



OPEN Sociodemographic, disease-related and lifestyle determinants of health-related quality of life among older patients hospitalized with heart failure

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The primary objective of this study was to evaluate the influence of sociodemographic, clinical, and lifestyle factors on health-related quality of life (HRQoL) in older adults hospitalized with heart failure. A total of 210 patients (mean age 80.99 ± 8.32 years; 65.24% female) participated in the study. The standardized EQ-5D-5 L questionnaire was used as the main instrument to assess HRQoL. The average health status assessment on the EQ VAS scale in the study group of patients was 56.03 ± 18.81 . Patients reported the greatest mobility problems, with 25.71% of them having severe walking problems and 7.62% of patients being unable to walk. 22.39% of respondents had serious problems with performing everyday activities or were unable to perform them at all. Nearly one fifth of patients experienced severe or extreme pain or discomfort (19.05%). Physical activity turned out to have a significant impact on motor skills ($p < 0.001$), self-care ($p < 0.001$), usual activities ($p < 0.001$) and anxiety/depression ($p = 0.001$). In conclusion, the quality of life of older patients hospitalized due to HF is reduced compared to the general population. The most prominent issues are pain/discomfort and anxiety/depression. A number of socioeconomic factors influence the quality of life of patients with HF.

Keywords Health-related quality of life, Health-failure, QoL determinants, EQ-5D-5L

Abbreviations

CAPI	Computer-assisted personal interviewing
COPD	Chronic obstructive pulmonary disease
HF	Heart failure
HFpEF	Heart failure with preserved ejection fraction
HFrfEF	Heart failure with reduced ejection fraction
HRQoL	Health-related quality of life

Heart failure (HF) is one of the most important clinical problems, constituting a major public health challenge¹. It is estimated that 64.3 million people live with heart failure worldwide^{2,3}. The incidence of heart failure is estimated at between 2% and 4%, and this percentage increases to as much as 12% in the population of patients 65 years and older^{4,5}. In Poland, HF occurs in 3,233/100,000 people, with an increasing trend observed both in the incidence and mortality due to HF⁶.

Today, due to a growing proportion of the aging population, the total number of patients with heart failure continues to increase. Nevertheless, more and more cases of HF are reported in younger people, which may be related to, among others, with the growing obesity epidemic. Other factors associated with the occurrence of HF include coronary artery disease, hypertension and diabetes, which often coexist and may interact, increasing

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the likelihood of developing HF⁷. Lifestyle factors are also associated with the development of HF⁸, in particular smoking⁴ and lack of physical activity⁹.

The high mortality rate among patients with HF is also disturbing, amounting to approximately 50% 5 years after diagnosis. This is particularly important given the progress in the treatment of this disease⁷.

In many cases, HF is associated with multiple diseases, requiring a holistic approach to treatment. The prevalence of HF creates the need for a multidimensional approach to the patient, including deeper research into the quality of life of this group of people¹⁰. Previous reports indicate that the health-related quality of life (HRQoL) in patients with HF is reduced compared to the general population¹¹ and may be additionally determined by sociodemographic and lifestyle factors¹². However, these factors are not widely described in the literature among the population of patients with HF¹³. The quality of life is an important aspect because it is considered a predictor of hospitalization and death among patients, including patients with HF. For this reason, it seems necessary to determine lifestyle-related factors that may determine the quality of life of patients with HF¹⁴.

Aim of the study

The main aim of the study was to assess the determinants of the health-related quality of life among older patients with heart failure. In the study, we also evaluated the relationship between patients' quality of life and the following sets of parameters:

- socio-demographic determinants: gender, age, pension amount, living with someone/alone;
- lifestyle determinants: smoking cessation, overweight/obesity, physical activity, diet, number of medications taken, stressful events in the previous year, self-assessment of lifestyle;
- disease-related determinants: type of heart failure and comorbidities (diabetes mellitus, COPD, hypertension).

Materials and methods

Patients and setting

The study was carried out between June 2022 and April 2024 among patients with heart failure hospitalized at the Department of Internal Medicine and Geriatric Cardiology, Centre of Postgraduate Medical Education.

The inclusion criteria for the study were:

- Age > 18 years.
- Hospitalization for heart failure.

The exclusion criterion was the lack of consent to participate in the study.

Ultimately, 210 patients participated in the study.

All methods were performed in accordance with the relevant guidelines and regulations. Consent to the study was given by the Bioethics Committee at the Centre of Postgraduate Medical Education of Warsaw (resolution No. 73/2022 of June 8, 2022).

Research tool

The basic research tool was the EQ-5D-5 L questionnaire - a standardized measure of health status developed by the EuroQol Group (Polish version). The questionnaire covers 5 dimensions of quality of life, including: mobility (MO), self-care (SC), usual activities (UA), pain/discomfort (PD), and anxiety/depression (AD). Each dimension is rated on a 5-point scale: 1 - no problems, 2 - slight problems, 3 - moderate problems, 4 - serious problems and 5 - extreme problems.

Health-related quality of life, as measured by the EQ-5D-5 L questionnaire, is represented through a combination of responses across five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension is rated on a five-point scale, and the resulting health state is expressed as a five-digit code—for example, "11111" indicates no problems in any dimension, while "55555" reflects extreme problems across all dimensions.

In addition to the descriptive system, the EQ-5D-5 L includes a visual analogue scale (EQ VAS), ranging from 0 to 100, on which patients rate their current overall health status—where 0 represents the worst imaginable health and 100 the best imaginable health.

Data analysis followed the guidelines outlined in the EQ-5D-5 L User Guide, Version 3.0 (September 2019)¹⁵. The study also collected data on patients' sociodemographic characteristics, comorbidities, and lifestyle-related factors.

Data collection

Patients received a paper-and-pencil questionnaire to complete on their own. Responses to questions regarding demographic characteristics were collected using the computer-assisted personal interview (CAPI) technique.

Statistical analysis

Statistica 13.3 was used for statistical analysis [TIBCO Software Inc. (2017). Statistica (data analysis software system), version 13. <http://statistica.io>]. The characteristics of the study group were made using numbers, percentages and descriptive statistics, such as mean, standard deviation, first and third quartiles, median, mode, minimum and maximum. Nonparametric statistics such as Spearman's correlation coefficient, Mann-Whitney U test, and Kruskal-Wallis test were used due to the ordinal nature of most of the dependent variables. The significance level α was set at 0.05.

Results

Characteristics of the study group

The study sample consisted of 210 patients aged 39 to 97 years, with the vast majority (95.24%) being over the age of 65. Women accounted for a greater proportion of participants (65.24%) compared to men (34.76%). Most patients reported an average income (59.05%), and living arrangements were almost evenly split between those living with someone (49.52%) and those living alone (48.57%).

A history of smoking was reported by 100 patients, half of whom had smoked for at least 25 years; however, 81% of these individuals had successfully quit. Nearly half of the participants were overweight or obese (42.86%), and one-third (33.81%) reported no physical activity. The number of medications taken ranged from 0 to 12, with half of the patients using at least six.

Dietary modifications were common, including increased consumption of fruits and vegetables (50.0%), reduction in alcohol intake (48.57%), and limiting sugar consumption (48.10%). In terms of lifestyle self-assessment, nearly half of the patients (46.67%) rated their lifestyle as average, while over one-third (39.52%) considered it healthy.

The vast majority of patients were diagnosed with hypertension (83.81%), almost half with diabetes mellitus (43.33%), and one-tenth with COPD (10.95%). The most common type of heart failure in the study group was HFpEF (64.29%). The socio-demographic characteristics, lifestyle and health status of the patients are presented in Table 1.

Quality of life scores in all domains

Table 2 shows the results of the EQ VAS and EQ-5D-5 L scale in all domains. The average health assessment on the EQ VAS scale in the study group of patients was 56.03 ± 18.81 . Patients reported the greatest problems with mobility, including 25.71% of them had severe problems in walking about, and 7.62% of patients were unable to walk about, and only 26.19% had no problems with mobility. 22.39% of respondents had severe problems with daily activities or were unable to do them at all. Almost one fifth of patients experienced severe or extreme pain or discomfort (19.05%). On the other hand, most patients had no problems with washing or dressing (61.90%), and slightly less than half had no problems with usual activities (47.14%) and anxiety/depression (43.80%).

The data analysis showed that full health status (i.e. 11111) was indicated by 9.5% of respondents, including 13 women and 7 men. Patients in good health achieved an average EQ VAS score of 70.26. None of the patients reported the worst possible health condition (55555).

Of all patients, 22.86% were in health states of no problems or little problems on all dimensions (health states level 1 or 2 in all domains).

Determinants of health-related quality of life

Table 3 shows the EQ-5D-5 L scores in all domains depending on the socio-demographic characteristics, lifestyle and health status of the examined patients. A weak, positive correlation was found between age ($R = 0.20$, $p = 0.003$), stressful events in the previous year ($R = 0.210$, $p = 0.002$) and number of medications taken ($R = 0.147$, $p = 0.033$) and the severity of problems with mobility. There was also a weak positive correlation between age and problems with self-care ($R = 0.236$, $p = 0.001$), usual activities ($R = 0.182$, $p = 0.008$), anxiety/depression ($R = 0.159$, $p = 0.021$). Moreover, the number of stressful events in the previous year influenced the severity of difficulties in usual activities ($R = 0.143$, $p = 0.039$), pain/discomfort ($R = 0.279$, $p < 0.001$) and anxiety/depression ($R = 0.155$, $p = 0.025$).

Females showed significantly greater severity of problems with pain/discomfort ($p = 0.008$) and anxiety/depression ($p = 0.003$). The Kruskal-Wallis test also showed significant differences in pain/discomfort ($p = 0.045$) and anxiety/depression ($p = 0.042$) depending on the pension amount, but Dunn's post-hoc test only indicated a significantly more intense pain experience among people with low income compared to people with high income ($p = 0.041$). Physical activity turned out to have a significant impact on mobility ($p < 0.001$), self-care ($p < 0.001$), usual activities ($p < 0.001$) and anxiety/depression ($p = 0.001$), and Dunn's post-hoc test indicated that patients with high physical activity, at least 5 times a week, experienced significantly fewer problems than patients with no or little physical activity, 1–2 times a week. Patients with obesity or overweight had significantly greater problems with mobility ($p = 0.030$), while reducing fats ($p = 0.037$), calories ($p = 0.004$) and sugar ($p = 0.035$) in the diet significantly increased the feeling of pain and discomfort. There are also statistically significant differences in mobility ($p = 0.026$), usual activities ($p = 0.009$) and anxiety/depression ($p = 0.017$) depending on self-assessment of lifestyle, and Dunn's post-hoc test in particular indicates a significantly lower feeling of problems by patients leading a healthy lifestyle. Moreover, patients with hypertension have significantly fewer problems with daily activities ($p = 0.028$), and those with HFpEF have significantly more severe problems related to self-care ($p = 0.037$). In the case of the remaining analyses, the results turned out to be statistically insignificant.

There was a weak, negative correlation between age and self-assessment of health ($R = -0.181$, $p = 0.011$), as well as a weak, positive correlation between the number of diet changes and self-assessment of health ($R = 0.158$, $p = 0.033$). The correlation was not statistically significant in the case of years of smoking ($p = 0.400$), stressful events in the previous year ($p = 0.165$), or number of medications taken ($p = 0.485$).

Patients who did not show any physical activity ($p < 0.001$) and defined their lifestyle as unhealthy ($p = 0.011$) rated their health as the worst, while better health was observed in those who consumed fruit and vegetables ($p = 0.018$) and reduced sugar in diet ($p = 0.027$). However, there was no significant effect of age group ($p = 0.926$), gender ($p = 0.812$), pension amount ($p = 0.968$), living with someone/alone ($p = 0.830$), smoking cessation ($p = 0.765$), overweight/obesity ($p = 0.211$), diabetes mellitus ($p = 0.055$), COPD ($p = 0.662$), hypertension ($p = 0.945$) and type of heart failure ($p = 0.372$) on self-assessment of health. Data regarding self-assessment of health depending on selected variables are presented in Table 4.

Variables	M ± SD	Me	Mo	Min–Max
Socio-demographic characteristics				
Age	80.99 ± 8.32	82.0	84 (N = 16)	39.0–97.0
	N	%		
Age group				
≤ 65	10	4.76		
> 65	200	95.24		
Gender				
Female	137	65.24		
Male	73	34.76		
Pension amount				
Very low	8	3.81		
Low	41	19.52		
Average	124	59.05		
High	24	11.43		
No data	13	6.19		
Living with someone/alone				
With someone	104	49.52		
Alone	102	48.57		
DPS	2	0.95		
No data	2	0.95		
	M ± SD	Me	Mo	Min–Max
Nicotinism [years] (N = 100)	28.04 ± 19.68	25.0	20.0 (N = 14)	0.17–80.0
Diet changes (N = 193)	3.61 ± 2.70	4.0	0 (N = 35)	0–8
Stressful events in the previous year (N = 209)	0.75 ± 1.01	0.0	0 (N = 115)	0–4
Number of medication taken	5.90 ± 2.22	6.0	5.0 (N = 41)	0–12
	N	%		
Smoking cessation (N = 100)				
Yes	81	81.0		
No	19	19.0		
Overweight/obesity				
Yes	90	42.86		
No	120	57.14		
Life-style				
Physical activity [x per week]				
Lack of physical activity	71	33.81		
1–2 per week	24	11.43		
3–4 per week	18	8.57		
5–6 per week	16	7.62		
Every day	74	35.24		
No data	7	3.33		
Diet				
Fat reduction	89	42.38		
Calorie reduction	76	36.19		
Changing the type of fats	65	30.95		
Salt reduction	83	39.52		
Fish consumption	77	36.67		
Fruit and vegetable consumption	105	50.0		
Sugar reduction	101	48.10		
Alcohol reduction	102	48.57		
Self-assessment of lifestyle				
Unhealthy	27	12.86		
Average	98	46.67		
Healthy	83	39.52		
No data	2	0.95		

	N	%		
Comorbidities				
Diabetes mellitus				
Continued				
No	119	56.67		
Yes	91	43.33		
COPD				
No	187	89.05		
Yes	23	10.95		
Hypertension				
No	34	16.19		
Yes	176	83.81		
Type of heart failure				
HFrEF	23	10.95		
HFmrEF	20	9.52		
HFpEF	135	64.29		
Unknown	14	6.67		
No data	19	8.57		

Table 1. Characteristics of the study group (N = 210).

EQ VAS	M ± SD	Me	Q1–Q3	Mo	Min–Max
Self-assessment of health [0–100] (N = 199)	56.03 ± 18.81	50.0	50.0–70.0	50.0 (N = 59)	10–100
EQ-5D-5 L			N	%	
Mobility (N = 210)					
I have no problems in walking about	55	26.19			
I have slight problems in walking about	30	14.29			
I have moderate problems in walking about	55	26.19			
I have severe problems in walking about	54	25.71			
I am unable to walk about	16	7.62			
Self-care					
I have no problems washing or dressing myself	130	61.90			
I have slight problems washing or dressing myself	36	17.14			
I have moderate problems washing or dressing myself	17	8.10			
I have severe problems washing or dressing myself	11	5.24			
I am unable to wash or dress myself	16	7.62			
Usual activities					
I have no problems doing my usual activities	99	47.14			
I have slight problems doing my usual activities	31	14.76			
I have moderate problems doing my usual activities	33	15.71			
I have severe problems doing my usual activities	30	14.29			
I am unable to do my usual activities	17	8.10			
Pain/discomfort					
I have no pain or discomfort	69	32.85			
I have slight pain or discomfort	40	19.05			
I have moderate pain or discomfort	61	29.05			
I have severe pain or discomfort	38	18.10			
I have extreme pain or discomfort	2	0.95			
Anxiety/depression					
I am not anxious or depressed	92	43.80			
I am slightly anxious or depressed	72	34.29			
I am moderately anxious or depressed	30	14.29			
I am severely anxious or depressed	13	6.19			
I am extremely anxious or depressed	3	1.43			

Table 2. EQ-5D-5 L scores in all domains.

Variables	EQ-5D-5 L scores in all domains [1–5]*				
	Mobility	Self-care	Usual-activities	Pain/discomfort	Anxiety/depression
Age	$R = 0.20, t = 3.015, p = 0.003$	$R = 0.236, p = 3.504, p = 0.001$	$R = 0.182, t = -2.671, p = 0.008$	$R = -0.018, t = -0.266, p = 0.791$	$R = 0.159, t = 2.330, p = 0.021$
Nicotinism [years] ($N = 100$)	$R = -0.002, t = -0.024, p = 0.981$	$R = -0.051, t = -0.506, p = 0.614$	$R = -0.097, t = -0.962, p = 0.338$	$R = 0.042, t = 0.415, p = 0.679$	$R = 0.134, t = 1.344, p = 0.182$
Diet changes ($N = 193$)	$R = 0.020, t = 0.278, p = 0.781$	$R = 0.048, t = 0.667, p = 0.505$	$R = 0.128, t = 1.780, p = 0.077$	$R = 0.132, t = 1.835, p = 0.068$	$R = -0.075, t = -1.045, p = 0.297$
Stressful events in the previous year ($N = 209$)	$R = 0.210, t = 3.087, p = 0.002$	$R = 0.127, t = 1.838, p = 0.067$	$R = 0.143, t = 2.081, p = 0.039$	$R = 0.279, t = 4.177, p < 0.001$	$R = 0.155, t = 2.253, p = 0.025$
Number of medication taken	$R = 0.147, t = 2.148, p = 0.033$	$R = 0.076, t = 1.096, p = 0.274$	$R = 0.068, t = 0.987, p = 0.325$	$R = 0.041, t = 0.592, p = 0.555$	$R = 0.018, t = 0.256, p = 0.798$
Age group					
≤ 65	2.0 (1.0–3.0)	1.50 (1.0–2.0)	2.0 (1.0–4.0)	3.0 (2.0–3.0)	1.50 (1.0–3.0)
> 65	3.0 (1.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Mann–Whitney U test	$Z = -1.573, p = 0.116$	$Z = 0.293, p = 0.769$	$Z = 0.776, p = 0.438$	$Z = 0.443, p = 0.658$	$Z = 0.240, p = 0.810$
Gender					
Female	3.0 (2.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	3.0 (1.0–3.0)	2.0 (1.0–3.0)
Male	3.0 (1.0–4.0)	1.0 (1.0–2.0)	1.0 (1.0–3.0)	2.0 (1.0–3.0)	1.0 (1.0–2.0)
Mann–Whitney U test	$Z = 1.341, p = 0.180$	$Z = 1.0, p = 0.317$	$Z = 1.044, p = 0.296$	$Z = 2.671, p = 0.008$	$Z = 3.014, p = 0.003$
Pension amount					
Very low	3.0 (1.50–4.0)	1.50 (1.0–4.0)	1.50 (1.0–4.0)	2.50 (1.50–3.50)	1.0 (1.0–2.0)
Low	3.0 (2.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	3.0 (2.0–4.0)	2.0 (1.0–3.0)
Average	3.0 (2.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
High	2.0 (1.0–3.50)	1.0 (1.0–1.50)	1.0 (1.0–4.0)	1.0 (1.0–3.0)	1.0 (1.0–2.0)
Kruskal–Wallis test	$H = 3.232, p = 0.357$	$H = 2.898, p = 0.408$	$H = 0.254, p = 0.968$	$H = 8.067, p = 0.045$	$H = 8.230, p = 0.042$
Living with someone/alone					
With someone	3.0 (1.0–4.0)	1.0 (1.0–2.0)	1.50 (1.0–4.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Alone	3.0 (2.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	3.0 (1.0–3.0)	2.0 (1.0–2.0)
Mann–Whitney U test	$Z = -0.396, p = 0.692$	$Z = 0.108, p = 0.914$	$Z = 0.493, p = 0.622$	$Z = -1.213, p = 0.225$	$Z = -0.435, p = 0.664$
Smoking cessation					
Yes	3.0 (2.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
No	2.0 (1.0–4.0)	1.0 (1.0–2.0)	1.0 (1.0–3.0)	3.0 (2.0–3.0)	2.0 (1.0–3.0)
Mann–Whitney U test	$Z = 0.505, p = 0.613$	$Z = -0.141, p = 0.888$	$Z = 0.984, p = 0.325$	$Z = -1.191, p = 0.234$	$Z = -1.116, p = 0.264$
Overweight/obesity					
No	3.0 (1.0–4.0)	1.0 (1.0–2.0)	1.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Yes	3.0 (2.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–4.0)	3.0 (1.0–4.0)	2.0 (1.0–2.0)
Mann–Whitney U test	$Z = -2.172, p = 0.030$	$Z = -1.012, p = 0.312$	$Z = -1.486, p = 0.137$	$Z = -1.905, p = 0.057$	$Z = -0.774, p = 0.439$
Physical activity					
Lack of physical activity	4.0 (3.0–4.0)	2.0 (1.0–3.0)	3.0 (1.0–4.0)	3.0 (1.0–4.0)	2.0 (1.0–3.0)
1–2 per week	3.0 (2.0–4.0)	1.0 (1.0–3.0)	3.0 (1.50–4.0)	2.50 (1.0–3.0)	2.0 (1.0–3.0)
3–4 per week	2.0 (1.0–3.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.0 (2.0–3.0)	2.0 (1.0–3.0)
5–6 per week	2.0 (1.0–3.0)	1.0 (1.0–2.0)	1.0 (1.0–2.0)	1.0 (1.0–3.0)	2.0 (1.0–2.0)
Every day	2.0 (1.0–3.0)	1.0 (1.0–1.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	1.0 (1.0–2.0)
Kruskal–Wallis test	$H = 49.743, p < 0.001$	$H = 26.436, p < 0.001$	$H = 39.984, p < 0.001$	$H = 7.734, p = 0.102$	$H = 19.200, p = 0.001$
Fat reduction					
Yes	3.0 (2.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–4.0)	3.0 (1.0–3.0)	2.0 (1.0–2.0)
No	3.0 (1.0–4.0)	1.0 (1.0–2.0)	1.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Mann–Whitney U test	$Z = 1.514, p = 0.130$	$Z = 0.906, p = 0.365$	$Z = 1.893, p = 0.058$	$Z = 2.086, p = 0.037$	$Z = -0.581, p = 0.561$
Calorie reduction					
Yes	3.0 (2.0–4.0)	1.0 (1.0–3.0)	2.0 (1.0–4.0)	3.0 (2.0–3.50)	2.0 (1.0–2.0)
No	3.0 (1.0–4.0)	1.0 (1.0–2.0)	1.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Mann–Whitney U test	$Z = 1.596, p = 0.111$	$Z = 1.435, p = 0.151$	$Z = 1.528, p = 0.126$	$Z = 2.894, p = 0.004$	$Z = 0.239, p = 0.811$
Changing the type of fats					
Yes	3.0 (1.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	3.0 (2.0–3.0)	2.0 (1.0–2.0)
No	3.0 (2.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Mann–Whitney U test	$Z = -0.578, p = 0.563$	$Z = -0.029, p = 0.977$	$Z = 0.370, p = 0.712$	$Z = 1.056, p = 0.291$	$Z = -0.816, p = 0.415$
Salt reduction					
Yes	3.0 (1.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	3.0 (1.0–3.0)	2.0 (1.0–2.0)
Continued					

Variables	EQ-5D-5 L scores in all domains [1–5]*				
	Mobility	Self-care	Usual-activities	Pain/discomfort	Anxiety/depression
No	3.0 (2.0–4.0)	1.0 (1.0–2.0)	1.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Mann–Whitney U test	Z = 0.303, <i>p</i> = 0.762	Z = 0.828, <i>p</i> = 0.407	Z = 1.611, <i>p</i> = 0.107	Z = 1.055, <i>p</i> = 0.291	Z = − 0.111, <i>p</i> = 0.911
Fish consumption					
Yes	3.0 (2.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–4.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
No	3.0 (1.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Mann–Whitney U test	Z = 0.327, <i>p</i> = 0.743	Z = − 0.602, <i>p</i> = 0.548	Z = 1.022, <i>p</i> = 0.307	Z = − 0.148, <i>p</i> = 0.882	Z = − 0.513, <i>p</i> = 0.608
Fruit and vegetable consumption					
Yes	3.0 (2.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	3.0 (1.0–3.0)	1.0 (1.0–2.0)
No	3.0 (1.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)
Mann–Whitney U test	Z = 0.179, <i>p</i> = 0.858	Z = − 0.296, <i>p</i> = 0.767	Z = 0.621, <i>p</i> = 0.535	Z = 0.584, <i>p</i> = 0.559	Z = − 1.914, <i>p</i> = 0.056
Sugar reduction					
Yes	3.0 (1.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	3.0 (1.0–3.0)	2.0 (1.0–2.0)
No	3.0 (2.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Mann–Whitney U test	Z = 0.299, <i>p</i> = 0.765	Z = 0.077, <i>p</i> = 0.939	Z = 0.726, <i>p</i> = 0.468	Z = 2.105, <i>p</i> = 0.035	Z = − 0.663, <i>p</i> = 0.507
Alcohol reduction					
Yes	3.0 (1.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–4.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
No	3.0 (2.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	3.0 (1.0–3.0)	2.0 (1.0–3.0)
Mann–Whitney U test	Z = − 1.706, <i>p</i> = 0.088	Z = 0.580, <i>p</i> = 0.562	Z = 0.782, <i>p</i> = 0.434	Z = − 0.706, <i>p</i> = 0.480	Z = − 1.097, <i>p</i> = 0.273
Self-assessment of lifestyle					
Unhealthy	4.0 (3.0–4.0)	1.0 (1.0–3.0)	3.0 (2.0–4.0)	3.0 (2.0–3.0)	2.0 (1.0–3.0)
Average	3.0 (1.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.50 (1.0–3.0)	2.0 (1.0–3.0)
Healthy	3.0 (1.0–4.0)	1.0 (1.0–2.0)	1.0 (1.0–3.0)	2.0 (1.0–3.0)	1.0 (1.0–2.0)
Kruskal–Wallis test	H = 7.341, <i>p</i> = 0.026	H = 2.367, <i>p</i> = 0.306	H = 9.525, <i>p</i> = 0.009	H = 1.108, <i>p</i> = 0.575	H = 8.119, <i>p</i> = 0.017
Diabetes mellitus					
No	3.0 (1.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Yes	3.0 (1.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Mann–Whitney U test	Z = − 0.080, <i>p</i> = 0.936	Z = 0.375, <i>p</i> = 0.708	Z = − 0.065, <i>p</i> = 0.948	Z = − 0.354, <i>p</i> = 0.723	Z = − 0.469, <i>p</i> = 0.639
COPD					
No	3.0 (1.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Yes	3.0 (1.0–4.0)	1.0 (1.0–3.0)	2.0 (1.0–4.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Mann–Whitney U test	Z = − 0.362, <i>p</i> = 0.717	Z = − 0.804, <i>p</i> = 0.422	Z = − 0.502, <i>p</i> = 0.616	Z = 0.311, <i>p</i> = 0.756	Z = − 0.576, <i>p</i> = 0.564
Hypertension					
No	3.0 (1.0–4.0)	1.50 (1.0–3.0)	3.0 (1.0–4.0)	2.50 (1.0–3.0)	2.0 (1.0–3.0)
Yes	3.0 (1.0–4.0)	1.0 (1.0–2.0)	1.50 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Mann–Whitney U test	Z = 0.794, <i>p</i> = 0.427	Z = 1.395, <i>p</i> = 0.163	Z = 2.192, <i>p</i> = 0.028	Z = 0.188, <i>p</i> = 0.851	Z = 0.683, <i>p</i> = 0.495
Type of heart failure					
Unknown	2.50 (1.0–4.0)	1.0 (1.0–1.0)	1.0 (1.0–1.0)	2.50 (1.0–3.0)	2.0 (1.0–2.0)
HFrEF	3.0 (1.0–4.0)	2.0 (1.0–4.0)	2.0 (1.0–4.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)
HFmrEF	3.0 (1.50–4.0)	1.0 (1.0–3.50)	3.0 (1.0–4.0)	2.50 (1.0–4.0)	2.0 (1.0–2.0)
HFpEF	3.0 (1.0–4.0)	1.0 (1.0–2.0)	2.0 (1.0–3.0)	2.0 (1.0–3.0)	2.0 (1.0–2.0)
Kruskal–Wallis test	H = 1.973, <i>p</i> = 0.578	H = 8.487, <i>p</i> = 0.037	H = 6.111, <i>p</i> = 0.106	H = 0.296, <i>p</i> = 0.961	H = 0.034, <i>p</i> = 0.998

Table 3. EQ-5D-5 L scores in all domains depending on sociodemographic characteristics, lifestyle and health condition. *When comparing groups, the median and quartile range were provided for each group.

Discussion

Our survey indicates that patients hospitalized for heart failure reported the most significant problems with mobility. One in four patients had serious difficulties walking, and nearly one in ten were unable to walk. Additionally, 60% of respondents reported problems in at least one dimension of the EQ-5D-5 L. More than 22% of patients experienced severe difficulties in performing daily activities or were unable to perform them at all. A similar proportion reported severe or extreme pain or discomfort.

The study further shows that limitations in mobility, daily activities, and the severity of pain/discomfort increased with age and the number of stressful events experienced in the previous year. Higher pain perception was also observed among individuals with lower income. Physical activity had a significant impact on mobility, self-care, usual activities, and anxiety/depression. A self-assessed healthy lifestyle was also strongly associated with better outcomes in these areas.

Variables				Self-assessment of health [0–100]			
				R	t	p	
Age				−0.181	−2.578	0.011	
Nicotinism [years] (N=100)				−0.087	−0.845	0.400	
Diet changes (N=193)				0.158	2.152	0.033	
Stressful events in the previous year (N=209)				−0.099	−1.395	0.165	
Number of medication taken				−0.050	−0.700	0.485	
	M ± SD	Me	Q1–Q3	Mo	Min–Max		
Age group							
≤ 65	56.50 ± 17.65	50.0	40.0–80.0	Multiple	35.0–80.0		
> 65	56.0 ± 18.91	50.0	50.0–70.0	50 (N=56)	10.0–100.0		
Mann–Whitney U test	Z = −0.093, p = 0.926						
Gender							
Female	56.09 ± 19.25	50.0	50.0–70.0	50 (N=40)	10.0–100.0		
Male	55.92 ± 18.15	50.0	48.0–70.0	50 (N=19)	10.0–100.0		
Mann–Whitney U test	Z = 0.238, p = 0.812						
Pension amount							
Very low	55.63 ± 27.18	50.0	45.0–70.0	50 (N=4)	15.0–100.0		
Low	55.20 ± 18.03	50.0	45.0–70.0	50 (N=9)	10.0–85.0		
Average	56.28 ± 18.68	50.0	50.0–70.0	50 (N=36)	10.0–100.0		
High	55.33 ± 20.77	50.0	41.5–70.0	50 (N=6)	10.0–90.0		
Kruskal–Wallis test	H = 0.255, p = 0.968						
Living with someone/alone							
With someone	55.89 ± 19.23	50.0	50.0–70.0	50 (N=32)	10.0–100.0		
Alone	55.63 ± 18.07	50.0	49.0–70.0	50 (N=26)	15.0–100.0		
Mann–Whitney U test	Z = 0.215, p = 0.830						
Smoking cessation							
Yes	55.90 ± 18.51	50.0	50.0–70.0	50 (N=24)	10.0–100.0		
No	55.68 ± 16.31	50.0	50.0–70.0	50 (N=8)	20.0–95.0		
Mann–Whitney U test	Z = 0.299, p = 0.765						
Overweight/ obesity							
No	54.77 ± 19.20	50.0	49.0–70.0	50 (N=36)	10.0–100.0		
Yes	57.67 ± 18.26	55.0	50.0–70.0	50 (N=23)	10.0–90.0		
Mann–Whitney U test	Z = −1.224, p = 0.211						
Physical activity							
Lack of physical activity	46.34 ± 18.06	50.0	35.0–60.0	50 (N=21)	10.0–85.0		
1–2 per week	60.0 ± 16.75	60.0	50.0–70.0	50 (N=5)	25.0–90.0		
3–4 per week	57.19 ± 13.16	55.0	50.0–70.0	50 (N=7)	25.0–80.0		
5–6 per week	58.06 ± 14.40	50.0	50.0–72.50	50 (N=7)	40.0–80.0		
Every day	63.79 ± 18.75	65.0	50.0–80.0	50 (N=17)	15.0–100.0		
Kruskal–Wallis test	H = 28.841, p < 0.001						
Fat reduction							
Yes	58.46 ± 18.19	60.0	50.0–70.0	50 (N=20)	10.0–90.0		
No	54.64 ± 18.47	50.0	49.50–70.0	50 (N=30)	10.0–100.0		
Mann–Whitney U test	Z = 1.613, p = 0.107						
Calorie reduction							
Yes	57.61 ± 18.28	55.0	50.0–70.0	50 (N=17)	10.0–95.0		
No	55.32 ± 18.60	50.0	49.0–70.0	50 (N=35)	10.0–100.0		
Mann–Whitney U test	Z = 1.022, p = 0.307						
Changing the type of fats							
Yes	59.49 ± 18.47	50.0	50.0–75.0	50 (N=12)			
No	54.70 ± 18.31	50.0	49.0–70.0	50 (N=39)	10.0–100.0		
Mann–Whitney U test	Z = 1.939, p = 0.053						
Salt reduction							
Yes	57.34 ± 18.95	55.0	50.0–70.0	50 (N=20)	10.0–95.0		
Continued							
No	55.62 ± 18.03	50.0	50.0–70.0	50 (N=33)	10–100.0		

	M±SD	Me	Q1–Q3	Mo	Min–Max
Mann–Whitney U test	Z = 0.772, <i>p</i> = 0.440				
Fish consumption					
Yes	56.83 ± 18.96	50.0	45.0–70.0	50 (<i>N</i> = 18)	10.0–100.0
No	56.04 ± 18.10	50.0	50.0–70.0	50 (<i>N</i> = 35)	10.0–100.0
Mann–Whitney U test	Z = 0.325, <i>p</i> = 0.745				
Fruit and vegetable consumption					
Yes	59.09 ± 17.65	60.0	50.0–70.0	50 (<i>N</i> = 28)	10.0–100.0
No	53.04 ± 18.84	50.0	40.0–65.0	50 (<i>N</i> = 25)	10.0–100.0
Mann–Whitney U test	Z = 2.371, <i>p</i> = 0.018				
Sugar reduction					
Yes	59.11 ± 16.54	60.0	50.0–70.0	50 (<i>N</i> = 26)	10.0–95.0
No	53.22 ± 19.92	50.0	40.0–65.0	50 (<i>N</i> = 27)	10.0–100.0
Mann–Whitney U test	Z = 2.212, <i>p</i> = 0.027				
Alcohol reduction					
Yes	57.18 ± 16.08	52.50	50.0–70.0	50 (<i>N</i> = 31)	20.0–90.0
No	55.18 ± 20.93	50.0	40.0–70.0	50 (<i>N</i> = 22)	10.0–100.0
Mann–Whitney U test	Z = 0.760, <i>p</i> = 0.447				
Self-assessment of lifestyle					
Unhealthy	45.0 ± 21.26	40.0	30.0–60.0	Multiple	10.0–80.0
Average	56.04 ± 16.66	50.0	50.0–70.0	50 (<i>N</i> = 31)	15.0–90.0
Healthy	59.36 ± 19.35	55.0	50.0–70.0	50 (<i>N</i> = 24)	10.0–100.0
Kruskal–Wallis test	H = 9.024, <i>p</i> = 0.011				
Diabetes mellitus					
No	54.02 ± 18.90	50.0	45.0–70.0	50 (<i>N</i> = 36)	10.0–100.0
Yes	58.66 ± 18.46	60.0	50.0–70.0	50 (<i>N</i> = 23)	10.0–90.0
Mann–Whitney U test	Z = − 1.918, <i>p</i> = 0.055				
COPD					
No	56.29 ± 18.48	50.0	50.0–70.0	50 (<i>N</i> = 53)	10.0–100.0
Yes	53.86 ± 21.60	50.0	45.0–70.0	50 (<i>N</i> = 6)	10.0–100.0
Mann–Whitney U test	Z = 0.438, <i>p</i> = 0.662				
Hypertension					
No	56.09 ± 19.25	50.0	45.0–70.0	50 (<i>N</i> = 9)	10.0–95.0
Yes	56.01 ± 18.78	50.0	50.0–70.0	50 (<i>N</i> = 50)	10.0–100.0
Mann–Whitney U test	Z = 0.069, <i>p</i> = 0.945				
Type of heart failure					
Unknown	63.46 ± 19.08	70.0	50.0–80.0	80 (<i>N</i> = 4)	30.0–90.0
HF _r EF	53.18 ± 17.22	50.0	45.0–70.0	50 (<i>N</i> = 6)	20.0–80.0
HF _{mr} EF	53.68 ± 21.59	50.0	40.0–70.0	50 (<i>N</i> = 7)	10.0–100.0
HF _p EF	55.62 ± 18.87	50.0	50.0–70.0	50 (<i>N</i> = 40)	10.0–100.0
Kruskal–Wallis test	H = 3.128, <i>p</i> = 0.372				

Table 4. Self-assessment of health depending on sociodemographic characteristics, lifestyle and health condition.

We compared the results of the EQ-5D-5 L questionnaire with population norms for Poland¹⁶. Research by Golicki et al. found that in the general Polish population, 38.5% of individuals report perfect health ('11111'), with men more frequently than women. In contrast, our study among patients with heart failure shows that only 9.5% reported full health—more often women than men. In the self-reported data, at least one mild health limitation was indicated by 90.5% of respondents, compared to 61.5% in the general population. EQ-5D-5 L results in the Polish population are comparable to those from Germany and the United States in the dimensions of mobility and self-care, although U.S. respondents report more limitations in usual activities¹⁷.

When analyzing the individual dimensions of the EQ-5D-5 L questionnaire, it is noteworthy that in our self-reported study among patients with heart failure, the highest frequency of limitations was observed in the self-care and usual activities dimensions. In contrast, within the general population, the most commonly reported limitations were in the areas of pain/discomfort and anxiety/depression. These dimensions are also the lowest rated among older adults in the Polish population, particularly in the 65–74 and 75 + age groups¹⁶.

Interestingly, overall self-assessed health in the Polish population is lower than in Germany, especially in the dimensions of pain/discomfort and anxiety/depression¹⁸. Both in our study and in the general Polish

population, limitations in these areas were more frequently reported by women. This finding has been confirmed in numerous studies, regardless of age or heart failure severity¹⁹. Furthermore, studies using other quality of life instruments have also identified female gender as a predictor of poorer overall, physical, and emotional quality of life²⁰.

However, some research, such as the study by Gallagher AM et al. conducted in a heart failure outpatient clinic in the UK has found no clear association between patient demographics and HRQoL²¹. Studies from other countries also confirm that patients with heart failure have significantly lower quality of life compared to the general population²². For example, Boczor et al., in an observational study in Germany, demonstrated that HF patients experienced significant health limitations across all EQ-5D-5 L domains. The study also highlighted associations between HRQoL and sociodemographic factors such as employment status, living alone, and comorbidities²³. Comorbid conditions in patients with HF particularly impacted mobility, usual activities, and pain/discomfort, as well as overall health status assessed via the EQ VAS. Consistent with our findings, other studies also emphasize the influence of age, psychological stress, and physical activity on HRQoL in this patient population²⁴.

Differences in quality of life as measured by the EQ-5D-5 L questionnaire between patients with heart failure and the general population are also evident among younger individuals. A study by Tan YJ et al., involving HF patients with a mean age of 57 years, showed that nearly half of the respondents reported problems in the dimensions of mobility, usual activities, and pain/discomfort. Worse outcomes in these areas were observed among patients living alone, those with lower levels of education, and those who were unemployed due to poor health²⁵.

Similarly, a prospective multicenter observational study focusing on patients with HFpEF (mean age 81 years) found significantly lower scores in the dimensions of mobility, usual activities, and self-care. Notably, these domains were identified as important predictors of mortality¹⁴.

It is also worth highlighting that self-assessed health status among patients with HF is poorer compared to individuals with other cardiovascular diseases. In our study, the mean EQ VAS score for HF patients was 56.03, whereas Chatzinikolaou A et al. reported an average score of 67.45 in a general cardiovascular patient population²⁶. Literature suggests that self-rated health is strongly associated with factors such as education level, occupational status, household income, and living conditions, while differences by age and gender tend to be less pronounced²⁷. In our study, however, EQ VAS scores were mainly differentiated by age and lifestyle-related variables.

While quantitative data provide essential information on HRQoL, qualitative research also plays a critical role in understanding the lived experience of patients with HF. A study by Saifan AR et al. revealed that HRQoL in HF patients is most affected by physical limitations, which influence daily functioning and contribute to symptoms such as fatigue and shortness of breath. These physical constraints also negatively impacted patients' psychosocial and spiritual well-being, cognitive functioning, and capacity for employment, ultimately leading to increased levels of fear, anxiety, and social isolation²⁸.

In conclusion, reduced health-related quality of life among patients with HF remains a significant clinical concern, as it is associated with poorer long-term outcomes and prognosis. Understanding the determinants of HRQoL in this population is therefore essential. Interestingly, studies also point to geographical disparities in HRQoL levels, with lower scores reported in Eastern Europe and Africa, and higher levels observed in Western European countries²².

Limitations of the study

The main limitation of the study was the inclusion of patients hospitalized in a large facility. This may have influenced the distribution of certain sociodemographic characteristics, particularly the place of residence. Additionally, by focusing solely on hospitalized patients, the study sample may overrepresent individuals with more severe health conditions and reduced quality of life, limiting the generalizability of the findings to the broader population of older adults with heart failure, especially those living in the community.

Another limitation is the cross-sectional design of the study, which does not allow for the assessment of changes in health-related quality of life over time or for establishing causal relationships between the examined variables. Furthermore, although the quantitative data provided a comprehensive overview of HRQoL determinants, the study lacked qualitative methods that could have enriched the interpretation of results by uncovering more nuanced patient experiences, emotional responses, and contextual factors.

We recognize these limitations and plan to address them in future research by expanding the study population to include community-dwelling patients and incorporating longitudinal and qualitative components.

Conclusions

Older patients hospitalized due to heart failure have a decreased quality of life compared to the general population. The greatest quality of life problems in these patients are related to pain/discomfort and anxiety/depression. Many socioeconomic, health and lifestyle factors may influence the assessed quality of life. In the studied population, these include, among others: gender, age, income, but especially lifestyle, including physical activity.

Data on quality of life, combined with socioeconomic and lifestyle variables, can be used to assess the health status and needs of specific populations. Combining them with medical data can be used to identify groups of people with potentially the lowest quality of life, which may help in making therapeutic decisions.

Therefore, during an interview with a patient with CHF, it is important to obtain not only medical information, but also information regarding the quality of life depending on the health condition, including the ability to function independently, which can be done using the EQ-5D-5 L.

Data availability

All data are available from the corresponding author.

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Author contributions

Conceptualization: UR and PJ; Methodology: UR and PJ; Formal Analysis: UR, MM and AB; Writing – Original Draft Preparation: UR, AS, WN, PC, KJ, MK-U, AD, MM, JP and PJ; Writing – Review & Editing: UR, AS, WN, PC, KJ, MK-U, AD, MM, JP and PJ; Visualization MM; Supervision: UR, JP and PJ. All authors have read and approved the manuscript.

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Declarations

Competing interests

The authors declare no competing interests.

Ethical approval and consent to participate

The study was approved by the Bioethics Committee at the Centre of Postgraduate Medical Education of Warsaw [resolution No. 73/2022 of June 8, 2022].

Informed consent

Informed consent was obtained from all subjects involved in the study.

Additional information

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