

Research Article

Health-Related Quality of Life and Associated Factors among Myocardial Infarction Patients at Cardiac Center, Ethiopia

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Introduction. Myocardial infarction is the most frequent manifestation of coronary heart disease and one of the leading causes of death worldwide. The sudden and often profound physiological and psychological effect of the acute onset of myocardial infarction hurts the health-related quality of life. **Objective.** To assess health-related quality of life and associated factors among myocardial infarction patients at Cardiac Center, Ethiopia, Addis Ababa, Ethiopia, 2020. **Method.** Institution-based cross-sectional study was conducted from April 10 to June 25, 2020, at the Cardiac Center-Ethiopia, Addis Ababa, Ethiopia. The sample consisted of 421 myocardial infarction patients. Data were collected through an interviewer-administered structured questionnaire by using the World Health Organization Quality of Life Questionnaire. Samples were selected using a consecutive sampling technique. The linear regression analysis model was fitted using SPSS 26 and STATA 14, and the unstandardized beta (?) coefficient with a 95% confidence interval was used. A p value <0.05 was considered statistically significant for all analyses. **Results.** The mean score of the overall health-related quality of life was found to be 49.29 ± 14.83 , and the mean score for the physical domain was 47.96 ± 16.50 ; for the psychological domain, it was 50.91 ± 16.07 , and for environmental and social relationship domains, it was 48.30 ± 16.54 and 52.02 ± 24.61 , respectively. In the multiple regression analysis, increased age, living in a rural area, heart failure, and hypertension were inversely associated with overall health-related quality of life, while secondary and higher education were associated with better overall health-related quality of life. **Conclusion.** Patients with myocardial infarction at Cardiac Center, Ethiopia, had lower health-related quality of life. Hence, the finding of this study suggests the implementation of a cardiac rehabilitation program and comprehensive service given by healthcare providers.

1. Introduction

Acute coronary syndrome (ACS) is one of the leading causes of morbidity and mortality globally [1]. It can be classified into three intensity categories: unstable angina (UA); non-ST-segment elevation myocardial infarction (NSTEMI), in which coronary arteries are partially or intermittently

occluded; and ST-segment elevation myocardial infarction (STEMI), in which there is full arterial occlusion [2, 3]. Myocardial infarction is a serious condition, referred to as cardiac necrosis due to prolonged ischemia usually caused by the abrupt complete obstruction of a coronary artery by a thrombus or plaque [4–6]. Following AMI, many patients are left traumatized emotionally and physically [7].

MI is one of the most important causes of death around the globe [5, 8–10]. Health-related quality of life (HRQoL) is a construct used to understand the impact of chronic disease on patients' wellbeing. In recent years, it is believed that HRQoL has to be included in clinical studies because it provides the most comprehensive evaluation of the impact of the disease and the effects of treatment [11, 12]. Even though the survival rate from MI has considerably increased due to the use of most up-to-date treatment modalities over the last few decades, yet, these patients often experience negative physiological and psychological problems and disrupted daily life [13, 14]. Patients after MI are at higher risk of subsequent physical consequences, such as malignant arrhythmias, reduced left ventricular function, angina pectoris, and adverse psychological reactions [15–17].

Patients with MI often report a diminished HRQoL that will delay their recovery from the disease due to the life-threatening nature of the disease, persistent disease symptoms, invasive medical interventions, the relatively poor disease prognosis, and the need for long-term lifestyle changes [18–20]. Due to the devastating consequences of MI, patients report fear of another cardiac event, reduced energy levels, and an inability to carry on their normal roles [21–23]. Understanding those factors that contribute to HRQoL post-MI, particularly modifiable factors, can open a window of opportunity to improve the recovery and disease outcomes of MI patients [24, 25]. Measuring HRQoL will assist in monitoring treatment guidelines and improving patients' HRQoL. To improve HRQoL, healthcare providers ought to know their patients' subjective perception of HRQoL [23, 26].

Patients are required to make lifelong lifestyle changes to reduce their risk of future cardiovascular events. These changes adversely affect different aspects of patients' life, which are reflected in HRQoL measures [14, 27]. A case-control study conducted in the United States showed that survivors were approximately 2.7 times more likely to report poor general health [28]. Another cross-sectional study conducted in China among 326 patients from tertiary hospitals showed more than half of the patients reported poor quality of life [29]. A descriptive correlational study conducted in South Korea showed that the HRQoL of post-MI patients was moderately poor [30]. Besides, a correlational study conducted in Myanmar revealed that the mean score of the overall health-related quality of life among MI patients was found to be moderate [21]. A descriptive study conducted in India showed that among MI patients attending cardiac OPD, 15% of patients had a good quality of life; 63.33% of patients had an average quality of life, and 21.67% of patients had poor quality of life [31]. Among the sociodemographic characteristics reviewed in the literature, age, gender, marital status, education level, employment status, and financial status were associated with HRQoL in patients with MI [19].

There were studies revealing that older age was associated with better HRQoL in patients with MI except for the physical dimension of the HRQoL [32]. A longitudinal observational study conducted in South Korea found that younger patients with MI had higher HRQoL [24]. A cross-sectional study conducted in China showed that females had significantly lower scores of HRQoL [31]. A study conducted in

Poland revealed the significant influence of education on almost all HRQoL domains, except the social domain [33]. Comorbidity is the number of coexisting diseases alongside the primary condition. A study conducted in Indonesia showed that patients with comorbidity may experience difficulties in their daily activities that may result in depression and fatigue. Thus, it is expected that higher comorbidity may be related to lower HRQoL [34].

HRQoL was adversely affected by the total number of comorbidities, hypertension, history of heart failure, and diabetes [35]. A cross-sectional study conducted among Korean MI patients showed that diabetes, history of stroke, and other heart disease were adversely associated with HRQoL [36]. Another cross-sectional study conducted in China found that heart failure influences patients in all aspects of HRQoL, including physical, psychological, and social dimensions [21]. A correlational study conducted in Singapore revealed that hypertension was found to be a predictor of poor mental HRQoL, and patients with hypertension reported significantly lower mean scores compared with those without hypertension [37].

Psychosocial factors are one of the most frequently studied variables in the HRQoL literature targeting MI patients. Anxiety and depression were measured more frequently than other psychosocial factors such as stress. Studies pointed out that depression and anxiety were very common in patients after the MI, and numerous studies have reported an association of depression with the appearance of new coronary events and increased mortality after coronary events occurred [38]. The global rise in the prevalence of myocardial infarction demands a better understanding of the disease course through the inclusion of patient perspectives and patient-reported measures. HRQoL is an important indication not only for assessing disease outcomes, like death and recurrent cardiac events, but also outcomes that are important to patients, such as daily functioning. Most studies examining the predictive factors of HRQoL among MI patients were conducted in developed countries outside Ethiopia, especially in western countries and Asian countries, where the economic, social, and cultural contexts are significantly different from our country. People under these differences have different perspectives on life satisfaction and well-being and may affect their perception of HRQoL. Therefore, identifying factors that are significantly associated with this important outcome will serve as a useful guide to patient-centered care; it informs health professionals in developing and providing effective interventions to improve patient recovery. This study, therefore, is aimed at assessing the HRQoL of MI patients and identifying associated factors at the cardiac center in Ethiopia. Identifying factors significantly associated with HRQoL may serve as useful pointers for health professionals in providing customized interventions to improve the HRQL of this group of people.

1.1. Conceptual Framework. The independent variables associated with health-related quality of life among myocardial infarction patients at Cardiac Center, Ethiopia, are classified as sociodemographic factors such as sex, age, residence, marital status, educational, status, occupation, and average

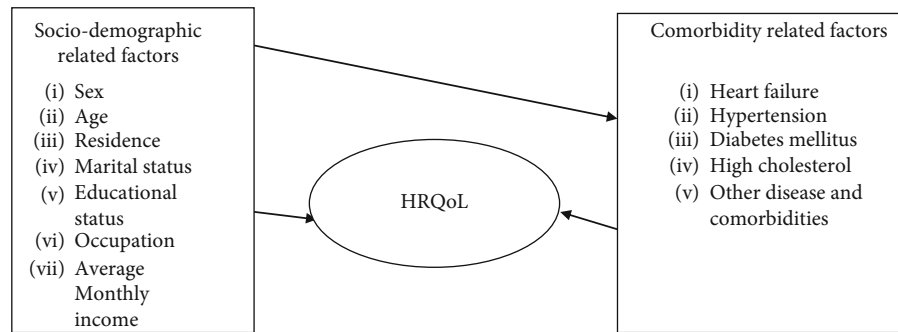


FIGURE 1: A conceptual framework to assess health-related quality of life and associated factors among myocardial infarction patients at Cardiac Center, Ethiopia, 2020, adopted from different literatures.

monthly income. Comorbidity-related factors include heart failure, hypertension, diabetes mellitus, high cholesterol, and other disease and comorbidities [19, 39] (Figure 1).

2. Methods and Materials

2.1. Study Design and Period. An institutional-based cross-sectional study was conducted from April to June, 2020, to assess the health-related quality of life and factors associated with myocardial infarction patients.

2.2. Study Area. The study was conducted at Cardiac Center, Ethiopia (Children’s Heart Fund of Ethiopia), located in Addis Ababa which is the capital city of Ethiopia, established in 1992 inside Zewditu Memorial Hospital, Cardiac Center, Ethiopia, and is now located inside Tikur Anbessa specialized hospital in Addis Ababa. The idea of this cardiac center was conceived 30 years ago by Dr. Belay Abegaz but started functioning in 2009. It is a tertiary referral cardiac center for patients requiring cardiac intervention from all parts of the country. It has 30 beds and gives 24-hour services for both children and adults. It has a total of 13 heart team members that include six cardiologists, two cardiac surgeons, two cardiac anesthesiologists, one cardiac intensivist, and two percussionists [40]. Since the first date of its operation, it has rendered services for about 10,000 patients free of charge, of which 4400 of them are adults. Cardiac catheterization, implanting peacemaker, coronary bypass surgery, coronary angiography, ECG, and echo are some of the services given by the center. It receives 150 new patients per month on average. Currently, the hospital has 600 patients with MI on follow-up. These patients have follow-up depending on their condition at least once per month. Besides, patients can visit the clinic when he/she needs care.

2.3. Population. All MI patients attended at Cardiac Center-Ethiopia are involved in this study. The study population included all adult MI patients at the Cardiac Center-Ethiopia during the study period and patients with a diagnosis of MI, aged 18 years old and above, and visit the clinic at least three times. Patients with serious illness who cannot give appropriate information were excluded from the study.

2.4. Sample Size. The study used a single population mean formula to calculate the sample size. $n = (Z\alpha/2)^2 \sigma^2 / d^2$, where $d = s.e * Z\alpha/2$ and

$$s.e = \frac{\sigma^2}{n} \tag{1}$$

Since there is no published study conducted in our country, σ was determined after the pilot study was conducted at chronic OPD of University of Gondar Specialized and Comprehensive Hospital (UOGSCH), North West, Ethiopia. The hospital has 500 MI patients on follow-up. By assuming a minimum of 400 sample sizes which is acceptable for analytical studies, the pilot study was conducted by taking 10% of the assumed sample size. Thus, the sample consisted of 40 MI patients. Data was collected using the WHOQoL-BREF tool to assess the overall HRQoL of the patients. The necessary steps were taken, and the data was analyzed by SPSS V-26 and STATA 14. According to the descriptive statics, the standard deviation was found to be 1.94.

Using $n = 40$, $Z\alpha/2 = 1.96$, and $\sigma^2 = 1.94$,

$$s.e = \frac{\sigma^2}{n},$$

$$d = s.e * \frac{Z\alpha}{2} = 0.186 = 0.09,$$

$$d^2 = 0.034,$$

$$n = \frac{(Z\alpha/2)^2 \sigma^2}{d^2} = 420.8.$$

The final sample size for the study was 421.

2.5. Sampling Procedure. A consecutive sampling technique was used to select study participants. The follow-up pattern depends on the patients’ condition. However, most of the patients had one follow-up per month. Patients’ medical record was checked for the confirmation of MI diagnosis (at least two of the following three conditions, including typical ischemia, chest pain, elevated cardiac enzyme levels in the serum, usually creatine kinase myocardial band (CK-MB), and typical ECG changes of the pathological Q-wave that are consistent with ischemia). Therefore, every subject

TABLE 1: Sociodemographic and clinical characteristics of myocardial infarction patients at the Cardiac Center-Ethiopia, Addis Ababa, Ethiopia, 2020 ($n = 421$).

Variables	Categories	Frequency (n)	Percent (%)
Gender	Male	182	43.2
	Female	239	56.8
Age category (years)	<46	186	44.2
	46-65	175	41.6
	>65	60	14.3
Residence	Urban	346	82.2
	Rural	75	17.8
Marital status	Single	142	26.8
	Married	262	62.2
	Divorced	32	7.6
	Widowed	15	3.6
Educational level	Cannot read and write	72	17.1
	Read and write only	58	13.8
	Primary education	58	13.8
	Secondary education	119	28.3
	College and above	114	27.1
Occupation	Government worker	73	17.3
	Private worker	119	28.3
	Farmer	20	4.8
	Housewife	85	20.2
	No occupation	72	17.1
	Others*	52	12.4
Average monthly income (ETB)	<500	108	25.0
	500-2000	143	34.0
	>2000	170	40.4
Heart failure	No	242	57.5
	Yes	179	42.5
Hypertension	No	365	86.7
	Yes	56	13.3
Diabetes mellitus	No	403	95.7
	Yes	18	4.30
High cholesterol	No	392	93.1
	Yes	29	6.90
Other comorbidities**	No	282	67.0
	Yes	139	33.3

*Daily laborers, students, drivers, etc.; **stroke, kidney disease, etc.

meeting the criteria of inclusion was selected until the required sample size was achieved. In the case of patients who had more than one follow-up appointment during the data collection period, their medical chart number was checked and they were excluded from the study.

2.6. Operational Definition

2.6.1. Overall HRQoL. The overall HRQoL was measured by using the WHOQoL-BREF 26-item instrument. The trans-

formed scores ranged from 0 to 100. A higher score is an indicative of a higher level of HRQoL [41].

2.6.2. Comorbidity. Comorbidity is the presence of one or more additional conditions often cooccurring with a primary condition [42].

2.6.3. High Cholesterol (High-Density Lipoprotein Cholesterol). It is 60mg/dL (1.6mmol/L) or above for both men and women [43].

2.7. Data Collection Tools and Procedures. The data collection tool consisted of three parts; part one assessed the sociodemographic and clinical characteristic form developed by the researcher obtained from literature; part two is the health-related quality of life using WHOQoL-BREF. Medical information was retrieved from the participants' most recent medical records. The WHOQoL-BREF was adopted from WHO, and its Amharic version was used in Ethiopia for patients with chronic diseases such as HIV and diabetes (Cronbach's alpha ranged from 0.76 to 0.90) [44, 45]. WHOQoL-BREF is a 5-point Likert scale questionnaire consisting of 26 items, categorized into four dimensions. These are physical health domain (7 items), psychological health domain (6 items), social relationship domain (3 items), and environmental health domain (8 items), one quality of life and one general health item. The scores were transformed linearly to a 0–100 scale. The higher total score denotes higher health-related quality of life except for Q3, Q4, and Q26 which were reversely coded, in which lower score denotes the higher quality of life and a higher score denotes the lower quality of life. Therefore, the three items were transformed from negatively framed questions to positively framed questions. The formula used to transform each domain score out of 100 was as follows: transformed domain score = (raw score – 4) * (100/16). The mean score of all items in each domain multiplied by four gives the raw data. The overall health-related quality of life was computed as the average score of four domain scores (sum of four domain scores divided by four). Participants were asked their perception before 1 month from the data collected in the day, as WHO recommended. Data was collected by the Amharic version questionnaire by interviewer-administered face to face interviews. Patients were interviewed after getting their services from the clinic. Three BSc nurses for data collection and one general practitioner for supervision were recruited. The one-day training was given for both data collectors and supervisors. Before collecting the data, the principal investigator met with the research assistant to discuss the purpose, ethical aspects related to patients, and the tools used for data collection. To ensure the consistency of the research methods between interviewers, the first five patients were interviewed by the team all together before subsequent data collection. The principal investigator reviewed the medical records and collected the patient's clinical information.

2.8. Data Quality Control. Standardized and validated WHOQoL-BREF questionnaire was prepared in English and translated to Amharic, official language of Ethiopia, and back to English for its consistency. Data were collected by trained data collectors. There was a periodic discussion with data collectors and the supervisor. The pilot study was done among 40 myocardial infarction patients conducted at the University of Gondar Specialized and Comprehensive Hospital. The face and content validity of the tool was examined by the researcher and healthcare professionals. The internal consistency of the tool was assessed, and Cronbach's alpha was computed (physical = 0.75, psychological = 0.74, environmental = 0.73, and social = 0.77), which was acceptable for this population.

TABLE 2: Internal consistency and correlations between the domains of the WHOQoL-BREF.

Domain	Cronbach's alpha	PHD	PSHD	EHD	SHD
PHD	0.75	1.0	0.55**	0.53**	0.48**
PSHD	0.74		1.0	0.51**	0.50**
EHD	0.73			1.0	0.56**
SHD	0.77				1.0

**Correlation is significant at the 0.05 level (two-tailed). PHD: physical health domain; PSHD: psychological health domain; EHD: environmental health domain; SHD: social health domain.

TABLE 3: HRQoL among adults with MI patients at the Cardiac Center-Ethiopia, Addis Ababa, Ethiopia, 2020 ($n = 421$).

Domain	N	Minimum	Maximum	Mean	SD
Physical health	421	7.14	100.00	47.96	16.50
Psychological health	421	12.50	83.33	50.91	16.07
Social relation	421	0.00	100.00	52.02	24.61
Environmental health	421	3.13	100.00	48.30	16.54
Overall HRQoL	421	15.25	88.28	49.29	14.83

Note: HRQoL: health-related quality of life; SD: standard deviation.

2.9. Data Processing and Analysis. Data were coded, recoded, cleaned, and explored to identify outliers, missing values, and inconsistencies. The coded data were checked for completeness and entered into Epi-info version 7.2.2.6 and analyzed by SPSS version 26 and STATA version 14. Descriptive statistics, including mean, standard deviation, frequency, and percentages, were used to summarize and describe the demographic and clinical characteristics of the sample. Differences in WHOQoL-BREF scores among participants based on demographic and clinical data were examined using the independent *t*-test for two-group comparisons or the one-way analysis of variance (ANOVA) for comparing three or more groups. Pearson's product-moment correlation was used to test the association between the domains of WHOQoL-BREF. Cronbach's alpha was calculated for each domain to check internal consistency. The WHOQoL responses of reverse-coded items (Q3, Q4, and Q26) were converted to a positive scale by transforming the negatively phrased items into positively framed questions in SPSS V-26 to be interpreted as higher scores having a higher outcome. Linearity assumptions were checked by scatter plot, the homogeneity of variances was checked by scatter plots, and there was no heteroscedasticity/no clear pattern on the scatter plot. Scatter plots, skewness, and kurtosis were used to be examined to determine the shape of the data distribution; on this, the data were fairly normally distributed, so no transformations were required. Multicollinearity was checked, and the maximum variable inflation factor reported was 1.58, which indicates that there was no multicollinearity threat. Simple and multiple linear regressions were fitted for all four domains and overall HRQoL to identify associated variables with each domain and overall HRQoL. For the goodness of model fit, all linear regression assumptions, adjusted *R*-square, overall

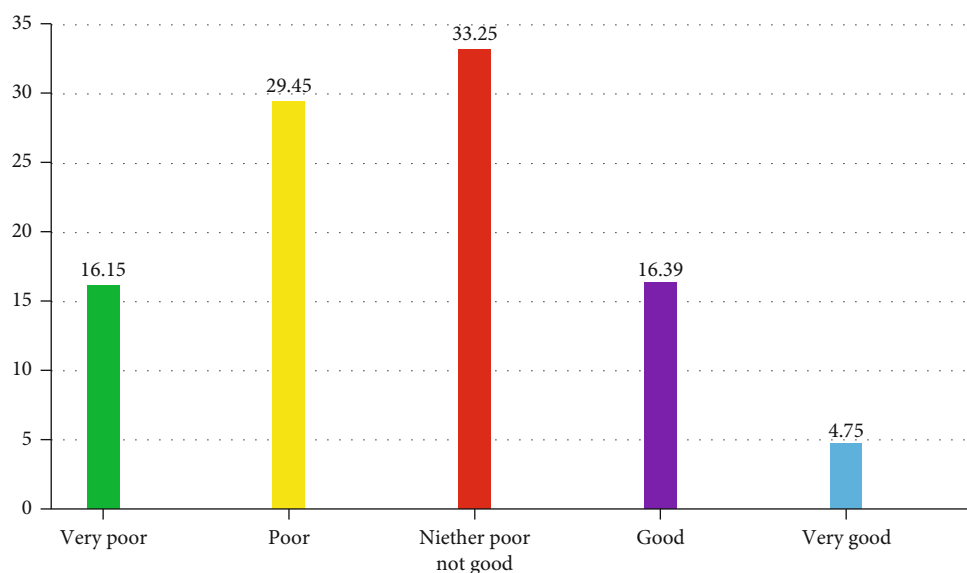


FIGURE 2: Perceived self-rated health satisfaction of myocardial infarction patients attended at Cardiac Center, Ethiopia, 2020 ($n = 421$).

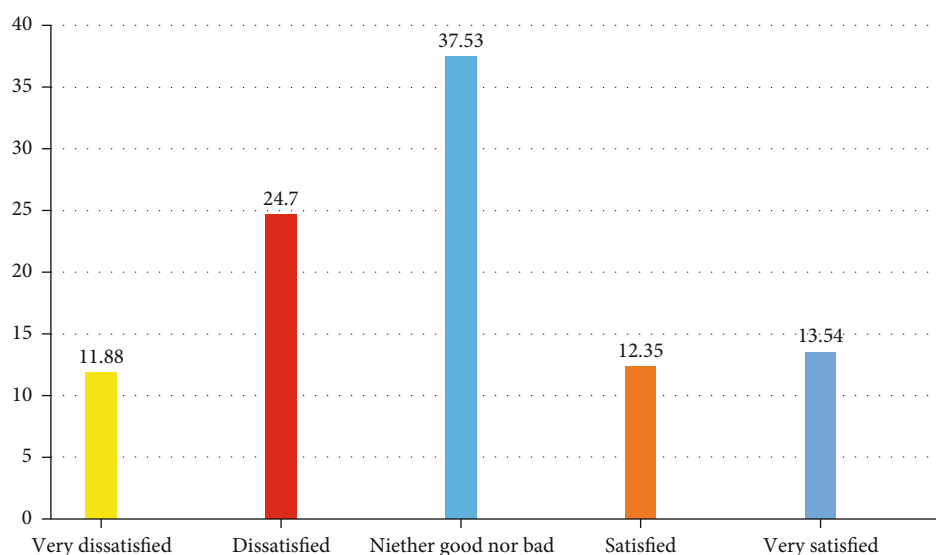


FIGURE 3: Perceived self-rated health satisfaction of myocardial infarction patients attended at Cardiac Center, Ethiopia, 2020 ($n = 421$).

F-test, residual plots, standard errors (SEs), and outliers were considered. Variables with a p value less than 0.25 during the simple linear regression were selected for multivariable linear regression using the enter method to identify independently associated predictors. The variables which had been independent association with HRQoL domain and overall HRQoL were expressed as adjusted unstandardized β coefficient by 95% confidence level. The level of significance of all statistical tests performed was set at $p < 0.05$ and two-tailed. Finally, the result was summarized and presented in statements, tables, graphs, and pie charts.

3. Result

3.1. Sociodemographic and Clinical Characteristics of Study Patients. Among the 421 participants, 56.8 were female, and

the mean age was 48.64 ± 15.16 years, and most of them were less than 46 years old. The majority of the study participants (82.2%) were from the urban area. Additionally, 62.2% were married, and 28.3% had a secondary school education. The average estimated monthly income was 2672.41 ± 3620.420 ETB, and 28.3% were private workers. Heart failure accounted for 42.5% of the disease and comorbidities among the study participants (Table 1).

3.2. Internal Consistency and Correlations between the Domains of the WHOQoL-BREF. Internal consistency was calculated for each domain of the instrument using Cronbach's alpha. All domains of WHOQoL-BREF had high values of Cronbach's alpha ($\alpha > 0.7$). Interdomain correlation showed that there was a statistically significant correlation between domains, and there was a highly positive correlation between

TABLE 4: Mean score of domains of health-related quality of life among MI patients at the Cardiac Center-Ethiopia, Addis Ababa, Ethiopia, 2020 ($n = 421$).

Domains Variables	PHD Mean	PSHD Mean	EHD Mean	SHD Mean	Overall HRQoL mean
Sex					
Male	49.05	52.90	46.72	54.53	50.80
Female	47.11	49.38	45.98	50.10	48.14
<i>p</i> value	0.026	0.124	0.652	0.067	0.069
Residence					
Urban	49.46	53.16	47.63	54.67	51.23
Rural	41.00	40.50	40.16	39.77	40.36
<i>p</i> value	<0.001	<0.001	<0.001	<0.001	<0.001
Heart failure					
No	46.98	49.29	45.90	49.24	47.85
Yes	49.26	53.09	46.84	55.77	51.24
<i>p</i> value	0.164	0.168	0.567	0.790	0.020
Hypertension					
No	48.61	51.68	46.39	52.73	49.85
Yes	43.68	45.83	45.70	47.32	45.63
<i>p</i> value	0.038	0.011	0.771	0.125	0.047
DM					
No	48.02	50.75	46.25	52.02	49.26
Yes	46.42	54.39	47.39	51.85	50.01
<i>p</i> value	0.690	0.347	0.775	0.977	0.833
High cholesterol					
No	48.23	51.29	46.81	52.69	49.76
Yes	44.21	45.68	39.33	42.81	43.01
<i>p</i> value	0.280	0.700	0.018	0.037	0.180
Other comorbidities					
No	47.45	50.97	45.87	52.51	49.02
Yes	48.97	50.77	47.16	52.01	49.48
<i>p</i> value	0.377	0.907	0.452	0.559	0.856

Note: PHD: physical health domain; PSHD: psychological health domain; EHD: environmental health domain; SHD: social health domain; HRQoL: health-related quality of life.

environmental health domain and social relation health domain ($r = 0.56$ and $p < 0.001$). A relatively weak correlation was observed between the physical health domain and social health domain ($r = 0.48$ and $p < 0.001$) (Table 2).

3.3. HRQoL among Patients with MI. Among the four domains of health-related quality of life, respondents scored the highest and lowest mean HRQoL scores in the social domain (52.02 ± 24.61) and physical domain (47.96 ± 16.50), respectively (Table 3).

3.4. Perceived Health Satisfaction and Self-Rating of HRQoL of Patients. Study participants were asked to give their perception of their quality of life and health satisfaction. Based on their response, 140 (33.33%) study participants reported that their quality of life was neither good nor poor, while 124 (29.5%) of them had poor QOL. Regarding health satisfaction, 158 (37.5%) of them were neither satisfied nor dissat-

TABLE 5: Mean score of domains of health-related quality of life among MI patients at the Cardiac Center-Ethiopia, Addis Ababa, Ethiopia, 2020 ($n = 421$).

Domains Variables	PHD Mean	PSHD Mean	EHD Mean	SHD Mean	Overall HRQoL mean
Marital status					
Single	50.47	53.19	47.82	50.52	50.50
Married	48.40	51.28	46.51	54.48	50.17
Divorced	40.73	44.40	42.67	42.70	42.63
Widowed	36.66	41.11	38.95	40.00	39.18
<i>p</i> value	0.001	0.004	0.039	0.010	0.002
Educational status					
Cannot read and write	39.88	43.69	38.41	43.17	41.28
Read and write only	45.87	44.25	43.96	46.40	45.12
Primary education	44.08	48.77	43.80	52.87	47.38
Secondary education	50.69	54.83	51.18	56.93	53.40
College and above	53.22	55.84	48.65	54.89	53.15
<i>p</i> value	<0.001	<0.001	<0.001	0.001	<0.001
Occupation					
Government worker	51.46	51.48	47.30	51.82	50.52
Private worker	52.34	53.88	49.29	55.95	52.86
Farmer	41.42	42.50	45.78	46.66	44.09
Housewife	42.47	46.42	43.38	45.98	44.56
Other	44.54	51.27	43.75	51.85	47.85
No occupation	49.17	53.36	46.63	55.44	51.15
<i>p</i> value	<0.001	0.003	0.030	0.071	0.001

Note: PHD: physical health domain; PSHD: psychological health domain; EHD: environmental health domain; SHD: social health domain; HRQoL: health-related quality of life.

isfied with their health and only 13.5% of them were satisfied with their health (Figures 2 and 3).

3.5. Mean Score Difference between Domains of HRQoL

3.5.1. Independent Sample *t*-Test. Mean scores were compared between sex, residence, heart failure, hypertension, diabetes mellitus, high cholesterol, and other comorbidities using an independent sample *t*-test concerning overall HRQoL and domains of HRQoL. Males scored significantly higher than females except for psychological and environmental health domains. Patients who lived in the urban area had a significantly higher mean score in the overall HRQoL and its domains than patients who lived in the rural area. Respondents with heart failure had a higher mean score in overall HRQoL and its domains than patients without heart failure, but this was not significant except for overall HRQoL. Patients without hypertension had significantly higher mean scores in physical and psychological health domains as well

TABLE 6: Predictors of physical domain among myocardial infarction patients at Cardiac Center, Ethiopia, 2020 ($n = 421$).

Variables	Categories	Crude unstandardized ? coefficient (95% CI)	Adjusted unstandardized ? coefficient (95% CI)	<i>p</i> value
Gender	Male	0	0	0.023**
	Female	-1.94 (-5.14, -1.26)*	-1.86 (-6.50, -2.78)	
Residence	Urban	0	0	0.431
	Rural	-8.46 (-12.5, -4.38)*	-1.65 (-4.50, 3.26)	
Marital status	Single	0	0	0.397
	Married	-2.07 (-5.69, 1.546)	-1.50 (-4.99, 1.98)	
	Divorced	-9.74 (-16.1, -3.31)*	-4.40 (-10.5, 1.74)	
	Widowed	-13.8 (-22.6, -4.99)*	-7.30 (-15.9, 1.34)	
Educational level	Unable to read and write	0	0	0.125
	Read and write only	4.13 (.571, 11.6)	4.05 (-1.12, 9.23)	
	Primary edu	6.11 (-1.46, 9.72)	-2.49 (-8.05, 3.09)	
	Secondary edu	10.4 (-5.52, -1.33)*	3.72 (-1.47, 8.911)	
	College and above	12.83 (-8.17, -249)*	4.35 (-.89, 9.60)	
Occupation	Gov't worker	0	0	0.562
	Private worker	.87 (-3.83, -.586)*	-1.29 (-5.68, 3.09)	
	Farmer	-10.0 (-18.0, -2.04)*	-1.94 (-10.4, 6.52)	
	House wife	-8.98 (-14.0, -3.93)*	-5.20 (-10.5, .142)	
	No occupation	-6.92 (-12.1, -1.66)*	-8.30 (-13.4, -3.17)	
	Others	-2.29 (-8.04, -3.45)*	-6.03 (-11.64, -4.22)	
Heart failure	No	0	0	0.737
	Yes	-2.27 (-9.34, 5.47)	-5.66 (-3.87, 2.74)	
Hypertension	No	0	0	0.685
	Yes	-4.92 (-9.58, -2.68)*	-.972 (-5.68, 3.73)	
DM	No	0	0	0.341
	Yes	-1.59 (-9.44, 6.25)	-3.66 (-11.2, 3.89)	
High cholesterol	No	0	0	0.290
	Yes	-4.02 (-10.2, 2.24)	-3.21 (-9.19, 2.75)	
Other comorbidities*	No	0	0	0.364
	Yes	-1.51 (-1.85, 4.89)	-2.05 (-3.56, 2.35)	
Age		-0.77 (-.181, .027)	.769 (-.025, .183)	0.137
Average monthly income level		.049 (.014, .098)	-.089 (-.056, .038)	0.709

Note: *significant at $p < 0.05$ (crude unstandardized ? coefficient (95% CI)); **significant at p value < 0.05 (adjusted unstandardized ? coefficient (95% CI)); * other comorbidities: stroke and kidney disease.

as overall HRQoL. Respondents who did not have high cholesterol levels had significantly higher mean scores in environmental and social health domains (Table 4).

3.5.2. ANOVA Analysis. The ANOVA result showed that there was a statistically significant mean difference seen regarding marital status concerning overall HRQoL and its domains in which single patients had higher mean scores except for the social domain. Patients who had secondary and college and above education had significantly higher

mean scores in the overall HRQoL and its domains. Mean score of private workers was significantly higher in all domains of HRQoL and overall HRQoL (Table 5).

3.6. Simple and Multiple Linear Regression Analysis for the Overall Domain of HRQoL. Twelve predictors were entered independently to see their independent effect on the physical health domain. Variables with p value < 0.25 in the bivariable analysis were entered in the final model. Among the twelve variables entered, sex and occupation were negatively

TABLE 7: Predictors of psychological domain among myocardial infarction patients ($n = 421$).

Variables	Categories	Crude unstandardized ? coefficient (95% CI)	Adjusted unstandardized ? coefficient (95% CI)	<i>p</i> value
Gender	Male	0	0	0.197
	Female	-3.51 (-6.61, -.42)	-2.17 (-5.49, 1.13)	
Residence	Urban	0	0	0.002**
	Rural	-12.6 (-16.5, -8.82)*	-7.10 (-11.6, -2.51)	
Marital status	Single	0	0	0.530
	Married	-1.91 (-5.43, 1.61)	-1.10 (-4.54, 2.34)	
	Divorced	-8.79 (-15.0, -2.54)*	-2.13 (-8.21, 3.93)	
	Widowed	-12.0 (-20.6, -3.51)*	-5.20 (-13.7, 3.33)	
Educational level	Unable to read and write	0	0	0.901
	Read and write only	2.28 (-3.06, 7.63)	.324 (-4.79, 5.44)	
	Primary education	5.30 (-.092, 10.6)	.395(-5.91, 5.12)	
	Secondary education	10.4 (-5.75, -.245)*	4.12 (-.99, 9.25)	
	College and above	12.2 (-16.7,-7.72)*	5.93 (-11.1, -.754)	
Occupation	Government worker	0	0	0.799
	Private worker	2.40 (-7.22, -1.26)*	.561 (-3.77, 4.89)	
	Farmer	-8.98 (-16.8, -1.13)*	3.12 (-5.24, 11.4)	
	House wife	-5.06 (-10.2, -.098)*	2.73 (-2.55, 8.01)	
	No occupation	-.210 (-5.37, 4.95)	-.62 (-5.68, 4.44)	
	Others	1.88 (-3.76, 7.52)	-1.21 (-6.75, 4.32)	
Heart failure	No	0	0	0.497
	Yes	-3.80 (.705, 6.89)	-1.13 (-2.13, 4.40)	
Hypertension	No	0	0	0.948
	Yes	-5.85 (-10.3, -1.35)*	-.15 (-4.80, 4.49)	
DM	No	0	0	0.430
	Yes	-3.64 (-3.96, 11.2)	-3.00 (-4.46, 10.4)	
High cholesterol	No	0	0	0.173
	Yes	-5.60 (-11.6, .455)	-4.10 (-9.99, 1.79)	
Other comorbidities*	No	0	0	0.223
	Yes	-.192 (-3.47, 3.08)	-.451 (-4.23, 2.03)	
Age		-.061 (-.037, -.162)*	.065 (-.037, .168)	0.211
Average monthly income level		.088 (.040, 013)	.017 (.063, .029)	0.469

Note: *significant at $p < 0.05$ (crude unstandardized ? coefficient (95% CI)); **significant at p value < 0.05 (adjusted unstandardized ? coefficient (95% CI)); * other comorbidities: stroke and kidney disease.

associated with the physical health domain. About 46.8% of the total variation in the physical health domain of HRQoL was explained by variables in the model (Table 6).

Regarding the psychological health domain, twelve variables were entered and variables with p value < 0.25 were entered in multivariable linear regression analysis. Of these variables, educational level was positively associated with the psychological health domain, whereas residence was negatively associated with the psychological health domain and explains 41.6% of the variability in this domain (Table 7).

Twelve predictors were entered independently to see their independent effect on the environmental health domain. Variables with a p value < 0.25 were entered in the final model. Educational level and average monthly income had a direct relationship with this domain, while high cholesterol levels had an inverse relationship with this domain. These predictors explain 43.2% of the variability in the dependent variable (Table 8).

Regarding the social health domain, among the twelve predictors, variables with a p value < 0.25 were entered in multivariable linear regression analysis. The residence was

TABLE 8: Predictors of environmental domain among myocardial infarction patients ($n = 421$).

Variables	Categories	Crude unstandardized ? coefficient (95% CI)	Adjusted unstandardized ? coefficient (95% CI)	<i>p</i> value
Gender	Male	0	0	0.074
	Female	-.734 (-3.93, 2.46)	3.24 (-.312, 6.80)	
Residence	Urban	0	0	0.081
	Rural	-7.46 (-11.5, -3.38)*	-4.37 (-9.29, .545)	
Marital status	Single	0	0	0.301
	Married	-1.30 (-4.96, -2.35)*	-1.94 (-5.64, 1.75)	
	Divorced	-5.14 (-11.6, -1.34)*	-1.71 (-8.23, 4.80)	
	Widowed	-8.86 (-17.7, .045)	-6.55 (-15.7, 2.61)	
Educational level	Unable to read and write	0	0	<0.001**
	Read and write only	6.28 (.733, 11.8)	5.01 (-.484, 10.5)	
	Primary education	5.71 (.111, 11.3)	2.96 (-2.95, 8.89)	
	Secondary education	12.6 (-17.5, -7.74)*	7.59 (-16.2, -5.22)	
Occupation	College and above	11.0 (-15.7, -6.39)*	10.72 (-13.1, -2.03)	0.008**
	Government worker	0	0	0.737
	Private worker	1.96 (-6.85, -2.77)*	.796 (-3.85, 5.45)	
	Farmer	-1.52 (-9.69, -6.64)*	11.64 (2.66, 20.6)	
	House wife	-3.92 (-9.08, 1.24)	.511 (-5.16, 6.18)	
	No occupation	-3.55 (-8.92, -1.82)*	-2.35 (-7.79, 3.07)	
Others	-.668 (-6.54, 5.20)	-1.97 (-7.92, 3.97)		
Heart failure	No	0	0	0.408
	Yes	-.933 (-2.27, 4.14)	-1.47 (-4.98, 2.03)	
Hypertension	No	0	0	0.510
	Yes	-.692 (-5.36, 3.97)	-1.67 (-3.32, 6.66)	
DM	No	0	0	0.410
	Yes	-1.14 (-6.69, 8.98)	-3.36 (-11.3, 4.64)	
High cholesterol	No	0	0	0.013**
	Yes	-7.48 (-13.7, -1.26)*	-8.02 (-14.3, -1.69)	
Other comorbidities	No	0	0	0.367
	Yes	-1.28 (-2.08, 4.66)	-3.45 (-12.3, -1.78)	
Age		.050 (-.054, -.054)*	.192 (0.81, .302)	0.131
Average monthly income level		.081 (-.040, -.013)	.057 (-.716, -.17)	0.025**

Note: *significant at $p < 0.05$ (crude unstandardized ? coefficient (95% CI)); **significant at p value < 0.05 (adjusted unstandardized ? coefficient (95% CI)); * other comorbidities: stroke and kidney disease.

negatively associated with the social health domain and accounted for 40.3% of the variation in this domain (Table 9).

Finally, overall HRQoL variables with p value < 0.25 were entered in the final model. Age, residence, educational level, heart failure, and hypertension were significant predictors of overall HRQoL and explained 49.8% of the variability in the dependent variable. Except for secondary and college and above educational levels, all other variables harmed the overall HRQoL. For a year increase in age, the overall HRQoL decreased by an average of 0.951. Living in a rural area reduced the overall HRQoL by 5.69 units.

Participants who received secondary education had a 5.39 increase in their overall HRQoL. Participants who attended college and above institutions had 4.93 increases in overall HRQoL (Table 10).

4. Discussion

This study tried to assess the overall HRQoL profile with its domains and associated factors among patients with MI. According to this finding, the overall mean of HRQoL among study participants was moderately poor (49.29 ± 14.83). A

TABLE 9: Predictors of social domain among myocardial infarction patients (n = 421).

Variables	Categories	Crude unstandardized ? coefficient (95% CI)	Adjusted unstandardized ? coefficient (95% CI)	p value
Gender	Male	0	0	0.821
	Female	4.42 (-9.17, -.318)*	-.610 (-5.91, 4.69)	
Residence	Urban	0	0	0.012**
	Rural	-4.89 (-20.8, -8.89)*	-9.42 (-16.7, -2.08)	
Marital status	Single	0	0	0.087
	Married	3.96 (-1.44, 9.37)	4.82 (-.697, 10.3)	
	Divorced	-7.81 (-17.4, 1.79)	.563 (-9.17, 10.2,)	
	Widowed	-10.5 (-23.6, 2.65)	-1.72 (-15.4, 11.9)	
Educational level	Unable to read and write	0	0	0.635
	Read and write only	4.59 (-3.84, 13.0)	1.98 (-6.21, 10.1)	
	Primary education	9.27 (.754, 17.7)	.704 (-8.13, 9.54)	
	Secondary education	11.6 (-19.1, -4.21)*	2.99 (-5.21, 11.20)	
	College and above	11.6 (-18.5, -8.76)*	1.84 (-6.46, 10.14)	
Occupation	Government worker	0	0	0.692
	Private worker	4.12 (-11.2, -3.26)*	1.40 (-5.54, 8.35)	
	Farmer	-5.15 (-17.2, 6.97)	8.46 (-4.93, 21.8)	
	House wife	-5.84 (-13.5, -1.82)*	1.05 (-7.41, 9.52)	
	No occupation	.025 (-7.96, 8.01)	-.519 (-8.63, 7.59)	
	Others	3.62 (-5.10, 12.3)	.951 (-7.92, 9.82)	
Heart failure	No	0	0	0.404
	Yes	-6.53 (1.79, 11.2)	-2.22 (-3.01, 7.46)	
Hypertension	No	0	0	0.733
	Yes	-5.41 (-12.3, 1.51)	1.29 (-6.16, 8.74)	
DM	No	0	0	0.452
	Yes	-.174 (-11.8, 11.4)	-4.57 (-16.5, 7.37)	
High cholesterol	No	0	0	0.103
	Yes	-9.88 (-19.1, -.608)*	-7.86 (-17.3, 1.58)	
Other comorbidities*	No	0	0	0.235
	Yes	-1.49 (-6.51, 3.52)	-6.05 (-13.4, 4.56)	
Age		-.071 (-.227, .084)	.046 (-.118, .211)	
Average monthly income level		.012 (-.055,-019)*	.068 (.057, .014)	0.321

Note: *significant at $p < 0.05$ (crude unstandardized ? coefficient (95% CI)); **significant at p value < 0.05 (adjusted unstandardized ? coefficient (95% CI)); * other comorbidities: stroke and kidney disease.

study in South Korea also reported a comparable level of HRQoL among patients with MI at 44.38 ± 27.66 [31]. The result of this finding is also consistent with a study conducted in mainland China [16]. The possible reason for the low HRQL as perceived by patients could be MI often occurs without warning, and to suddenly find oneself in a hospital is a frightening experience for most people, impacting profoundly on HRQoL. The sudden and often profound physiological and psychological impact of the acute onset of MI, as well as the psychosocial impact of hospitalization, often, and understandably, harms HRQL. Other possible

explanations could be that the sample in this study had different comorbidities. The more comorbidities patients manifest, the poorer their HRQL is likely to be. Unlike the findings of this study in a study conducted in Myanmar indicated that overall HRQoL was moderate ($M = 82.02$ and $SD = 8.84$) [39]. Another inconsistent finding was observed in a study conducted in Singapore. Despite a high percentage of this sample having hypertension, diabetes, and other coronary risk factors, participants reported having a better HRQoL [21]. The possible reason for the variation might be due to the approach to the summation of the items, data collection

TABLE 10: Predictors of overall domain among myocardial infarction patients at Cardiac Center, Ethiopia, 2020 ($n = 421$).

Variables	Categories	Crude unstandardized ? coefficient (95% CI)	Adjusted unstandardized ? coefficient (95% CI)	<i>p</i> value
Gender	Male	0	0	0.840
	Female	-2.65 (-5.51, -.204)*	.303 (-2.65, 3.26)	
Residence	Urban	0	0	0.007**
	Rural	-.039 (-.133, -.053)*	-5.69 (-9.79, -1.59)	
Marital status	Single	0	0	0.966
	Married	-10.8 (-14.4, -7.30)*	.067 (-3.01, 3.14)	
	Divorced	-.331 (-3.57, 2.91)	-1.92 (-7.35, 3.50)	
	Widowed	-11.3 (-19.2, -3.42)*	-5.19 (-12.8, 2.44)	
Educational level	Unable to read and write	0	0	0.223
	Read and write only	4.82 (-.109, 9.74)	2.84 (-1.73, 7.41)	
	Primary education	6.10 (1.13, 11.0)	.195 (-4.73, 5.13)	
	Secondary education	11.3 (-5.6, -.95)*	5.39 (-8.09, -.990)	
	College and above	11.9 (-7.80, -1.30)*	4.93 (-2.98, -9.56)	
Occupation	Government worker	0	0	0.853
	Private worker	2.34 (-11.9, -.598)*	.365 (-3.51, 4.24)	
	Farmer	-6.42 (-13.6, .796)	5.32 (-2.15, 12.7)	
	House wife	-5.95 (-10.5, -1.38)*	-.227 (-4.95, 4.49)	
	No occupation	-2.66 (-7.41, -2.08)*	-2.95 (-7.47, 1.57)	
	Others	.635 (-4.55, 5.82)	-2.06 (-7.01, 2.88)	
Heart failure	No	0	0	0.031**
	Yes	-6.74 (-12.3, -1.17)*	-5.80 (-11.0, -.529)	
Hypertension	No	0	0	0.021**
	Yes	-4.22 (-8.39, -.054)*	-6.62 (-11.3, -9.86)	
DM	No	0	0	0.527
	Yes	-.753 (-6.27, 7.78)	-2.15 (-8.82, 4.52)	
High cholesterol	No	0	0	0.825
	Yes	-3.38 (-5.25, -1.51)	-.328 (-9.43, 2.40)	
Other comorbidities*	No	0	0	0.230
	Yes	-.279 (-2.74, 3.30)	-6.25 (-10.2, -2.23)	
Age		-.390 (-.133, -.538)*	.951 (-.139, -.088)	0.041**
Average monthly income level		.077 (.035, .012)	.024 (.016, .066)	0.239

Note: *significant at $p < 0.05$ (crude unstandardized ? coefficient (95% CI)); **significant at p value < 0.05 (adjusted unstandardized ? coefficient (95% CI)); * other comorbidities: stroke and kidney disease.

instrument, sample size difference, study design, sociocultural differences, and difference between participants' perception of the quality of life.

According to the findings of this study, the mean score for the physical health domain was (47.96 ± 16.50) the least when compared to the other domains of HRQoL. MI impaired all domains of HRQoL of the study participants, but physical health was the most affected domain according to different studies, which are consistent with this finding. Studies done in the United States and Australia found a

decrease in the dimensions of physical functioning after experiencing acute coronary syndrome (ACS). This consistency could be justified by MI manifesting more physically than other domains [23, 28]. This could be further explained by patients with MI having higher rates of complications which can affect their physical ability to do regular activities.

This study revealed that in all domains of HRQoL, the mean score of the social health domain was higher than the rest of the domains (52.02 ± 24.61), which is similar to a study done in South Korea. This might be due to the

similarity between South Korean and Ethiopian culture which can be referred to as familism, coping problems depending on social support from their families and friends. This is also in line with a finding of a study conducted in Brazil, in which the highest scores of HRQoL were seen in the social functioning domain. This could be that the participants might have opportunities for social life [24]. According to this study, age has an inverse relation with overall HRQoL. The older the patient gets, the lower his or her HRQoL could be. In line with the current finding, studies conducted in India and South Korea revealed that age was inversely related to HRQoL and younger patients with MI had a higher quality of life. This can be explained by higher physical functioning in younger patients, and aging may decline the physiological system, which could limit the different activities of the body. Besides, old age is accompanied by problems of mobility, metabolism, decreased immunity, and psychological problems. Based on these study findings, females have lower physical health domains compared to male participants. This is in line with the study conducted in India which revealed that women demonstrated more physical limitations than men. Differences in physical functioning between men and women may be related to differences in baseline characteristics [46].

According to the results of this study, living in a rural area was inversely associated with overall HRQoL. Such findings may reflect that people living in the urban area are more likely to enjoy better HRQoL than rural people. The reason for this could be rehabilitation programs are easily accessible in urban areas. Many studies did not assess health-related quality of life differences among MI patients regarding the place of residence. The current research indicates a significant influence of education as a predictor of HRQoL. Study participants with secondary education as well as college and above educational level had better HRQoL than those with primary education and others. This finding is similar to a study done in Korea [36] and Poland [33]. Higher and better education can be an advantage for access to wider resources within the community and higher awareness of risk factors of MI. People who have a higher level of education tend to be more aware of risk factors in their health and to obtain more from health-related education than those who have a lower education level [47].

Presence of heart failure is associated with poorer HRQoL. This finding is consistent with a study done in Xi'an city, China. Heart failure is a chronic condition that can significantly affect various aspects of patients' health and thus negatively affect the HRQoL outcome. A possible explanation for this could be patients with heart failure experiencing various such as dyspnea, fatigue, edema, and sleeping difficulties. All these additional disease burdens result in a decrease HRQoL [21]. Hypertension was found to be a predictor of poor HRQoL. This is a similar finding to a study conducted in Singapore which demonstrated that hypertension is associated with poor HRQoL. A possible reason for this might be the chronic nature, severity, and long-term antihypertensive medication use together with lifestyle and behavior change to adjust to the illness may impose an added stress burden on patients, and this affects their HRQoL

negatively. This could also be due to the contributions of different chronic diseases in patients with MI and the side effects of the different drugs or drug interactions, which impair overall HRQoL [35, 48].

4.1. Strength of the Study. This study used an internationally valid and consistent tool to measure health-related quality of life (WHOQoL-BREF-26). The current study considered the outcome variable as continuous, which might minimize misclassification bias. Besides, this study assessed the impact of residence on HRQoL, which has not been addressed by most of the similar studies.

4.2. Limitations of the Study. We acknowledge the different limitations of this study. First, the data were collected through a face-to-face interview by considering the different educational levels of respondents, and this might be prone to social desirability bias and could overestimate the result. In the tool, some questions ask about their life in the last one month. These might be prone to recall bias and could over or underestimate the result. Moreover, the cross-sectional study design could not explain the causal relationships. Thus, more longitudinal or cohort studies may be required to develop better plans for the recovery of HRQoL among patients with MI.

5. Conclusion

Based on the results of this study, patients with MI at Cardiac Center, Ethiopia, had relatively lower HRQoL. Being old aged, living in a rural area, having heart failure, and hypertension were significant predictors for worsening HRQL. Attending secondary and college and above educational levels were positively associated with better HRQoL. Understanding these factors can assist healthcare professionals to adapt interventions designed to improve HRQoL and assist recovery. It is recommended to implement a cardiac rehabilitation program (CRP). This program is a comprehensive intervention for the improvement of HRQoL in patients who have heart disease that includes exercise, educational programs to promote patient motivation regarding lifestyle modification, counseling, and monitoring by health professionals to optimize patients' physical functionality, to improve their quality of life, and to reduce the recurrence of major cardiac events. The healthcare providers should give special attention to older age patients, those who had heart failure, hypertension, and patients living in a rural area.

Abbreviations

CHD:	Coronary heart disease
DM:	Diabetes mellitus
HF:	Heart failure
HIV:	Human immunodeficiency virus
HRQoL:	Health-related quality of life
MI:	Myocardial infarction
OPD:	Outpatient department
WHOQoL-BREF:	World Health Organization Quality of Life-BREF
WHO:	World Health Organization.

Data Availability

All data about this study are contained and presented in this document.

Ethical Approval

Ethical clearance and approval were obtained from the ethical review committee of the school of nursing to behaving of the institutional review board (IRB) of the University of Gondar (R/N:-S/N/2012/06/2012). An official letter of permission was obtained from the administration of the Children's Heart Fund of Ethiopia. Before data collection, the aim of the study was explained to the participants and after their willingness, verbal permission was obtained before filling the questionnaire. Confidentiality was maintained by omitting their identification.

Consent

No consent was necessary.

Conflicts of Interest

The authors have declared that no competing interests exist.

Authors' Contributions

HLE conceived and designed the study, analyzed and interpreted the data, and wrote the manuscript; BL, ZB, and GET revised the proposal, data analysis, and interpretation, advised the whole research paper and also were involved in the interpretation of the data, and contributed to manuscript preparation. All authors read and approved the final manuscript.

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