)
9	Types of CHF in patients	LV (0)
		BV (1)
		RV (2)
10	Etiology of CHF in patients	VHD (0)
		HTN (1)
		IHD (2)
		Other (3)

Operational Definition

Heart failure (HF): is also known as congestive heart failure, which is a condition that develops when your heart does not pump enough blood for your body's needs. Time to event data: Time from the start of the treatment to the death of CHF patients

Data Analysis

In R software version 4.2, the cox proportional model for time to event data was utilized to evaluate data from congestive heart failure patients.

Survival Analysis

Time to event data is often the subject of survival analysis. It includes procedures for positive-valued random variables such as time to death, time to onset (or relapse) of a disease, length of stay in a hospital, strike duration, and so on. We require a clear-cut time origin or a time scale (e.g. actual time (days, weeks, months, years) and a characterization of the event of interest in order to build a survival time random variable.

Survival time random variables are always non-negative, that is, if we denote the survival time by, T and then $T \geq 0$ can be discrete or continuous (defined on $(0, \infty)$). We require statistical approaches that employ data from all subjects, whether we monitor their survival times or only time until censoring. The probability distribution of a survival random variable can be described in a variety of ways. To model survival data, non-parametric, semi-parametric, and parametric models are available. The Cox proportional hazard model is a popular choice for modeling the time-to-event data.

Kaplan-Meier Survival Function Estimation

The Kaplan Meier estimator is a standard non-parametric survival function estimator that is used to calculate survival probabilities. It considers any point in time as a succession of steps defined by observed survival and censored times, incorporating information from all available observations, both censored and uncensored (Cochran *et al.*, 2007). The estimator is just the sample proportion of observations with event times greater than when there is no censoring. When censored times are added, the technique becomes a little more difficult, but still manageable.

$$\hat{S}_{KM(t)} = \prod_{t_i<t}\left(\frac{n_i - d_i}{n_i}\right)=\prod_{t_i<t}\left(1-\frac{d_i}{n_i}\right) \quad (1)$$

Where, (di)=the number of CHF patients who experience the event (death) at time (t_i)

(n_i) = the number of patients who have not yet experienced the event (death) or the total number of individuals at risk before time(t_i).

RESULTS AND DISCUSSION

Descriptive Analysis

The current study seeks to determine risk variables that are related with survival time to death in congestive heart failure patients at ArbaMinch General Hospital. A Cox proportional model was supposed to predict survival time. The findings of the models are all evaluated as meaningful in different ways. The most recent comparative R program version 4.2 was used to examine the data.

Women made up 50.3% of the 199 congestive heart failure patients who underwent therapy, while males made up the remaining 49.7%. According to our findings, 21.6 percent of the patients died, with the remaining 78.4 percent censored.

Table 1: Congestive heart failure patient data from January 2017 to December 2020 at ArbaMinch General Hospital in South Ethiopia was analyzed using categorical variable coding.

Variables		Frequency (%)	Survival Status	
			Event (%)	Censored (%)
Gender	Female	100 (50.3)	24 (12.1)	76(38.2)
	Male	99 (49.7)	19 (9.5)	80(40.2)
Residence	Rural	117(58.8)	21 (10.5)	96(48.3)
	Urban	82(41.2)	22 (11.1)	60(30.1)
Diabetes status	Absent	87(43.7)	9(4.5)	78(39.2)
	Present	112(56.3)	34(17.1)	78(39.2)
Tuberculosis status	Negative	81(40.7)	7(3.5)	74(37.2)
	Positive	118(59.3)	36(18.1)	82(41.2)
Smoking status	Non smoker	125(62.8)	24(12.1)	101(50.7)
	Smoker	74(37.2)	19(9.6)	55(27.6)
Pneumonia status	Absent	112(56.3)	16(8.1)	96(48.2)
	Present	87(43.7)	27(13.6)	60(30.1)
Alcohol intake status	No	103(51.8)	21(10.6)	82(41.2)
	Yes	96(48.2)	22(11.1)	74(37.1)
Chronic Kidney disease	Absent	128(64.3)	21(10.6)	107(53.8)
	Present	71(35.7)	22(11.1)	49(24.6)
Types of congestive heart failure	Right ventricular	55(27.6)	5(2.5)	50(25.1)
	Bi ventricular	64(32.2)	12(6.1)	52(26.1)
	Left ventricular	80(40.2)	26(13.1)	54(27.1)

Etiology of congestive heart failure	Valvular Heart Disease	51(25.6)	16(8.0)	35(17.6)
	Hypertensive heart disease	43(21.6)	7(3.5)	36(18.1)
	Ischemic heart disease	55(27.6)	12(6.0)	43(21.6)
	Other	50(25.1)	8(4.0)	42(21.1)
Status		Censored	156 (78.4)	
		Event (death)	43 (21.6)	

The large percentage of congestive heart failure patients (58.8%) resided in rural regions. As a consequence, ischemic heart disease was responsible for 55 (27.1%), valvular heart disease was responsible for 51 (25.6%), hypertensive heart disease was responsible for 43 (21.6%), and various etiologies were responsible for the remaining 50 (25.1%).

Concerning diabetes as comorbidities, 56.3% of heart failure patients had diabetes, 35.7% had chronic kidney disease, 37.2 percent were smokers, 43.7 percent had pneumonia, and 59.3% had tuberculosis. Likewise, of the total 199 congestive heart failure therapy participants, about 24 (12.1%) female responders died as a result of treatment, and the remainder was censored. On the other side, approximately 19 (9.5%) of the male responders died, while the remainder were censored. Based on the patient's location, 22 (11.1%) and 21(10.5%) of the 82 urban and 117 rural patients had an incident occur, respectively.

The overall average starting point age, weight, and left ventricular ejection fraction of patients were 48.6 years (with a standard deviation of 17.385 years), 54.21 kilograms (with a standard deviation of 10.93 kilograms), and 43.18 percent (with a standard deviation of 13.93 percent), trying to imply that an average of 43.18 percent of blood in the left ventricle is pushed out with each heartbeat (See Table 2).

Survival Time Analysis

Based on a cohort involving 199 congestive heart failure patients, the median life duration was 24 months, with an average and standard deviation of 24.8 and 7.3 months, respectively.

Kaplan Meier Estimations

The comparison of survival functions provides a good indication of the groups' event experiences, and the graphs showed the pattern of one's survival function lying above another, indicating that the cohort defined by the upper curve had a greater chance of surviving than the members to participate by the lower curve.

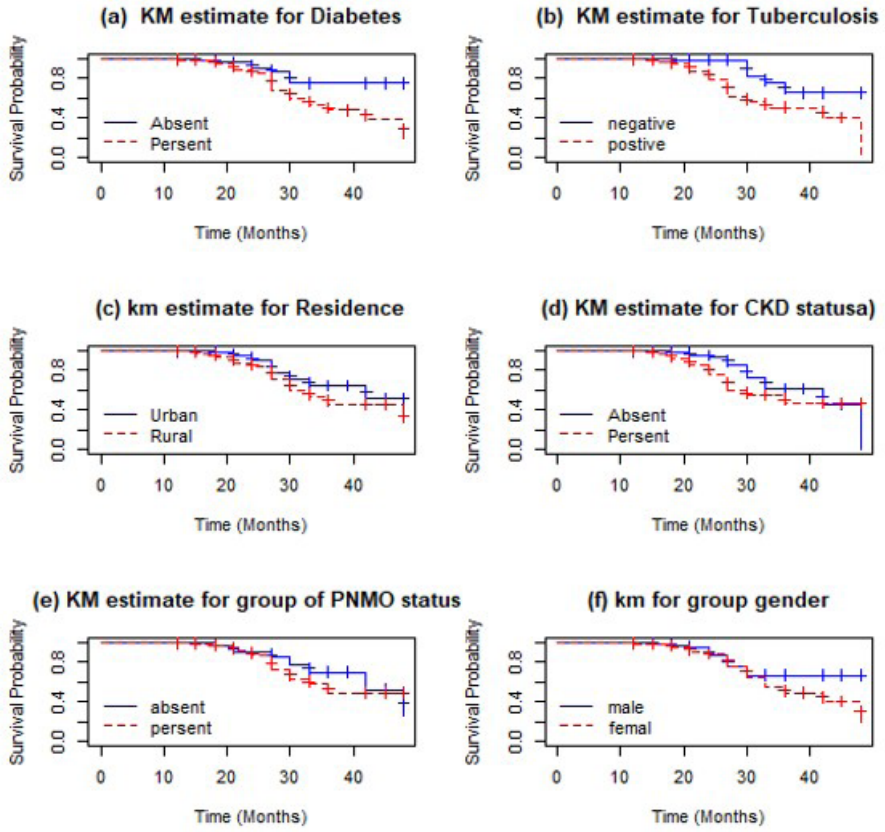

Figure 1: Kaplan-Meier Survival Plots of predictors with congestive heart failure patients data from January 2017 to December 2020, in ArbaMinch General Hospital, South Ethiopia

Figure 1 shows the estimate of survival function graphs for TB and diabetes millets. Then, for TB patients, it shows that those with tuberculosis negative tests had a higher chance of surviving than those with tuberculosis positive results. That is, patients who do not have TB have a better probability of survival than those who have it (See figure 1).

Diabetes mellitus is more common in congestive heart failure patients, indicating that people without diabetes mellitus have a better probability of survival than patients with diabetes mellitus in congestive heart failure. That is, TB positive patients and patients with diabetes militias had a higher risk of dying from medication than tuberculosis negative patients and patients without diabetes militias, respectively (See figure 1)

Log-Rank Test

The log rank test was performed to determine the significance of the observed difference among covariate categories using chi-square. The log rank test results discovered that there were significant differences in the survival chances of patients in different categories of Diabetes mellitus ($\chi2=5.6,p<0.02$), Smoking ($\chi2=4.6,p<0.03$), Chronickidneydisease ($\chi2=5.4,p<0.01$), Tuberculosis $\chi2=14.3,p<0.0002$) and Type of congestive heart failure patients ($\chi2=6.3,p<0.004$) The remaining variables are similarly described in the same manner. (See Table 3)

Table 3: Cox Proportional Model Analysis of Predictors with congestive heart failure patient's data from January 2017 to December 2020, in Arba Minch General Hospital, South Ethiopia

Covariates	Chi-square	Df	p-value
Gender	0.7	1	0.4
Place of residence	2.3	1	0.10
Diabetes status	5.6	1	0.02*
Tuberculosis status	14.3	1	2e-04*
Smoking status	4.6	1	0.03*
Pneumonia status	0.9	1	0.4
Chronic kidney status	5.4	1	0.01*
Type of congestive heart failure	6.3	2	0.004*
Etiology of heart failure	2.6	3	0.5
Alcohol intake status	0.6	1	0.4

** Indicates significance of covariate at 5% level of significance*

DISCUSSION

The Cox proportional hazards model was employed in this study for a survival outcome, and variables such as diabetes, smoking status, chronic kidney disease, left ventricular ejection fraction, type of congestive heart failure, etiology of heart failure, and tuberculosis are significant variables that influence congestive heart failure patients.

Congestive Heart Failure Patient who has diabetes militias' disease was positive significant effect on a risk death of congestive heart failure patients. This study is in similar with previous studies done by (Barlera *et al.*, 2013). That the presence diabetes militias has a positive significance effect with quality of Heart Failure, But other study done by (Ahmad *et al.*, 2017). Shows that Diabetes Militias has no significance effect with Heart Failure.

The estimated risk of death for a heart failure patient with the presence of chronic kidney disease patients was (HR = 4.313, 95% CI: 1.9438 , 9.5724, P = < 0.000325), This indicates that the risk of death for chronic kidney disease patients were 4.313 times higher as compared to non- chronic kidney disease patients keeping other variables constant. This finding is in line with the previous findings (Zeru *et al.*, 2018) which showed chronic kidney disease was positive and significantly associated with the prevalence of heart failure (See Table 4)

Table 4: Log-Rank Test Statistics Analysis of Categorical Predictors in Patients with Congestive Heart Failure from January 2017 to December 2020 in ArbaMinch General Hospital South Ethiopia

Parameters	Estimates (SE)	HR(95%CI)	P-value
LVEF	-0.056 (0.015)	0.945 (0.9178 0.9736)	0.000184 *
Temperature	-0.299(0.231)	0.741 (0.4709 1.1665)	0.195450
weight	-0.026 (0.015)	0.973 (0.9439 1.0040)	0.087931
Age	-0.005 (0.0104)	0.994 (0.9747 1.0156)	0.666826
Etiology of HF (ref=VHD)			
Ischemic Heart disease	0.982 (0.554)	2.672 (0.9014 7.9230)	0.076264
Hypertensive heart disease	0.801 (0.580)	2.229 (0.7153 6.9510)	0.166865
Other	1.336 (0.626)	3.806 (1.1140 13.0079)	0.032991 *

Type CHF (ref=Left Ventricular)			
Right ventricular	-0.281 (0.619)	0.754 (0.2242 2.5385)	0.648975
Biventricular	1.169 (0.544)	3.221 (1.1091 9.3570)	0.031528 *
Gender (ref=Female)			
Male	-0.051 (0.398)	0.950 (0.4347 2.0760)	0.897689
Residence (ref=Urban)			
Rural	0.046 (0.396)	1.047 (0.4816 2.2779)	0.907037
Alcohol intake(ref=No)			
Yes	0.320 (0.357)	1.377 (0.6831 2.7788)	0.370668
Smoking status (ref=No)			
Yes	0.899 (0.397)	2.459 (1.1288 5.3570)	0.023522 *
Chronic kidney status (ref=No)			
Yes	1.461 (0.4067)	4.313 (1.9438 9.5724)	0.000325 *
Pneumonia status (ref=No)			
Yes	0.067 (0.571)	1.069 (0.3491 3.2788)	0.906010
Diabetes millets status (ref=No)			
Yes	1.427 (0.445)	4.168 (1.7394 9.9904)	0.001369 *
Tuberculosis (ref=Negative)			
Positive	1.905 (0.447)	6.722 (2.7978 16.1526)	2.04e-05 *

**Indicates significant covariates at 5% level of significance, ref= reference category*

CONCLUSION

The purpose of this study was to recognize the factors associated to survival time of congestive heart failure patients admitted to treatment at ArbaMinch General Hospital by using cox proportional hazard model. The log-rank tests demonstrated that the survival experience of distinct groups of congestive heart failure patients was statistically significant in different categories of diabetes mellitus, chronic kidney disease, TB, and type of congestive heart failure. However, in the survival analysis, the risk factors of mortality were chronic kidney disease, left ventricular ejection fraction, etiology of heart failure, types of congestive heart failure, smoking status, diabetes mellitus, and tuberculosis. When examining overall model performance, we decided that the cox proportional model was best suited for survival data.

RECOMMENDATIONS

Due to a lack of understanding about risk factors for heart failure, clients were pushed to have a high risk of heart failure-related mortality and morbidity. As a result, relevant stakeholders should pay closer attention to and intervene on known risk factors like chronic kidney disease, tuberculosis, diabetes, left ventricular ejection fraction, etiology of heart failure, type of congestive heart failure, and smoking status, which should be acknowledged in the community.

Health practitioners are advised to pay special attention to congestive heart failure patients who have chronic kidney disease, tuberculosis, or diabetes and are at a higher risk of mortality in the district; consequently, special care should be paid to patients with this co-morbidity. Furthermore, based on the results of the study, individuals who are candidates for congestive heart failure should take action on early diagnosis and preventive strategies, as well as be aware of the risk factors for congestive heart failure.

Additionally, the study's fault is the insufficient use of accessible secondary data. As a result, critical information such as obesity, family status, and educational background were missing from the patients' records; however, these factors were not considered in our study. As a result, we advised researchers to incorporate such variables in future studies.

Abbreviations

CHF: Congestive Heart Failure; HF: Heart Failure; HHD: Hypertensive Heart Disease; HR: Heart Rate; IHD: Ischemic Heart Disease; LVEF Left Ventricular Ejection Fraction; PH: Proportional Hazard; VHD: Valvular Heart Disease.

Ethical Consideration

The study was carried out with the approval of Arba Minch University's Statistics Department. In this regard, the formal letter of cooperation referred with stat/534/2013 was addressed to the Arba Minch General Hospital's ethical approval committee. The letter was then authorized by the ethics committee, who granted authority to gather data from recorded patients' cards. There were no ties with specific patients for the sake of secrecy, and all data had no personal identity. As a result, the Arba Minch General Hospital ethics committee has waived the patient's informed consent.

Consent for Publication

Not applicable.

Availability of Data and Materials

The dataset supporting conclusions of this article is available by contacting the authors.

Competing Interests

The authors declare that they have no competing interests.

Funding

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Authors' Contributions

Sebisibe Kusse Kumaso planned the study, analyzed the data, and wrote the publication; Markos Abiso Erango and Belay Belete Anjullo supervised data analysis and provided critical feedback on the article. The final manuscript was reviewed and approved by all writers.

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