

# Assessing Quality of Life and Its Predictors in Patients with Heart Failure with Reduced Ejection Fraction: A Single-Center, Cross-Sectional Study in Bangladesh

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## ABSTRACT

**Introduction:** Heart failure significantly impairs quality of life, yet data on the patient experience, particularly from low- and middle-income countries like Bangladesh, are scarce. Understanding the key drivers of poor HRQoL is essential for developing effective, patient-centered management strategies. This study aimed to assess health-related quality of life (HRQoL) and identify its associated sociodemographic and clinical factors among patients with heart failure with reduced ejection fraction (HFrEF) in Bangladesh.

**Methods:** We conducted a prospective, single-center, cross-sectional study at a tertiary care hospital in Dhaka. A total of 800 patients with a confirmed diagnosis of HFrEF were enrolled. HRQoL was measured using the Minnesota Living with Heart Failure Questionnaire (MLHFQ). Sociodemographic, clinical, biochemical, and echocardiographic data were collected. A multiple linear regression model was used to identify independent factors associated with HRQoL scores.

**Results:** The mean total MLHFQ score was  $46.12 \pm 26.06$ , with 43.3% of patients reporting poor HRQoL. In the multivariable analysis, poorer HRQoL was significantly associated with older age, being single or widowed, lower income, higher NYHA functional class, recent hospitalization, atrial fibrillation, and moderate or severe pulmonary hypertension. Conversely, higher systolic blood pressure and longer duration of HF were associated with better HRQoL scores. The final model explained a significant portion of the variance in total HRQoL (Adjusted  $R^2 = 0.879$ ).

**Conclusion:** A large proportion of HFrEF patients in this Bangladeshi cohort experience poor health-related quality of life. Both clinical severity and sociodemographic factors are strong determinants of patient well-being. These findings underscore the need to integrate routine HRQoL assessment and address social determinants of health within heart failure management programs in the region.

**Keywords:** Heart Failure, Hfref, Quality of Life, Mlhfq, Cross-Sectional Study, Bangladesh

## Introduction

Heart failure (HF) is a global health problem affecting millions worldwide, characterized by high rates of hospitalization,

mortality, and profound impairment of quality of life [1]. For patients living with HF, improving health-related quality of life (HRQoL) is a primary treatment goal, reflecting the impact of the disease on their daily physical and emotional functioning [2]. Assessing HRQoL provides a crucial patient-centered perspective that complements traditional clinical endpoints [3,4].

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The Minnesota Living with Heart Failure Questionnaire (MLHFQ) is a widely validated, disease-specific instrument used to quantify HRQoL in this population [5-7]. While extensive research has been conducted in high-income countries, there is a significant lack of data on HRQoL among HF patients in South Asia, particularly in Bangladesh [8-10].

Understanding the specific factors that influence HRQoL in this context is vital for tailoring interventions and improving patient outcomes [11]. This study, therefore, aimed to assess the HRQoL and identify its associated factors in a cohort of patients with heart failure with reduced ejection fraction (HFrEF) at a major tertiary care center in Bangladesh.

## Methods

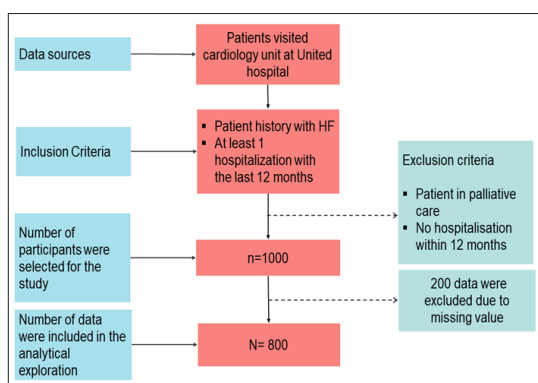
### Study Design and Settings

This was a prospective, single-center, cross-sectional study conducted at the Department of Cardiology, United Hospital, a large specialized tertiary hospital in Dhaka, Bangladesh. Patient recruitment and data collection occurred during routine outpatient clinic visits.

### Participants and Survey Procedures

Consecutive patients attending the cardiology clinic were screened for eligibility. The inclusion criteria were: (i) age 18 years or older, (ii) a confirmed diagnosis of HFrEF (LVEF  $\leq 40\%$ ), (iii) ability to read, write, and communicate effectively, and (iv) provision of written informed consent to participate.

The exclusion criteria were: (i) patients in a severe condition requiring intensive care; and (ii) patients with other major chronic diseases that could independently and significantly affect quality of life, such as chronic kidney disease (CKD), cirrhosis, chronic obstructive pulmonary disease (COPD), or diabetes mellitus. A total of 1,100 patients were initially screened, and after excluding those with incomplete data, 800 patients were included in the final analysis (Figure 1).



**Figure 1:** Flow chart for patients' selection

### Study Variables

**Dependent Variable:** Health-Related Quality of Life, measured using the MLHFQ. The MLHFQ is a 21-item questionnaire that yields a total score (range 0-105) and two sub-scores: a physical dimension (8 items, range 0-40) and an emotional dimension (5 items, range 0-25). Higher scores indicate poorer HRQoL. Total scores were categorized as Good ( $\leq 23$ ), Moderate (24-45), and Poor ( $\geq 46$ ).

**Independent Variables:** Data were collected on sociodemographic characteristics (age, sex, income, etc.), clinical parameters (blood pressure, heart rate, NYHA class, comorbidities), biochemical markers, and echocardiographic findings (LVEF, pulmonary hypertension).

### Data Management

Data were analyzed using SPSS version 25. Descriptive statistics were used to summarize patient characteristics. Bivariate analyses (t-tests, ANOVA, Pearson's correlation) were performed to examine the relationship between independent variables and HRQoL scores. Variables with a p-value  $< 0.25$  in the bivariate analysis were entered into a multiple linear regression model using a stepwise selection method to identify independent factors associated with the physical, emotional, and total HRQoL scores. A p-value  $< 0.05$  was considered statistically significant. Model assumptions were verified.

## Results

### Participant's Characteristics

A total of 800 HFrEF patients were included. The mean age was  $51.04 \pm 13.2$  years, and 52.1% were female. The majority of participants were in NYHA class III or IV (61.7%), and 35.8% had been hospitalized within the past 6 months. Ischemic heart disease (IHD) was the most common etiology (39.2%). Detailed sociodemographic, clinical, and echocardiographic characteristics are presented in Tables 1, 2, and 3.

**Table 1: Patients' Basic Characteristics**

Variable	Category	Frequency	Percent
Age	30 to 49	145	18.0
	50 to 69	376	47.0
	70 & above	279	35.0
Sex	Male	383	47.9
	Female	417	52.1
Residence	Rural	394	49.2
	Urban	406	50.8
Marital Status	Married	490	61.3
	Single	97	12.1
	Divorced	97	12.1
	Widowed	117	14.6
Occupation	Farmer	203	25.4
	Merchant	174	21.7
	Housewife	274	34.2
	Service holder	150	18.8
Level of education	No formal education	343	42.9
	Primary education	177	22.1
	Secondary school	274	34.2
	College and above	150	18.8
Monthly income (BDT)	Mean $\pm$ SD 3,473.3 $\pm$ 1605.4		

**Table 2: Clinical characteristics of patients with HFrEF**

Variables	Category	Frequency	Percentage
Systolic BP (mmHg)	Median (IQR) 105 (20)		
Heart rate (bpm)	Median (IQR) 89 (23)		
Duration of HFrEF (years)	Median (IQR) 1.5(1)		
NYHA class	I	106	13.3
	II	200	25.0
	III	357	44.6
	IV	137	17.1
Hospitalization within 6 months	No	514	64.2
	Yes	286	35.8
Etiology of HFrEF	IHD	314	39.2
	DCMP	190	23.8
	CRVHD	206	25.8
	DVHD	90	11.3
Comorbidity	No	263	32.9
	Yes	537	67.1
Anemia	No	626	78.3
	Yes	174	21.7
Hypertension	No	614	76.7
	Yes	186	23.3
Atrial fibrillation	No	597	74.6
	Yes	203	25.4
Thyrotoxicosis	No	717	89.6
	Yes	83	10.4
Obesity	No	730	91.2
	Yes	70	8.8
Dyslipidaemia	No	654	81.7
	Yes	146	18.3
Other comorbidities	No	757	94.6
	Yes	43	5.4
<b>Medication</b>			
ACEIs/ARBs	No	70	8.7
	Yes	730	91.3
b-Blockers	No	183	22.9
	Yes	617	77.1
Spironolactone	No	537	67.1
	Yes	263	32.9
Diuretics (Furosemide)	No	380	47.5
	Yes	420	52.5
Digoxin	No	760	95.0
	Yes	40	5.0
Antiplatelet	No	477	59.6
	Yes	325	40.6
Anticoagulants	No	597	74.6
	Yes	203	25.4

Statins	No	390	48.8
	Yes	410	51.2
Antibiotics	No	760	95.0
	Yes	40	5.0
Anti-thyroids	No	720	90.0
	Yes	80	10.0
Others	No	783	97.9
	Yes	17	2.1

**Table 3: Biochemical and echocardiographic characteristics of patients with HFrEF**

Variables	Category	Frequency	Percentage
Hemoglobin, g/dl	Median (IQR) 14.1 (2)		
Creatinine, mg/dl	Median (IQR) 0.89 (0.23)		
Glomerular filtration rate, ml/min/1.73 m <sup>2</sup>	Mean $\pm$ SD = 92.48 $\pm$ 20.52		
Serum sodium, mEq/L	Mean $\pm$ SD = 136.22 $\pm$ 4.70		
Baseline echocardiography LVEF, %	Median (IQR) 30 (7.75)		
Baseline echo LVEF class	From 30% to 40% (Moderate systolic dysfunction)	510	63.7
	Less than 30% (Severe systolic dysfunction)	290	36.3
Baseline echo PH	Mild or none	500	62.5
	Moderate or severe	300	37.5

**Health-related quality of life**

The mean MLHFQ scores were 17.60  $\pm$  10.33 for the physical domain, 10.58  $\pm$  6.33 for the emotional domain, and 46.12  $\pm$  26.06 for the total score. A substantial proportion of patients (43.3%) had poor HRQoL, while 29.2% had moderate and 27.5% had good HRQoL (Table 4).

**Table 4: Health-Related Quality of Life of Patients with HFrEF**

HRQoL domains	Mean $\pm$ SD	95% CI	Cronbach's Alpha
Physical (range 0–40)	17.60 $\pm$ 10.33	16.28–18.90	0.98
Emotional (range 0–25)	10.58 $\pm$ 6.33	9.77–11.38	0.98
Total (range 0–105)	46.12 $\pm$ 26.06	42.80–49.43	0.99

Level of Total HRQoL	Frequency	Percent	
(Good, score 0–23)	220	27.5	
(Moderate, score 24–45)	234	29.2	63.7
(Poor, score 46–105)	346	43.3	36.3

### Factors associated with health-related quality of life

The multiple linear regression analysis identified several independent factors significantly associated with HRQoL (Table 5). Poorer total HRQoL (higher scores) was associated with older age, being single or widowed, lower monthly income, higher NYHA class, recent hospitalization, atrial fibrillation, use of diuretics and anticoagulants, severe LV systolic dysfunction, and moderate-to-severe pulmonary hypertension.

**Table 5: Factors Associated with Health-Related Quality of Life from Multiple Linear Regression Analysis**

Variable	$\beta$ (Physical-HRQoL)	95% CI	P-value	$\beta$ (Emotional-HRQoL)	95% CI	P-value
Age	0.150	(0.10, 0.20)***	0.000	0.550		0.174
Marital status: Single	3.450	(1.84, 5.06)***	0.000	0.032		
Marital status: Divorced	0.027		0.264	0.014		0.637
Marital status: Widowed	2.450	(1.00, 3.90)*	0.001	1.360	(0.33, 2.40)*	0.015
Occupation: Farmer	1.830	(0.49, 3.17)**	0.008	-0.034		0.320
Occupation: Employee	1.830	(0.81, 1.24)**	0.008	-0.0100		0.848
Education: Secondary	0.011		0.563	1.700	(0.22, 2.32)*	0.025
Education: College+	0.717		0.478	2.210	(1.08, 3.33)**	0.000
Monthly income	-0.002	(-0.003, -0.001)*	0.012	-0.004	(-0.005, -0.001)**	0.000

### Discussion

This study provides critical insights into the health-related quality of life of HFREF patients in Bangladesh, revealing that nearly half of the cohort experiences poor HRQoL despite high rates of guideline-directed medical therapy. Our findings highlight that HRQoL is determined by a complex interplay of clinical severity and sociodemographic factors.

Consistent with other studies, advanced NYHA class, recent hospitalization, and comorbidities like atrial fibrillation were strong predictors of worse HRQoL, underscoring the impact of disease severity on patient well-being [12–15]. The association with sociodemographic factors such as age, marital status, and income is particularly important in a low- and middle-income country context, where financial hardship and lack of social support can compound the burden of chronic illness [16–18].

The high uptake of medications like ACEIs/ARBs (91.3%) and beta-blockers (77.1%) in this tertiary care setting is commendable. However, the persistence of poor HRQoL suggests that pharmacotherapy alone is insufficient [19]. This points to the need for more comprehensive, multidisciplinary care models that integrate patient education, psychosocial support, and community-based follow-up to address the multifaceted needs of these patients.

### Limitations and Strengths

This study has several important limitations. First, its cross-sectional design means we can only identify associations, not establish causality. Second, the single-center design in a private tertiary hospital may limit the generalizability of our findings to the broader Bangladeshi population. Third, the exclusion of patients with common comorbidities like diabetes and CKD

creates a highly selected sample that is not representative of the typical HFREF patient, who often presents with multiple chronic conditions. This significantly limits the external validity of our findings. Finally, the use of a stepwise regression model, while common, can sometimes lead to unstable models; the very high R-squared value (0.879) may suggest a degree of model overfitting.

### Conclusions

This study demonstrates a significant burden of poor health-related quality of life among patients with HFREF in Bangladesh. Both clinical and sociodemographic factors are powerful determinants of patient-reported outcomes. These findings underscore the urgent need for a paradigm shift in HF management in the region, moving beyond a purely pharmacological approach to an integrated, patient-centered model that includes routine HRQoL monitoring and addresses the social determinants of health.

### Declaration

#### Data availability

Data can be shared with the corresponding author upon request and for a valid reason.

### Funding

We did not receive any financial support to conduct this study.

### Conflicts of interest

The authors have no conflicts of interest.

### Ethics approval

To ensure compliance with ethical standards and participant confidentiality, we obtained ethical approval from the Bangladesh Medical Research Council (BMRC) (Ref-25003092019). The

data were de-identified to maintain anonymity prior to analysis. Before data collection, the purpose of the study was fully clarified to the participants, and their informed written consent was taken. Each of the steps of this study was completed following the Helsinki Declaration (1964).

### Authors' contributions

All authors critically reviewed the manuscript, contributed significantly, and approved the final version.

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