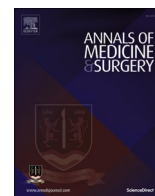Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Cohort Study

Time to recovery and its predictors among COVID-19 positive patients admitted to treatment centers of Southwestern Ethiopian hospitals. A multicenter retrospective cohort study

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ABSTRACT

Background: Nowadays, coronavirus disease is a leading cause of death. Therefore, the study aimed to assess the time to recovery and its predictors among Covid-19 positive patients.

Methods: A hospital-based retrospective cohort study was conducted among 300 COVID-19 patients admitted to Southwestern Ethiopian hospital COVID-19 treatment centers from August 7, 2020 to February 7, 2022. Kaplan Meier was used to estimate the survival time and the Log-rank test was used to compare the survival time between groups of categorical variables. The multivariable survival regression model was used to identify a significant predictor of time to recovery among COVID-19 patients at a P value ⩽ 0.05 with a 95% CI.

Result: In this study, 92% of patients admitted to Jimma University COVID-19 treatment center and Mettu Karl Comprehensive Specialized Hospital COVID-19 treatment center were recovered from COVID-19 after a maximum of 33 days of follow-up. The overall incidence density was 11.99/100 PD (person day) with a 95% CI of [11.273, 12.719] per 100 PD after a total of 3452 PD observations. The median time of recovery from COVID-19 was 10 days. Age (AHR = 1.945, 95% CI: 1.157, 3.268), hypertension (AHR = 1.856, 95% CI, 1.30, 2.63), diabetes (AHR = 1.406, 95% CI, 1.05, 1.84), being critical (0.298, 2039, 0.434), cancer (AHR = 3.050, 95% CI, 1.172, 7.943), and tuberculosis (AHR = 2.487, 95% CI, 1.504, 4.110) were found to be independent predictors of time to recovery of COVID-19 patients.

Conclusion: A total of 92% of patients were recovered within 10 days of the median time. Age, hypertension, diabetes mellitus, tuberculosis, severity of the case, cancer, and the presence of acute kidney injury were predictors of recovery time of COVID-19 patients. Therefore, healthcare providers should give strict follow-up and priority to elderly patients with chronic illnesses and those under supportive care.

1. Background

Coronavirus disease is a novel beta coronavirus family of single-stranded RNA viruses caused by a novel beta coronavirus called severe acute respiratory syndrome coronavirus 2 or SARS-CoV-2 [1]. The World Health Organization (WHO) stated that almost 85% of COVID-19 cases have mild to moderate symptoms and that 10%–15% of individuals have severe symptoms. The median time from onset to clinical recovery for mild cases is approximately 2 weeks and 3–6 weeks for patients with severe or critical disease [2].

Globally, the burden of COVID-19 has increased in terms of morbidity, mortality, and economic crisis since its outbreak in December 2019. It has now become the 12th leading cause of death globally and the 6th leading cause of death in developed countries. More than 173.3 million people had been infected and more than 3.7 million had died of coronavirus as of July 9, 2020(3) [4]. Coronavirus disease has affected over 7 million people in the United States, resulting in over 100,000 deaths [4].According to studies, this pandemic has become severe in middle and low-income countries, particularly Ethiopia, due to a

Abbreviations

AHR	Adjisted Hazard Ratio
AKI	Acute kidney injury
COVID	Coronaviruses disease
DM	Diabetes mellitus
HMIS	Health Management Information System
ICU	Intensive Care Unit
CHF	Congestive heart failure
COPD	Chronic obstructive pulmonary disease
KM	Kaplan meier
MKCSH	Mettu Karl Comprehensive Specialized Hospital
SARS- CoV-2	Severe Acute Respiratory Syndrome Coronavirus-2
SPSS	Statistical Packages of Social Science
TB	Tuberculosis
WHO	World Health Organization
WURH	Wollega University Referral Hospital

shortage of health care providers, ICU beds, personal protective equipment, supplemental oxygen therapy, and poor healthcare service quality [5].

Rapid recovery from the virus is critical in developing countries such as Ethiopia, where COVID-19 outbreaks have increased the demand for hospital beds, human resources, and supportive care and medical equipment [6–9].

Different factors is associated with the delayed recovery of COVID-19 patients like the presence of comorbidities such as diabetes, hypertension, hepatic disease, chronic pulmonary disease, cardiac disease, older age, presence of fever, gender, and admission location [5,10–12]. Additionally, the duration of hospitalization, area of residence, and sources of contamination were significantly associated with a longer duration of hospitalization [13].

Despite the fact that the WHO estimates COVID-19 patients' recovery time to be 2 weeks for mild infection and 3–6 weeks for severe illness [3]. The time to recovery was not studied in poor resource settings including our study area. Therefore, the aim of this study was to assess time to recovery and its predictors among COVID-19 patients admitted to JUMC and MKSH COVID-19 treatment centers.

2. Patients and methods

2.1. Study area, design and period

A hospital-based retrospective cohort study was conducted among Covid-19 positive patients admitted in Jimma University Medical Center and MKSH, Covid-19 treatment centers from August 7, 2020–February 7, 2022. Both treatment center found in Southwestern part of Ethiopia 350 and 600 km far apart from Finfinne, the capital city of Ethiopia. The work has been reported in line with the strengthening of the reporting of cohort studies in surgery (STROCSS) criteria [14].

2.2. Study participants and eligibility criteria

All COVID-19 positive patients registered on health management information system(HMIS) registration book and havinga full information of disease severity and socio-demographic characterestics was included whereas, patients having incomplete clinical and demographic information were excluded.

2.3. Study variables and outcome measures

The primary outcome was time to recovery from COVID-19 whereas Independent variables were socio demographic variables such as age,

sex, place of treatment, residence, contact history, presence of symptoms at admission, presence of TB, severity of cases, presence of comorbidity, types of comorbidity, length of stay, chest finding on auscultation, presence of bilateral pneumonia and intranasaloxygen use and supportive treatment used.

2.4. Sample size determination and technique

Sample size was determined using predictors significantly associated with time to recovery from Covid-19 using previous studies and sample size was calculated using Schoen Feld formula by Stata software version 14. $E = \frac{\left(\frac{Z\alpha}{2} + Z\beta\right)^2}{P1P2(lnHR)^2}$ And $n = \frac{E}{P(E)}$ = Schoenfeld formula for manual calculation. Where E = number of required events, n = sample size, *HR* is hazard ratio of selected covariates, p1 is proportion of subjects under exposure group, $p2 = 1 - p1$ and $P(E)$ is probability of an event from previous study. By taking Hazard Ratio for three covariates significantly associated with time to recovery from Covid-19. By considering the probability of an event of 4.38 and hazard ratio of 1.59 the final sample size becames 300(2). A systematic random sampling technique was used to include the patients. The total sample size for each hospital was allocated proportionally. Accordingly 115 patients were from MKCSH and 185 were from JUMC

2.5. Data collection process and management

The structured data extraction tools were adapted from the Ethiopia Federal Ministry of Health COVID-19 treatment center registration book. The questionnaire's main sections include the socio-demographic characteristics, patient related factors, comorbidities, clinical and investigation findings. The patient chart was searched and extracted from medical record unit. The was a daily extraction of the patient medical record number of COVID-19 positive cases from admission and discharge register found in treatment center then extracting charts from MRU (medical record unit) retrospectively. Appropriate supervision was conducted by the investigators during data collection. The principal investigators and supervisors strictly followed the overall activities of the data collection on a daily basis to ensure the completeness of the questionnaire and to give further clarification and support to data collectors. The training was given in Mettu health science college and JUMC COVID-19 treatment center staff hall to collect a data. Four nurses and two hospital pharmacist were involved in data collection. Two medical doctors were assigned to supervise the whole process of data collection. The pretest was conduct for 5% of the patients. The study was registered with unique reference number of **researchregistry 8200**.

2.6. Data processing and analysis

The data entry was done using Epi-data version 3.1 and then exported to Stata version 14 for further data analysis. Descriptive measures such as means, median, inter quartile ranges, percentages, frequencies and standard deviations was used to characterize the study population standard deviation (SD) was used to describe continuous variables for normally distributed variables. Time to recovery from COVID-19 was estimated using the Kaplan-Meier (KM) method and the Log-rank test was used to compare survival time between groups of categorical variables. Proportional hazard assumptions (PHA) was checked before fitting the survival model then a multivariable using the best fitted survival model was analyzed using STATA. The overall goodness of fit of the final model was checked using Nelson Aalen's cumulative hazard function against the Cox-Snell residual plot. Finally, the best-fitting multivariable survival regression model was used to identify significant predictors of time to recovery among COVID-19 patients with a P value of 0.05 and a 95% confidence interval.

2.7. Operational definitions

➤ **Event:** Refers to recovery of COVID-19 positive patients in the study period [2].
➤ **Length of stay:** Refers to length of time in days from date of admission to event and discharge from treatment center [12].
➤ **Censored:** Refers to those patients died, lost to follow up, isolated to home based care, who were not have negative result [15].
➤ **Time to Recovery:** Is the number of days from admission until patient recovery from COVID-19 and is obtained by calculating the difference (in days) from the start of treatment until recovery [15].
➤ **Co-morbidities:** Refers to COVID-19 patients who have medical problems such as TB, HIV, DM, COPD, Asthma, and CHF before, during, or after admission to treatment centers [16].

3. Results

3.1. Socio demographic and clinical characteristics of COVID-19 positive patients

Out of 300 COVID-19 patients chart reviewed, 191 (63.7%) were male with mean survival time of 12.3days and 109(36.3) were females with mean survival time of 11.3 days. The minimum and maximum age were 18 and 85 years old respectively with a mean age of 39.52 (SD: 16.858). The majority of Covid-19 patients were from urban 208(69.3%) areas.

Of total Covid-19 patients 224(74.7%) had Covid-19 signs and symptoms and 76(25.3%) of them were asymptomatic. Lastly among 300 COVID-19 positive patients 24(8%) were censored or not experienced the event whereas 276(92%) were recovered. In terms of severity of the case, 76(25.3%) were asymptomatic, 101(33.7%) were mild, 95 (31.7%) were moderate, 18(6%) severe and 10(3.3%) were critical and during admission. The minimum length of stay in the ward was 5 days whereas the maximum length of stay in the ward was 33 days with mean11.49 and SD of 5.33(Table 1**).**

3.2. Physical examination findings and supportive treatment

Among the clinical findings exist on Covid-19 patients admitted in

the study area a total of 116(38.7%) patients had a chest finding on auscultation and 126(42%) have bilateral pneumonia on chest x-ray.The most regularly prescribed supportive treatments were anticoagulants 288 (96%), antipyretics 205(68.3%), and dexamethasone160 (53.3%) (Table 2).

3.3. The recovery status of COVID-19 positive patients

At the end of the follow-up time 276(92%) observations were recovered from COVID-19 and 24 (8%) were censored. Among those censored cases, 7 (2.3%) of them were discharged by isolated home based care after clinical improvement, 4 (1.4%) were lost to follow up from the treatment center while 13 (4.3%) are died in the treatment

Table 2
Physical Examination findings and Supportive treatment given at southwestern Ethiopian covid-19 treatment centers from August 7, 2020 to February 7, 2022.

Variables	Categories	Frequency (%)	Recovery (%)	Censored (%)
Supportive treatment given and physical examination	Antibiotics	149 (49.7%)	130 (43.3%)	19 (38.7%)
	Anticoagulant	288(96%)	264(88%)	24(8%)
	Dexamethasone	160 (53.3%)	140 (46.7%)	20(6.7%)
	Antipyretics	205 (68.3%)	183(61%)	22(7.3%)
	Vitamin c	143 (47.7%)	129(43%)	14(4.7%)
	Vitamin D	143 (47.7%)	129(43%)	14(4.7%)
	Zinc	142 (47.3%)	128 (42.7%)	4(1.3%)
	Antiviral	33(11%)	29(9.7%)	18(6%)
	Intra nasal oxygen Administered	108(36%)	90(30%)	18(6%)
	Chest finding On auscultation.	116 (38.7%)	97 (32.3%)	19(6.3%)
	Presence of bilateral pneumonia on X-ray	126(42%)	102(34%)	24(8%)

Table 1
Sociodemographic and Clinical characteristics of Covid-19 Patients admitted to southwestern Ethiopian covid-19 treatment centers from August 7, 2020 to February 7, 2022.

Variables	Categories	Frequency (%)	Recovery (%)	Censored (%)	Mean(days)	[95% CI]
Sex	Male	191(63.7%)	175(63.4%)	16(66.7%)	12.3	[11.4, 13.2]
	Female	109(36.3%)	101(36.6%)	8(33.3%)	11.3	[10.2, 12.5]
Residence	Urban	208(69.3%)	192(69.6%)	16(66.7%)	11.878	[11.05,10.7]
	Rural	92(30.7%)	84(30.4%)	8(33.3%)	12.126	[12.7, 13.5]
Severity of the case	Asymptomatic	76(25.3%)	74(26.8%)	2(8.3%)	13.763	(13.439,14.087)
	Mild	101(33.7%)	98(35.5%)	3(12.5%)	23.399	[22.72,24.07]
	Moderate	95(31.7%)	92(33.3%)	3(12.5%)	23.806	[22.478,25.134]
	Severe	18(6%)	12(4.3%)	6(25%)	25.155	[22.199,28.111]
	Critical	10(3.3%)	0(0.0%)	10(41.7%)	25.300	[22.59,28.01]
Place of treatment	Ward	272(90.7%)	264(97.1%)	8(2.9%)	10.566	[10.09,11.04]
	Ward and ICU	28(9.3%)	12(42.9%)	16(57.1%)	25.698	[22.516,28.88]
Cancer	Yes	6(2%)	3(50.0%)	3(50.0%)	24.100	[16.068,32.132]
	No	294(98%)	273(92.9%)	21(7.1%)	11.718	[11.041,12.39]
Asthma	Yes	50(16.7%)	44(88.0%)	6(12.0%)	12.692	[11.086,14.297]
	No	250(83.3%)	232(92.8%)	18(7.2%)	11.782	[10.998,12.565]
TB	Yes	21(7%)	18(85.7%)	3(14.3%)	16.308	[13.290,19.325]
	No	279(93%)	258(92.5%)	21(7.5%)	11.701	[10.955,12.447]
Cardiac disease	Yes	31(10.3%)	22(71.0%)	9(29.0%)	18.077	[14.631,21.522]
	No	269(89.7%)	254(94.4%)	15(5.6%)	11.267	[10.626,11.907]
Presence of AKI	Yes	37(12.3)	26(70.3%)	11(29.7%)	18.200	[15.358,21.043]
	No	263(87.7%)	250(95.1%)	13(4.9%)	11.068	[10.437,11.699]
Hypertension	Yes	62 (20.7%)	47 (17%)	15(62.5%)	18.326	[16.09,20.56]
	No	238 (79.3%)	229 (83%)	9(37.5%)	10.265	[9.77,10.76]
Diabetes mellitus	Yes	80 (26.7%)	71(25.7%)	9(37.5%)	14.431	[12.8,16.02]
	No	220 (73.3%)	205(74.3%)	15(62.5%)	10.994	[10.27,11.72]

center. The overall mean time of recovery was 11.50667 days with 95% CI of [10.90, 12.10] and the overall incidence density was 11.99/100 PD (person day) with 95% CI of [11.273, 12.719] per 100 PD after a total 3452/PD observation. The cumulative hazard of recovery from COVID-19 was 0.01, 0.58, 0.82, 0.90 and 0.97 at 5, 10, 15, 20 and at the end of the follow up period respectively.

The overall Kaplan –Meier survivor function showed that relatively a large number of the COVID-19 patient recovery occurred at the earlier days of COVID-19 treatment initiation and there was decrement in recovery as their stay in hospital increase(Fig. 1).

The Kaplan- Meier plot show that males have equal survival time to female patients. The result of the log rank test also revealed that statistically insignificant difference (P = 0.269)(Fig. 2).

The Kaplan- Meier plot showed that there is no survival experience difference among residence(P = 0.833) and the second Kaplan- Meier plot graph show that COVID-19 patients admitted to ward and intensive care unit (ICU) had a long survival time than patients admitted to the ward(P= <0.001(Fig. 3).

3.4. Predictors of time to recovery from COVID-19

COVID-19 positive patients in 18–29 age groups admitted to were 1.945 (AHR 1.945, 95% CI: 1.157, 3.268) times more likely to had recovery than elderly patients of >60 years old. Severely/Critically ill COVID-19 positive patients admitted to COVID-19 treatment center were 70% less likely to had a recovery time than COVID-19 positive patients admitted by moderate COVID-19 cases. COVID-19 positive patients who had no hypertension admitted to a Covid-19 treatment center were 1.856(AHR 1.856, 95% CI, 1.30–2.63)times more likely to have recovery time than Covid-19 positive patients who had hypertension. Covid-19 positive patients with no diabetes mellitus admitted to the Covid-19 treatment center were 1.406(AHR 1.406, 95% CI, 1.05, 1.84) times more likely to have a recovery time than Covid-19 positive patients with diabetes mellitus. Covid-19 positive patients without congestive heart failure who were admitted to a Covid-19 treatment center were 1.199 (AHR 1.199, 95% CI.790, 1.820) times more likely to recover than Covid-19 positive patients with congestive heart failure. Covid-19 positive patients with no cancer admitted to the Covid-19 treatment center were 3.050 (AHR 3.050, 95% CI 1.172, 7.943) times more likely to have a recovery time than Covid-19 positive patients with cancer. 2.487 (AHR 2.487, 95% CI, 1.504, 4.110) times more likely to recover than Covid-19 positive tuberculosis patients. Covid-19 positive patients with no acute kidney injury admitted to the Covid-19 treatment center were 1.495(AHR 1.495, 95% CI, 1.011, 2.208) times more likely to had a recovery time than Covid-19 positive patients with acute kidney injury (Table 3).

4. Discussion

The study found that a total of 76(92%)COVID-19 patients were recovered after treatment. This is consistent with the South Indian study's 92.5% [1] and higher than the studies' 86.3% in Wellaga University Referral Hospital, 83.8% in South Central Ethiopia, 61.7% in Vietnam, 46.8% in Beijing, 41.6% in the Republic of Korea, and 20% in Australia [2,13,15,17,20]. This discrepancy might be due to differences in the age of patients, sample size, and prevalence of comorbidity, and severity of the disease.

The median time to recovery from COVID-19 patients was 10 days. Which was in line with the studies conducted in different Indian states and in Australia, where their median time to recovery was 10 days [17, 21]. On the contrary, the median time was 12 days in Nigeria,13 days in South Central Ethiopia, 14 days in Beijing, 17 days in Vietnam, 18 days in WURH, and 19 days in Addis Ababa, and 21 days in other studies conducted in Vietnam 4–53 days within China and 4–21 days outside of China [2,7,13,15,18,19,22]. The rate of recovery was delayed as compared to Saudi Arabia's 6.0 days and South 7 days [1,23]. These differences could be due to differences in the quality of care, differences in the organizational set-up,qualifications of care providers, socio-economic status of the country, or number of health professionals, which might be the reason for differences in recovery rates.

In a multivariable semi-parametric Cox proportional regression analysis, age was found to be a significant predictor of time to recovery from COVID-19. The current study revealed that COVID-19 positive patients in the 18–29 age groups admitted to COVID-19 treatment centers had a greater chance of recovery than the elderly age groups. This is consistent with findings in Vietnam, China, Wellaga university referral hospital,Addis Ababa Millennium Covid-19 Care Center [2,19, 24–26]. This is due to the fact that as age increases, there are changes in the normal physiology of each organ, which results in immunity suppression and the presence of different underlying conditions among aged individuals.

The severity of the case (being critical) is also another predictor of prolonged time to recovery from COVID-19 cases. This study found that critically ill Covid-19 positive patients admitted to Covid-19 treatment center were 70% less likely to had a recovery time than Covid-19 positive patients admitted by moderate Covid-19 cases. It is consistent with the study conducted in Beijing and Wuhan [10,18]. This might be due to involvement of respiratory system by SARS cov2, impairment of other organ function due to hypoxia, or decreased oxygen supply, so the outcome was that individuals with critical conditions had a lower rate of recovery compared to their counterparts.

The COVID-19 positive patients who had no hypertension had a greater chance of recovery from COVID-19 when compared with those who had hypertension. It was aligned with a study in Addis Ababa, and China [26,27]. The most probable reason might be that the majority of the patients receiving this supportive care were in worsening conditions
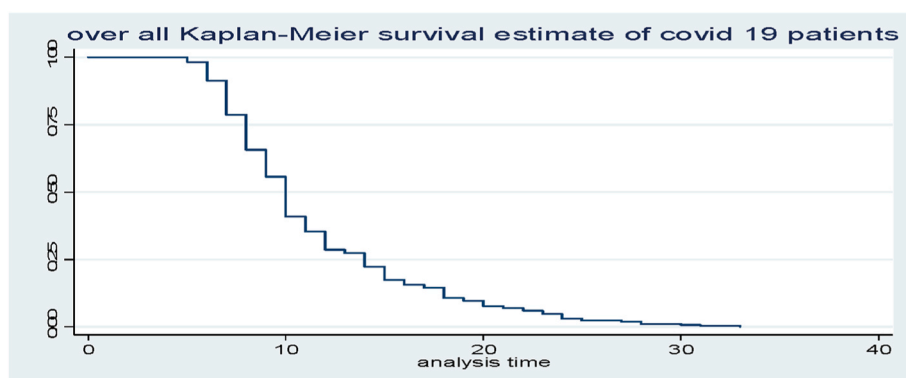

Fig. 1. The kaplan-meier estimate of covid-19 patients admitted to Southwestern Ethiopian Covid-19 treatment center.
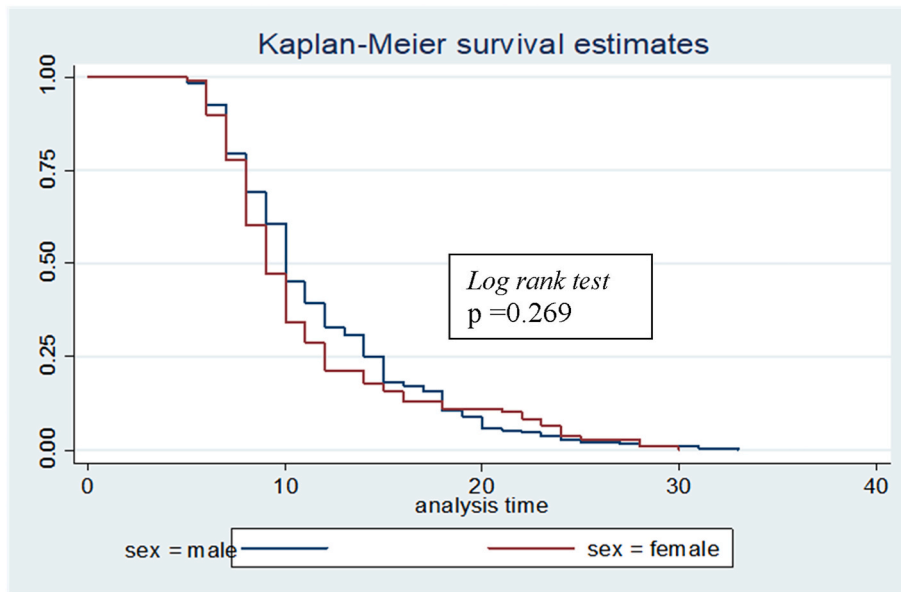
Fig. 2. KM plot survivals Time-to recovery by sex of Covid-19 patients.
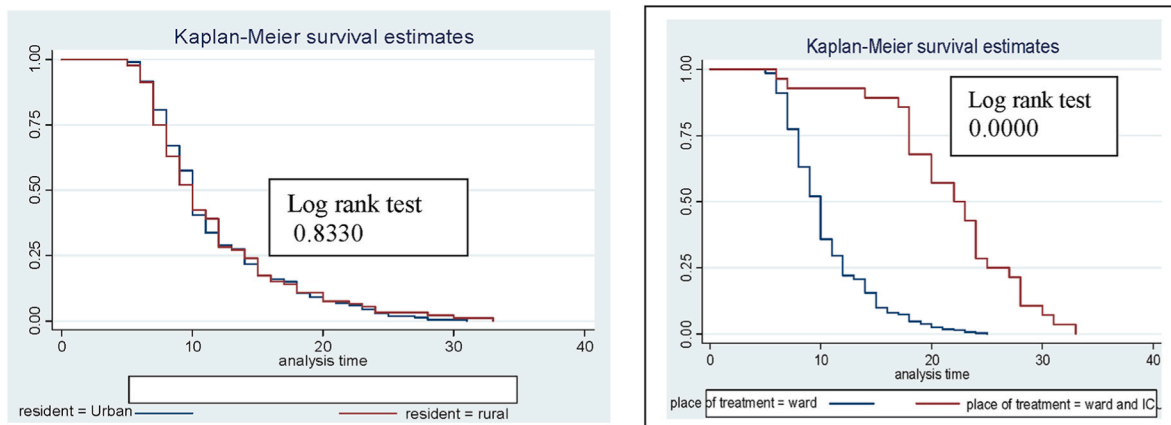

Fig. 3. Kaplan-meier plot survivals Time-to recovery by place of treatment and residence of Covid-19 patient.

related to the complication of hypertension.

Similarly, Covid-19 positive patients who did not have diabetes mellitus had a higher chance of recovering from Covid-19 than those who did. It was aligned with a study conducted at the Addis Ababa Millennium Covid-19 Care Center [26]. This is due to the fact that diabetes mellitus is a chronic illness that deteriorates the immunity of the patient on top of COVID-19 infections.

The Covid-19 positive patients who had no congestive heart failure had greater chance of recovery from COVID-19 when compared with those who had congestive heart failure. It was aligned with a study conducted in Kurdistan [5]. This may be due to the effect of COVID-19 infection on the respiratory system that can decrease oxygen supply to the organs, including the heart This might increase the load on the heart, which can delay the recovery of the COVID-19 patients.

The COVID-19 positive patients who didn't have cancer have a greater chance of recovery from COVID-19 when compared with their counterparts. This is consistent with the study conducted of Kurdistan [5]. This might be explained by cancer patients need additional nutrition and energy for survival.

The Covid-19 positive patients who had no tuberculosis had a greater chance of recovery from Covid-19 when compared with their counterparts. A similar finding was obtained in Philippines [28]. This might be

due to the pathogenesis of TB and Covid-19 involves the respiratory system. Finally Covid-19 positive patients who haven't acute kidney injury had a greater chance of recovery from Covid-19 when compared with their counterparts. It was aligned with a study conducted in Wuhan China, Saudi Arabia, Turkish society [10,22,29]. This might be due to worsening condition in Covid-19 patient.

4.1. The strength and limitation of the study

The study was multicenter, with the limitation that it was retrospective and relied on secondary data. Therefore, essential variables that couldn't be recorded in patients' medical records might have affected the duration of the patient's recovery from COVID-19 infection.

5. Conclusions

A large number of the COVID-19 patients were recovered in our study area. Besides this, the recovery of the patients occurred in the earlier days of COVID-19 treatment initiation. Age, hypertension, diabetes mellitus, being critical, TB, congestive heart failure, and the presence of acute kidney injury are significantly associated with prolonged recovery time from COVID-19 infection. Therefore, health

Table 3
Predictors of Time to Recovery of Covid-19 patient admitted in Southwestern Ethiopian covid-19 treatment centers.

Variable	Category	Recovery		CHR (95% CI)	AHR (95% CI)	P-value
		Cured	Censored			
Age	18–29	99(33.0%)	(1.3%)	1.70 (1.13,2.61)	1.945(1.157, 3.268)	0.001*
	30–45	105(35%)	5(1.7%)	1.31(1.026,1.68)	1.42 (1.02,1.67)	0.030 *
	46–59	27(9%)	1(0.3%)	1.42(1.021,1.969)	1.31(1.02,1.68)	0.003*
	>60	45(15.0%)	14(4.7%)	1	1	
Place of treatment	Ward	264(97.1%)	8(2.9%)	5.76(3.54, 9.32)	1.878(1.488,1.972)	0.775
	Ward and ICU	12(42.9%)	16(57.1%)	1	1	
Severity of case	Asymptomatic	74(26.8%)	2(8.3%)	2.02(.122,33.43)	0.98(0.708,1.213)	0.489
	Mild	98(35.5%)	3(12.5%)	2.39(.330,17.33)	.657(.481, .896)	0.388*
	Moderate	92(33.3%)	3(12.5%)	1.66 (.507, 5.429)	.298(2039, 0.434)	0.402
	Severe/critical	12(4.3%)	16(66.7%)	1	1	0.000[a]
Hypertension	Yes	47 (17%)	15(62.5%)	1	1	
	No	229(83%)	9(37.5%)	3.11(2.27,4.283)	1.85(1.30, 2.63)	0.027*
DM	Yes	71(25.7%)	9(37.5%)	1	1	
	No	205(74.3%)	15(62.5%)	1.64(1.27,2.139)	1.406(1.05,1.84)	0.020*
COPD	Yes	11(3.7%)	5(1.7%)	1	1	
	No	265(88.3%)	19(6.3%)	1.892 (1.139,3.145)	1.35(.765, 2.37)	0.531
Congestive heart failure	Yes	22(71.0%)	9(29.0%)	1	1	
	No	254(94.4%)	15(5.6%)	2.087(1.412,3.085)	1.199(.790,1.820)	0.392 *
Hepatic disease	Yes	11(1.7%)	6(2%)	1	1	
	No	271(90.3%)	18(6%)	3.791(1.858,7.734)	1.406(.639,3.093)	0.570
Cancer	Yes	3(1%)	3(1%)	1	1	
	No	273(91%)	21(7%)	3.160(1.285,7.769)	3.050(1.172,7.943)	0.022*
TB	Yes	18(6%)	3(1%)	1	1	.
	No	258(86%)	21(7%)	1.692(1.083, 2.643)	2.487 (1.504,4.110)	0.000[a]
Presence of AKI	Yes	26(8.7%)	11(3.7%)	1	1	
	No	250(83.3%)	13(4.3%)	2.120(1.490,3.015)	1.495(1.011, 2.208)	0.0044*

[a] Significant association P < 0.01,*p-value<0.05 (Age, Hypertension, DM, being critical, Congestive heart failure, cancer,Presence of AKI, TB.

providers in treatment centers should give strict follow-up and priority to the elderly and patients with chronic illnesses.

Annals of medicine and surgery

The following information is required for submission. Please note that failure to respond to these questions/statements will mean your submission will be returned. If you have nothing to declare in any of these categories then this should be stated.

Ethical approval

Ethical clearance was obtained from the Institutional Review Board (IRB) of Mattu University, College of Health Science.

Author contribution

ST, FB and YL contribute in the preparation of proposal, methodology, and statistical analysis. GRD,TB, LDT and KB were participated in preparing the first draft of the manuscript and contributed to the methodology and editing of the manuscript. All authors checked and confirmed the final version of the manuscript.

Registration of research studies

1. Name of the registry: RESEARCH REGISTRY, https://www.researchregistry.com.
Unique Identifying number or registration ID: **researchregistry8200**.
2. Hyperlink to the registration (must be publicly accessible): https://www.researchregistry.com/register-now#home/registrat

iondetails/5d70f2520791fb0011b79e9f/

Guarantor

Firomsa Bekele.

Consent

Not applicable. No individual person's personal details, images or videos are being used in this study.

Availability of data and materials

The materials used while conducting this study are obtained from the corresponding author on reasonable request.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Declaration of competing interest

The authors declared that they have no competing interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amsu.2022.104917.

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