Health Information Literacy of Cardiac Patients: A Systematic Literature Review

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ABSTRACT

Background and Objectives: Health information literacy (HIL) is gaining global attention due to complex information ecosystem and exponential health issues. This systematic review investigates the low functioning of HIL among cardiac patients and the key factors associated with HIL and cardiac patients. In this study, we investigate the poor performance of HIL in cardiac patients (CP) and the important factors associated with HIL and CP.

Materials and Methods: This review examined Exploring the Gaps and Associations in Health Information Literacy among Cardiac Patients: A Systematic Review while evaluating research in English that appeared within the time period of 2006 to December 2024. The research eliminated studies which utilized Exploring the Gaps and Associations in Health Information Literacy among Cardiac Patients: The flowchart stated in the PRISMA diagram shows how researchers selected 521 relevant studies for inclusion. A material extraction structure was applied to analyze the selected studies. Final selection of studies took place after conducting title reviews and abstract and full text evaluations. This review implementation conformed to the PRISMA standards for systematic reviews with meta-analyses.

Results: The systematic review of 21 studies found that demographic and clinical factors, such as gender, age, education, and disease knowledge, positively impact health information literacy (HIL) among cardiac patients. Conversely, factors like older age, lower education, African American ethnicity, depression, hypertension, and longer disease duration negatively affect HIL. The study suggests tailored interventions and patient-centered care approaches.

Conclusion: The menstrual health literacy level among female undergraduates was high and good. Schools and homes should provide girls and young adult's females with information about the meaning of menstruation, cycle and the importance of good hygienic practices.

Paper Type: Research Article

Keywords: Health literacy; Health Information Literacy; Cardiac Patients; Heart Failure, Systematic Review; Heart Disease.

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Introduction

Health information literacy (HIL) is gaining global attention due to complex information ecosystem and exponential health issues. Globally, 26 million persons are affected by heart diseases, including 2 million new cases per year (1), (2). HIL refers to an individual's ability to recognize, identify, and apply information and resources to inform their own and others' health-related outcomes and activities. This skill set and level of knowledge enable individuals to locate, comprehend, and utilize knowledge and resources to guide health-related behavior (3).

Socioeconomic status significantly impacts cardiovascular health outcomes, correlated with increased risks, especially among Black and Hispanic populations. Factors like education, income, employment, and living conditions contribute to disparities in CVD incidence and outcomes. Mental health conditions further compound cardiovascular risks, highlighting the need for targeted interventions. (4) The clinical practice guideline required (5) to develop quality indicators for managing heart failure effectively. The healthcare institutions can use this identified set of practices as an evaluation system to monitor cardiac patient care while performing quality improvement assessments. Heidenreich et al., (6) developed guidelines for heart failure patients that show optimal HF patient management approaches while enhancing quality care delivery and meeting patient needs. The authors Reveilhac and Blanchard (7) explained that people with solid health concept knowledge demonstrate better abilities to process health content as well as critique medical information. The physicians of primary health care (PHC) play a vital role to diagnose the heart disease among patients who lack awareness, education, self-care skills, cultural limitations, cognitive issues, low socioeconomic status, absence of social support, and low level of health information literacy skills (8). has become a serious public health issue due to higher hospitalization and re-admission statistics (9). It is a distinct form of literacy that is popular among healthcare professionals, information specialists, and the general public (3). The major steps in patient health information literacy also include knowledge, education, and skills in the search for information, application of information, and assessment of the information in the fulfillment of best patient care (10). In other words, HIL is the extent to which individuals are able to obtain, process, and comprehend the health information and services they require to make appropriate health decisions. According to Ponikowski et al. (11), the precise meaning of cardiac failure is an anomaly of the heart's structure and/or function that results in a decreased cardiac output and/or raised intra-cardiac pressures at rest or while the heart is under stress. Cardiac failure disturbs daily activities, quality of life, living standards, and decreased the hope of life. Patients with heart disease need special treatment that can improve mortality rate and their wellbeing. Medical services such as post-hospital recovery, specific care plans, follow-up, education, skills and monitoring programs may enhance the survival opportunities (12). HIL equips individuals with superior cognitive and social abilities to respond more effectively to novel and evolving health-related situations. Rudd (13) stated that the use of health materials,

resources, and tools confirmed an individual's inability to use them for self-care because the majority of health-related materials are written in technical language, rendering health information inaccessible to laymen. Experts in literacy demand contextual skills and knowledge to address multiple health issues. To prevent negative health outcomes, health professionals and the education sector contemplated raising the public's literacy rate. A major step in patient health information literacy also includes skills, knowledge and search for information, development of a question, application of information, and assessment of the information in the fulfillment of best patient care. A person with good HIL can confirm the authenticated, reliable, and valid information which is needed for the quality of the medical outcomes (14). Insufficient HIL has been shown to increase morbidity and mortality and also to reduce self-care. Self-care management skills, and follow up are associated with better health outcomes in cardiac patients (15). A high level of education, good social support, better socioeconomic status, and skills for acquiring medical resources were very important for heart patients and these factors increased the health outcomes and reduced the hospitalization (16). A person with good HIL can confirm the authenticated, reliable, and valid information which is needed for the quality of the medical outcomes. Tung et al., (17) indicated that the majority of cardiac patients have a high level of education, good income, married, and good social support they have good HIL, self-care behaviors, and better health outcomes.

The systematic review highlights factors influencing HIL and its association with self-care and medication adherence, it does not sufficiently emphasize how HIL directly impacts clinical outcomes, such as hospitalization rates, mortality, or quality of life. Providing evidence through review the literature on how improved HIL leads to better disease management, reduced complications, and enhanced patient outcomes would strengthen the argument. This would help establish a clearer rationale for the importance of HIL in cardiac care and underscore the need for targeted interventions to address low HIL in this population. Besides, the available literature reported positive and negative factors associated with HIL and cardiac patients. Studies showed different factors which impeded HIL operation among cardiac patients. The research was performed to document findings regarding the weak dimension of HIL among cardiac patients with a focus on their HIL supportive and obstructive elements. The review explores variables which impact HIL access to health information through evaluations of language and cultural diversification among patients who face technology constraints. A literature evaluation follows this research to determine what gaps exist in previous work before new investigations should be conducted. The analysis recognizes potential healthcare communication and information literacy enhancement techniques for the public. The study unveils essential findings which help recognize practical methods to enhance health results among people. The researchers analyzed existing research before working to complete the existing knowledge gap.

Research objectives

The objectives of this study are:

1. To identify the key reasons behind low functioning of HIL by cardiac patients.

2. To determine the factors (positively or negatively) associated with HIL and cardiac patients.

Materials and Methods

We conducted a systematic literature review approach for this study. This review was conducted in a systematic and rigorous manner, following the established Preferred Reporting Items for the Systematic Review and Meta-analysis (PRISMA) guidelines. For the critical appraisal of the published literature, the role of PRISMA is significant in helping the researchers to report the evidence-based set of lowest items. Identification, screening, eligibility and include the studies are considered to be the four aspects of the PRISMA guidelines Shamseer et al. (18). The PRISMA is a systematic procedure to identify and retrieve the results on a given topic. In this first stage, a search query using Boolean operator was framed to identify a relevant literature on the topic. The second step in PRISMA guidelines are screening of the results. We prepare inclusion and exclusion criteria to screen out the irrelevant results as some duplicate, literature review, bibliometric, and other than English language studies were removed. The third step in PRIMA is 'eligibility' means the eligible studies to be included for a systematic review. Some studies were also screen out at this stage that did not meet the eligibility criteria as some studies that investigate the personality traits or the personality traits other than the big five personality traits were removed. Finally, the last step is 'included' studies that meet the inclusion criteria or meet the objectives of the study.

Search strategy and inclusion criteria

An inclusive research strategy has been utilized by the investigators to find out the relevant literature regarding the selected topic. For the selected study, three major databases such as Web of science, Scopus and PubMed, has been used. The following search query was run in the title, abstract and keywords field;

TITLE-ABS-KEY: ("Health literacy" OR "health information literacy") AND ("cardiac patients and Health Information literacy" OR "Level of health literacy and cardiac patients" OR "cardiac patients and low functioning HIL" OR "health literacy") AND ("Cardiac patient" OR "cardiovascular" OR "heart failure" OR "cardiac disease" OR "cardiac condition" OR "cardiac arrest")

These searches were performed on April 24, 2024. The relevant data was downloaded via three different databases and records were imported into the Endnote software on the same date. To ensure the accurateness of data, the entire procedure was repeated by the second author. To further ensure its authenticity, the reviewing procedure, including screening, aptness and involved studies, was repeated. After the final data extraction, it was rechecked by the second author. To ensure the validity and reliability of the extracted data, in all the stages of extraction and downloading of data, both team members performed their roles to ensure the accuracy and validity of the data.

Data extraction

This analysis contains two sections with research which explains HIL dysfunction

causes in cardiac patients and explores connections between their HIL levels. An appropriate search technique was created to collect necessary data. The search query yielded 4115 records in the results (Figure 1). The necessary data emerged after applying different filtering methods. The search parameters included 'document type', 'subject category' and 'language'. Our research focused exclusively on English-language research articles belonging to the health sciences category. Endnote software received all remaining bibliographic information for data processing. The research team used PRISMA guidelines to toss away duplicate and irrelevant papers and screened the remaining possible collection (n=106). The full text accessibility issues together with articles containing non-English content caused nineteen records to be excluded from the analysis. Among 87 accessible records we discarded 66 as they presented one-dimensional research about HIL functioning among low-performing health institutions or HIL correlations with cardiac patients. The evaluation team proceeded with analyzing 21 records obtained from the database.

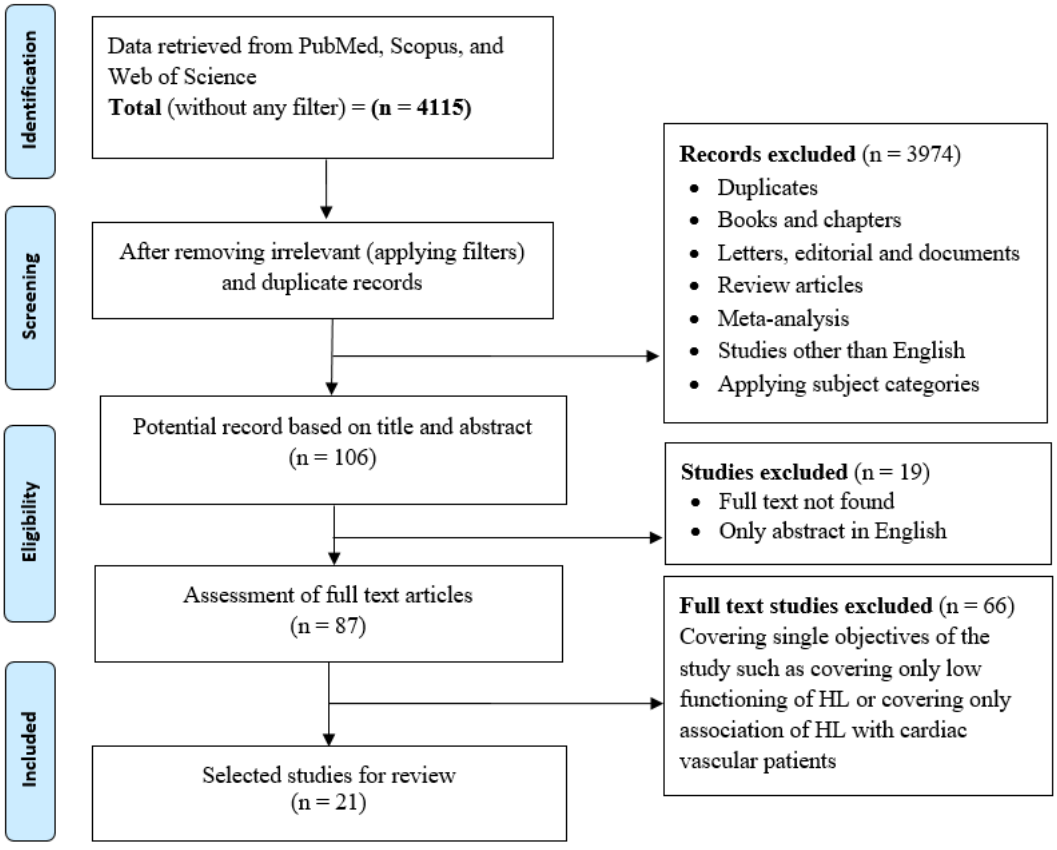

Figure 1. Flow diagram of the studies

Quality assessment of included studies

Determining the quality of each study represents a fundamental requirement for performing a complete systematic review. The development of multiple quality assessment tools occurred throughout time.

For this research the author selected the (19) checklist as the most suitable instrument since it incorporates essential components that evaluate study quality including research questions or objectives and research design and sampling methods and response rates and instrumentation and research results alongside visual presentation quality. This checklist contains requirements necessary for six aspects of research including questions and design selection and sampling practices as well as instrument application and response rate management and result coding and data analysis and result presentation components. The first element that is questions and design consist of 2 score (if a study mentioned or written research questions, objectives and design of the study then this study will get 2 scores), sampling (2 scores: one each for sample size and appropriateness of sample size), instrument (4 score consist of instrumentation, its development, procedure, reliability and validity), response rate (1 score), coding and analysis (2 score: one each for valid coding and its appropriate analysis), and presentation of result (2 score: proper presentation such as figure, tables, diagrams, et c. and its explanation). Six evaluation perspectives result in a maximum study score total of 13 points. Table 1 demonstrated that the categories ‘questions and design score’ and ‘instrument score’ with ‘response score’ received maximum points. Both categories 'coding and analysis' and 'representation of result' achieved a score of 45 out of 46 points while "response score" only achieved the maximum points. A total of 38 points out of 46 was achieved in ‘sampling score’ because some studies obtained their data from convenience samples. The quality appraisal scores show that participating studies maintain respectable levels of quality.

Inclusion criteria

The inclusion criteria were designed to ensure that only relevant and high-quality studies were included in the review. Studies were included if they investigated the reasons for low functioning of Health Information Literacy (HIL) among cardiac patients or explored the relationship between HIL and cardiac patients, including its impact on health outcomes, self-care, or disease management. Only research articles were considered, while other document types such as reviews, editorials, or conference abstracts were excluded. Studies were limited to those within the health sciences domain to maintain relevance to medical and public health contexts. Additionally, only studies published in English were included to ensure consistency in language and interpretation. Studies were included only if the full text was accessible for thorough evaluation. Finally, studies had to address both objectives of the review: low functioning of HIL and its association with cardiac patients.

Exclusion Criteria

The exclusion criteria were applied to remove studies that did not meet the review's objectives or quality standards. Non-research articles, such as reviews, commentaries, or editorials, were excluded to focus on original research. Studies outside the health sciences domain were excluded to maintain a focus on medical and public health contexts. Articles published in languages other than English were excluded, even if they were relevant, to ensure consistency in analysis. Studies for

which the full text was unavailable were excluded to allow for comprehensive evaluation. Studies addressing only one objective of the review, such as focusing solely on low functioning of HIL or only its association with cardiac patients, were excluded to ensure a balanced analysis. Duplicate records identified during the screening process were removed to avoid redundancy. Lastly, articles with incomplete or irrelevant data were excluded to maintain the review's quality and relevance.

Overview of selected studies

The overview of the included studies is presented in Table 2. These studies published between 2006 to 2024 and all these studies published collaboratively. Most of these studies published by the United States (n=13) and remaining by various other countries from the developed and developing world. These studies used correlational design and were applied randomized controlled trial (RCT). Seven each studies used convenience and stratified random sampling (SRS), whereas remaining were used purposive sampling. Most of these studies mentioned the site from which the sample was taken, whereas three studies did not report the site. The sample size range of these studies from minimum to maximum was n=49 to n=6444. Whereas, the mean age of the study participants was also reported most of these studies (Table 2).

Results

This study addressed two research questions, reasons behind low functioning of HIL and key factors associated with HIL and CP. Four themes emerged from the data identified the reasons behind low functioning of health information literacy (HIL) of cardiac patients (CP) are, gender and low HIL among older patients; HIL and lower educational attainment; HIL, socio-economic status and race; and HIL, CP and other associated diseases; respectively (Table 3).

Gender and low HIL among older cardiac patients

As in Table 3, most of the included studies reported that older people have poor HIL scores. Studies indicate that older individuals, particularly older patients (over 65 years age) with heart failure (HF), tend to exhibit lower health literacy skills or obtain lower scores on HIL assessments (2), (13),(17). Older individuals may face challenges in understanding and utilizing health-related information effectively, which impacts their ability to navigate healthcare systems and make informed decisions about their health (30). Low health literacy is at risk for poor health outcomes, medical adherence, re-hospitalization, and mortality. Some studies reported that individuals with low HIL levels are more likely to experience poor health outcomes, such as uncontrolled symptoms, medication errors, higher rates of hospital readmissions, and increased mortality rates (25), (26), (32). The limited understanding and utilization of health information hinder their ability to manage their condition effectively and make informed decisions about their health, leading to negative consequences. Lower HIL among older HF patients also impact overall quality of life (17). Difficulties in understanding health information, communicating with healthcare providers, and participating in self-care activities contribute to reduced self-confidence, increased anxiety, and a sense of disempowerment (29).

Table 1. Quality Assessment Score of Selected Studies

Studies	Question and design score (total 2)	Sampling score (total 2)	Instrument score (total 4)	Response score (total 1)	Coding and analysis score (total 2)	Presentation of result score (total 2)	Total score (out of 13)
Bahçecioğlu Turan and Çiftçi, 2023	2	1	4	1	2	2	12
Chaudhry et al., 2011	2	2	4	1	2	2	12
Chen et al., 2011	2	1	4	1	1	1	10
Chen et al., 2013	2	1	4	1	2	2	12
Dennison et al., 2011	2	1	4	1	2	2	11
Fabbri et al., 2018	2	2	4	1	2	2	13
Gomez et al., 2023	2	2	4	1	2	2	13
Jovanić et al., 2018	2	2	4	1	2	2	13
Leon-Gonzalez et al., 2018	2	2	4	1	2	2	13
McNaughton et al., 2015	2	2	4	1	2	2	13
Meraz et al., 2022	2	2	4	1	2	2	13
Meraz et al., 2023	2	1	4	1	2	2	12
Morrow et al., 2006	2	1	4	1	2	2	12
Moser et al., 2015	2	2	4	1	2	2	13
Murray et al., 2009	2	2	4	1	2	2	13
Peterson et al., 2011	2	2	4	1	2	2	13
Rezaei et al., 2022	2	1	4	1	2	2	12
Son et al., 2023	2	2	4	1	2	2	13
Tilahun et al., 2021	2	2	4	1	2	2	13
Tung et al., 2014	2	1	4	1	2	2	12
Wu et al., 2016	2	2	4	1	2	2	13
Category score (Quality obtained)	46	38	92	23	45	45	289
Maximum score of categories (Quality expected)	46	46	92	23	46	46	299

Table 2. Bibliographic information of selected studies

No.	Study	Country	Design	Method	Site	Sample Size	Mean age (Years)
1	Turan and Çiftçi, 2023 (20)	Turkey	Descriptive correlational	Convenience	Fırat University Hospital	n=210	NR
2	Chaudhry et al., 2011 (21)	USA	RCT	SRS	33 community-based cardiology practices across the US	n=1464	67
3	Chen et al., 2011 (22)	USA	Cross-sectional	Convenience	Midwestern community settings (one urban and one rural HF clinics)	n=49	72
4	Chen et al., 2013 (23)	USA	Correlational longitudinal design	Purposive	3 clinics: Indiana University Health-Bloomington Hospital; Community Health Network Indiana Heart Hospital Healthy Hearts Center; and Cleveland Clinic in the Heart and Vascular Institute	n=51	64.68
5	Dennison et al., 2011 (24)	USA	descriptive, comparative study	Convenience	NR	n=95	59
6	Fabbri et al., 2018 (25)	USA	Mixed-method design	Purposive	11 counties in southeast Minnesota	n=2487	73.5
7	Gomez et al., 2023 (26)	Spain	Prospective cohort study	Purposive	Hospital Universitario Puerto Real, Spain	n=6444	NR
8	Jovanić et al., 2018 (2)	Serbia	Cross-sectional	Purposive	Clinical Center “Bežanijska Kosa”	n=200	70.12
9	Leon-Gonzalez et al., 2018 (15)	Spain	Prospective cohort	SRS	Six hospitals in Spain	n=556	85
10	McNaughton et al., 2015 (27)	USA	Retrospective cohort	Purposive	American Heart Association (AHF) patients	n=1379	64

No.	Study	Country	Design	Method	Site	Sample Size	Mean age (Years)
11	Meraz et al., 2023 (28)	USA	Correlational cross-sectional	Convenience	NR	n=174	62.22
12	Meraz et al., 2022 (29)	USA	Correlational cross-sectional	SRS	NR	n=174	62.22
13	Morrow et al., 2006 (30)	USA	Descriptive correlational	Convenience	Midwestern, county-managed urban hospital.	n=314	62.73
14	Moser et al., 2015 (14)	USA	RCT	SRS	Outpatient clinics and hospitals referral of HF resided at the California, Nevada, and Kentucky.	n=575	66
15	Murray et al., 2009 (31)	USA	RCT	SRS	Wishard Health Services, Indiana	n=192	63.2
16	Peterson et al., 2011 (32)	USA	Retrospective cohort	Purposive	Kaiser Permanente of Colorado (KPCO)	n=1547	74.9
17	Rezaei et al., 2022 (33)	Iran	Cross-sectional	Convenience	Shahid Rajaee Cardiovascular Medical and Research Center	n=250	NR
18	Son et al., 2023 (34)	South Korea	Cross-sectional	Purposive	Two tertiary acute care hospitals in Seoul, South Korea.	n=182	74.03
19	Tilahun et al., 2021 (35)	Ethiopia	Cross-sectional	SRS	Jimma Medical Center	n=410	48
20	Tung et al., 2014 (17)	Taiwan	Cross-sectional	Convenience	A large medical center in Taiwan	n=98	67.4
21	Wu et al., 2016 (13)	USA	RCT	SRS	Outpatient clinics and hospitals referral of HF resided at the California, Nevada, and Kentucky.	n=575	66

RCT= Randomized controlled trial, SRS= Stratified random sampling, NR= not reported.

Table 3. Data extraction and key findings of included studies (Factors associated with HIL)

Study	Low functioning HL	Factors associated with HL	Key Findings
Turan and Çiftçi, 2023 (20)	Low HL among older HF patients, educational status, high levels of health fatalism, poor health literacy	Negative correlation between religious health fatalism and the health literacy of heart failure patients. Patients exhibited a high degree of religious fatalism and a lack of health literacy.	HL of HF patients decreased as religious health fatalism increased.
Chaudhry et al., 2011 (21)	Low level of education and income, absence of a medical centre for black patients, cost as a barrier to obtaining health care and medications on prescription, and limited access to medical specialists.	Age, social support, insurance status, hypertension, education and annual house hold income are associated with HL	Black patients have poor health literacy than white. There are racial disparities in health literacy and access to care among heart failure patients.
Chen et al., 2011 (22)	Higher educational status, self-care maintenance and management,	Higher health literacy was associated with better self-care maintenance, while lower health literacy was correlated with better self-care management.	Health literacy was positively associated with self-care maintenance, negatively with management, and not correlated to self-care confidence.
Chen et al., 2013 (23)	Low HL, low knowledge level of patients with inadequate HL.	Higher health literacy was associated with increased knowledge, but not with self-care adherence or self-efficacy for self-care	Increased HF knowledge was associated with adequate health literacy, but not adherence to self-care expectations or self-efficacy.
Dennison et al., 2011 (24)	Low HL among older patients, low level of high school education, limited sources and knowledge, self-care issues	Levels of HL and HF knowledge are positively correlated. Patients with marginal HL had lower self-care confidence scores than patients with insufficient HL. Participants with low HL had the highest 30-day readmission rate, but this trend was not statistically significant (p=.116).	Hospitalized patients with adequate health literacy have greater heart failure knowledge and self-care confidence.
Fabbri et al., 2018 (25)	Older and less likely to be married, low self-care, lower educational attainment,	Poor health literacy increased hospitalizations by almost 50%. Poor health literacy increases mortality. Age, sex, education, marital status, and comorbidities reduced this connection.	Low HL is correlated with increased risks of death and hospitalization.

Study	Low functioning HL	Factors associated with HL	Key Findings
Gomez et al., 2023 (26)	Low level of HL, socioeconomic status, education level, depressive symptoms, social support, dependency, cognitive status, self-care behaviour, and medication exposure.	A sufficient HL was correlated with a reduction in all-cause and cardiovascular mortality, hospitalizations, and 30-day readmissions. Low HL is independently related to increased mortality and hospitalizations in patients with heart failure (HF).	A sufficient HL is associated with a lower mortality and hospitalization risk.
Jovanić et al., 2018 (2)	Low HL, low quality of life dimensions score, lower levels of education, unemployment, low self-care, poor financial status.	Education level (χ 2 = 110.426; p 0.001), employment status (χ2 = 7.461; p = 0.024), self-assessment of financial status (χ2 = 17.389; p = 0.002), and self-assessment of general health were found to have significant associations with HL levels.	The health literacy of heart failure patients was highly statistically significant and an independent predictor of quality of life.
Leon-Gonzalez et al., 2018(15)	Less primary education, other diseases with HF, Hypertension and depression, low HL score,	With increasing HL, disease knowledge increased progressively. However, there was no correlation between HL and HF self-care. No association between HL and all-cause mortality and an inverse association between HL and self-care behaviour.	There is no association between HL and all-cause mortality at 12 months.
McNaughton et al., 2015 (26)	Low HL among elders, No attainment of high schooling, low self-care, limited access to health resources,	There was no correlation between HL and re-hospitalization or emergency department visit. After hospitalization, HL was associated with an increased risk of mortality. Patients with a lower level of HL had an increased risk of mortality from all causes; this risk increased as HL decreased.	There was no correlation between HL and emergency department visits within 90 days or re-hospitalization.
Meraz et al., 2023 (28)	Lower HL in unmarried, lower annual household income, lower HL among persons of color, lower educational level,	There was a significant correlation between residing in an urban area and greater HF self-care (r =.154, p .05). HL has a moderately positive correlation with both race (r =.300, p .01) and age (r =.301, p .01). There is a modest positive relationship between HL and income (r =.186, p .05), education level (r =.175, p .05) and marital status (r =.185, p .05).	There was no correlation between patient activation and self-care adherence for HL and HF.

Study	Low functioning HL	Factors associated with HL	Key Findings
Meraz et al., 2022 (29)	Low self-care, lack of resilience, lack of social support, depression and anxiety,	Depression and age affect drug adherence. Medication adherence scores decrease with age, indicating higher adherence. Medication adherence decreases when depression scores rise. Resilience and health literacy still predicted drug adherence after controlling for age and depression. Medication adherence decreases as resilience increases. Health literacy improved drug adherence.	Resilience and health literacy were found to be significant predictors of medication adherence, while social support predicted self-care.
Morrow et al., 2006 (30)	Low HIL, low medication comprehension skills, race impact on HL (African American), age and cognitive skills,	Participants who were elderly, male, less educated, African-American, had more comorbidities, or lower score on all cognitive ability assessments. Analyses of hierarchical linear regression demonstrated that cognitive ability and education are independently related to the HL measure.	Gender and race are significant predictors of cognitive abilities and educational attainment.
Moser et al., 2015 (14)	Patients who were elderly male, unemployed, and less educated were more likely to be in the HL group with the lowest prevalence. The marginal HL group comprised a greater proportion of patients with higher depression scores.	An inadequate and marginal HL category posed a significantly higher risk for HF, overall mortality, and re-hospitalization. In addition to inadequate or marginal HL, depression scores, worse New York Heart Association (NYHA) functional class, and greater comorbidity burden were three predictors of poor outcomes.	Inadequate or limited HL is a risk factor for re-hospitalization or death from all causes in rural heart failure patients.
Murray et al., 2009 (31)	Poor treatment adherence, low HL skills, being female, African American, having less formal schooling, not being married and living alone, and having diabetes or depression	The serum potassium level, the New York Heart Association (NYHA) class, Medicaid insurance, and the score on reading medication labels were all associated with visits to the emergency room because of heart failure.	Participants who correctly read the medication prescription had 6-fold fewer emergency visits and 11-fold fewer heart failure hospitalizations.

Study	Low functioning HL	Factors associated with HL	Key Findings
Peterson et al., 2011 (32)	Low HL, lesser socioeconomic status, and lack of higher education. Diabetes, hypertension, chronic pulmonary disease, and stroke are coexisting conditions.	There is no correlation between all-cause mortality and HL. However, the association between low HL and hospitalization for all causes was statistically significant. Independently, low HL remained associated with an increased risk of mortality.	Low HL was significantly associated with increased all-cause mortality.
Rezaei et al., 2022 (33)	Insufficient HL level, lower educational level, non-adherence to medication, and forgetfulness for their non-adherence behavior.	Significant predictors of medication adherence were HL, gender, number of medications, and an HF medical history of less than five years. There is a significant relationship between gender and medication adherence, as women have lower medication adherence. Medication adherence is negatively impacted by the duration of HF disease.	The results of the study revealed a positive correlation between health literacy and medication adherence.
Son et al., 2023 (34)	Low education level, income, self-care behaviour, and NYHA functional class.	There were significant correlations between HL, self-care behaviour and disease knowledge. Patients with NYHA functional class were more likely to adhere to self-care regimens than those with NYHA functional class.	Higher levels of patient activation anticipated better HF self-care behaviour in older patients.
Tilahun et al., 2021 (35)	Low HL level, Insufficient information sources, difficulty in understanding health information	Sex (female has less sufficient health information), educational status, number of information sources and monthly income more likely to get sufficient health information.	Half of patients had low HL for understanding health information.
Tung et al., 2014 (17)	Low levels of education, unemployment, and older age were sociodemographic variables associated with low HL.	Health literacy contributes to improved self-assurance, socially relevant quality of life and self-care maintenance.	Inadequate HL is affecting self-care maintenance, confidence, and quality of life.
Wu et al., 2016 (13)	Low HL, poor health outcomes, older age, and lower socio-economic factors	Positive association between age and health literacy (better health literacy scores reduced cardiac event risk, while greater age increased cardiac event risk). Sex, income, ethnicity, work status and marital status did not affect cardiac event–free survival	In adults with HF, health literacy mediates the association between age and health outcomes.

These factors negatively affect various aspects of an individual's quality of life, including physical, emotional, and social well-being (17), (21). Studies reported that older cardiac patients with lower HIL skills may experience challenges in engaging in effective self-care and maintenance (26), (34). Self-care activities, such as adhering to medication regimens, following dietary restrictions, managing symptoms, and recognizing warning signs, require a solid understanding of health information. Limited HIL impede their ability to carry out these self-care tasks properly, which can lead to worsened symptoms, higher healthcare utilization, and a decreased ability to manage their condition independently (28).

HIL and lower educational attainment

This theme indicates that a significant proportion of older individuals, particularly those with cardiovascular conditions, have lower levels of educational attainment. Studies reported that patients have not completed primary education or high school, indicating limited formal education (15), (24), (33). This lack of educational background with lower health literacy levels, contribute to limited knowledge and understanding of health-related information among patients (33).Patients with lower educational backgrounds also struggle to comprehend complex medical terminology, health instructions, and disease management concepts (15). This limited knowledge and understanding hinder their ability to make informed decisions about their health, communicate effectively with healthcare providers, and engage in appropriate self-care practices. Individuals with lower educational attainment face challenges in medical adherence and prescription reading (31). Recognizing these challenges is crucial for healthcare providers to address the specific needs of patients with lower educational backgrounds. Tailoring communication strategies, providing simplified health information, and offering support and resources to enhance health literacy are crucial to improve patient understanding, engagement, and self-care practices.

HIL, socio-economic status and race

Socio-economic status plays an important role in health literacy levels among cardiac patients. Studies indicate that patients with higher annual incomes tend to have better health literacy skills compared to those with lower incomes (21), (28), (34). Higher socio-economic status provide individuals with increased access to educational opportunities, resources, and health information (35) which can contribute to better understanding and utilization of health-related knowledge. Patients with higher annual incomes demonstrate better self-care behavior (23). This attribute to factors such as increased access to healthcare services, greater awareness of preventive measures, and the ability to afford and prioritize healthier lifestyle choices. Patients with higher annual incomes have also better access to healthcare services, including preventive care, regular check-ups, and timely interventions (2). Limited sources and knowledge also result in lower health literacy levels and hinder individuals' ability to understand and make informed decisions about their health (26).

Besides, some studies reported that black patients (mostly studies were about

American African patients) face barriers to healthcare, including the absence of a medical home (a consistent primary care provider or clinic), limited access to medical specialists, financial constraints that deter seeking healthcare, and the inability to afford prescription medications (21), (30), (31). These factors ultimately contribute to lower health literacy levels and hinder the ability of black patients to effectively navigate the healthcare system and engage in appropriate self-care.

HIL, CP and other associated diseases

Studies reported that cardiac patients (CP) also have coexisting illnesses. The data from the reviewed studies indicate that individuals diagnosed with heart failure often experience other medical conditions simultaneously. These conditions include depression (14), (26), (29) diabetes (31) hypertension (high blood pressure) (31), (32) chronic pulmonary disease (such as chronic obstructive pulmonary disease or asthma) and stroke (32). This implies that heart failure patients commonly face the challenge of managing multiple health conditions concurrently, which significantly impact their overall health and well-being. The presence of coexisting illnesses alongside heart failure further complicate a patient's health management (22). Each additional condition requires specific treatments, medications, self-care practices, and lifestyle adjustments, which ultimately increase the complexity of the patient's healthcare regimen (13). Besides, managing multiple diseases effectively demands a higher level of HIL. It refers to an individual's ability to understand and use health information to make informed decisions and engage in appropriate health behaviors. It encompasses skills such as reading, comprehending medical instructions, interpreting health-related materials, and navigating healthcare systems. In the context of cardiac disease and coexisting illnesses, individuals with higher health literacy are better equipped to understand their conditions, adhere to complex treatment plans, recognize and manage symptoms, communicate effectively with healthcare providers, and make informed decisions about their health (22). Conversely, lower health literacy levels can impede a patient's ability to navigate their healthcare effectively, comprehend medical instructions, interpret health information accurately, and engage in optimal self-care practices (26).

Factors associated with HIL and CP

As identified in Table 3, the 21 included studies reported various factors or variables associated with HIL and CP along with the key findings of the included studies. The positive associated variables with HIL were gender, age, educational status, marital status, income, knowledge of disease, self-care behaviour, quality of life, cognitive ability, social support, insurance status, self-assessment, New York Heart Association (NYHA) functional class, urban area, and medication adherence. Whereas, the negative associated variables with low HIL were older/age, less education, race, depression and hypertension, increased risk of death, increased risk of hospitalization, lower self-care confidence, religious health fatalism, and longer duration of HF disease. Overall, there are some interesting results reported in the included studies. As regard to the gender, some studies reported that male

patients have low HIL score (14), (30) while, other reported female patients have low HIL score (31), (33), (35). Similarly, Chen et al.(22) revealed that lower levels of HIL were related to greater adherence to self-care management behaviors. Usually, the low HIL score is associated with lesser adherence or self-care management behaviour or better score is associated with greater self-care management (15), (17), (23). Turan and Çiftçi (20) identified the inverse relationship between HIL and health fatalism as HIL of cardiac patients decreased if religious health fatalism increased (Religious health fatalism is the belief that health outcomes are predetermined by a higher power, such as God or divine will, and that human actions have little influence on these outcomes, often leading individuals to rely on faith or prayer instead of seeking medical treatment or engaging in preventive health behaviors) (20).

The study data provides essential knowledge about health literacy components affecting cardiac patients as well as their relation to healthcare results. Every study confirms that older patients with limited education and lower socioeconomic status and belonging to a racial minority group experience diminished health literacy specifically within the African American community. Greater age along with low education levels and socioeconomic status with racial differences directly lead to patients disregarding self-care practices and adhering to medications and obtaining limited healthcare resources which results in worsening health disparities. People with higher education levels along with better socioeconomic situation and effective self-care practices demonstrate better health results because of lower hospitalization and mortality rates. The negative effects of religious health fatalism in combination with depression and extended heart failure duration restrict patients' health literacy and self-care behavior development. Research data reveals how various demographic characteristics together with healthcare attributes contribute to health literacy thus demanding patient-specific intervention approaches. Healthcare challenges affect patients with low HL because they experience difficulties when processing health information and following medical instructions and disease management practices. Detailed knowledge in heart disease combined with enhanced self-care skills reduces hospitalization risks and mortality statistics among patients. Information from the study demonstrates that healthcare professionals must focus on dealing with social determinants of health because this work reduces healthcare gaps while promoting equal healthcare access. This research demonstrates how Health Literacy enables better cardiac outcomes through an analysis requiring person-centered practices and standard Healthcare Literacy evaluations for vulnerable patient populations. Healthcare practitioners and public health policymakers must implement these approaches to enhance patient participation as well as medication compliance and overall medical results thus decreasing the weight of heart failure combined with its associated health issues.

Discussion

The findings from the systematic review of 21 relevant studies provide valuable insights into

the HIL of cardiac patients (CP). The study reveals that health literacy (HL) among cardiac patients is influenced by factors such as age, education, socio-economic disadvantages, and racial disparities. Low HL is linked to older age, lower education, and limited healthcare access. Positive HL is associated with higher education, better socio-economic conditions, and strong self-care maintenance. Negative HL is linked to religious health fatalism, depression, and longer heart failure durations. The study emphasizes the need for tailored interventions and addressing social determinants of health to improve cardiac care outcomes.

The findings from this study shed light on the complex relationship between HIL and various factors associated with cardiac disease. This study addressed two research questions, reasons behind low functioning of HIL and key factors associated with HIL and CP. Four key themes emerged addressing the question one, namely, gender and low HIL among older CP; HIL and lower educational attainment; HIL, socio-economic status and race; and HL, CP and other associated diseases. These themes provide valuable insights into the challenges and disparities associated with health literacy and its impact on cardiac health outcomes.

The first theme, "Gender and low HIL among older CP," highlighted that older individuals (particularly women as identified in most of the studies under Table 3), tend to have poor health literacy skills. This finding aligns with previous research indicating that older age and female gender are associated with lower health literacy levels (31), (36). The lower health literacy contribute to adverse health outcomes, including poor medical adherence, higher rates of re-hospitalization, and increased mortality (25), (37). Healthcare practitioners must address these challenges to increase health literacy, self-care, and general health and well-being of the patients. The second theme, "HIL and lower educational attainment," revealed a significant association between education level and health literacy. Several studies reported that patients with lower educational attainment, including those who did not complete primary education or high school, exhibited limited knowledge and understanding of health information (25), (38). This finding is consistent with previous research, highlighting the impact of educational attainment on health literacy levels (26). It suggests the need for targeted interventions and accessible health information to bridge the knowledge gap and improve health literacy among individuals with lower educational backgrounds.

Higher annual income was associated with greater health literacy skills and better self-care behaviors among cardiac patients (35), (39). Conversely, African American and black individuals were found to have poorer health literacy levels, leading to limited access to medical specialists, financial barriers to healthcare, and challenges in medication adherence (21), (30). According to Morrow et al. (30) that race and gender remained significant predictors with education and cognitive abilities. These findings highlight the presence of health disparities related to socio-economic status and race, emphasizing the need for targeted interventions to address these inequities. Furthermore, cardiac patients often experience coexisting

diseases such as diabetes, hypertension, chronic pulmonary disease, stroke, and depression (14), (26), (29), (31), (32). These comorbidities can further complicate health literacy levels and impact self-care behaviors. The presence of multiple diseases poses challenges in understanding and managing complex health conditions, emphasizing the importance of comprehensive and patient-centered approaches to address the unique needs of patients with multiple comorbidities.

The identified positive and negative associated variables provide further insights into the factors influencing health information literacy among cardiac patients. The positive associated variables with health literacy were gender, age, educational status, marital status, income, knowledge of disease, self-care behaviour, quality of life, cognitive ability, social support, insurance status, self-assessment, New York Heart Association (NYHA) functional class, urban area, and medication adherence. For instance, a study conducted by Meraz et al.(28) found that patients with higher educational attainment and income had better health literacy scores. Another study by (13) reported that patients who received social support had a higher level of health literacy, which in turn improved their self-care behavior. On the other hand, the negative associated variables with health literacy were older/age, lower educational attainment, African American ethnicity, depression and hypertension, increased risk of death, all-cause death, increased risk of hospitalization, lower self-care confidence, religious health fatalism, and longer duration of cardiac disease. For example, a study by Morrow et al.(30) and Murray et al. (31) found that older age and lower educational attainment were significantly associated with lower health information literacy levels among cardiac patients. Another study by Chaudhry et al. (21) reported that African American patients had lower health literacy scores compared to their white counterparts. These findings highlight the importance of considering various demographic and clinical factors when assessing the HIL of CP. Healthcare providers should be aware of the negative associated variables and take steps to provide targeted health education and support to patients at increased risk for low health literacy. On the other hand, positive associated variables can be utilized to improve health literacy, such as utilizing social support networks, improving medication adherence, and improving self-assessment tools.

Research about health information literacy (HIL) for cardiac patients reveals how essential literacy skills become for managing diseases effectively. Medical studies reveal a direct correlation between enhanced HIL levels and both improved medication compliance and superior health results in cardiac patients. This connection demonstrates why patients require comprehensive knowledge along with necessary resources to grasp their diseases and treatment possibilities (40). High levels of health literacy generate better results in cardiovascular mortality prevention because they enable patients to actively manage blood pressure (41). Although HIL gaps continue to exist most prominently among individuals who hold low socio-economic positions and experience restricted health

resource availability. Low health literacy levels produce elevated mortality rates together with enhanced morbidity while patients who have minimal literacy tend to fail at comprehending medical jargon and healthcare systems and following complicated treatment requirements (42). Healthcare disparities for low-literate patients intensify because of education level and information access which strongly influence treatment results.

Implications

The findings of this study contribute to the theoretical understanding of health information literacy among cardiac patients. The identified themes and associated variables shed light on the factors that influence health literacy levels in this population. This knowledge can inform theoretical frameworks and models related to health literacy and provide a foundation for future research in the field. The study highlights the importance of adopting an intersectionality perspective when examining health literacy. It underscores how gender, age, educational attainment, socio-economic status, race, and coexisting diseases intersect to shape health literacy levels. This theoretical lens helps in understanding the complex interplay of various factors and their combined impact on health literacy outcomes.

Tailoring interventions and health communication strategies to specific patient groups based on their gender, age, educational background, and socio-economic status can improve health literacy levels. This includes using plain language, visual aids, and culturally appropriate materials to enhance patient understanding and engagement. Healthcare providers should adopt a patient-centered approach by considering individual patient needs, preferences, and health literacy levels. This can involve using teach-back methods, involving family members or caregivers in health education, and providing ongoing support to patients with low health literacy. Implementing patient-centered care can enhance patient satisfaction, health outcomes, and medication adherence. Policymakers should recognize the importance of HIL in cardiac care and consider integrating health literacy education into public health programs and healthcare policies. This can include developing standardized health literacy curricula for healthcare professionals and incorporating health literacy assessment as a routine part of clinical practice. The study's findings highlight the presence of health disparities related to socio-economic status and race. Policymakers should prioritize efforts to address these disparities by improving access to healthcare services, reducing financial barriers, and implementing policies that promote health equity. This can include targeted interventions to improve health literacy among vulnerable populations and addressing social determinants of health that contribute to health inequities.

For Clinical

Healthcare professionals need standardized educational curricula about health literacy along with routine assessments while patient healthcare and public health programs must adopt health literacy training programs. Health equity requires targeted interventions along with improved healthcare service access and policies that address socio-economic status and racial health disparity to

deliver equal care to vulnerable populations. Healthcare providers along with policymakers can benefit from these clinical implications to improve patient healthcare delivery and expand quality care accessibility for cardiac patients.

For Community

Society faces crucial implications from this research due to its confirmation that health literacy promotion requires public health focus. Society needs to enhance understanding of low health information literacy effects on cardiac treatment to combat health inequalities that reduce positive outcomes among vulnerable patient populations. People need access to health education programs that suit their cultural needs and communities ought to work for these resources so individuals can learn to effectively control their health. A fair healthcare system emerges when societies tackle social health determinants consisting of education and income together with racial factors to give equal health chances for all citizens.

For Health care professionals

Healthcare providers need to implement patient-centered approaches by speaking plainly while using diagrams and asking patients to repeat information to verify their understanding of medical information. Healthcare providers must create intervention approaches which address individual patient needs based on their age demographics along with gender as well as educational attainment and socioeconomic standing. Better health literacy training with an inclusive healthcare model enables medical staff to enhance patient participation and treatment adherence which leads to better health results.

Study Limitations and Strengths: The study investigates elements that affect health information literacy among cardiac patients though it encounters various shortcomings. The research uses information from previous studies and patient self-reports yet these data could contain biases. The variations between individual studies affect how well their research findings can be applied to other situations. Because the research only obtained cross-sectional data it does not optimally measure how intersectional elements affect HIL. The paper does not present any particular strategies to execute personalized interventions within actual clinical contexts. Additional studies need to be conducted to create effective treatments.

Future Research

The systematic review created an understanding of central themes with related variables yet it lacked quantitative data processing through a meta-analysis to derive stronger relationships between HIL and diverse elements. Future research needs to dedicate attention to three main research gaps such as studying diverse languages and settings and employing standardized measurement systems for assessing HIL and uncovering additional components that shape HIL. While the study faces constraints it creates essential guidance for health systems to deliver specific care approaches and patient-focused interventions which boost health literacy outcomes in cardiac patients. Empirical research should be performed to achieve hospitalization reduction. Training programs and workshops about Health Information Literacy need to

become the priority now because they will produce important clinical results.

Recommendation

The systematic review recommendations emphasize that health information literacy (HIL) plays an essential role in enhancing cardiac patient outcomes through multiple essential recommendations. Healthcare professionals must develop specific intervention approaches which consider distinct patient requirements based on age group demographics alongside educational levels and social status and ethnic background.

Healthcare providers need to use patient-centered care techniques to deal with patients' barriers from poor reading comprehension and long-term heart failure durations and insufficient resources.

All healthcare providers should perform health literacy evaluations during patient examinations in order to recognize people with low HIL and provide necessary support.

Health literacy instruction should become part of both clinical care settings and public health program offerings which aim to equip patients with essential knowledge for successful self-care practices and medicine following.

The interventions should teach patients about self-care behaviors along with medication adherence because these practices directly enhance HIL outcomes.

The research should investigate health literacy variations across different cultural and regional populations through standardized assessment tools to evaluate cardiac healthcare impacts. Organizational interaction between medical staff and policy creators remains vital to integrate health literacy programs within national health policies at both national and regional levels. Through their implementation of proposed recommendations healthcare providers together with policymakers can both close health literacy gaps and advance patient involvement and understanding and consequently improve cardiac care results as well as quality healthcare access equity.

Conclusion

This systematic review examined the health information literacy of cardiac patients based on data extracted from 21 relevant studies. The positive and negative associated variables with HIL were identified. The study highlighted the impact of various demographic and clinical factors on HIL among cardiac patients. Factors such as gender, age, educational status, socio-economic status, race, knowledge of disease, self-care behavior, and medication adherence were positively associated with health literacy. On the other hand, factors including older age, lower educational attainment, African American ethnicity, depression and hypertension, and longer duration of cardiac disease were negatively associated with health literacy. These findings have important implications for healthcare practice. Tailored interventions should be developed to address the specific needs of different patient groups, considering their demographic and clinical characteristics. Patient-centered care approaches should be adopted, recognizing the influence of various factors on HIL. Efforts to reduce health disparities and promote health equity among cardiac patients should be prioritized.

This study provides valuable insights into the HIL of cardiac patients and offers

important directions for future research and healthcare interventions. By addressing the identified themes and associated variables, healthcare providers and policymakers can work towards improving health literacy, enhancing patient understanding and engagement, and ultimately promoting better cardiac care and outcomes.

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