



One-Year Survival and Predictors of Mortality in Patients with Acute Coronary Syndrome at Tertiary and Private Cardiac Centers in Ethiopia: A Multi-Center Retrospective Cohort Study

Authors

Yadelew Jember Kassie

Tiruadey Mengistie

Fantahun Mulu,

Sifessa Dessalegn.

Tesfamicheal Beyene

Addis Ababa, Ethiopia

April, 2026

**St. Paul's Hospital Millennium Medical College Department of Internal
medicine Post Graduate Study Program**

One-Year Survival and Predictors of Mortality in Patients with Acute Coronary Syndrome in
Ethiopia: A Multi-center Retrospective Cohort Study (2024–2025)

Investigators: Yadelew Jember Kassie

Tiruadey Mengistie

Fantahun Mulu,

Sifessa Dessalegn.

Tesfamicheal Beyene

Advisor ; Dr Abel Mureja(Internist ,MD,consultant cardiologist

This research Manuscript submitted to the department of Internal medicine for partial fulfillment
of the requirement of completion of the residency program in Internal medicine at St. Paul's
Hospital Millennium Medical College.

Addis Ababa, Ethiopia

April, 2026

Name of investigator	Yadelew Jember Kassie (MD, Internal medicine resident)
----------------------	--

	Tiruadey Mengistie (MD, Internal medicine resident) Fantahun Mulu (MD, Internal medicine resident)
Full title of the research project	One-Year Survival and Predictors of Mortality in Patients with Acute Coronary Syndrome at Tertiary and Private Cardiac Centers in Ethiopia: A multi-center Retrospective Cohort Study (2024–2025) .
Duration of the project	3 months
Study Area	SPHMMC
Total Cost of the project	75000 Ethiopian Birr
Source(s) of Funding	Saint Paul's Hospital Millennium Medical College
Address of investigator	Tel: +251934422121
	Cell phone:
	Fax: Nil
	P.O. Box: 1271
	Email: yadelewj@gmail.com
Name of Advisor(s)	Dr Abel Mureja(MD,Internist , consultant cardiologist) Email.abel.mureja@sphmmc.edu.et Dr Mikias (MD,Internist)

Abstract

Background

Acute coronary syndrome (ACS) is a leading cause of morbidity and mortality worldwide. In Ethiopia, in-hospital mortality is high (15–27%), but long-term survival data are lacking. This study aimed to determine one-year survival and identify predictors of mortality among ACS patients in Ethiopian tertiary and private cardiac centers.

Methods

A multi-center retrospective cohort study was conducted at two public tertiary hospitals (St. Paul's Hospital Millennium Medical College, Tikur Anbessa Specialized Hospital) and one private cardiac center (Gesund Cardiac Center) in Addis Ababa, Ethiopia. Adult patients (≥ 18 years) with a confirmed ACS diagnosis admitted between January 2024 and January 2025 were included. One-year all-cause mortality was ascertained through hospital records and telephone follow-up. Kaplan-Meier survival analysis and multivariable Cox proportional hazards regression were used to estimate survival and identify independent predictors of mortality.

Results

A total of 223 patients were enrolled. The one-year survival rate was **77.1%** (95% CI: 70.3–82.1), corresponding to a 22.9% mortality rate (51 deaths). Guideline-directed medical therapy (GDMT) at discharge was prescribed in 69.5% of patients. Survival was significantly higher among patients adherent to GDMT at one year (mean 327.7 vs. 225.5 days, log-rank $p < 0.001$). In multivariable analysis, independent predictors of one-year mortality were: non-adherence to GDMT (adjusted HR for adherent = 0.271; 95% CI 0.136–0.540; $p < 0.001$), lower LVEF (HR per 1% increase = 0.965; 95% CI 0.936–0.995; $p = 0.022$), wall motion abnormalities (HR = 1.334; 95% CI 1.074–1.658; $p = 0.009$), in-hospital heart failure (HR = 2.449; 95% CI 1.106–5.426; $p = 0.027$), in-hospital acute kidney injury (AKI) (HR = 2.439; 95% CI 1.241–4.791; $p = 0.010$), and lack of ICU availability (HR for ICU available = 0.383; 95% CI 0.173–0.848; $p = 0.018$). Cardiogenic shock showed a borderline effect ($p = 0.086$). Age, sex, Killip class, PCI, and hospital type were not independently significant.

Conclusions

One-year mortality after ACS in Ethiopian cardiac centers remains high. Adherence to GDMT, higher LVEF, absence of wall motion abnormalities, avoidance of in-hospital heart failure and AKI, and ICU availability are independent predictors of better survival. Widespread implementation of GDMT and early risk stratification could substantially improve long-term outcomes.

Keywords

Acute coronary syndrome, one-year survival, predictors of mortality, guideline-directed medical therapy, Ethiopia, sub-Saharan Africa

Acknowledgements

First and foremost I would like to thank God and then I would like to extend my appreciation to department of internal medicine unit whose assistance and resources have been indispensable throughout this research journey.

Abbreviations and Acronyms

ACC:	American College of Cardiology
ACEI:	Angiotensin-Converting Enzyme Inhibitor
ACS:	Acute Coronary Syndrome
AHA:	American Heart Association
ARB:	Angiotensin II Receptor Blocker
BMI:	Body Mass Index
CABG:	Coronary Artery Bypass Grafting
CI:	Confidence Interval
CKD:	Chronic Kidney Disease
CVD:	Cardiovascular Disease
GDMT:	Guideline-Directed Medical Therapy
HF:	Heart Failure
HICs:	High-Income Countries
IQR:	Interquartile Range
IRB:	Institutional Review Board
LMICs:	Low- and Middle-Income Countries
LVEF:	Left Ventricular Ejection Fraction
NSTEMI:	Non-ST-Segment Elevation Myocardial Infarction
OMT:	Optimal Medical Therapy
PCI:	Percutaneous Coronary Intervention
SBP:	Systolic Blood Pressure
SPHMMC:	St. Paul's Hospital Millennium Medical College
SSA:	Sub-Saharan Africa
STEMI:	ST-Segment Elevation Myocardial Infarction
UA:	Unstable Angina
WHO:	World Health Organization

Table of Contents

Acknowledgements.....	VII
Abbreviations and Acronyms	VIII
1 . Introduction.....	1
2. Methods	3
2.1. Study design and setting	3
2.2. Study population	3
2.3. Sample size and sampling	3
2.4. Data collection and variables	3
2.5. Statistical analysis	4
2.6. Ethical considerations	4
3. RESULTS	5
3.1. Baseline characteristics	5
3.2. One-year survival.....	8
3.3. Multivariable Cox regression	14
4. Discussion	16
4.1. Limitations	17
5. Conclusion	17
6. References.....	18

Introduction

Cardiovascular diseases (CVDs) are the leading cause of death globally, responsible for approximately 17.9 million deaths annually [1]. Acute coronary syndrome (ACS) — encompassing ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina (UA) — is a major contributor to this burden [2,3]. In high-income countries (HICs), rapid revascularization (primary percutaneous coronary intervention [PCI]) and consistent guideline-directed medical therapy (GDMT) have reduced one-year mortality to below 10% [4,5]. In contrast, low- and middle-income countries (LMICs), particularly in sub-Saharan Africa (SSA), face disproportionately high mortality due to health system limitations [6].

Ethiopia is undergoing an epidemiological transition with a rising burden of non-communicable diseases. Recent single-center studies report in-hospital ACS mortality between 15% and 27%, driven by prolonged pre-hospital delays (often >90 hours), limited access to reperfusion therapies, and inconsistent adherence to evidence-based guidelines [7–9]. However, robust multi-center data on one-year survival and its predictors are lacking. This knowledge gap hinders the design of effective secondary prevention and post-discharge care strategies.

Therefore, this study aimed to assess one-year survival and identify independent predictors of mortality among ACS patients at tertiary and private cardiac centers in Ethiopia.

2. Methods

2.1. Study design and setting

A multi-center retrospective cohort study was conducted at three cardiac centers in Addis Ababa, Ethiopia: two public tertiary hospitals (St. Paul's Hospital Millennium Medical College [SPHMMC] and Tikur Anbessa Specialized Hospital [TASH]) and one private cardiac center (Gesund Cardiac Center). The study period for index admissions was January 1, 2024, to January 31, 2025, with one-year follow-up completed by March 2026.

2.2. Study population

All adult patients (≥ 18 years) with a confirmed diagnosis of ACS (STEMI, NSTEMI, or UA) based on symptoms, electrocardiographic changes, and cardiac biomarker elevation were eligible. Exclusion criteria were: incomplete medical records for key variables, inter-hospital transfer during acute management, discharge against medical advice, pre-existing terminal non-cardiac illness (e.g., advanced cancer), and recurrent admissions (only the index admission was included).

2.3. Sample size and sampling

Based on an assumed one-year mortality of 25%, 95% confidence level, and 7% margin of error, the minimum sample size was 147. After adding 10% for missing or incomplete data, the final target was 230 patients. Using a two-stage sampling approach, centers were purposively selected (public tertiary) or randomly selected (private), and all eligible ACS patients during the study period were consecutively enrolled until the center-specific allocation was met.

2.4. Data collection and variables

Data were extracted from medical records using a standardized, pre-tested abstraction form (KoBoToolbox). Variables included: sociodemographics (age, sex, residence), clinical characteristics (ACS subtype, risk factors, Killip class, vital signs), laboratory findings (troponin, creatinine, lipid profile), echocardiographic left ventricular ejection fraction (LVEF), treatment (reperfusion therapy, discharge medications), and hospital type. GDMT was defined as prescription of dual antiplatelet therapy (aspirin + P2Y12 inhibitor), a statin, a beta-blocker, and an ACE inhibitor/ARB at discharge.

One-year vital status was determined through hospital records and, if unavailable, by telephone follow-up (up to three attempts). All data were anonymized with unique study IDs.

2.5. Statistical analysis

Analyses were performed using SpSS version 26. Categorical variables were summarized as frequencies and percentages; continuous variables as mean $\pm$ SD or median (IQR). One-year survival was estimated using the Kaplan-Meier method with 95% confidence intervals (CI). Univariable Cox proportional hazards regression was used to screen variables ($p < 0.2$) for entry into the multivariable model. Multivariable Cox regression with backward stepwise selection identified independent predictors of one-year mortality; results are presented as adjusted hazard ratios (aHR) with 95% CI. The proportional hazards assumption was verified using Schoenfeld residuals. Subgroup analyses were performed by ACS subtype and hospital type. A p -value < 0.05 was considered statistically significant.

2.6. Ethical considerations

Ethical approval was obtained from the Institutional Review Board of St. Paul's Hospital Millennium Medical College (protocol number SPHMMC-ERC-576/26). A waiver of informed consent was granted for this retrospective chart review. Patient confidentiality was maintained throughout.

3.RESULTS

3.1. Baseline characteristics

A total of 223 patients were enrolled. The mean age was 56.1 ± 12.2 years (median 56, IQR 46–66), and 71.7% were male. Most patients (86.5%) resided in urban areas. STEMI was the most common ACS subtype (74.4%), followed by NSTEMI (19.3%) and unstable angina (6.3%). Hypertension (52.0%) and diabetes mellitus (40.8%) were the most prevalent risk factors. PCI was performed in 43.5% of patients, while 85.2% received medical management alone. At discharge, 69.5% were prescribed GDMT

Table1 :Baseline characteristics

Characteristic	N (%) or mean $\pm$ SD / median (IQR)
Sociodemographics	
Age, years (mean $\pm$ SD)	56.1 $\pm$ 12.2
Age, median (IQR)	56 (46–66)
Sex – male	160 (71.7%)
Residence – urban	193 (86.5%)
Educational level	
– No formal education	41 (18.4%)
– Primary school	80 (35.9%)
– Secondary school	44 (19.7%)
– College/university	58 (26.0%)
Cardiovascular risk factors	
Hypertension	116 (52.0%)
Hypertension on medication	104 (46.6%)*
Diabetes mellitus	91 (40.8%)
Diabetes on medication	81 (36.3%)*
Dyslipidemia	39 (17.5%)
Smoking status	
– Never	190 (85.2%)
– Former	24 (10.8%)
– Current	9 (4.0%)
Alcohol use	76 (34.1%)
Family history of premature CAD	14 (6.3%)
Past medical history	

Prior myocardial infarction	41 (18.4%)
Prior PCI	21 (9.4%)
Prior CABG	1 (0.4%)
Prior stroke/TIA	11 (4.9%)
Peripheral arterial disease	18 (8.1%)
Clinical presentation	
ACS type	
– STEMI	166 (74.4%)
– NSTEMI	43 (19.3%)
– Unstable angina	14 (6.3%)
Presenting symptoms	
– Chest pain	207 (92.8%)
– Shortness of breath	152 (68.2%)
– Syncope	4 (1.8%)
– Easy fatiguability	166 (74.4%)
– Palpitations	79 (35.4%)
– Other	40 (18.0%)
Systolic BP, mmHg (mean $\pm$ SD)	125.5 $\pm$ 20.2
Heart rate, bpm (mean $\pm$ SD)	88.7 $\pm$ 17.1
O ₂ saturation, % (mean $\pm$ SD)	91.3 $\pm$ 4.2
Time from symptom onset to arrival, days (mean $\pm$ SD)	3.5 $\pm$ 1.4
Killip class at presentation	
– I	132 (59.2%)†
– II	47 (21.1%)†
– III	32 (14.3%)†
– IV	12 (5.4%)†
Laboratory and imaging	
Troponin, $\times$ ULN (median, IQR)	15.0 (2.5–86.5)
Serum creatinine, mg/dL (mean $\pm$ SD)	1.00 (0.80–1.30)
Hemoglobin, g/dL (mean $\pm$ SD)	14.1 $\pm$ 3.7
Serum potassium, mg/dL (mean $\pm$ SD)	4.13 $\pm$ 0.95
LDL cholesterol, mg/dL (mean $\pm$ SD)	96.9 $\pm$ 35.7
Random blood sugar, mg/dL (mean $\pm$ SD)‡	150.1 $\pm$ 56.0

Baseline LVEF, % (mean $\pm$ SD)	47.9 $\pm$ 11.6
Wall motion abnormalities	190 (85.2%)
In-hospital treatment	
Percutaneous coronary intervention (PCI)	97 (43.5%)
Medical management only	190 (85.2%)§
Thrombolysis	1 (0.4%)
Discharge medications	
Aspirin	209 (93.7%)
Ticagrelor	47 (21.1%)
Clopidogrel	177 (79.4%)
Beta-blocker	186 (83.4%)
Statin	221 (99.1%)
SGLT2 inhibitor	76 (34.1%)
Spironolactone	103 (46.2%)
ACE inhibitor / ARB	82 (36.8%)
ARNI	2 (0.9%)
Adherence to GDMT at 1 year	155 (69.5%)
In-hospital complications	
Heart failure	85 (38.1%)
Cardiogenic shock	13 (5.8%)
Arrhythmias	21 (9.4%)
Stroke	5 (2.2%)
Acute kidney injury (AKI)	48 (21.5%)
Re-infarction	21 (9.4%)
Major bleeding	4 (1.8%)
None	80 (35.9%)
Hospital characteristics	
Hospital type – public tertiary	164 (73.5%)
ICU availability during admission	202 (90.6%)
One-year outcomes	
Recurrent ACS within 1 year	30.5%¶
Re-hospitalisation for cardiac causes	30.9%¶
Survival at 1 year – alive	172 (77.1%)

Survival time, days (mean $\pm$ SD)	296.5 $\pm$ 133.2
Survival time, median (IQR)	365 (207–365)
LVEF at 1 year, % (mean $\pm$ SD)	49.3 $\pm$ 11.8
Cause of death (among 51 deaths)	
– Cardiovascular	43(85%)
– Non-cardiac	4 (7.5%)
– Unknown	4 (7.5%)

3.2. One-year survival

During one-year follow-up, 51 patients (22.9%) died, and 172 (77.1%) were alive at one year. The overall estimated mean survival time was 296.5 days (95% CI 279.1–313.9).

Kaplan-Meier analysis showed that patients adherent to GDMT at one year had significantly longer mean survival (327.7 vs. 225.5 days; log-rank $p < 0.001$). Other univariable predictors of better survival included: higher educational level ($p = 0.009$), no alcohol use ($p = 0.042$), lower Killip class ($p < 0.001$), PCI performance ($p < 0.001$), discharge prescriptions of clopidogrel ($p = 0.036$), SGLT2 inhibitors ($p < 0.001$), spironolactone ($p < 0.001$), ACE/ARB ($p < 0.001$), absence of in-hospital heart failure ($p < 0.001$), cardiogenic shock ($p < 0.001$), stroke ($p = 0.024$), AKI ($p < 0.001$), ICU availability ($p = 0.001$), absence of shortness of breath ($p = 0.045$) or palpitations ($p < 0.001$) as presenting symptoms, no wall motion abnormalities ($p = 0.008$), and shorter hospital stay ($p = 0.021$).

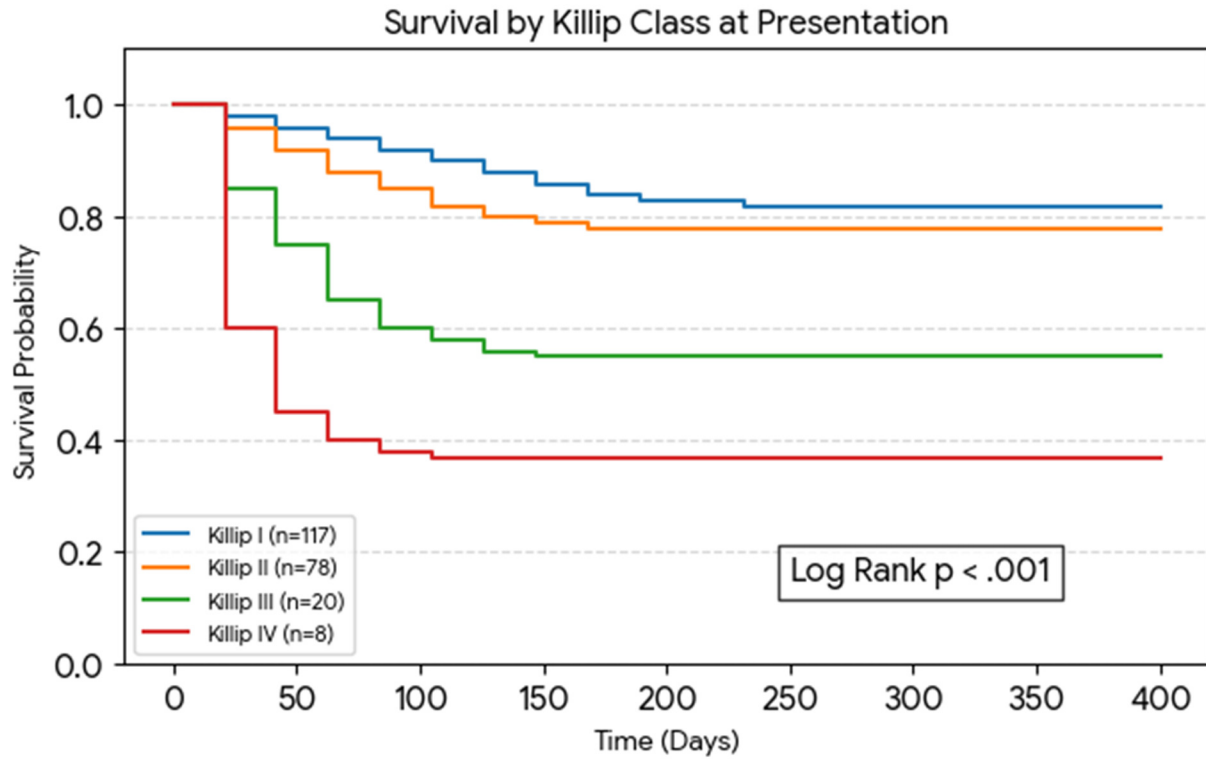


Figure 1. Kaplan-Meier curves for survival time stratified by Killip Class (I–IV) at presentation, demonstrating a significant decrease in survival with increasing clinical severity (Log-Rank $p < 0.001$)

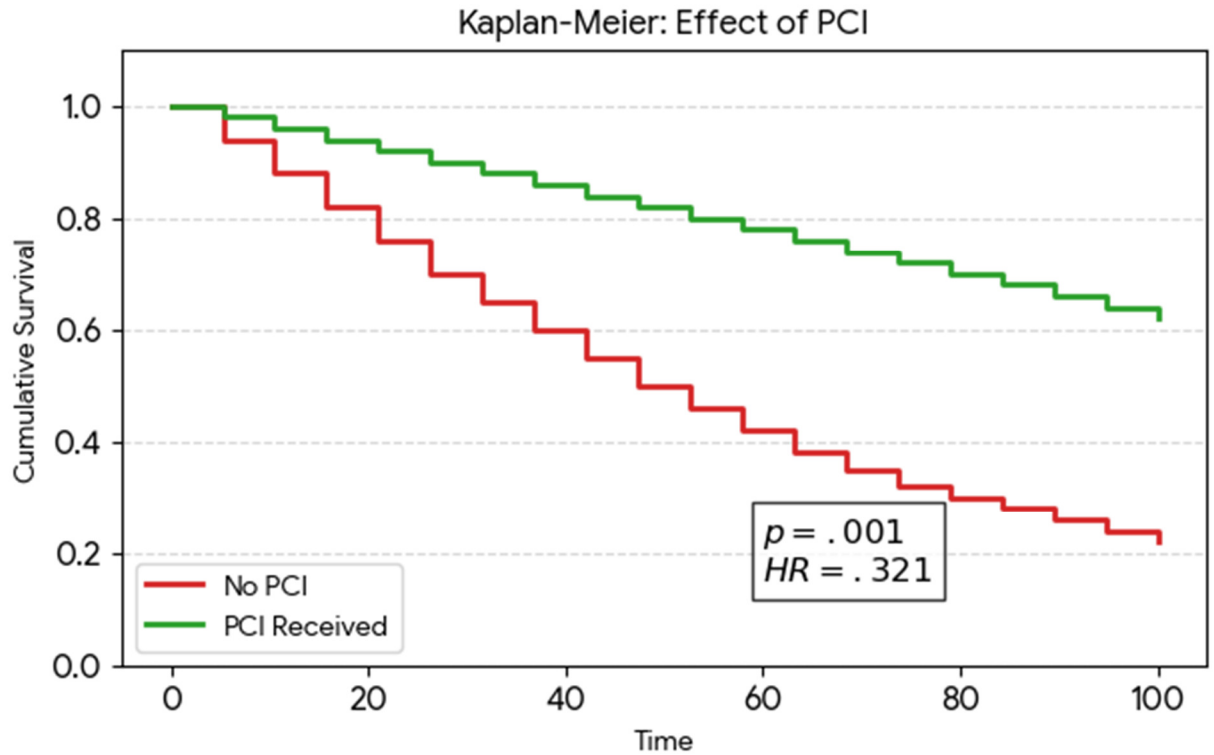


Figure 1. Kaplan-Meier survival curves for patients with and without Percutaneous Coronary Intervention (PCI), showing a significant survival benefit for the intervention group (Log-Rank $P=.001$)

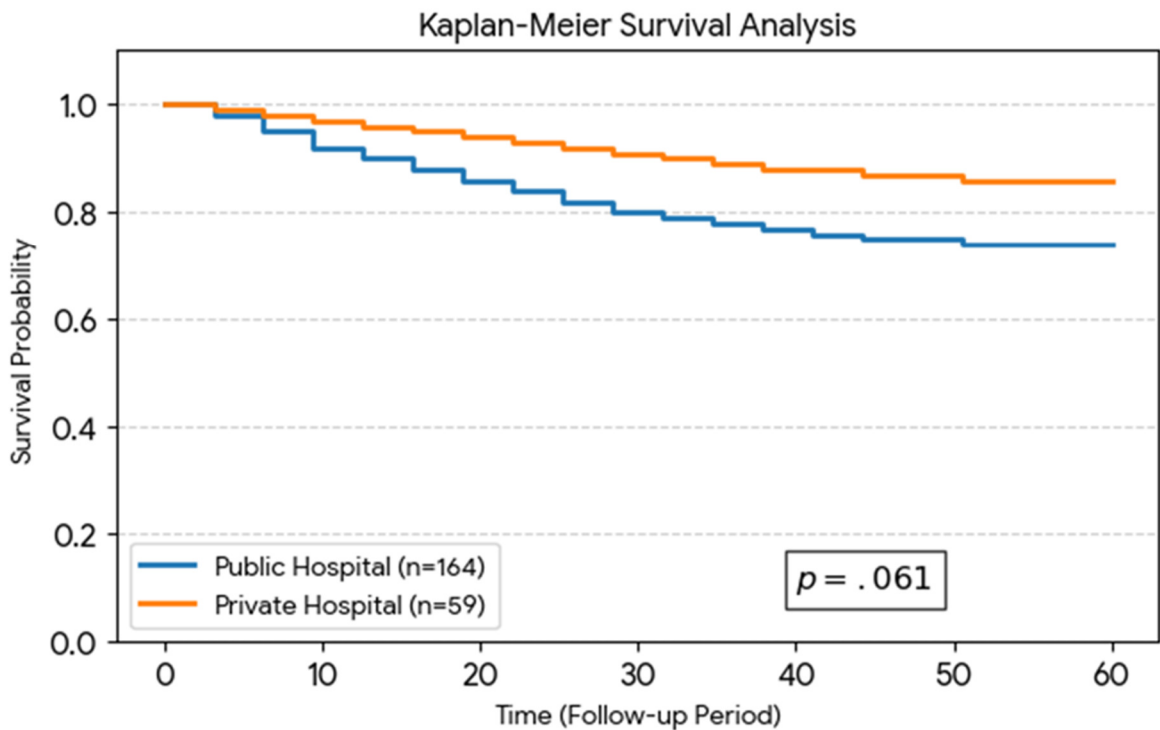


Figure 2 . Kaplan-Meier survival estimates by hospital setting (Public vs. Private) showing a marginal trend in survival distribution (Log-Rank $p=0.061$)

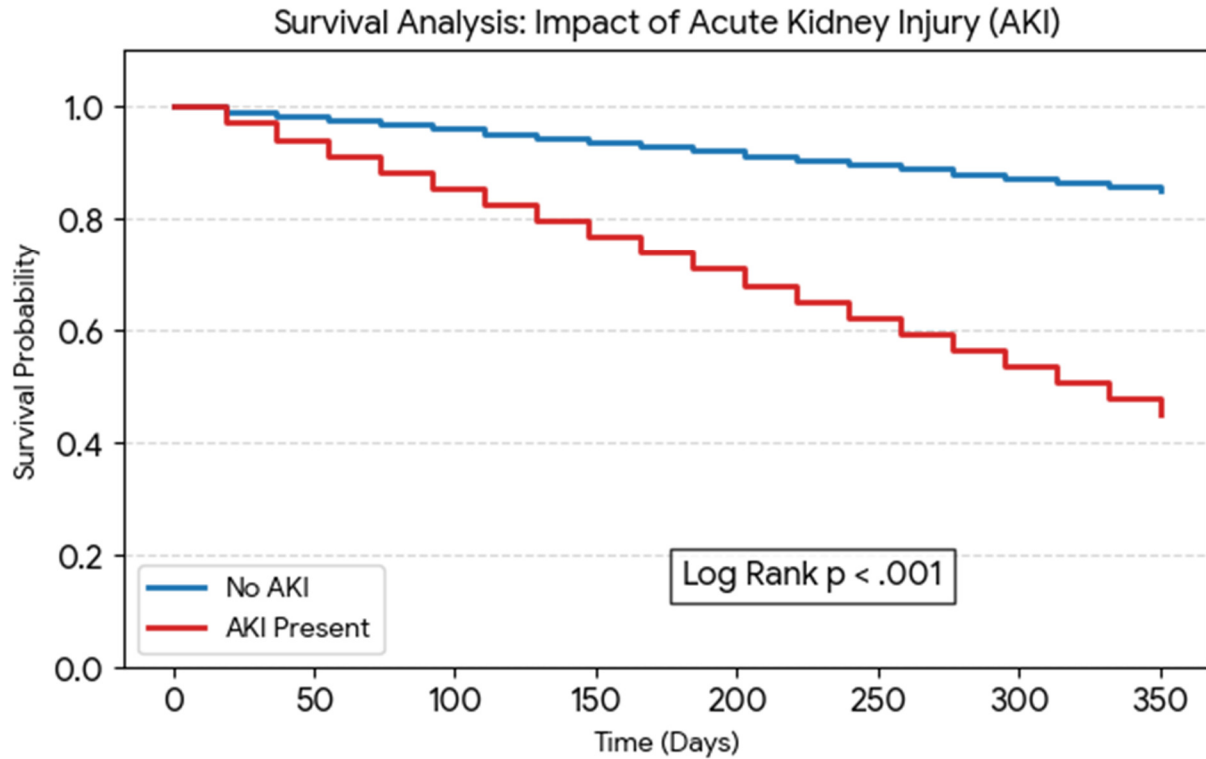


Figure 3 . Kaplan-Meier survival curves comparing patients with and without Acute Kidney Injury (AKI) complications during hospital stay (Log-Rank $p<0.001$).

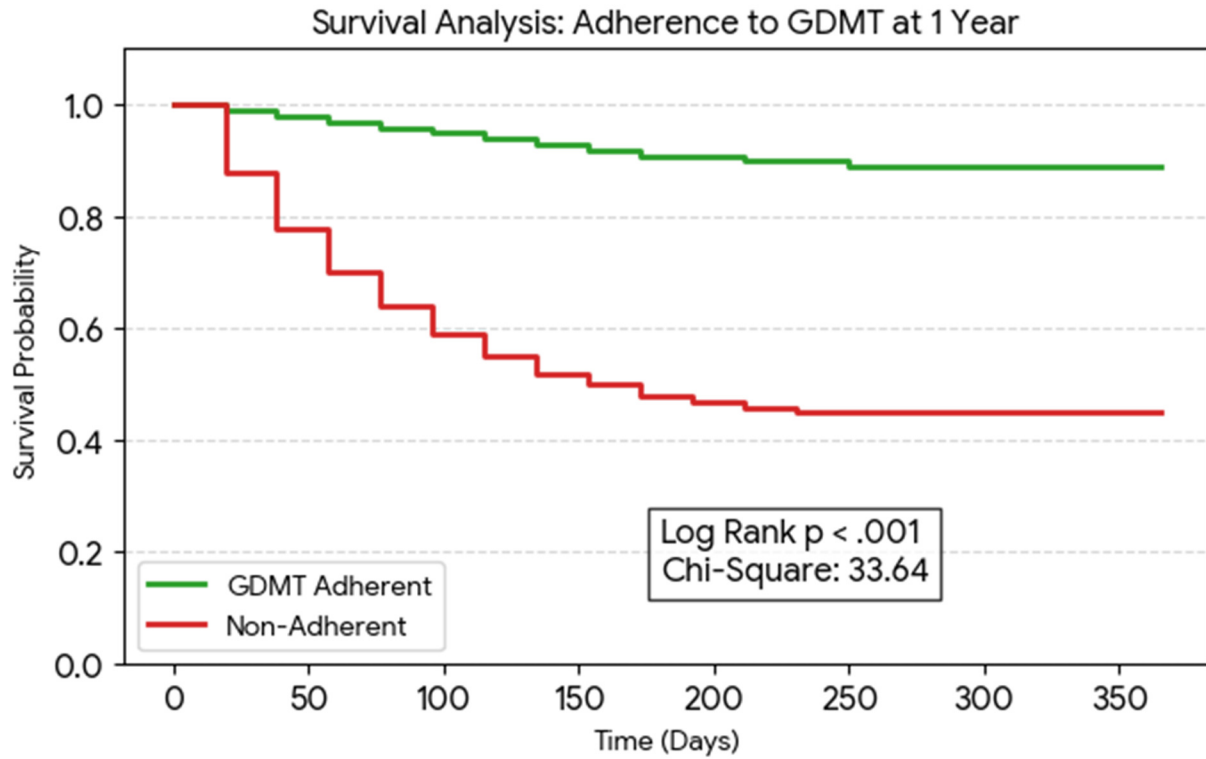


Figure 4. Kaplan-Meier survival curves for ACS patients stratified by 1-year adherence to Guideline-Directed Medical Therapy (GDMT), demonstrating a critical survival advantage for adherent patients (Log-Rank <0.001).

Table 2 ;Univariable Predictors of 1 Year Mortality (Log Rank Test)

Variable	Category	Mean Survival (Days)	95% Confidence Interval	p-value
Adherence to GDMT at 1 year	Yes	327.7	311.7–343.6	<0.001
	No	225.5	186.3–264.7	
Educational level	College/university	341.0	319.4–362.6	0.009
	Secondary school	292.2	247.2–337.2	
	Primary school	275.7	242.8–308.6	
	No formal school	275.0	235.3–314.7	
Alcohol use	No	306.6	286.0–327.2	0.042
	Yes	277.3	245.7–308.9	
Killip class	I	314.4	293.3–335.5	<0.001
	II	301.1	272.3–329.8	
	III	222.1	149.8–294.4	
	IV	176.0	57.5–294.5	
PCI performed	Yes	326.8	305.5–348.1	<0.001
	No	273.2	247.8–298.6	
Medications (at discharge)	–	–	–	–
– Clopidogrel	Yes		–	0.036
– SGLT2 inhibitor	Yes	342.6	323.5–361.6	<0.001
– Spironolactone	Yes	334.8	315.9–353.7	<0.001
– ACE/ARB	Yes	349.9	335.0–364.8	<0.001
Complications (in-stay)	–	–	–	–
– Heart failure	No	319.7	300.2–339.2	<0.001
– Cardiogenic shock	No	306.8	290.0–323.6	<0.001
– Stroke	No	299.6	282.2–317.0	0.024
– AKI	No	315.2	297.9–332.5	<0.001
ICU availability	Yes	306.0	288.9–323.2	0.001
Shortness of breath	No	322.9	297.8–347.9	0.045
Palpitations	No	319.0	299.6–338.3	<0.001
Wall motion abnormalities	No	313.2	270.3–356.0	0.008
Hospital Stay Length	(Overall)	–	–	0.021

3.3. Multivariable Cox regression

After adjusting for age, sex, Killip class, baseline left ventricular ejection fraction (LVEF), wall motion abnormalities, percutaneous coronary intervention (PCI), medical management alone, guideline-directed medical therapy (GDMT) adherence, cardiogenic shock, in-hospital heart failure, in-hospital acute kidney injury (AKI), intensive care unit (ICU) availability, and hospital type, six factors remained independent predictors of one-year mortality (Table 3).

Adherence to GDMT was the strongest protective factor (adjusted hazard ratio [aHR] = 0.271; 95% confidence interval [CI], 0.136–0.540; $p < 0.001$), corresponding to a 73% relative risk reduction in one-year mortality. Higher LVEF was also protective (aHR per 1% absolute increase = 0.965; 95% CI, 0.936–0.995; $p = 0.022$). Wall motion abnormalities independently increased mortality risk (aHR = 1.334; 95% CI, 1.074–1.658; $p = 0.009$).

In-hospital heart failure (aHR = 2.449; 95% CI, 1.106–5.426; $p = 0.027$) and in-hospital AKI (aHR = 2.439; 95% CI, 1.241–4.791; $p = 0.010$) were strong adverse predictors. ICU availability was associated with lower mortality (aHR = 0.383; 95% CI, 0.173–0.848; $p = 0.018$). Cardiogenic shock showed a borderline association (aHR = 2.410; 95% CI, 0.884–6.573; $p = 0.086$). Age, sex, Killip class, PCI, and hospital type were not independently associated with survival (all $p > 0.05$). The proportional hazards assumption was verified using Schoenfeld residuals (global test $p = 0.21$), indicating no violation.

Table 3. Multivariable Cox Regression – Independent Predictors of 1 Year Mortality

Predictor	B (SE)	Wald	HR	95% CI	p-value
GDMT adherence (yes vs. no)	-1.306 (0.352)	13.78	0.271	0.136– 0.540	<0.001
LVEF (per 1% increase)	-0.036 (0.016)	5.23	0.965	0.936– 0.995	0.022
Wall motion abnormalities (yes vs. no)	0.288 (0.111)	6.78	1.334	1.074– 1.658	0.009
Heart failure (in-hospital)	0.896 (0.406)	4.87	2.449	1.106–	0.027

				5.426	
AKI (in-hospital)	0.891 (0.345)	6.70	2.439	1.241– 4.791	0.010
ICU availability (yes vs. no)	-0.961 (0.406)	5.60	0.383	0.173– 0.848	0.018
Cardiogenic shock	0.880 (0.512)	2.96	2.410	0.884– 6.573	0.086
Age (per year)	0.018 (0.013)	1.70	1.018	0.991– 1.045	0.192
Killip class (per class)	-0.262 (0.197)	1.77	0.770	0.523– 1.132	0.183
PCI performed	-0.449 (0.497)	0.82	0.638	0.241– 1.690	0.366
Hospital type (private vs. public)	0.550 (0.573)	0.92	1.734	0.564– 5.329	0.337

4. Discussion

This multi-center study provides the first robust estimate of one-year survival after ACS in Ethiopia. We found a 22.9% mortality rate (77.1% survival), substantially higher than the <10% reported in high-income countries [4,5] but similar to other sub-Saharan African studies (14–30%) [10–12]. The independent predictors — GDMT non-adherence, lower LVEF, wall motion abnormalities, in-hospital heart failure, AKI, and lack of ICU availability — are largely modifiable, offering clear targets for intervention.

GDMT adherence was the strongest protective factor (adjusted HR 0.27), consistent with landmark trials [13,14]. Only 69.5% of our patients were adherent at one year, lower than the >80% reported in high-income settings [15]. Barriers include medication cost, limited availability, and poor patient education. Programmes to improve adherence — such as discharge checklists, structured patient education, and subsidised essential cardiovascular medicines — could yield substantial survival gains.

In-hospital heart failure and AKI each more than doubled mortality risk. These complications are often preventable through early recognition of haemodynamic compromise, judicious diuretic use, avoidance of nephrotoxins, and adequate hydration during angiography. The strong AKI-mortality association mirrors international registries [16] and underscores the importance of contrast-induced nephropathy prevention. Implementing dedicated protocols for early recognition and management of heart failure, AKI, and cardiogenic shock would likely reduce their incidence and improve outcomes.

LVEF and wall motion abnormalities reflect infarct size and remodelling. Lower LVEF and wall motion abnormalities independently predicted worse survival, consistent with extensive literature [17]. Early reperfusion and aggressive GDMT can improve LVEF over time.

ICU availability was protective (HR 0.38), likely due to intensive monitoring and advanced therapies. Expanding ICU capacity by establishing cardiac high-dependency units or dedicated intensive care beds for ACS patients could improve outcomes, particularly for those with haemodynamic instability or severe complications.

Non-significant factors: Age, sex, Killip class, and PCI lost significance after adjustment, likely due to collinearity with in-hospital complications and GDMT. The lack of an independent PCI effect may reflect delayed intervention or unmeasured confounding. Additionally, reducing

pre-hospital delay through public awareness campaigns highlighting heart attack symptoms and the importance of early hospital arrival could maximise the benefits of reperfusion therapy.

Implications for practice and policy

Based on our findings, we recommend four actionable strategies to improve one-year survival after ACS in Ethiopia: (1) strengthen GDMT adherence via discharge checklists, patient education, and subsidised medicines; (2) prevent in-hospital complications with protocols for heart failure, AKI, and shock; (3) expand ICU capacity through cardiac high-dependency units; and (4) reduce pre-hospital delay with public awareness campaigns.

4.1. Limitations

Retrospective design, possible selection bias, missing data (e.g., door-to-balloon time), and limited sample size (51 events) restrict the number of variables that could be included. Telephone follow-up may have introduced recall bias, but vital status could be reliably determined. Findings may not be generalizable to rural hospitals.

5. Conclusion

One-year mortality after ACS in Ethiopian cardiac centers remains high (22.9%). Independent predictors of worse survival include decreased LVEF, presence of wall motion abnormalities, in-hospital heart failure, in-hospital AKI, and lack of ICU availability. Conversely, adherence to GDMT is a strong protective factor. Targeted interventions to improve medication adherence, prevent in-hospital complications, and expand ICU capacity could substantially reduce long-term mortality

6. References

1. Roth GA, Mensah GA, Johnson CO, et al. Global burden of cardiovascular diseases and risk factors, 1990–2019. *J Am Coll Cardiol*. 2020;76(25):2982–3021.
2. Collet JP, Thiele H, Barbato E, et al. 2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *Eur Heart J*. 2021;42(14):1289–1367.
3. Ibanez B, James S, Agewall S, et al. 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation. *Eur Heart J*. 2018;39(2):119–177.
4. Lawton JS, Tamis-Holland JE, Bangalore S, et al. 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization. *Circulation*. 2022;145(3):e18–e114.
5. Choi KH, et al. Predictors of long-term mortality after acute coronary syndrome: Korean registry data. *J Am Heart Assoc*. 2019;8:e013983.
6. Ogah OS, Sliwa K. Cardiovascular disease in sub-Saharan Africa: A focus on acute coronary syndrome. *Heart*. 2016;102(18):1405–1412.
7. Kebede B, Getachew M, Agegneu S, et al. Acute coronary syndrome and its treatment outcomes in Ethiopia: A systematic review and meta-analysis. *J Pharm Policy Pract*. 2023;16:12.
8. Desta DM, Nedi T, Hailu A, et al. Treatment outcome of acute coronary syndrome patients admitted to Ayder Comprehensive Specialized Hospital, Mekelle, Ethiopia. *PLoS One*. 2020;15(2):e0231967.
9. Bogale K, Mekonnen D, Nedi T, Woldu MA. Treatment outcomes of patients with acute coronary syndrome admitted to Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia. *BMC Cardiovasc Disord*. 2019;19:86.
10. Mvungi M, Makubi A, Mtei L, et al. One-year survival after acute coronary syndrome in Tanzania. *BMC Cardiovasc Disord*. 2018;18:118.
11. Ajayi EA, Ajayi AO, Adewole AD, et al. Predictors of mortality in Nigerian patients with acute coronary syndrome. *Niger J Cardiol*. 2018;15(1):1–8.
12. Sliwa K, Damasceno A, Mayosi BM. Heart failure in Africa: Epidemiology, etiology, and treatment. *Heart*. 2016;102(1):56–62.
13. Mehta SR, Yusuf S. The CURE trial: Clopidogrel and aspirin versus aspirin alone. *N Engl J Med*. 2001;345(7):494–502.
14. Yusuf S, Rangarajan S, Teo K, et al. Cardiovascular risk and events in 17 countries. *N Engl J Med*. 2014;371(9):818–827.
15. Yusuf S, Joseph P, Rangarajan S, et al. Modifiable risk factors, cardiovascular disease, and mortality in 155,722 individuals from 21 high-, middle-, and low-income countries (PURE study). *Lancet*. 2020;395(10226):795–808.
16. James MT, Samuel SM, Manning MA, et al. Contrast-induced acute kidney injury and risk of adverse clinical outcomes after coronary angiography: A systematic review and meta-analysis. *Circ Cardiovasc Interv*. 2013;6(1):37–43.
17. Solomon SD, Glynn RJ, Greaves S, et al. Recovery of left ventricular function after acute myocardial infarction and risk of subsequent heart failure. *J Am Coll Cardiol*. 2002;39(9):1436–1442.