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REVIEW

Health-related quality of life of people with heart failure in low- and middle-income countries: a systematic review and meta-analysis

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Abstract

Purpose Heart failure is a global health concern and associated with poor health-related quality of life and increased mortality. There is a disproportionate burden on patients and health systems in low- and middle-income countries. This systematic review and meta-analysis estimates the health-related quality of life of people with heart failure in low- and middle-income countries.

Methods A systematic literature search was conducted to identify relevant studies from January 2012 to November 2022 using the following databases: MEDLINE, EMBASE, PsycINFO, CINAHL, Web of Science, Scopus and JBI EBP database. Study screening, quality appraisal and data extraction were conducted using JBI methodology. A random-effects model was used to perform the meta-analysis. Heterogeneity was assessed using the I^2 statistic. All statistical analyses were done in STATA version 17.

Results A total of 33 studies with 5612 participants were included in this review. The Minnesota Living with Heart Failure Questionnaire (MLHFQ) and the Short-Form-36 questionnaire (SF-36) were the most used instruments across 19 and 8 studies, respectively. The pooled mean MLHFQ and SF-36 scores using the random-effects model were 46.08 (95% CI 35.06, 57.10) and 41.23 (95% CI 36.63, 45.83), respectively. In a subgroup analysis using both instruments, the highest health-related quality-of-life scores occurred in studies with inpatient participants.

Conclusion The overall health-related quality of life of people with heart failure in low- and middle-income countries is poor. Strategies should be strategically developed to improve the health-related quality of life of people with heart failure in these countries.

Systematic review registration PROSPERO CRD42022377781.

Keywords Heart failure · HRQoL · Systematic review · Low- and middle-income countries

Abbreviations

HF	Heart failure
HRQoL	Health-related quality of life
JBI	Joanna Briggs Institute
KCCQ	Kansas City Cardiomyopathy Questionnaire
LMICs	Low- and middle-income countries
LVD-36	Left Ventricular Dysfunction Questionnaire-36
MLHFQ	Minnesota Living with Heart Failure Questionnaire
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-analyses
SF-36	Short-Form-36 Questionnaire
WHOQOL-BREEF	WHO Quality of Life-BREF

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Background

Heart failure (HF) is a global health problem characterised by a variety of devastating symptoms, whose severity is measured by changes in symptoms with exercise [1, 2]. It is one of the major causes of morbidity, mortality and

rehospitalisations internationally. In 2019, more than 64 million people were living with HF globally [3], a number predicted to increase despite advances in medical therapy [4]. Heart failure is a significant health concern and economic burden with a growing prevalence in low- and middle-income countries (LMICs) [5]. Although there are little data on the prevalence of HF in these settings, one population-based study from Northern China reported a prevalence of 3.5% ($N=2230$) [6].

Health-related quality of life (HRQoL) is defined as an individual's perception of their physical, mental, emotional and social health functioning [7]. People with HF are more likely to experience variety of symptoms such as shortness of breathing, fatigue, pain and oedema and develop emotional conditions like depression compared to the general population [8, 9]. These symptoms affect activities of daily living and can adversely affect HRQoL [10]. In LMICs, HF is associated with poorer outcomes, including longer hospital stays, lower HRQoL and significant in-hospital mortality [11]. People with HF and associated poor HRQoL are at further risk of the deleterious effects of rehospitalisation and increased healthcare costs. Consequently, there is an imperative to evaluate the level of HRQoL in these populations [12, 13].

To date, there is a paucity of systematic reviews or meta-analyses estimating the HRQoL of people with HF in LMICs. A recently published systematic review determined the global level of HRQoL in people with HF [14]. However, this estimate was mainly based on data from developed countries with little data from developing countries, which limits generalisability to populations in LMICs. Additionally, this review only used three international databases (PubMed, Scopus and Web of Science) which was inconsistent with data collection and reporting standards for systematic reviews [15]. Consequently, this paper reports a systematic review and meta-analysis which estimated the HRQoL among people with HF in LMICs. The findings will indicate a need to develop strategies to improve management, care and HRQoL in these populations.

Review question

What is the HRQoL of people with heart failure in low- and middle-income countries?

Inclusion criteria

Participants

Studies including adult participants with a confirmed diagnosis of HF were included in this review.

Condition

This review included studies that reported the HRQoL of people with HF measured using a psychometrically validated instrument. HRQoL was defined as an individual's perceived physical and mental health functioning over time [16].

Context

This review included studies from LMICs. For the purposes of this review, low- to middle-income countries were defined using the World Bank atlas method based on the stratification of economies based on gross national income (GNI) per capita. Low-income countries were those with a GNI per capita of $1,045 or less; lower and upper middle-income economies were those with a GNI per capita between $1,046 and $4,095 and $4,096 and $12,695, respectively [17].

Types of studies

Observational (cross-sectional, cohort, case–control) studies that reported the HRQoL of people with HF published in English from January 2012 to November 2022 were included in this review.

Methods

The Joanna Briggs Institute (JBI) methodology for Systematic Reviews [15] was used to inform the processed for this review, and the protocol was registered with the PROSPERO database (registration number CRD42022377781).

Search strategy

A three-step search strategy was undertaken on 9 November 2022 using several databases including MEDLINE (Ovid), EMBASE (Ovid), PsycINFO (EBSCOhost), CINAHL(EBSCOhost), Web of Science (direct access), Scopus (direct access) and JBI EBP database (Ovid) to identify relevant research from the January 2012 to November 2022. The CoCoPop (Co = Condition, Co = Context, Pop = Population) framework was used to develop the search strategy using a combination of subject headings (index terms) and text words including "quality of life", "health-related quality of life", QoL, HRQoL,

"heart diseases", "heart failure", "cardiac failure" and all LMICs [17]. Boolean operators were used to combine search terms. The search strategy and results are reported in Appendix I.

Study selection

All identified records were imported into EndNote V20 (Clarivate Analytics, PA, USA). After the removal of duplicates, all identified articles were exported into Microsoft Excel (Redmond, Washington, USA) for screening. Blinded screening was done by two independent reviewers, starting with a title and abstract screening, followed by a full-text screening. First, all titles and abstracts were screened by two authors (HM and PS) in accordance with the predetermined inclusion criteria and a preliminary list of articles for full-text screening was generated. Then, the two reviewers (HM and PS) screened the full-text articles against the inclusion criteria. The per cent agreement between the two reviewers was calculated by dividing the number of agreements by total number of studies reviewed. The authors reported a per cent agreement of 88%, indicating a high level of agreement between the two reviewers in their screening decision. Any disagreements between the reviewers were resolved through discussion. References of included studies and related articles were hand searched to identify any additional relevant studies. The search for unpublished studies and grey literature was conducted by using Google scholar, Mednar, ProQuest and dissertation databases.

Quality assessment

The methodological quality of eligible articles was appraised independently by two reviewers (HM and PS) using the standardised JBI critical appraisal instrument for studies reporting prevalence data [18] which provides a numerical quality score out of 9 points. A threshold cut-off criterion was set so that studies with quality score of six or less would be excluded. This cut-off was consistent with other published systematic reviews in this area. Disagreements between the reviewers were resolved through discussion. The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines [19] were followed in the reporting of the review.

Data extraction

Two authors (HM and AW) independently conducted the primary data extraction from the included studies using the JBI data extraction tool for prevalence data studies [20] and PS cross-checked for accuracy. Any disagreements and discrepancies between the reviewers were resolved by discussion. The following data from each included study were extracted: authors, year of publication, country, region, study design, population, sample size, sampling methods, outcome measuring tool, mean HRQoL score and quality appraisal score.

Data analysis

The meta-analysis to estimate the pooled mean HRQoL score was performed using the DerSimonian and Laird random-effects model [21]. Heterogeneity was assessed using standard Chi-squared and I-squared tests. Sources of heterogeneity were analysed using subgroup analysis and meta-regression. Publication bias was assessed visually by funnel plot and statistically using Egger test. A leave-one-out sensitivity analysis was also conducted for assessing the influence of each study on the overall effect size estimate. The pooled effect size was presented using a forest plot. All statistical analysis was performed using STATA Version 17.0 (StataCorp, College Station, TX, USA).

Results

Search results

A total of 4249 initial records (4126 from databases and 123 from the grey literature) were retrieved. Of these, 1562 duplicate articles were removed. Then, 2622 articles were excluded after screening titles and abstracts. From the remaining 65 articles, 32 were removed after full-text review and quality appraisal leaving a total of 33 articles that met the inclusion criteria and were subsequently included in this review and meta-analysis (Fig. 1).

Assessment of methodological quality

The methodological quality of included studies was appraised using the JBI critical appraisal checklist. Of the 33 studies, 2 [22, 23] scored the maximum 9 points and 14 [24–37] scored 8 points. The remaining 17 articles [38–55] scored 7 points in the checklist (Table 1).

Characteristics of included studies

A total of 33 studies consisting of 5612 participants with HF in LMICs were included in this review. Eight studies [22, 27–31, 45, 55] were conducted in Middle East and North Africa, five studies [37–40, 42] were conducted in Latin America and the Caribbean, nine studies [23–26, 32, 33, 41, 51, 54] were conducted in East Asia and Pacific, four studies [34, 35, 43, 47] were conducted in Sub-Saharan Africa, six studies [44, 46, 48, 49, 52, 53] were conducted in Europe and central Asia, and one study [36] was conducted in South Asia. A cross-sectional

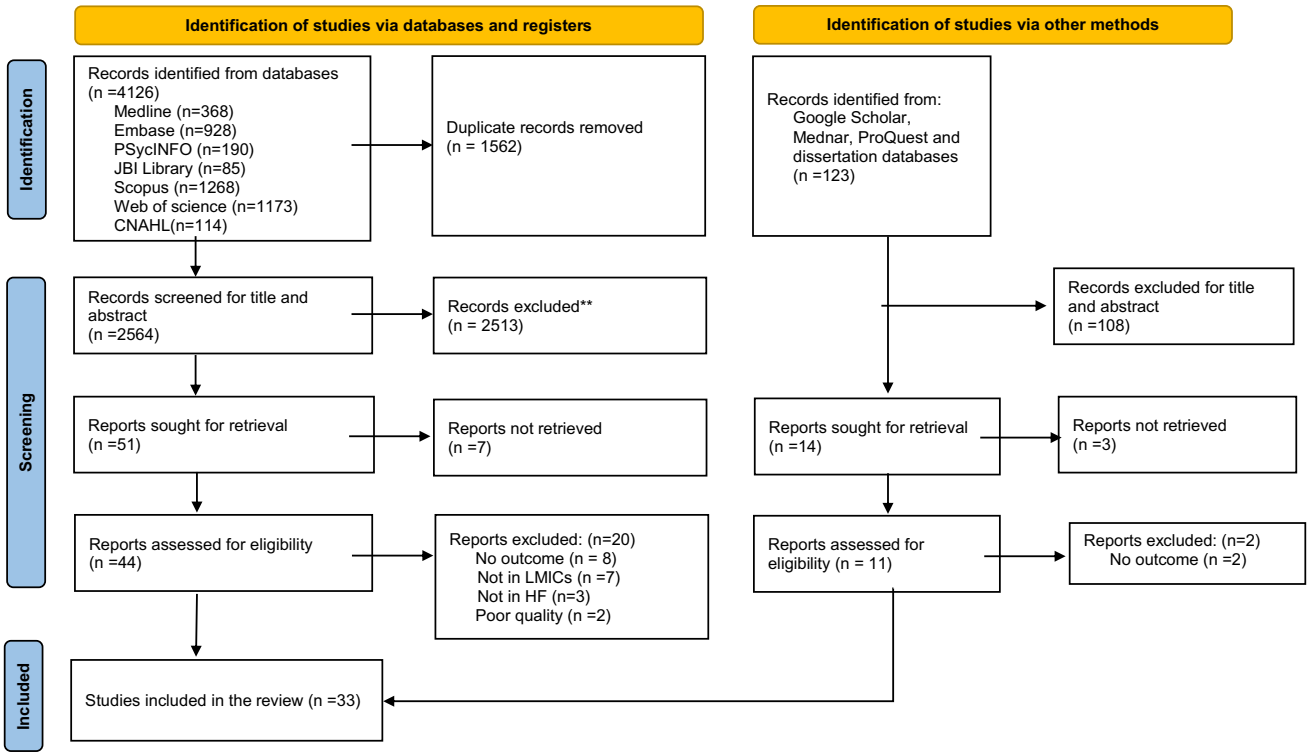


Fig. 1 PRISMA flow diagram of literature identification, study selection and inclusion process

study design was used in most of the studies ($n=31$). The remaining two studies used a prospective cohort study design. Twenty-two studies recruited participants from outpatient departments and eleven recruited participants, while they were inpatients. Sample sizes ranged from 59 to 500 participants, and the majority of studies ($n=21$) used consecutive sampling technique. Five different psychometrically validated instruments were used to measure HRQoL: 19 used the Minnesota Living with Heart Failure Questionnaire (MLHFQ), eight used the Short-Form-36 Questionnaire (SF-36), three studies used the WHO Quality of Life-BREF (WHOQOL-BREEF), two used the Kansas City Cardiomyopathy Questionnaire (KCCQ), and one used the Left Ventricular Dysfunction Questionnaire-36 (LVD-36). Mean scores of HRQoL ranged from 13 to 94 (Table 2).

HRQoL of people with HF in LMICs

The overall meta-analysis for the HRQoL score was performed as a subgroup analysis using the QoL measuring instruments across the included studies. The disease-specific tools included MLHFQ, KCCQ and LVD-36, whereas the general tools included SF-36 and WHOQOL-BREF. The overall pooled HRQoL score is presented in Fig. 2.

Health-related quality of life based on MLHFQ

Nineteen ($n=3197$) of the 33 studies used the Minnesota Living with Heart Failure Questionnaire (MLHFQ) which is a psychometrically validated disease-specific instrument used to assess HRQoL. The pooled mean MLHFQ score using the random-effects model was 46.08 (95% CI 35.06, 57.10). The meta-analysis found significant heterogeneity across studies ($I^2=98.01\%$, $P<0.001$) (Fig. 3).

Subgroup analysis

The subgroup analysis demonstrated that higher MLHFQ scores were observed among studies with inpatient participants (58.15, 95% CI 39.77, 76.53) and one study from South Asia (94.16, 95% CI 90.30, 98.02) (Fig. 4).

Assessment of heterogeneity and publication bias

The heterogeneity test showed significant ($P\leq0.001$) variation across the MLHFQ -based studies. The meta-regression analysis using publication year, sample size and quality score found none of the three covariates were significantly associated with the presence of heterogeneity (Table 3). The Egger's test demonstrated no statistically significant publication bias ($P=0.41$).

Table 1 Methodological quality of included studies

ID	Authors (reference)	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Quality score/9
1	Costa LL, et al. [36]	Y	U	Y	Y	Y	Y	Y	Y	Y	8
2	Paz LF, et al. [38]	U	Y	Y	Y	Y	Y	U	Y	Y	7
3	de Sousa MM, et al. [39]	U	Y	Y	Y	Y	Y	N	Y	Y	7
4	Sousa MM, et al. [37]	Y	Y	Y	Y	Y	Y	U	Y	Y	8
5	Jorge AJ, et al. [40]	N	Y	Y	Y	Y	Y	U	Y	Y	7
6	An Y, et al. [32]	Y	Y	Y	Y	Y	Y	U	Y	Y	8
7	Wang G, et al. [41]	U	Y	Y	Y	Y	Y	U	Y	Y	7
8	Zhang J, et al. [33]	Y	Y	Y	Y	Y	Y	U	Y	Y	8
9	Olivera MJ, et al. [42]	U	Y	Y	Y	Y	Y	N	Y	Y	7
10	Molla S, et al. [34]	Y	Y	Y	Y	Y	Y	U	Y	Y	8
11	Seid MA. [43]	Y	U	Y	Y	Y	Y	U	Y	Y	7
12	Tarekegn GE, et al. [35]	Y	Y	Y	Y	Y	Y	U	Y	Y	8
13	DeWolfe A, et al. [44]	Y	Y	Y	Y	Y	Y	Y	Y	U	7
14	Asadi P, et al. [30]	U	Y	Y	Y	Y	Y	Y	Y	Y	8
15	Poorshadan S, et al. [31]	U	Y	Y	Y	Y	Y	N	Y	Y	8
16	Borumandpour M, et al. [45]	U	Y	Y	Y	Y	Y	U	Y	Y	7
17	Molavynejad S, et al. [55]	U	Y	Y	Y	Y	Y	N	Y	Y	7
18	AbuRuz ME. [29]	U	Y	Y	Y	Y	Y	Y	Y	Y	8
19	Alaloul F, et al. [27]	U	Y	Y	Y	Y	Y	Y	Y	Y	8
20	Alemoush RA, et al. [22]	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
21	Odeh H, et al. [28]	Y	Y	Y	Y	Y	Y	U	Y	Y	8
22	Ahmeti A, et al. [46]	U	Y	Y	Y	Y	Y	U	Y	Y	7
23	Thida M, et al. [23]	Y	Y	Y	Y	Y	Y	Y	Y	Y	9
24	Mbakwem AC, et al. [47]	U	Y	Y	Y	Y	Y	U	Y	Y	7
25	Erceg P, et al. [48]	U	Y	Y	Y	Y	Y	N	Y	Y	7
26	Jovanić M, et al. [49]	Y	U	Y	Y	Y	Y	N	Y	Y	7
27	Chu SH, et al. [24]	Y	Y	Y	Y	Y	Y	U	Y	Y	8
28	Jeong Y, et al. [25]	Y	U	Y	Y	Y	Y	Y	Y	Y	8
29	Lee H, et al. [26]	Y	U	Y	Y	Y	Y	Y	Y	Y	8
30	Son YJ, et al. [51]	U	Y	Y	Y	Y	Y	U	Y	Y	7
31	Silavanich V, et al. [54]	U	Y	Y	Y	Y	Y	U	Y	Y	7
32	Barutcu CD, et al. [52]	Y	Y	Y	Y	Y	Y	N	U	Y	7
33	Gok Metin Z, et al. [53]	U	Y	Y	Y	Y	Y	N	Y	Y	7

Y, yes; N, No; U, unclear

Sensitivity analysis

The leave-one-out sensitivity analysis using a random-effects model revealed that the omission of study 1 (Costa LL, et al., 2020) had a relatively larger influence on the pooled estimate of MLHFQ score compared to other studies. The omission of study 1 caused the overall MLHFQ score to decrease by 2.76, which would make the overall level of HRQoL moderate. This suggests that the results of the meta-analysis may be sensitive to the inclusion or exclusion of this particular study. The effect size displayed for each study corresponds to an overall effect size computed from a meta-analysis excluding that study (Fig. 5).

Health-related quality of life based on SF-36

Of the 33 included studies, eight studies ($n = 1250$) evaluated the HRQoL using SF-36. The Short-Form-36 (SF-36) Questionnaire is a general, psychometrically validated instrument used to assess HRQoL. In this study, we have used the overall mean SF-36 score as reported in the included paper, whenever available. In cases where the overall score was not provided, we computed the mean SF-36 score by using the Physical Component Summary (PCS) and Mental Component Summary (MCS) scores. To calculate the overall mean QoL score of SF-36 from PCS and MCS, the following formula was used: overall SF-36 score = PCS score + MCS

Table 2 Characteristics of included studies for HRQoL of people with heart failure in LMICs

ID	Authors (Reference)	Publication year	Country	Region	Study design	Population	Sample size	Sampling method	Instrument	QoL score ± SD	Quality score
1	Costa LL, et al. [36]	2020	Bangladesh	South Asia	Cross-sectional	Inpatient	142	Convenient	MLHFQ	94.16 ± 3.20	8
2	Paz LF, et al. [38]	2019	Brazil	Latin America and Caribbean	Cross-sectional	Outpatient	101	Convenient	MLHFQ	34.30 ± 21.60	7
3	de Sousa MM, et al. [39]	2017	Brazil	Latin America and Caribbean	Cross-sectional	Outpatient	84	Consecutive	MLHFQ	33.13 ± 19.66	7
4	Sousa MM, et al. [37]	2017	Brazil	Latin America and Caribbean	Cross-sectional	Outpatient	84	Consecutive	MLHFQ	33.10 ± 19.7	8
5	Jorge AJ, et al. [40]	2017	Brazil	Latin America and Caribbean	Cross-sectional	Outpatient	59	Consecutive	SF-36	53.10 ± 29.6	7
6	An Y, et al. [32]	2022	China	East Asia and Pacific	Cross-sectional	Inpatient	302	Consecutive	SF-36	50.00 ± 9.20	8
7	Wang G, et al. [41]	2020	China	East Asia and Pacific	Cross-sectional	Outpatient	301	Convenient	SF-36	38.45 ± 17.28	8
8	Zhang J, et al. [33]	2020	China	East Asia and Pacific	Cross-sectional	Inpatient	310	Convenient	MLHFQ	42.20	8
9	Olivera MJ, et al. [42]	2021	Colombia	Latin America and Caribbean	Cross-sectional	Outpatient	80	Convenient	MLHFQ	53.70 ± 19.6	7
10	Molla S, et al. [34]	2021	Ethiopia	Sub-Saharan Africa	Cross-sectional	Outpatient	372	Simple random	MLHFQ	46.40 ± 20.63	8
11	Seid MA. [43]	2020	Ethiopia	Sub-Saharan Africa	Cross-sectional	Outpatient	284	Consecutive	MLHFQ	46.40 ± 22.4	8
12	Tarekegn GE, et al. [35]	2021	Ethiopia	Sub-Saharan Africa	Cross-sectional	Outpatient	468	Consecutive	WHOQOL-BREF	41.60 ± 11.6	8
13	DeWolfe A, et al. [44]	2012	Georgia	Europe and Central Asia	Prospective cohort	Outpatient	314	Consecutive	MLHFQ	60.90 ± 14.6	8
14	Asadi P, et al. [30]	2019	Iran	Middle East and North Africa	Cross-sectional	Inpatient	77	Convenient	SF-36	38.45 ± 17.28	8
15	Poorshadan S, et al. [31]	2019	Iran	Middle East and North Africa	Cross-sectional	Inpatient	80	Convenient	WHOQOL-BREF	48.60 ± 8.5	8
16	Borumandpour M, et al. [45]	2016	Iran	Middle East and North Africa	Cross-sectional	Inpatient	147	Consecutive	WHOQOL-BREF	49.50 ± 18.51	7
17	Molavynejad S, et al. [55]	2019	Iran	Middle East and North Africa	Cross-sectional	Inpatient	151	Convenient	MLHFQ	62.30 ± 19.4	7
18	AbuRuz ME. [29]	2018	Jordan	Middle East and North Africa	Cross-sectional	Outpatient	200	Convenient	SF-36	38.60 ± 10.4	8
19	Alaloul F, et al. [27]	2017	Jordan	Middle East and North Africa	Cross-sectional	Outpatient	99	Consecutive	SF-36	40.14 ± 21.7	8

Table 2 (continued)

ID	Authors (Reference)	Publication year	Country	Region	Study design	Population	Sample size	Sampling method	Instrument	QoL score ± SD	Quality score
20	Alemoush RA, et al. [22]	2021	Jordan	Middle East and North Africa	Prospective cohort	Outpatient	127	Consecutive	SF-36	40.20 ± 23.2	9
21	Odeh H, et al. [28]	2019	Jordan	Middle East and North Africa	Cross-sectional	Outpatient	85	Convenient	SF-36	31.70 ± 18.6	8
22	Ahmeti A, et al. [46]	2016	Kosovo	Europe and Central Asia	Cross-sectional	Inpatient	103	Consecutive	MLHFQ	49.60 ± 17.7	7
23	Thida M, et al. [23]	2021	Myanmar	East Asia and Pacific	Cross-sectional	Outpatient	140	Purposive	MLHFQ	39.90 ± 12.8	9
24	Mbakwem AC, et al. [47]	2013	Nigeria	Sub-Saharan Africa	Cross-sectional	Outpatient	190	Consecutive	KCCQ	59.60 ± 23.8	7
25	Erceg P, et al. [48]	2013	Serbia	Europe and Central Asia	Cross-sectional	Inpatient	136	Consecutive	MLHFQ	50.40 ± 19.3	7
26	Jovanić M, et al. [49]	2018	Serbia	Europe and Central Asia	Cross-sectional	Inpatient	200	Consecutive	MLHFQ	51.67 ± 24.1	7
27	Chu SH, et al. [24]	2014	South Korea	East Asia and Pacific	Cross-sectional	Outpatient	118	Consecutive	MLHFQ	34.50 ± 22.8	8
28	Jeong Y, et al. [25]	2022	South Korea	East Asia and Pacific	Cross-sectional	Inpatient	122	Consecutive	MLHFQ	56.09 ± 22.46	8
29	Lee H, et al. [26]	2020	South Korea	East Asia and Pacific	Cross-sectional	Outpatient	142	Consecutive	MLHFQ	18.50 ± 21.0	8
30	Son YJ, et al. [51]	2012	South Korea	East Asia and Pacific	Cross-sectional	Outpatient	134	Consecutive	MLHFQ	54.60 ± 11.7	7
31	Silavanich V, et al. [54]	2019	Thailand	East Asia and Pacific	Cross-sectional	Outpatient	180	Consecutive	MLHFQ	13.00 ± 8.6	7
32	Barutcu CD, et al. [52]	2013	Turkey	Europe and Central Asia	Cross-sectional	Outpatient	150	Convenient	LVD-36	69.25 ± 23.12	7
33	Gok Metin Z, et al. [53]	2021	Turkey	Europe and Central Asia	Cross-sectional	Outpatient	130	Consecutive	KCCQ	47.70 ± 9.50	7

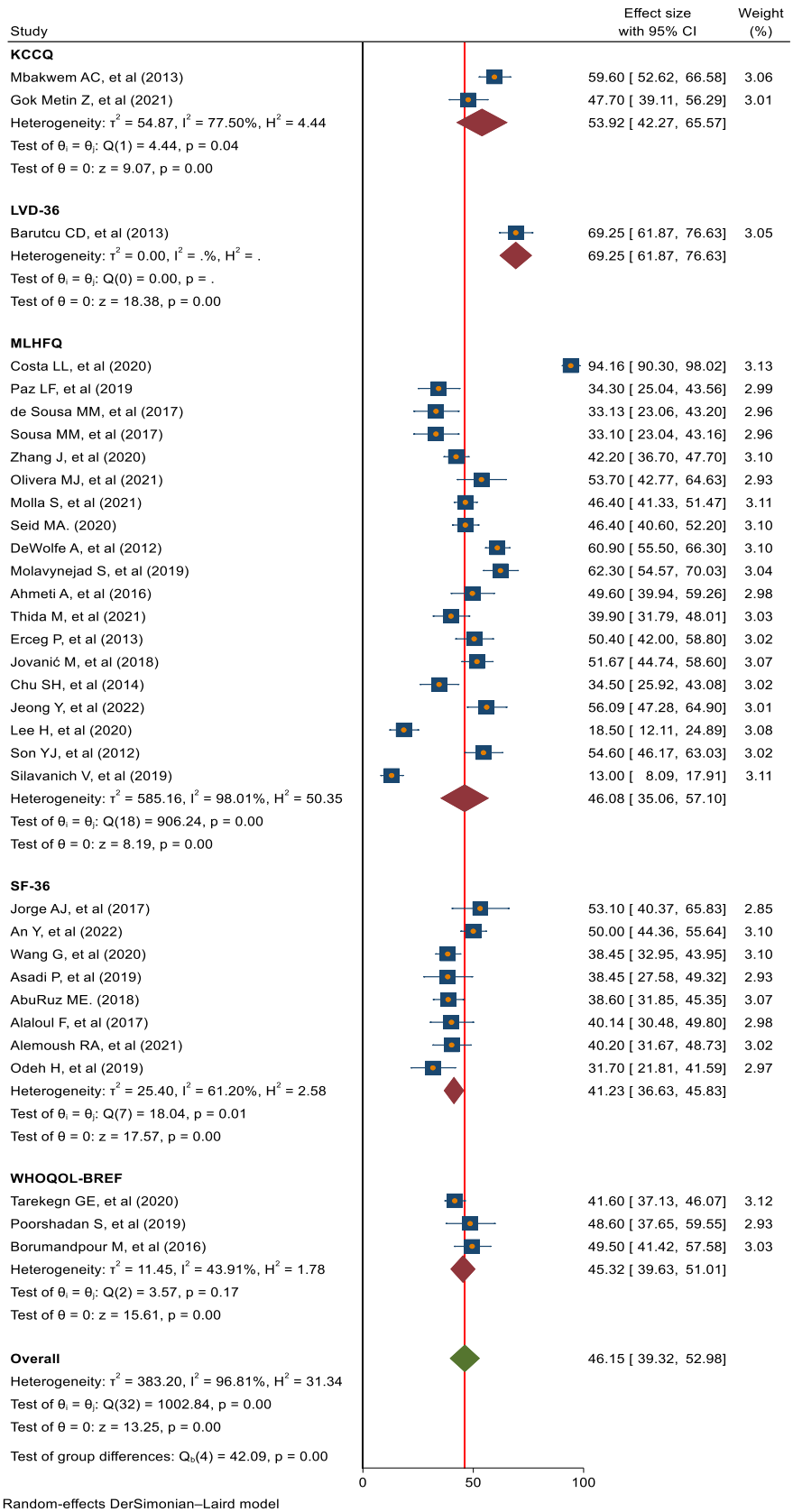


Fig. 2 Forest plot showing the mean HRQoL score by tools

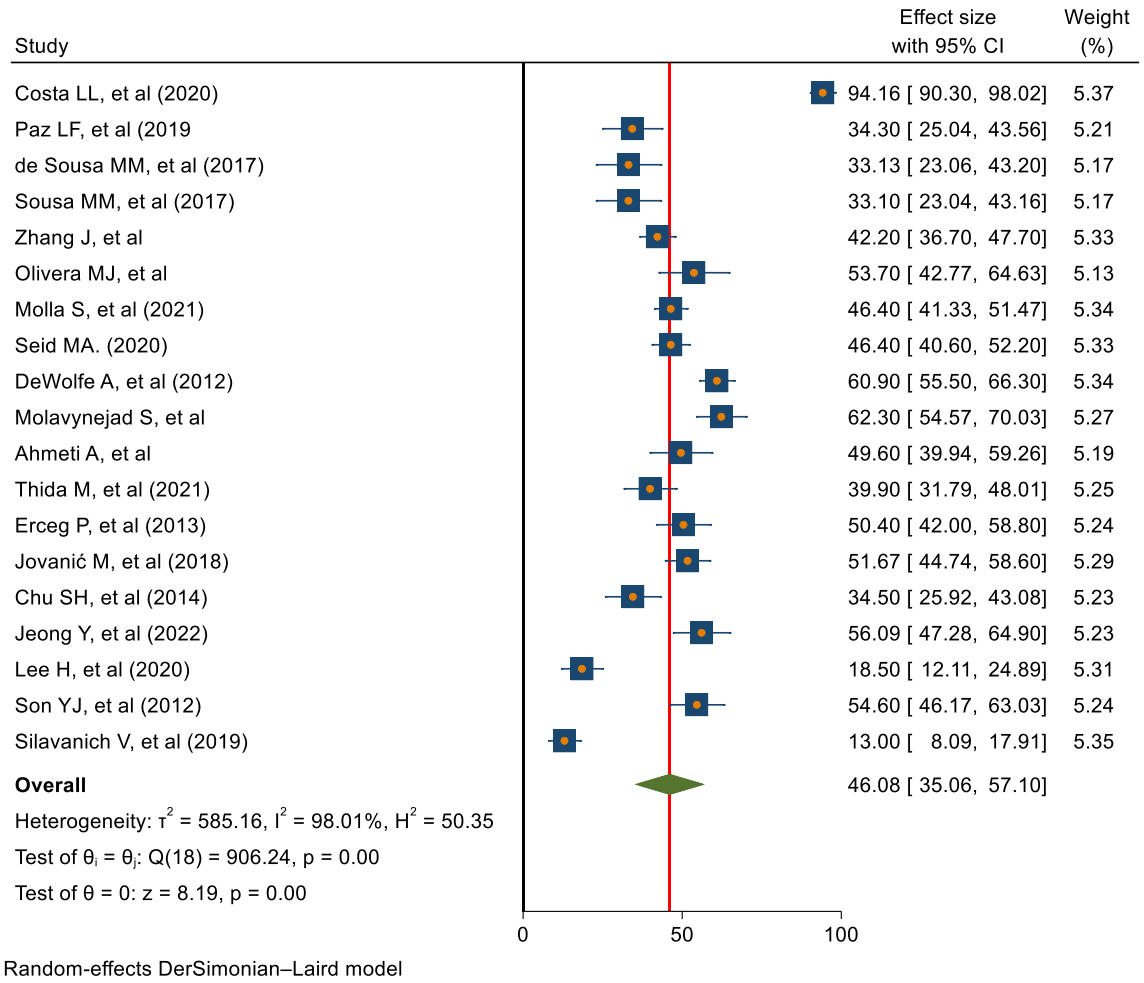


Fig. 3 Forest plot showing the pooled mean MLHFQ score

score. Subsequently, the mean SF-36 QoL score was computed as the overall score divided by 2. The pooled mean SF-36 score using the random-effects model was 41.23 (95% CI 36.63, 45.83). The meta-analysis found significant heterogeneity across the SF-36-based studies ($I^2 = 61.20\%$, $P = 0.01$) (Fig. 6).

Subgroup analysis

The subgroup analysis found the highest SF-36 score was in one study (40] from Latin America and Caribbean region (53.10, 95% CI 40.37, 65.83) and studies with inpatient participants (45.20, 95% CI 34.04, 56.35) (Fig. 7).

Assessment of heterogeneity and publication bias

The heterogeneity test showed significant variation ($P = 0.01$) across SF-36-based studies. Meta-regression analysis using publication year, sample size and quality score found none of the three covariates were significantly associated with the presence of heterogeneity (Table 3). No statistically significant publication bias was detected on Egger's test ($P = 0.99$).

Sensitivity analysis

The result of leave-one-out sensitivity analysis using a random-effects model showed that no single study unduly influenced the pooled SF-36 score. For each study, the displayed effect size corresponds to an overall effect size computed from a meta-analysis excluding that study (Fig. 8).

Discussion

Heart failure is a chronic condition with poor prognosis [56]. Health-related quality of life (HRQoL) is an important predictor of poor HF outcomes such as hospitalisation and death [57, 58]. To the best of our knowledge, this is the first systematic review on HRQoL of people with HF in LMICs.

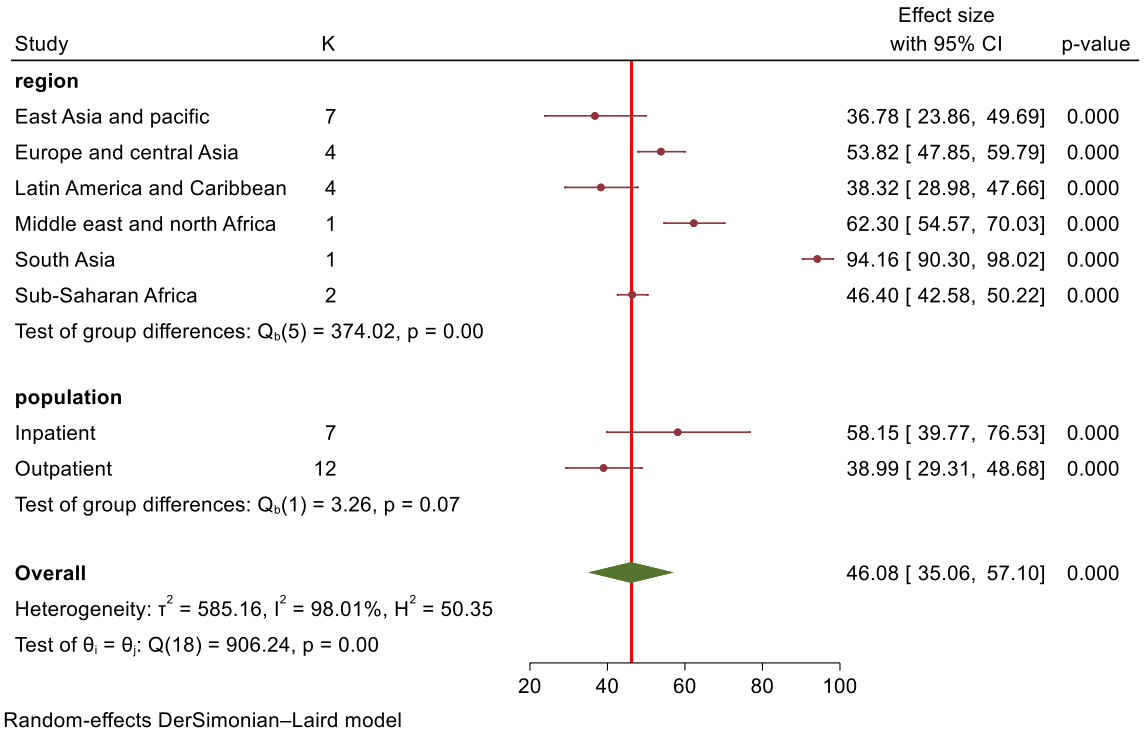


Fig. 4 Subgroup analysis on MLHFQ score

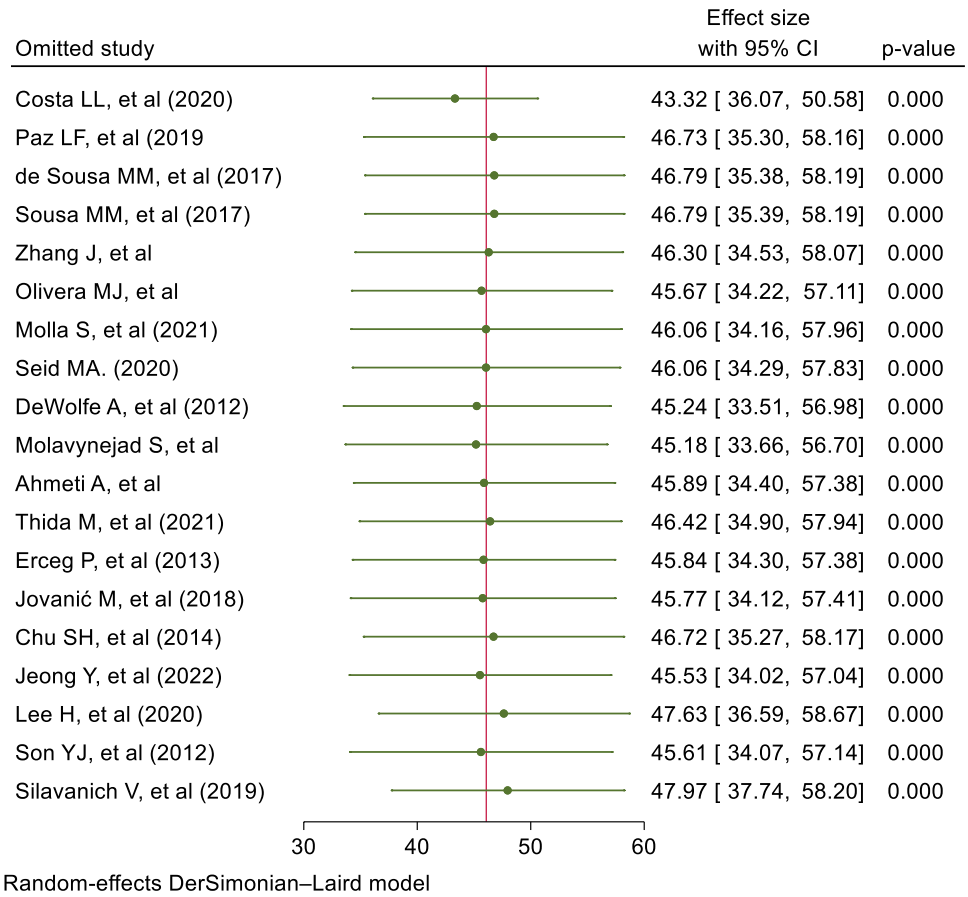
This review identified 33 relevant studies that reported the HRQoL of people with HF. Study characteristics such as study area, study participants and outcome measuring instruments varied considerably across the included studies.

Instruments used to quantify the HRQoL varied significantly among the included studies. The MLHFQ, KCCQ and LVD-36 (disease-specific instruments) and SF-36 and WHOQOL-BREEF (generic instruments) were used across the included studies. The most frequently used disease-specific and generic measures were the MLHFQ and the SF-36, respectively. The MLHFQ has 21 questions about how participants feel HF has affected their life over the previous month using a six-point Likert-type scale that ranges from 0 (no effect) to 5 (very much effect). The score ranges from 0 to 105 with the higher scores representing a poorer quality of life [59, 60]. The SF-36 Questionnaire consists of 36 items and eight dimensions that are summarised into the PCS and MCS scores. The scores on all subscales are transformed linearly to a possible range of 0–100 with higher scores represent better HRQoL. The cut-off points for poor HRQoL were: MLHFQ score ≥ 45 and SF-36 score < 60 [61]. It is important to note that these new cut-off points are specific to heart failure patients and may not be applicable to other health condition.

Table 3 Meta-regression analysis of factors with heterogeneity across MLHFQ-based studies

Heterogeneity source	Coefficients	Std. Err	*P* value
Publication year	−0.336	2.044	0.87
Sample size	0.018	0.075	0.80
Quality score	0.590	11.291	0.86

In this review, the pooled mean HRQoL score based on the MLHFQ was 46.08 (95% CI 35.06, 57.10) showing poor HRQoL in people with HF in LMICs. This conclusion differs from a recently published meta-analysis by Moradi M. et al. on a global MLHFQ-based pooled HRQoL score [42] which found a moderate HRQoL [14]. The higher MLHFQ score in the current review could be due to difference in sociodemographic characteristics of the study participants or because the majority of the studies in Moradi M. et al.'s study were conducted in upper-income countries. People with HF in LMICs are generally diagnosed at a later stage and have poor health literacy, less access to HF healthcare services and poorer prognosis than those in upper-income countries [62–64]. The pooled mean SF-36 score in this review was 41.23 (95% CI 36.63, 45.83) which suggests that participants in the cohorts had a poor HRQoL. This finding is consistent with previous systematic reviews of the SF-36 tool on other chronic diseases (hypertension and tuberculosis) which revealed poor HRQoL [65, 66]. Based on the result of this review, inpatient participants had higher



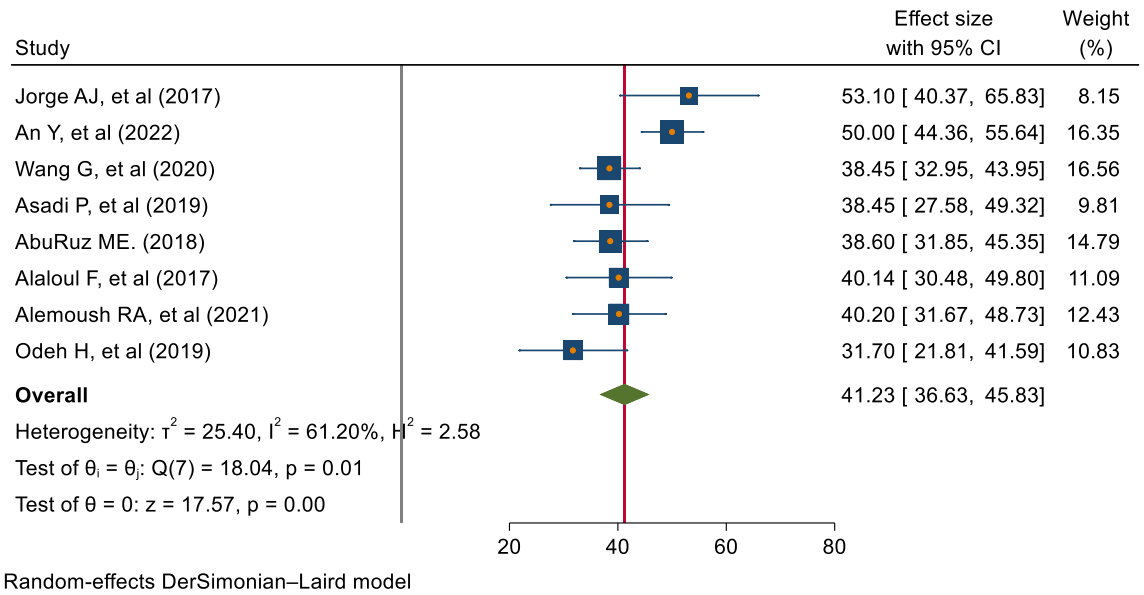


Fig. 5 Result of sensitivity analysis of the 19 studies

Fig. 6 Forest plot showing the pooled mean SF-36 score

HRQoL scores than outpatient participants. This is likely due to inpatient participants generally being more acutely unwell than outpatient participants.

This review has several implications for clinical practice. Heart failure has a negative impact on outcomes such as morbidity, mortality and QoL. The key finding

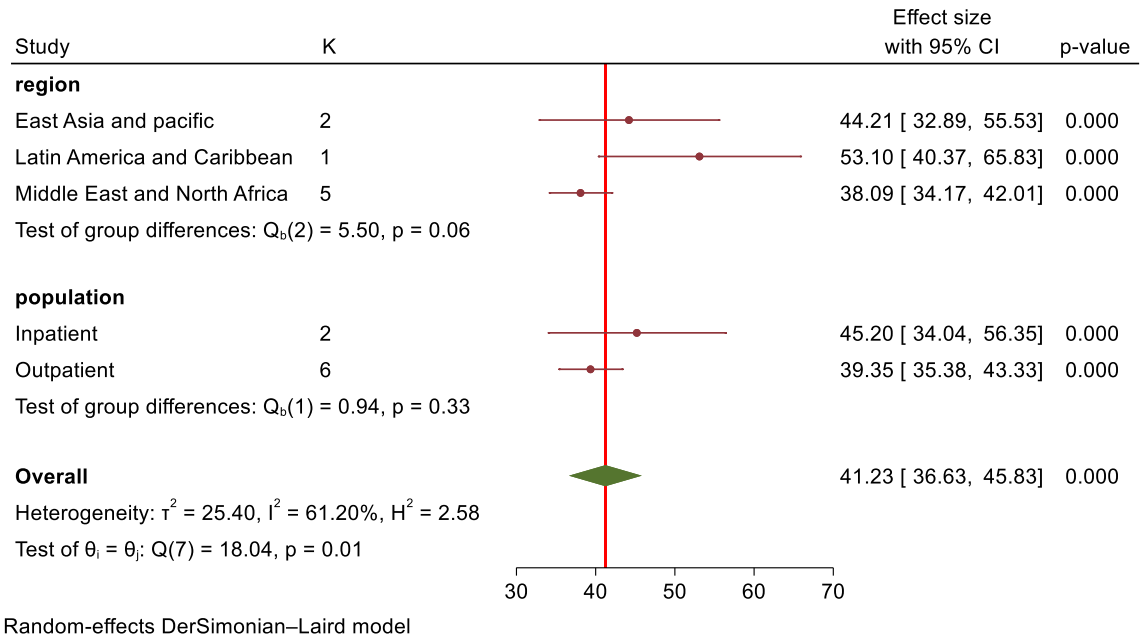


Fig. 7 Subgroup analysis on SF-36 score

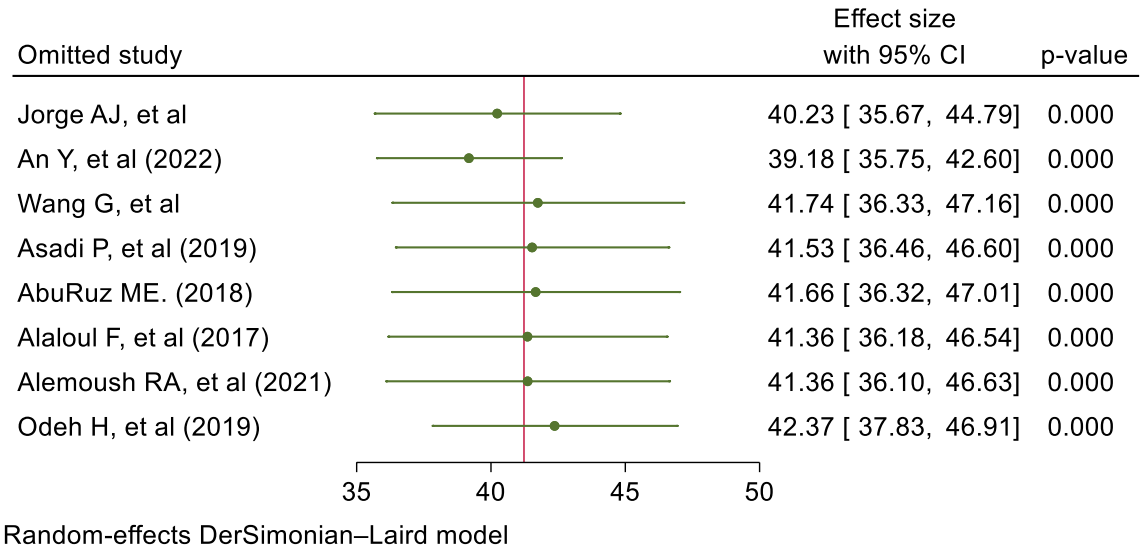


Fig. 8 Result of sensitivity analysis of the 8 studies

in this review was people with HF in LMICs had poor HRQoL, highlighting the greater impact of HF on overall HRQoL scores. This evidence helps health professionals in these countries to consider changing HF care practice and develop strategies to improve the HRQoL of these populations. The finding of a recent systematic review provides evidence that better HRQoL was associated with lower mortality risk [67]. Therefore, healthcare professionals should give clinical priority for assessment of the HRQoL of people with HF during their routine follow-up care to reduce the risk of poor outcomes such as death.

This systematic review involved a systematic search of seven large databases and identified a larger number of studies conducted in LMICs than previous reviews. However, there are some limitations that should be considered. The cut-off date of 2012 was selected arbitrarily to estimate the most recent evidence relevant to current clinical practice today; there may be previous important studies which were not included.

The included articles were restricted to the English language, which may have excluded important studies published in other languages. The results of this meta-analysis should be interpreted with caution as it had statistically significant heterogeneity across the included studies which can affect the quality of the evidence and the conclusion of the review. Additionally, several factors that were not examined in this review may confound the HRQoL of these populations.

Conclusion

This systematic review and meta-analysis revealed that people with HF in LMICs had poor HRQoL. These findings provide evidence-based data about the need of improving HRQoL to reduce the risk of morbidity and mortality in these populations. Therefore, early interventions should focus on improving HRQoL to achieve a better prognosis and to enhance the overall experience of living with HF. Large-scale prospective studies are needed to verify these findings and to investigate factors influencing the HRQoL of people with HF.

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Availability of data and materials All the data are available from the corresponding author up on request.

Declarations

Conflict of interest The authors report no competing interests.

Ethics approval and consent to participate Not applicable.

Consent for publication Not applicable.

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