



**St. Paul's Hospital
Millennium Medical College**
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St. Paul Hospital Millennium Medical College Graduate Study Program

**Outcome and Associated factor of Acute Heart Failure Patients at Saint's Paul Hospital Millennium
Medical College Adult Emergency Department, Addis Ababa, Ethiopia**

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Addis Ababa, Ethiopia

December, 2023



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Outcome and Associated factor of Acute Heart Failure Patients at Saint Paul's Hospital Millennium Medical College Adult Emergency Department, Addis Ababa, Ethiopia, A One Year Cross Sectional Study.

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A research Thesis submitted to Saint Paul millennium Medical College and Department of Emergency Medicine and Critical Care as Partial Fulfillment of the Requirements for the Degree of Specialty Program, Emergency Medicine and Critical Care.

Addis Ababa, Ethiopia

December, 2023

Acknowledgement

I express my gratitude to my advisors, Dr.Mohammed Kalifa, Dr Natan Negash,and Dr Ayalew zewude for their important support and direction during the writing of this thesis.I would also like to express my gratitude to my friends for helping me with this thesis preparation. I also want to thank the St. Paul Hospital Millennium Medical College Department of Emergency and Critical Care Medicine from the bottom of my heart for giving me the opportunity to learn and get research experience. I am truly grateful for this opportunity, as it will provide the groundwork for my future professional growth.

Acronym and Abbreviation

ACS.....	Acute coronary syndrome
ADHF.....	Acute Decompensated Heart Failure
AHF.....	Acute Heart Failure
CRVHD.....	Chronic Rheumatic Valvular Heart Disease
DCMP.....	Dilated Cardiomyopathy
DM.....	Diabetes Mallets
ED.....	Emergency Department
HHD.....	Hypertensive Heart Disease
HTN.....	Hypertension
ICU.....	Intensive Care Unit
IHD.....	Ischemic Heart Disease
K.....	Potassium
Na	Sodium
PR.....	Pulse rate
RR.....	Respiratory rate
SPHMMC.....	Saint Paul Hospital Millennium Medical College
SPO2.....	Oxygen Saturation
T.	Temperature

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Abstract

Background:

Acute Heart Failure is a syndrome manifest as new onset or recurrence of acute decompensated heart failure requiring emergency treatment and hospitalization. It is a major public health issue and its burden is growing in developing countries. Studies about outcome and associated factors of heart failure patient at emergency department is lacking in developing countries

Objectives -The objective of this study was to assess outcome and associated factor of Acute Heart Failure patients in Adult Emergency of Saint Paul hospital Millennium Medical College from September 01, 2022, to August 30, 2023.

Methods -A cross-sectional study was conducted in Adult Emergency of Saint Paul hospital Millennium Medical College on patients presented with Acute Heart Failure from September 01, 2022 to August 30, 2023. A simple random sampling technique was used to select eligible patient's charts. Data was collected using structured questionnaire from patient's chart and analyzed using SPSS version 25.

Results -Patients were admitted to a medical ward in 47.2% of cases, while nearly half (48%) were discharged to their homes. 3.5% of patients required hospitalization to the intensive care unit. In 1.3% of patients with acute heart failure, a death was reported. Patient who had comorbidity and previous history of admission significantly associated with hospital admission.

Conclusion- More than half of patients were admitted and nearly half of patient were discharged to their home from the emergency. Patient who had comorbidity and previous history of admission needs hospital admission.

Key words: Heart Failure, Outcome, Associated Factor

1. INTRODUCTION

1.1 Background

Heart Failure (HF) is a major public health problem worldwide [1]. Rather than being a main diagnosis, it is more of a syndrome.

Acute heart failure with a new onset or recurrence that necessitates hospitalization and emergency care is the hallmark of heart failure syndromes [2, 3]. Around the world, there are differences in the prevalence of AHF. A growing number of people are becoming older, complications from cardiovascular disorders such as acute coronary syndrome are becoming more common, and lifestyle-related risk factors are becoming more prevalent are the reasons behind its increased occurrence [4].

The aging of the population and the prevalence of hypertension are the main causes of the rising prevalence of HF in sub-Saharan Africa [1]. CHF is thought to affect 5.7 million people in the US, and among those 65 and older, it is one of the most frequent causes of hospitalization(5).

Patients with AHF may present with a variety of signs and symptoms upon admission, such as neck vein distension, peripheral edema, murmur, S3 gallop, orthopnea, high jugular venous pressure, and easy fatigability. Cardiac disorders such as uncontrolled hypertension, arrhythmias, as well as non-cardiac circumstances such as diabetes mellitus, renal dysfunction, infection, and non-adherence to medical regimen are key precipitants that may lead to decompensation and hospital admissions. The most common causes of AHF hospitalization in Ethiopia are medicine cessation, myocardial infarction, infection, arrhythmia, and anemia (6).

According to the prospective registries conducted on the clinical features and outcome of acute heart failure around the world, ischemic heart disease is the most common cause, accounting for 53% of cases in Gulf care and 65% of cases in the ADHER registry (18,21). In the majority of sub-Saharan African nations, rheumatic heart disease is the most prevalent cardiac condition. Hypertensive heart disease, which is on the rise along with other non-communicable diseases, is the second most common condition [7].

Due to their delayed presentation, AHF patients that visited hospitals in Africa are often young and exhibit severe symptoms.

Therefore, we have to spend time with the youth who are burdened by an acute episode of heart failure. The economy of the society was significantly impacted by this younger age group [5, 6].

An estimated 50% of people will die from CHF within five years, and age, race, and gender are the main factors contributing to epidemiological disparities in incidence and mortality rates. Adherence to medicine, anemia, and infection are factors that impact prognosis (6).

1.2 statement of the problem

Heart failure (HF) affects approximately 26 million people globally and is a significant and developing public health issue [9]. According to affluent countries with well-established population-based registries, the prevalence of HF is between 1% and 2% of the adult population; among those over 70, the prevalence rises to roughly 10% [8,9]. ADHF is a significant clinical syndrome that impacts individuals across all age groups. About 100,000 hospital admissions in Canada and one million hospital admissions in the US are attributed to it annually. Both in-hospital mortality and readmission after discharge have high rates (10).

An increased risk of death and a poor prognosis characterize AHF, one of the most prevalent disorders in emergency care. For patients participating in clinical trials, the in-hospital mortality rate can be as low as 2.3%; for referral patients, it can reach 19%. The United States' OPTIMIZE-HF registry has a hospital death rate of 3.8%, while the European ALARAM-HF registry has a mortality rate of 12% (11, 12).

In-hospital mortality for heart failure patients was found to be 21.6% in a prospective cohort study conducted in Brazil. In Cameroon, intra-hospital mortality was found to be 18.45% according to a retrospective observational research. Hospitalized HF patients in Ethiopia had a 24.4% in-hospital death rate. Predictors of in-hospital mortality included diabetes mellitus, pulmonary hypertension, smoking, adverse pharmacological events, and noncompliance with HF medication (7)

There are insufficient investigations on the outcomes and contributing factors of patients with acute heart failure in Ethiopia's adult emergency department. Consequently, this research will help close this gap.

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1.3 Significance of the study

Ethiopia and other African nations have not done sufficient research on the outcomes of adult emergency department patients with acute heart failure or the factors that are linked with them. The study analyzes patterns, outcomes, comorbidity, precipitating factor and length of ED stay of Heart Failure patients presenting to Adult Emergency Department of SPHMMC.

Additionally, it analyzes variables related to hospital admission. In general, this research contributes to the body of knowledge in the field where little is known about the outcome and contributing factors for adult ED patients with heart failure at a tertiary hospital in Ethiopia. Furthermore, it acts as a path for further research. Consequently, the research's conclusions may be utilized to provide input to SPHMMC so that actions may be taken to expand the hospital's bed capacity, lower heart failure's risk factors by raising awareness, and concentrate on the disease's common causing.

2. literature Review

Over the past three decades, there has been an increase in research on heart failure (HF), a global problem with a high death rate that affects millions of people annually [13]. Large multi-center studies from the USA (e.g. ADHERE) and Europe (e.g. EHFS II) have given researchers more insight into the etiology, treatment, and outcomes of patients with HF in the developed world. Ischemic heart disease (IHD) is the main cause of HF in the developed world, where the condition primarily affects an older population [14,15]. Observational studies from sub-Saharan Africa (SSA) suggest that the main causes of HF in young individuals are hypertension, rheumatic valvular heart disease (RHD), and idiopathic cardiomyopathies[4,6]

AHF admission rates, hospital procedures, durations of stay, and costs were examined in U.S. emergency rooms from 2006 to 2010 by a retrospective cohort analysis. 0.77% of all ED visits were made up of AHF patients who fulfilled the inclusion criteria, or 958,167 average yearly weighted ED visits. 83.7% of them were accepted for admission. 3.4 days were the median hospital duration of stay. Acute cardiac failure has an ED mortality rate of 0.12 to 0.16 percent(16).

In the years 2007, 2009, and 2011, a prospective multicenter cohort research was conducted in 29 hospital emergency departments located throughout Spain. There were 56% females and a mean age of 79 years. In 66.4% of the cases, the patients were normotensive ; in 23.5%, they had hypertension; and in 4.6%, they had hypotension. 34.6% of the patients said that this was their first AHF event. There was a significant rate of comorbidity: 42.3% of people had diabetes mellitus, 82% had hypertension, and 47.7% had atrial fibrillation. 73.1 were admitted to the ward while 1.9 to the intensive care unit. There was a 23.9% ED discharge rate, with a median hospital stay of 7 days. The hospital death rate was 7.6%(17).

A prospective, multi-center, observational study was done at ED in Beijing, china from January 1, 2011, to September 23, 2012. The patients that were enrolled had a median age of 71 (58–79) years, with 46.84% of them being female. Myocardial ischemia (30.22%) was the primary precipitant in individuals with AHF, with coronary heart disease (43.27%) being the most frequent cause. In the ED, about 53% of patients were admitted, 34% were released, 7% disregarded medical advice, and 4% passed away (18).

From January 2016 to December 2017, a study was carried out in Thailand to identify the clinical factors that influence the duration of hospitalization for patients with acute heart failure. With an interquartile range of 17.5 to 149.3 hours, the median total LOS was 54.6 hours. 1.7 and 1322.8 hours were the lowest and maximum LOS, respectively. The results indicated that 13 patients (6.3%) were admitted to in-patient wards, 59 patients (28.5%) were admitted to an intensive care unit, and 135 patients (65.2%) received treatment in the ED before being released home due to clinical improvement. Significant clinical predictors of patients with acute heart failure that required a prolonged length of stay were poor NYHA functional class, tachypnea, anemia, and hypoalbuminemia(19).

A prospective cross-sectional study on acute heart failure patients conducted from December 1, 2013, to March 31, 2014, in the adult emergency medicine department at Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia, revealed that 41.4% of the patients were male and 58.6% of the patients were female. 52.3% of the patients had CRVHD as the most prevalent ECHO finding, followed by DCMP 10.9%, Cor pulmonale 10.78%, IHD 6.3%, HHD 3.1%, and cardiomyopathy 1.6%. The most common precipitating factor reported was pneumonia (34.9%), followed by arrhythmia (22.7%) and medication discontinuation (2.5%). Out of all the patients, only 29.7% were released from the emergency room during the first 24 hours. For the four patients (3.1%) who died in the ED, there were no statistically significant predictors of mortality. Of the patients, 45% were discharged and 52% required hospitalization (20).

The most common cardiovascular risk factor (56.38%) in patients with acute heart failure (HF) at the Regional Hospital Center of Tenkodogo, in the eastern part of the country, was hypertension. The study involved a prospective cohort of patients with HF from January 1 to December 31, 2016, with follow-up conducted until June 2017. Eighty-five percent of the research patients were from rural areas. A mean of 58.56 ± 18.54 years was recorded. Dyspnea was the commonest symptoms. The two most common etiologies of heart failure were idiopathic dilated cardiomyopathy (19.80%) and hypertensive heart disease (50.34%). Thirteen patients (4.36%) were diagnosed with ischemic heart disease, and six-seven percent of the cases had valvular heart disease (VHD), which includes both degenerative and rheumatic heart disease. In-hospital mortality was 18.45% [21].

From 2014 to 2018, Philippine Cardiology Centers undertook a prospective, multi-center, observational study to ascertain the epidemiology, treatment trends, and in-hospital outcomes of patients suffering from heart failure with reduced ejection fraction. Ischemic heart disease (50.0%) and hypertension (35.7%) were the most common causes of heart failure (HF); rheumatic heart disease accounted for 7.5% of cases. Of the patients, 8.0% had non-cardiac problems and 13.2% had cardiac issues. 3.9% was the overall death rate [21]

Over the course of three years, from January 1st, 2013 to March 30th, 2016, an observational, descriptive, and retrospective study conducted in the cardiology department of Yaounde Central Hospital in Cameroon revealed that the prevalence of hypertensive heart disease was [30.16%], followed by dilated cardiomyopathy [28.57%], ventricular heart disease [11.90%], chronic cor pulmonale [8.73%], ischemic heart disease [6.35%], pericardial diseases [3.96%], and peripartum cardiomyopathy [3.18%]. Dyspnea on exertion was the most prevalent symptom (86%), with 65.85% at stage IV of the New York Heart Association. Intra-hospital mortality was 18.45% [22].

At the Dessie referral hospital, clinical characteristics and in-hospital mortality in patients with acute heart failure were assessed using a retrospective cross-sectional study design between January 1, 2019, and December 31, 2019. Dessie is a city in Ethiopia's South Wollo Zone, Amhara Region. Women made up 51%. The average age was 52.5 years (SD = ± 20.28) years. Approximately two thirds of the patient group consisted of AHF patients with a recent diagnosis. The mean length of hospital stay was 5.13 days (SD = ± 3.92). Acute lung congestion (89.58%), orthopnea (81.25%), and peripheral edema (66.67%) were the most frequently observed clinical symptoms. In-hospital mortality was 22.9% among the 96 patients hospitalized to the DRH emergency department [24].

The Gondar Comprehensive Specialized Hospital in Northwest Ethiopia conducted a cross-sectional study with a prospective observational design between November 2019 and October 2020. The study participants had a mean age of 51.17 ± 19.03 years, with 59.3% being female. 39.4% of the patients were diagnosed with ADCHF at admission, while 60.6% of the patients had a diagnosis of new-onset HF. For 31.4% of the patients, the cause of the event is unknown. For 36.7% of AHF patients, CAP was the primary precipitating event, while for 42.6% of ADCHF patients, non-adherence to medication was the primary precipitating factor. 10.6% of hospitalized patients passed away, 72.1% were released from the hospital, 15% refused medical advice, and 2.2% were sent to a more advanced medical facility [25].

A hospital-based prospective observational study design was undertaken to investigate treatment outcome and its predictors among patients of acute heart failure from May 15 to September 12, 2017 at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia. The nation's largest referral hospital is Tikur Anbessa Specialized Hospital. Among the 169 patients, 140 (82.8%) saw a clinical improvement, while 29 (17.2%) passed away while they were hospitalized. 160 patients had AHF upon admission due to various reasons; the top four precipitating factors were medicine cessation (22.5%), anemia (24.4%), atrial fibrillation (34.4%), and pneumonia (47.5%). The three most common underlying diseases found in AHF patients in order of decreasing frequency were chronic rheumatic heart disease (48.5%), degenerative valvular heart disease (22.5%), and congenital heart disease (19.5%). Risk factors for in-hospital death were pulmonary hypertension, smoking, diabetes mellitus, and the occurrence of adverse medication events [26].

A retrospective study that was carried out at St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia, over a five-year period, from September 2010 to September 2015, to determine the clinical characteristics and in-hospital outcome of acute heart failure on 496 patients admitted with the condition, revealed that RHD (30%) was the most common etiology, followed by right side heart failure (20.3%) [5]. Just 5.2% and 90.3% of the patients, respectively, were in NYHA classifications III or IV at the time of admission. Of the research participants, 24.4% died. The study's patients were considerably younger than those in developed countries [27].

3. Objective

3.1. General Objective

To assess outcome and associated factor of Acute HF patients in Adult Emergency of Saint Paul Hospital Millennium Medical College , Addis Ababa, Ethiopia, from September 1, 2022 to August 30, 2023.

3.2.specific Objective

To describe outcome of Acute HF cases in Adult Emergency of Saint Paul Hospital Millennium Medical College , Addis Ababa, Ethiopia.

To determine associated factor for those needs hospital admission of Acute HF cases in Adult Emergency of Saint Paul Hospital Millennium Medical college , Addis Ababa, Ethiopia.

4. Methodology

4.1 Study setting

The study was conducted at SPHMMC, which is found in Gulelle sub city, Addis Ababa, capital city of Ethiopia, and one of the biggest tertiary hospitals in Addis Ababa. It is Tertiary Referral Hospital that provides Medical, Surgical and Obstetrical services on an elective and emergency basis. The Adult Emergency Department is one of the department which gives in patient medical service for average of 740 patients monthly. It is also the training center for undergraduate and a wide spectrum of postgraduate programs. It was built by Emperor Haile Selassie I in 1969 with the help of the German Evangelical Church and attain its current name of St. Paul Millennium Medical College starting from Ethiopian new Millennium on 2007 GC. Since then it has started post graduate and sub specialty programs with more than 2800 Clinical, Academic and Admin staffs.

4.2 Study Design and Period

Hospital based cross sectional study design was conducted on outcome and associated factor of Acute HF patients in Adult Emergency of Saint Paul Hospital Millennium Medical College from November 15, 2023 to December 15, 2023.

4.3 Source population

All adult patients who attended Adult Emergency of Saint Paul Hospital Millennium Medical College during the study period.

4.4 Study population

All adult patients with AHF who attended Adult Emergency of Saint Paul Hospital Millennium Medical College during the study period.

4.4.1 Inclusion and exclusion criteria

Inclusion criteria

All adult patients with Acute HF both clinically and Echocardiography-confirmed diagnosis during the study period.

Both newly diagnosed and known HF patients.

Exclusion criteria

Patients without Echocardiography.

Incomplete charts

4.5 sample size

Sampling procedure: Medical records of patients who fulfill the inclusion criteria during the study period was included in the study and sample size was determined by using single population proportion formula;

$$n = (Z_{\alpha/2})^2 \times p \times q / d^2$$

- Where: n= required number of sample size.
- $Z_{\alpha/2}$ = desired 95% confidence, $Z=1.96$.
- $p=0.3$ (From previous study)
- $q=1-p = 1-0.24=0.64$
- d = is the margin of sampling error tolerated (5%) $=0.05$
- so, $n = (1.96)^2 \times 0.24 \times 0.64 / 0.0025 = 323$

By adding 10% drop out, the final sample size was = 296

4.6 variables

4.6.1 independent variable

- Sex
- Age
- Vital signs
- Co morbid conditions
- Cause of heart failure
- Duration symptoms
- Precipitating factor
- Clinical features
- Length of ED stay

4.6.2 Dependant variable

✓ Discharge and Admission

4.7 Data collection Procedure

Data was collected from all eligible acute heart failure patient chart using a structured questionnaire. The data was collected from St Paul hospital millennium medical college emergency department patient's chart. The source was reviewed for age of the patient, sex, vital sign at initial presentation, signs and symptoms, laboratory result, imaging, precipitating factor, etiology, comorbidity, length of ED stay, outcome using structured questionnaire. The questionnaire was prepared from the articles in the literature review, and based on the objective relevant questionnaire components were added. The data collection tool was prepared in English language and filled. The questionnaire was filled by trained data collectors.

4.8 Operational definition

Acute Heart failure is the term used to describe the rapid onset of, or change in symptoms and signs of HF.

Pattern of heart failure: is described what classification of heart failure like CRVHD, IHD, HNT, DCMP...ect.

Outcome of heart failure: will be presented as what the final destination of the patient after or while treatment given at the ED, like the patient discharged home, admitted or died.

Adult patients; patients whose age is above 18 years old.

4.9 Data quality control and management

Before starting the data collection, data collection format was cross matched with available information on records; then the study questions were slightly modified. Completeness of the data was cross checked and incomplete charts were discarded. Collected data was handled, sorted and inputted by principal investigator.

4.10 data analysis plan and procedure

Data entering, coding and clearing was performed using kobotool box and statistical analysis was done using SPSS (Statistical Package for Social science) version 25. Frequency and cross tabulation was used to check for missed value and variables. The demographic and clinical characteristics of patients was computed by using descriptive statistics such as mean, percentage, frequencies, and standard deviation. The study finding was presented using tables and figures. Bivariate and multivariate logistic regression were used to assess the association between outcome and independent variable. Variable having P-value <0.05 were declared as significant factor.

4.11 Ethical consideration

Ethical clearance and approval to conduct this research was obtained from St. Paul's hospital millennium medical college institutional research review board, Addis Ababa. Permission was also obtained from the Department of Emergency Medicine and Critical care. To ensure privacy, names and other personal identities was not used. Confidentiality was respected.

4.12 Dissemination of results

The results of the study will be reported to SPHMMC, Emergency medicine, and the Critical Care Department and will also be presented to the medical and/or scientific community at different national and international meetings. Other ways of disseminating the finding may be through morning sessions to physicians and nurses involved in managing these patients as well as publishing to a journal

5 .Results

5.1 socio-demographic profile of study participants

In this study, the medical records of 229 patients were examined; 126 (55%) of those patients were female. The median age of the patients was 55 years, with interquartile range of 30 . Eighteen was the minimum age and ninety was the highest. Over 40% of the patients were over 60 years old.

Table;1 Socio-demographic profile of heart failure patients at initial presentation to Adult Emergency of Saint Paul’s hospital Millennium Medical College, Addis Ababa from September 01, 2022 to August 30, 2023.

Age	Frequency	Percent
18-39	64	27.9
40-59	73	31.9
≥60	92	40.2
sex		
male	103	45
female	126	55
Total	229	100

5.2 Clinical profile of study participant

Common symptoms and signs of CHF patients upon ED presentation

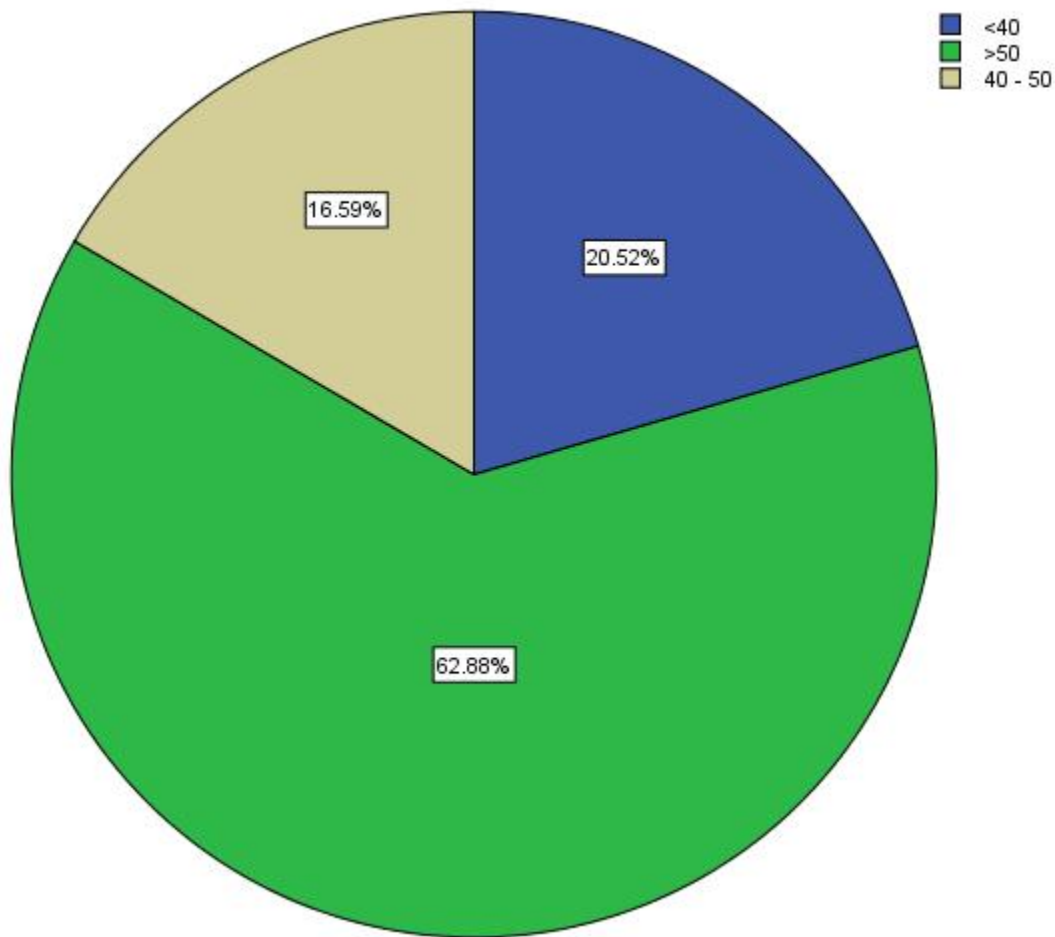
The most prevalent presentation symptom (97%) was shortness of breath, with 108 (86.5%) of patients reporting having a cough at the time of presentation, 72.5% of patients reporting shortness of breath at rest, and 24.5% reporting shortness of breath with exertion. Patients with orthopnea comprised 64.2% of cases, while PND affected 54.1%. 8.7% of patients had pulmonary edema, 48.9% of patients had bilateral leg swelling, and 88 patients (38.4%) shown generalized body swelling. 44.1% patients had new onset heart failure, and the majority of patients (55.9%) experienced acute decompensated heart failure .

Vital signs of CHF patients upon ED presentation

At initial presentation, 1.3% of patients had a blood pressure below 90, whereas 98.7% of patients had a blood pressure above 90. Out of the total patients, 76.5% had saturation < 90%, 2.6% had Bradycardia, 42.4% had Tachypnea (RR>20) symptoms, and 76.5% had Tachycardia. The result does not include the temperature data because it was incomplete.

Table 2;vital signs,clinical signs and laboratory result Heart Failure Patients at initial presentation to Adult Emergency of Saint Paul’s Hospital Millennium Medical College,Addis Ababa from September 01, 2022 to August 30, 2023.

Vital signs		No of patients	Percent
BP(systolic)	<90	3	1.3%
	90-139	143	62.4%
	≥140	83	36.2%
Pulse rate	<60	6	2.6%
	60-100	49	21.4%
	>100	174	76%
Respiratory rate	≤20	94	41%
	21-28	97	42.4%
	≥28	38	16.6%
SPO2	<90	134	58.5%
	≥90	95	41.5%
signs			
Body swelling		200	87.3%
Rales		45	19.7%
Pulmonary edema		20	8.7%
Raised JVP		57	24.9
Laboratory results			
Sodium level			
<135		77	33.6
135-145		124	54.1
>45		22	9.2
Not determined		6	2.6
Potassium level			
<3.5		36	15.7
3.5-4.5		128	55.9
>4.5		60	26.2
Not determined		6	2.2
Creatinine level			
<1.3		175	76.4
≥1.3		45	19.7
Not determined		9	3.9



Figures;1 Heart failure Patients based on ejection fraction at Adult Emergency of Saint Paul’s Hospital Millennium Medical College, Addis Ababa from September 01, 2022 to August 30, 2023.

Preserved ejection fraction (>50%) was present in 144 (62.9%) of the patients. There were 47 (20.5%) individuals with an ejection fraction of less than 40% and 16.6% with a fraction between 40 and 50%.

Etiology of CHF

CRVHD accounts for twenty-two percent of the cause; HHD (18.8%), Corpulmonale (17.5%), DCMP (16.2%), DVHD (8.7%), and IHD (7.4%) make up the other contributors. Acute coronary syndrome, anemia, Thyrocardia disease, and other conditions were additional factors. Under the DCMP, peripartum cardiomyopathy is covered

Table 3;Causes of Heart Failure and of patients Admitted to Adult Emergency of Saint Paul’s hospital Millennium Medical College,Addis Ababa from September 01, 2022 to August 30, 2023.

Causes	Frequency	Percent
ACS	3	1.3
Anemia	5	2.2
Arrhythmia	1	0.4
Corpulmonale	40	17.5
CRVHD	51	22.3
DCMP	37	16.2
DVHD	20	8.7
HHD	43	18.8
IHD	17	7.4
Thyrocardiac disease	5	3.1
Other	7	2.2
Acute decompensated heart failure	128	55.9
Newly diagnosed heart failure	101	44.1
Total	229	100

Seventy percent(70%) of the patients had never been admitted to St. Paul Hospital before.Four patients (1.7%) had four admissions, 16.2% had one, 7% had two, and 4.4% had three.

.Twenty-seven percent stayed for less than 24 hours, and nineteen percent stayed for more than 72 hours.52.8% patients stayed for 24 to 72 hours.77.7% of patients had class 4 heart failure.

Table 4;NYHA classification,length of ED stay and previous hx of admission of heart failure patients at initial presentation to Adult Emergency of Saint Paul’s hospital Millennium Medical College,Addis Ababa from September 01, 2022 to August 30, 2023.

CHF NYHA classification	Frequency	Percent
1	0	0
2	4	1.7
3	23	10
4	178	77.7
Not classified	24	10.5
Length of stay		
<24	64	27.5
24-72	121	52.8
>72	45	19.7
History of previous admission		
1	37	16.2
2	16	7
3	10	4.4
4	4	1.7
>4	0	0
No admission	162	70.7
Total	229	100

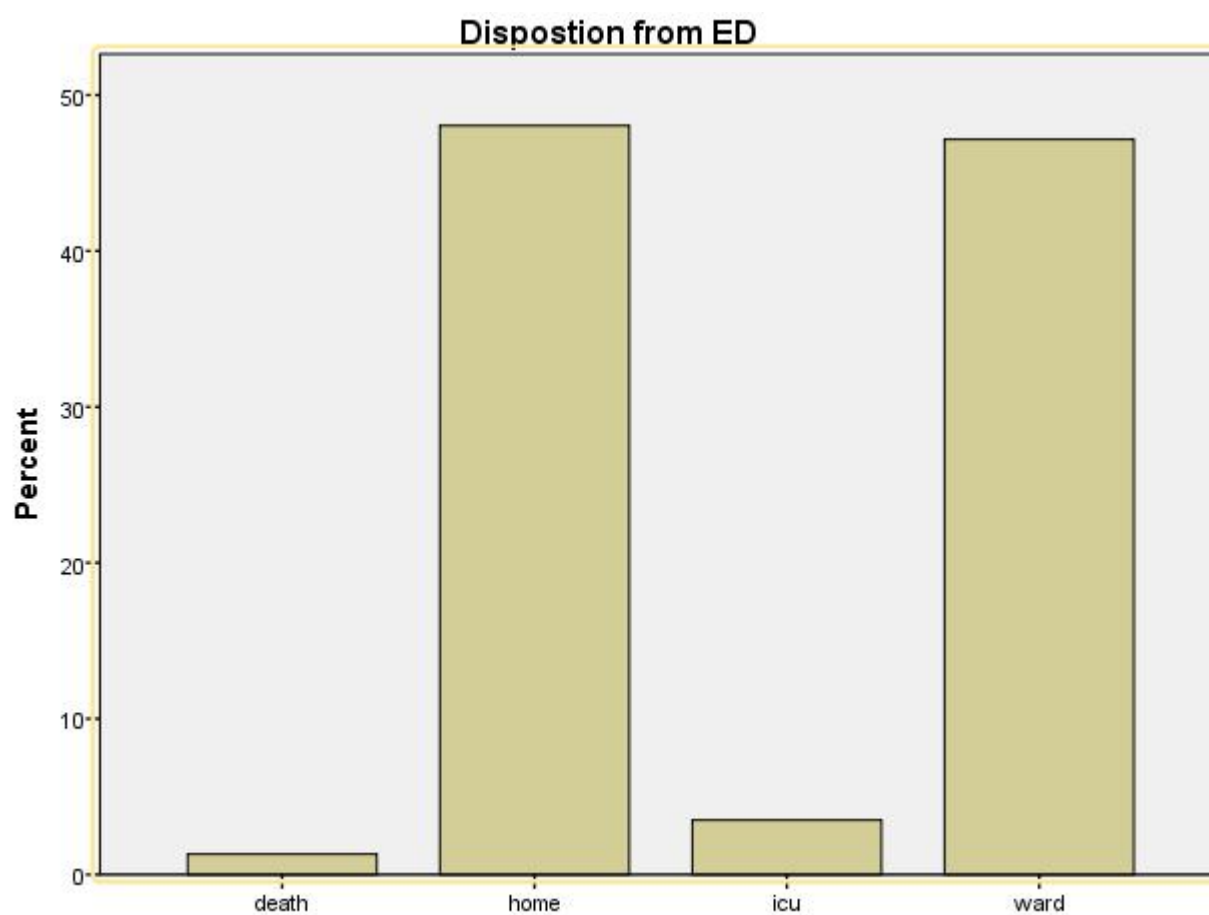
Twenty five percent of patients had more than one comorbidity. In this study, pneumonia was the most frequently identified precipitating factor (45%), followed by drug disconitunation (11.8%), atrial fibrillation, hypertension, pregnancy, and other conditions. For twenty-six patients (22.3%), the precipitating factor was unknown. Comorbidity was found in 61.1% of patients. Hypertension was found in 77 (33.6%) of patients.

Table 5; Comorbidity and precipitating factors of heart failure patients at Adult Emergency of Saint Paul’s hospital Millennium Medical College,Addis Ababa from September 01, 2022 to August 30, 2023.5.3 Associated factor

Types of comorbidity	Frequency	Percent
HTN	77	33.6%
T1DM	11	4.8%
T2DM	29	12.7%
CKD	16	7%
COPD	15	6.5%
Asthma	12	5.24%
Pregnancy and postparta	11	4.8%
Other	43	18.77%
More than one comorbidity	35	25%
Types of precipitating factor		
Atrial fibrillation	14	6.1
anemia	7	3.1
Drug disconitunation	27	11.8
Hyperthyroidism	2	0.9
Pneumonia	102	45
Unknown	51	22.3
Other	26	11.4
Total	229	100

Outcomes of patient admitted to ED

Forty eight patients were sent straight home, while the remainder 47.2% were admitted to a medical ward, 3.5% to an intensive care unit, and 1.3% passed away in the emergency department.



Figure;2 Patters of disposition of heart failure patients from Adult Emergency of Saint Paul’s hospital Millennium Medical College,Addis Ababa from September 01, 2022 to August 30, 2023.

5.3 Associated Factor

A bivariate binary regression analysis was performed to compare several independent variables with the dependent variable of not being discharged straight from the emergency department. Bivariate binary regression analysis was used to find a significant association between the dependent variable of not being discharged from the emergency department (ED) and saturation level, presence of comorbidity, previous history of admission, NYHA class 4 heart failure, precipitant factor, hypokalemia, and hyponatremia at a significant level of 0.25. Following the discovery of a significant relationship between the independent variable and the dependent variable by bivariate binary regression, these significant relationships were further examined using multivariate logistic regression, with a significant <0.05 threshold. 1.907(1.068-3.404

The final finding indicated that there was a significant association between comorbidity and ED discharge, with a P-value of 0.029 and an OR=1.907;95%CI:1.068-3.404. A significant association was also observed with previous hx of admission (P-value of 0.047 and OR=1.869;95%CI:1.008-3.465)

Table 6;Bivariate and multi-variate logistic analysis result of independent variables of Associated factor of heart failure patients to be discharged from ED at Adult Emergency of Saint Paul’s hospital Millennium Medical College,Addis Ababa from September 01, 2022 to August 30, 2023.

Variable		Discharge from ED		COR(95%CI)	AOR(95%CI)	P-value
		No(%) 119(52%)	Yes(%) 110(48%)			
SPO2	<90	42(18.3%)	24(10.5%)	1.955(1.085-3.520)	1.742(0.930-3.266)	0.083
	≥90	77(33.6%)	86(37.6%)			
NYHA class 4	Yes	110(48%)	92(40.2%)	0.418(0.179-0.975)	0.696(0.282-1.720)	0.432
	no	9(3.8%)	18(7.9%)			
hypokalemia	Yes	30(13.1%)	15(6.6%)	2.135(1.077-4.230)	1.797(0.880-3.671)	0.107
	No	89(38.90)	95(41.5%)			
hyponatremia	Yes	47(20.5%)	30(13.1%)	1.741(0.997-3.0410)	1.626(0.903-2.927)	0.105
	No	72(31.4%)	80(34.9%)			
Precipitant factor	Yes	21(9.2%)	30(13.1%)	0.571(0.304-1.0740)	0.515(0.263-1.009)	0.053
	No	98(42.8%)	80(34.9%)			
comorbidity	Yes	82(35.8%)	58(25.3%)	1.987(1.159-3.407)	1.907(1.068-3.404)	0.029*
	No	37(16.2%)	52(22.7%)			
previous hx admission	Yes	41(17.9%)	26(11.4%)	1.698(0.951-3.033)	1.869(1.008-3.465)	0.047*
	No	78(34.1%)	84(36.7%)			

6. Discussion

Globally, heart failure (HF) is a significant public health issue [1]. The prevalence of AHF varies around the world. The aging of the population, complications from cardiovascular disorders such as Acute Coronary Syndrome (ACS), and the prevalence of lifestyle-related risk factors are the main causes of its rising occurrence [4]. Because of population aging and the frequency of hypertension, sub-Saharan Africa continues to see an increase in the prevalence of heart failure [1]. This study's goal was to evaluate the outcomes and associated factor of acute heart failure patients receiving care in the adult emergency department of Saint Paul's Hospital at Millennium Medical College in Addis Ababa, Ethiopia.

In this study, approximately half (48%) were returned to their homes, with the rest 50.7% requiring hospitalization. This is in line with research conducted at Ethiopia's Tikur Anbessa Specialty Hospital, where 52% of patients were admitted and 45% were discharged to their homes. In this study, just 1.3% of patients died in the ED. This finding conflicts with another study that found a 3% death rate. This might be because there were more cor pulmonale patients in that trial, which raises mortality (27).

It also aligns with a research conducted at Thailand, wherein no patients died at the ED and the majority of patients (65.2%) were discharged straight home. The distinction lies in the fact that 28.5% of the patients were admitted to an ICU (30). This may be due to elderly patient are found in that study. It is also in agreement with a study done at Canada and China, where 54% and 53% of patients were admitted to the hospital respectively (28,29). There is difference with a study done at Spanish emergency, where 76.1% were admitted and 23.9% were discharged from the ED. This difference may be due to hospital bed capacity which leads early disposition of patients from ED in the Spanish study (30).

Regarding the association factor, patients who had comorbidity and previous history of admission had significantly associated with hospitalization. Patients who have comorbidity is 10% time more likely to be admitted. Patients who had Previous history of admission is 13% times more likely to be admitted. This is in agreement with a study done at Spain where hypoxic patients had prolonged hospital stay and having comorbidity increase length of hospital stay (31,32). It is also in agreement with a study done at Europe (35).

Female patients made up 55% of the total. This aligns with another study conducted at Ethiopia's Tikur Anbessa Specialty Hospital, where the percentage of female patients was 58.6%. Additionally, it is in line with research conducted at the cardiac clinic at Gondar College of Medical Science in Gondar, Ethiopia, which found that 59.3% of participants and at the southeast Ethiopian Dessie Referral Hospital, which found that 51% of participants, as well as nine African nations, where 50.8% of participants were found (5, 24,25, 28).

A study conducted in Nigeria found that the mean age of the patients was 54.4 ± 17.3 years, which is similar with the mean age of 51.37 ± 18.001 years that these patients had. It also aligns with research conducted at Gondar College of Medical Science in Ethiopia, where the average age was 51.17 ± 19.03 years; research conducted at Dessie Referral Hospital in northeast Ethiopia, where the average age was 52.5 ± 20.28 years; and research conducted in nine African countries, where the average age was 52.3 ± 18.3 years (5,,24.25.29).

In this study, CRVHD was the most frequent cause of heart failure (22.3%). The second leading cause of heart failure was hypertension (18.8%), which was followed by corpulmonale (17.5%), DCMP (16.2%), DVHD (8.7%), and IHD (7.4%). Other minority causes include Acute Coronary Syndrome, Anemia, Peripartal Cardiomyopathy and Thyrocardia diseases

The main cause of heart failure, according to this study and other research conducted at Ethiopia's Tikur Anbessa Specialty Hospital, is CRVHD. Regarding the second, third, and fourth causes of heart failure, there are some differences: DCMP (10.9%) ranked second, Corpulmonale (7.8%) ranked third, and IHD (6.3%) ranked fourth (28). The difference could be attributed to a higher rate of medication non-adherence in this study, making hypertension the second most common cause of heart failure. The most prevalent cause of cardiovascular illness, according to a similar study from the cardiac clinic at Gondar College of Medical Science in Gondar, Ethiopia, was RHD (42%), followed by hypertension (38.1%) (25).

In terms of precipitating factors, pneumonia accounted for the highest percentage (45%), followed by medicine discontinuation (11.8%) and arrhythmia (6.1%). The results of this study are in line with a study conducted at the Tikur Anbessa Specialized Hospital in Ethiopia, which found that pneumonia (30.6%) was the most common precipitating factor, followed by arrhythmia (19.2%) and drug discontinuation (13.24%). In 22.3% of cases, the precipitating factor was unknown. The study is also consistent with research conducted at the same location, at Nigeria, and at Gondar College of Medical Science, Gonder, Ethiopia (25, 28).

Majority 144 (62.9%) of patient had preserved ejection fraction ($>50\%$). Ejection fraction of $<40\%$ recorded in 47 (20.5%) of patients and between 40-50% in 16.6% of patients. This is consistent with a study done at Thailand where 52.3% patients had preserved ejection fraction, 24.6% patients had mid-range ejection fraction, and 45 (23.1%) had reduced ejection fraction (30).

Over half of the patients stayed for 24 to 72 hours. Less than 24 hours was spent by 27.5% of visitors, and more than 72 hours was spent by 19.7%. This study is congruent with a study done at Tikur Anbessa specialized hospital in Ethiopia, in that patients stayed less than 24 hours were 30% and patients stayed for 24-72 hours were 49% (28).

7. Strength and Limitation

7.1 Strength

The research conducted on a topic which was never published in a similar ED setup of our country.

It used both descriptive and logistic regression analysis

7.2 limitation

The study was conducted at a single center, so the finding can't be generalizable.

Sample size was limited due to lost patient medical records.

8. Conclusion and recommendation

8.1 Conclusion

More than half of patients were admitted and nearly half of patient were discharged to their home from the emergency

Patients who had comorbidity and previous history of admission significantly associated with hospital admission.

8.2 Recommendation

For healthcare professionals

Should focus on prevention, diagnosis and treatment of CRVHD and its precipitating factors.

For local health policymakers

Concerned stakeholder should improve the use of inpatient beds to decrease crowding of ED. Since non-compliance to medication is the 2nd precipitating factor, patient health education on compliance should be core part of patient care.

The hospital should improve handling of patients' medical charts

For researchers

Multi-center with adequate sample size needs to be done at ED to have good information regarding the topic.

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10. Annex

ID MRN=_____ Date of interview _____ Contact number _____

Data abstraction tool: Pattern and Outcome of heart failure patients in St Pauls Hospital Addis Ababa, Ethiopia, 2023

Part one: - Sociodemographic Characteristics

1. Age in years -----

2. Sex A. Male B. Female ⁱ

part two: clinical characteristics

1.Vital signs

BP

PR

RR

T

SPO2

2.Laboratory result

Na

K

Creatinine

Urea

hemoglobin

3.does the patient has new onset HF ?

A. yes B. no

4.what is the cause of heart disease ?

A.HHD B. IHD C..DCMP D . .DVHD E.CRVHD F. Corpulmonale G.ACS H.Arrhythmia I.Anemia J.Thyrocardia
disease K.other

5. does the patient has co morbidity ?

A. yes B. no

6.if yes what types of co morbidity ?

A. HTN B. T1DM C,T2DM D. CKD D. CLD E. Epilepsy F.Ischemic stroke G.hemorrhagic stroke
H.HIV/AIDS I.Malignancy J. Thyroid disease K.Asthma L.COPD M. Other

7 .what is the precipitating factor for the heart failure ?

A. pneumonia B. atrial fibrillation C. drug discontinuation D. unknown E other

8.how is the ejection fraction ? A.<40 B. 40-50 C.>50

9.what type of medication used ?

A.B/blocker B.A CEI/ARBS C. diuretic D. other

10.Time since CHF diagnosed (years) A. < one year B.1- 3 years C. 3- 5 years D.5-10 years E. > 10 years F. newly diagnosed

11.Common symptoms of presentation to ED more one possible

A. Shortness of breath at rest B. Shortness of breath with exertion C. Cough D. Orthopnea E.PND F. Chest pain G. Palpitation H. Fever I.Generalized Body swelling J.Bilateral leg swelling K. JVP L,Pulmonary edema M.Other

12 .Duration of symptoms

A <1 week B .1-2 weeks C>2weeks

13 .How many previous hx of admission

A .1 B .2 C .3 D .4 E .>4 F .No admission

14 . disposition from ED

A .ICU B .Ward C .Home D .Death E .Against medical advice F .Other

15 . NYHA CHF class

A.1 B .2 C .3 D .4 E .Not classified

16. Did the patient discontinue her/his HF medication prior to the current admission? 1, Yes 2, No

17 .Total period of stay at ED

18 . A. <24 hours B.24 -72 hours C> 72 hours

19.Does the patient has hx of abuse?

20. A .Yes B .No

21. If yes what type

A .Smoking B .Alcoholic C .Chat chewing D .Other

22.Condition of the patient when discharge from ED ?

A. improved B. improving C. the same D. deteriorating E. Dead F.Against medical advice G .other

part three:- Complications and outcomes related to HF

1.does the patient develop complication ?

A. yes B. no

2.if yes what type of complication ?A . Septic shock

B. hospital acquired infection

C. Cardiogenic shock D .AKI

E .UGIB F .Other

Assurance of Principal Investigator

I agree to accept all the responsibilities for the scientific and ethical conduct of the research project. I will try to provide a timely progress report to my advisor and seek the necessary advice and approval from my primary advisors whenever needed in the course of the research. I will communicate timely to my advisors and all stakeholders involved in the study including any source of funding for this research.

Name of the student: Dr. Mesfin T/wold

Signature: _____

Date: _____

Approval of the Primary Advisor

Name of the primary advisor: Dr. Mohammed kalif

Signature: _____

Date: _____

Approval of the Co-Advisor

Name of the primary advisor Dr. Natan negash

Signature: _____

Date: _____

Name of Public health advisor: Mr Tewodros Getinet

Signature: _____

Date: _____
