

Determinants of patients' participation in cardiac rehabilitation programs: A scoping review

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ABSTRACT

Introduction: Cardiac rehabilitation (CR) has been shown to reduce morbidity and mortality while enhancing quality of life in patients with cardiovascular disease. Despite these benefits, participation in CR programs remains low globally. This scoping review aimed to map the determinants influencing patients' participation in CR.

Materials and Methods: A systematic search of peer-reviewed publications from 2016 to 2023 was performed. Studies were included if they examined patient-level or system-level determinants affecting participation in Phase II CR. Data was systematically extracted, and the Critical Appraisal Skills Programme checklist was used to assess methodological quality. The findings were integrated and interpreted using thematic analysis and reported in accordance with PRISMA-ScR guidelines.

Results: Ten studies from diverse countries, predominantly cross-sectional, were selected for review. Structural and logistical barriers were most prominent, including transportation issues, distance, inconvenient locations, time constraints, and financial costs. Sociodemographic factors such as older age, lower education, reduced income, unemployment, immigrant status, and family responsibilities were linked to lower participation. Psychosocial barriers included anxiety, limited social support, and preference for self-management. Healthcare system barriers involved lack of referrals, limited physician encouragement, and poor dissemination of information. Knowledge and perceived need barriers were evident, with low awareness, limited understanding of benefits, perceived lack of necessity, and concerns about fatigue, comorbidities, and exercise tolerance. Overall, participation is shaped by complex, interrelated structural, individual, and system-level factors.

Conclusion: Engagement in CR is shaped by a complex interaction of structural, individual, and healthcare system factors. Approaches such as home-based and hybrid CR models, improved referral pathways, and targeted patient education may enhance participation and support better clinical outcomes.

KEYWORDS:

Cardiac rehabilitation program, Patient participation, Patient adherence, cardiovascular disease

INTRODUCTION

Cardiovascular diseases continue to be the dominant cause of mortality worldwide, especially in low- and middle-income countries, including Malaysia.^{1,2} Cardiac rehabilitation (CR) is a structured secondary prevention strategy that has demonstrated effectiveness in reducing hospital re-admissions, improving quality of life, and decreasing mortality.³⁻⁵ Phase II CR specifically refers to an outpatient, professionally supervised program that involves exercise training, education, and counseling on risk factor modification, often lasting for several weeks to months after a cardiac event.⁶ Despite the well-documented efficacy of CR in improving patient outcomes and reducing healthcare burden, global participation rates persistently remain suboptimal, often falling below 50% due to a variety of barriers that are yet to be systematically addressed.⁷⁻⁸ While individual studies have identified various obstacles, the multifactorial and interconnected nature of these barriers often makes it challenging for healthcare systems to implement effective, targeted interventions.⁹ Previous reviews may have focused on specific types of barriers or particular geographical regions. However, a comprehensive and contemporary synthesis that categorizes the breadth of identified barriers from structural and sociodemographic to psychosocial and healthcare system-related and considers emerging facilitators like technology, is crucial.¹⁰⁻¹¹ Such a review is particularly vital in diverse and resource-variable contexts, such as Malaysia, to inform the development of more inclusive and effective CR programs.

This review synthesizes evidence from ten studies to identify and categorize the key obstacles that hinder CR participation. Understanding the barriers patients face in accessing CR is critical, particularly in multicultural and resource-variable contexts like Malaysia.

Table I: Search protocol guided by PCC framework

Search Protocol	
Review question	The primary research question guiding this review was: What determinants influence patients' participation in cardiac rehabilitation programs?
P Population	The secondary research questions include: 1. What structural and logistical factors influence patients' participation in cardiac rehabilitation (CR) programs? 2. Which sociodemographic characteristics are associated with participation in CR programs? 3. What psychosocial factors affect patients' engagement and adherence to CR programs? 4. What healthcare system related barriers and facilitators impact enrolment and participation in CR programs?
C Concept	Adult patients with coronary artery disease, acute coronary syndrome, myocardial infarction, or post-cardiac surgery.
C Context	Determinants, barriers, and facilitators influencing participation in cardiac rehabilitation. Phase II cardiac rehabilitation programs in hospital or community settings
Inclusion criteria	1. Peer-reviewed literature 2016 – 2023 2. Published studies (English language, Full article) 3. Quantitative cross-sectional study 4. Adult cardiac patients
Exclusion criteria	1. Non cardiac case heart failure patient refers for CRP 2. Pilot study/audit based/quality measure/qualitative study/interventional study 3. Inaccessible full text publications and secondary research
Databases:	1. PubMed 2. Scopus 3. ScienceDirect 4. Cochrane Library 5. ProQuest

MATERIALS AND METHODS

Protocol and Registration

This scoping review adhered to the Joanna Briggs Institute (JBI) methodology for scoping reviews and was reported in accordance with the PRISMA-ScR guidelines.¹² The protocol was prospectively registered with the Open Science Framework (OSF). Registration DOI: 10.17605/OSF.IO/94UVQ.

Review Framework and Research Questions

The review aimed to systematically map the determinants influencing patient participation in CR programs. Development of the review question was guided by the Population–Concept–Context (PCC) framework recommended by JBI (Table I)

Search Strategy

The search strategy followed a structured three-step approach in accordance with JBI recommendations. An initial limited search of PubMed was conducted to identify relevant keywords and index terms. This was followed by a comprehensive search across PubMed, Scopus, ScienceDirect, Cochrane Library, and ProQuest using the identified terms combined with Boolean operators (AND/OR). Finally, the reference lists of included studies were reviewed to identify additional relevant articles.

Key search terms included “cardiac rehabilitation,” “patient participation,” “adherence,” “barriers,” “determinants,” and “coronary artery disease.” The search was limited to studies published between January 2016 and December 2023. The full search strategies for each database are provided in the supplementary materials.

Study Selection and Data Extraction

Two reviewers independently screened titles and abstracts, followed by full-text assessment to determine study eligibility. Data were systematically extracted using a standardized data extraction form to capture findings relevant to the review objectives. Extracted information was synthesized and presented in tabular format, summarizing key study characteristics, including study design, population, identified barriers, and principal findings. Eligible studies comprised primary research utilizing descriptive, cohort, and cross-sectional designs. Data analysis involved the structured organization and tabulation of extracted data, followed by a comprehensive review and interpretation of findings by all authors, with particular emphasis on barriers influencing participation in cardiac rehabilitation programs among patients with coronary artery disease.

All ten included studies were appraised as high quality according to the Critical Appraisal Skills Programme (CASP) criteria (Table II). The selected studies demonstrated clearly defined objectives and provided comprehensive reporting of findings, with the use of appropriate quantitative cross-sectional designs. A detailed summary of the characteristics of the included studies is presented in Table III.

RESULTS

The search of five electronic databases identified 1453 studies. Among these, 700 duplicated and ineligible studies were removed. A total of 753 records were excluded, and 665 studies were screened for eligibility. The remaining 88 studies were included for synthesis. Of these, 78 full-text studies were excluded. Studies included narrative synthesis in the

Table II: Database search protocol for the study (From the 1st January 2016 of each database to 16th October 2023)

Database	Search strategy	No. of studies retrieved
PubMed	("cardiovascular diseases"[MeSH Terms] OR "heart diseases"[MeSH Terms] OR "myocardial infarction"[MeSH Terms] OR patient* OR "cardiac patient*" OR "heart disease*" OR "coronary artery disease" OR "post-MI") AND ("cardiac rehabilitation"[MeSH Terms] OR "cardiac rehabilitation" OR "cardiac rehab" OR "rehabilitation program*" OR "secondary prevention program*") AND ("determinant*" OR "factor*" OR "predictor*" OR "barrier*" OR "facilitator*" OR "enabler*" OR "influence*" OR "adherence" OR "participation" OR "uptake" OR "attendance" OR "compliance" OR "engagement")) Filter Setting Publication years 2016 – 2023 Language English Samples Humans Study types Observational studies, cross-sectional studies (use "Article" or "Journal Article" filters)	170 articles
ProQuest	(TI("cardiovascular disease*" OR "heart disease*" OR "coronary artery disease" OR "myocardial infarction" OR patient* OR AB("cardiovascular disease*" OR "heart disease*" OR "coronary artery disease" OR "myocardial infarction" OR patient*)) AND (TI("cardiac rehabilitation" OR "cardiac rehab" OR "rehabilitation program*" OR "secondary prevention program*") OR AB("cardiac rehabilitation" OR "cardiac rehab" OR "rehabilitation program*" OR "secondary prevention program*")) AND (TI(determinant* OR factor* OR predictor* OR barrier* OR facilitator* OR participation OR adherence OR compliance OR uptake OR attendance OR engagement) OR AB(determinant* OR factor* OR predictor* OR barrier* OR facilitator* OR participation OR adherence OR compliance OR uptake OR attendance OR engagement)) Filter Setting Publication date 2016 – 2023 Language English Document type Scholarly Journals / Peer-reviewed articles Population Humans Subject area Nursing, Health Sciences, Medicine, or Cardiovascular, Rehabilitation Source type Journal Articles only	20 articles
Scopus	(TITLE-ABS-KEY("cardiovascular disease*" OR "heart disease*" OR "coronary artery disease" OR "myocardial infarction" OR "post myocardial infarction" OR patient* OR "cardiac patient*")) AND (TITLE-ABS-KEY("cardiac rehabilitation" OR "cardiac rehab" OR "cardiac rehabilitation program*" OR "secondary prevention program*")) AND (TITLE-ABS-KEY(determinant* OR factor* OR predictor* OR barrier* OR facilitator* OR enabler* OR influence* OR participation OR uptake OR attendance OR adherence OR compliance OR engagement)) Filter Setting Content type Journal Articles Subject area Nursing, Medicine, Critical Care, Public Health Publication year 2016 – 2023 Language English Availability Include both Open Access and Subscription articles	660 articles
Science Direct	("cardiovascular disease" OR "heart disease" OR "coronary artery disease" OR "myocardial infarction" OR "cardiac patient") AND ("cardiac rehabilitation" OR "cardiac rehab" OR "rehabilitation program" OR "secondary prevention") AND (determinant OR factor OR predictor OR barrier OR facilitator OR participation OR adherence OR compliance OR uptake OR attendance OR engagement)	580 articles

Table II: Database search protocol for the study (From the 1st January 2016 of each database to 16th October 2023)

Database	Search strategy	No. of studies retrieved
Cochrain Library	Filter Setting Publication Years 2016 – 2023 Article Type Research articles Subject Area Nursing, Health Professions, Cardiovascular, Rehabilitation Language English Access Type Include all (Open + Subscription)	580 articles
	([mh "Cardiovascular Diseases"] OR [mh "Myocardial Infarction"] OR [mh "Coronary Artery Disease"] OR "heart disease":ti,ab,kw OR "cardiac patient*":ti,ab,kw) AND ([mh "Cardiac Rehabilitation"] OR "cardiac rehabilitation":ti,ab,kw OR "cardiac rehab":ti,ab,kw) AND ([mh "Patient Compliance"] OR determinant*:ti,ab,kw OR factor*:ti,ab,kw OR barrier*:ti,ab,kw OR facilitator*:ti,ab,kw OR participation:ti,ab,kw OR adherence:ti,ab,kw OR attendance:ti,ab,kw)	23 articles
	Filter Setting Publication Years 2016 – 2023 Article Type Research articles Subject Area Medicine, Health Professions, Cardiovascular, Rehabilitation Language English Access Type Include all (Open + Subscription)	

Table V: Agreement analysis

Item	Borg et al. (2019)	Chong et al. (2023)	Foster et al. (2021)	Fraser et al. (2022)	Gravers en et al. (2017)	Im et al. (2018)	Patafi et al. (2021)	Pattanshetty et al. (2016)	Santos et al. (2023)	Servio et al. (2019)
1. Did the review address a clearly focused question?	+	+	+	+	+	+	+	+	+	+
2. Did the authors look for the right type of papers?	+	+	+	+	?	+	+	+	+	+
3. Do you think all the important, relevant studies were included?	+	?	?	+	--	+	+	+	+	--
4. Did the review's authors do enough to assess quality of the included studies?	+	+	+	+	+	+	+	+	+	--
5. If the results of the review have been combined, was it reasonable to do so?	+	--	--	+	+	--	--	--	+	+
6. What are the overall results of the review?	+	+	+	+	+	+	+	+	+	+
7. How precise are the results?	+	+	+	+	+	+	+	+	+	+
8. Can the results be applied to the local population?	+	+	+	+	+	+	+	+	+	+
9. Were all important outcomes considered?	+	+	+	+	+	+	+	+	+	+
10. Are the benefits worth the harms and costs?	+	+	+	+	+	+	+	+	+	+
Score/10	10	8	8	10	8	9	9	9	10	8

Notes: + Yes, -- No, ? Can't Tell

systematic review were (n=10). Figure 1 depicts the PRISMA flow diagram for literature search and study selection.

Quality Assessment of Included Studies based on CASP Tool

Quality assessment of the ten included studies was conducted using the CASP¹⁴, demonstrated overall moderate to high methodological rigor, with scores ranging from 8 to 10 out of a possible 10. All studies clearly addressed focused research questions and reported overall results, precision, applicability, and relevant outcomes adequately. Most

studies also demonstrated appropriate study designs and inclusion of relevant papers, although some uncertainty remained regarding the comprehensiveness of literature inclusion. A common limitation identified was insufficient rigor in the assessment of the quality of the included studies, with several articles not clearly reporting this process. Additionally, inconsistencies were noted in the appropriateness of combining results across studies. Despite these limitations, the overall evidence was considered reliable, with findings broadly applicable to clinical practice.

Table IV: Characteristics and findings of the selected studies

Author (year)	Country	Research design & instrument	Population Sample size (n) Age (Mean±SD)	Results				
				Structural & Logistics	Sociodemographic	Psychosocial	Healthcare System	Knowledge & Needs
1. Chong et al., (2023)	Malaysia	Cross-sectional study Questionnaire	Patients with CAD n=240 Age (60.5±10.6)	Self-driving (p=0.002) logistical factors (p<0.001)	Comorbidities status (p<0.001)	Health care factors (p<.001), perceived social support from friends (p=0.048), perceived anxiety (p=0.02)	Health care factors (p<.001)	Perceived need (p<.001),
2. Santos et al., (2023)	Brazil	Cross-sectional study Questionnaire	Cardiac Patients n=220 Age (66.80±11.59)	A higher barrier regarding distance, transportation Distance	City of residence higher adherence	Cost, and time constraints. Anxiety	Low adherence in the public service (P=0.023).	--
3. Fraser et al., (2022)	North of Scotland	Cross-sectional study Questionnaire.	Cardiac patients n=567 Age (68.4±10.4)	Distance	Older age	Class timings, which increased travel time and costs.		Poor health
4. Foster et al., (2021)	Remote Scotland	Cross-sectional study	Post cardiac event patients n=567 Age (68.9±11.5)	Rural areas (p = 0.026)	Older group (p <0.005)	Lack of will power (p = 0.043),	--	Lack of perceived need (p=0.06)
5. Patafi et al., (2021)	Karachi	Cross-sectional study	Cardiac Patient n=100 Age (57.29±22.29)	Transportation (85%) Distance (84%),	Family responsibilities (49%)	Cost (80%) Time constraint (37%) Lack of energy (34%)	Patient referral system (82%)	Lack of awareness as a barrier (83%)
6. Borg et al., (2019)	Swedish	Questionnaire Cohort Study Case report form	Post MI patients n=31,297 Age (62.4±4)	Distance to CR centre (OR 1.75; 95% CI: 1.64-1.86).	Older age Male Multiple Comorbidities	--	No intervention done (PCI/CABG)	--
7. Servio et al., (2019)	Brazil	Cross-sectional study Questionnaire	Cardiac Patients n=805 Age (62.85±12.42)	Distance	--	Prefer to self-manage their chronic condition, self-exercising at home, tired, time constraints and cost.	Lack of physician encouragement	Lack of awareness of CR, lack of perceived need, finding exercise tiring or painful,
8. Im et al., (2018)	Korean	Cross-sectional study Questionnaire	Acute Coronary Syndrome patients n=382 Age (63.9±13.0)	Logistical factors (OR=7.61; 95% CI, 4.62-12.55); Transportation, inconvenient location (p=0.0001),	Comorbidities status (OR=6.60; 95% CI, 3.95-11.01); Age (p=0.0236)	Work/time conflict (OR=2.17; 95% CI, 1.29-3.66)	--	--
9. Pattanshetty et al., (2016)	India	Cross-sectional study Questionnaire	Post CABG patients n=288 Mean aged men:43.36 women: 50.96			Expenses (p=0.0030)	No one recommended it (p=0.0236)	Illiteracy (p=0.0021),
10. Graversen et al. (2017)	Denmark	Cross-sectional study Questionnaire, Case report form	Cardiac patients n=13,575 Age (66.0±10.0)	--	Income, employment, and immigrant status are associated with reduced CR participation;	--	Less information and referral among disadvantaged groups	Lower education,

Notes: "... " indicates not a barrier or not reported in the study, CR = cardiac rehabilitation

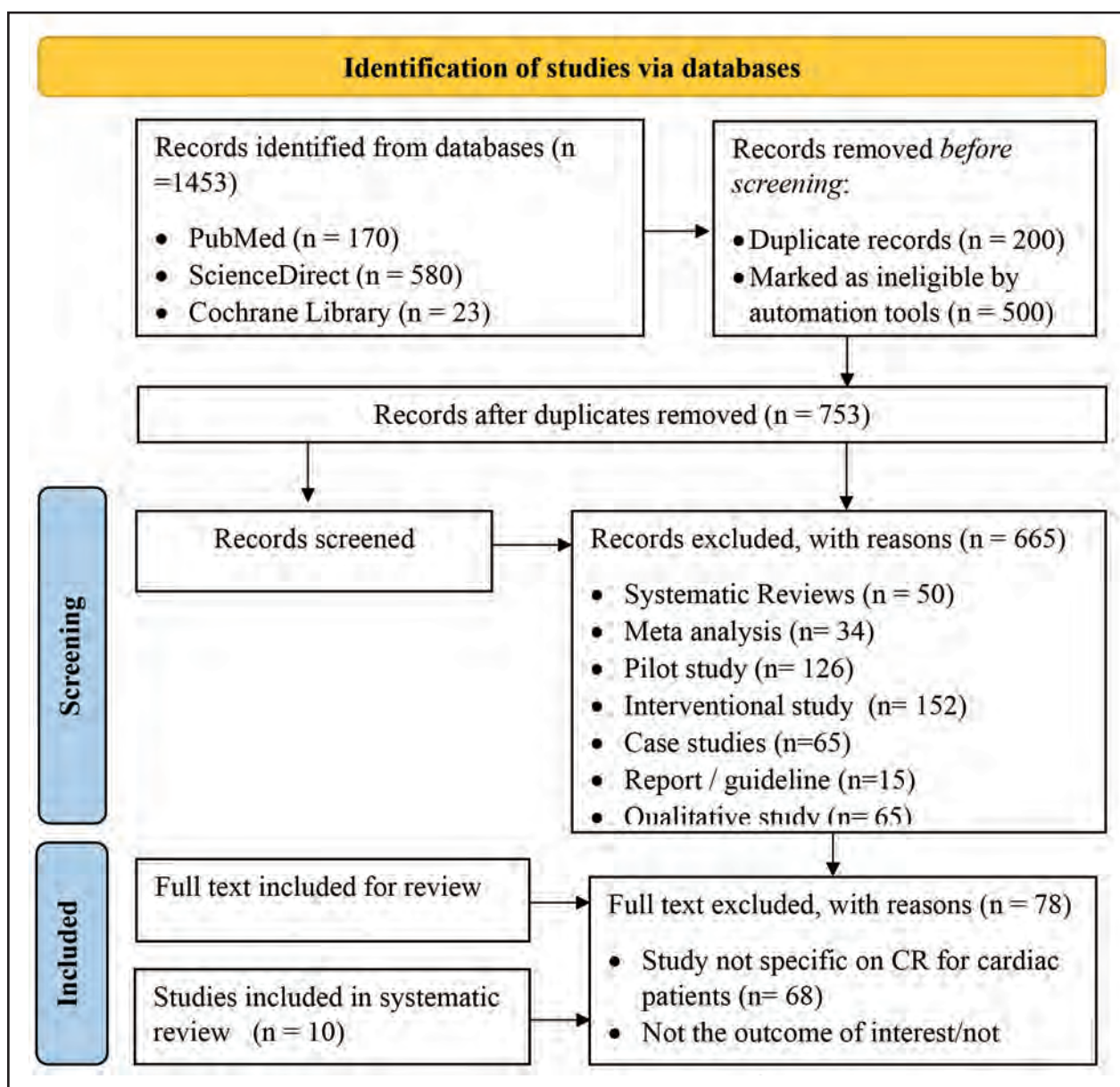


Fig. 1: PRISMA flow diagram¹³

Characteristics and findings of the selected studies

The systematic review included ten studies conducted across diverse geographical settings, including Malaysia, Brazil, Scotland, Pakistan, Sweden, Korea, India, and Denmark, predominantly employing cross-sectional designs, with one large cohort study.^{15–24} Sample sizes varied widely, ranging from 100 to 31,297 participants, with most populations comprising patients with coronary artery disease, acute coronary syndrome, post-myocardial infarction, or post-coronary artery bypass graft. The mean age of participants across studies generally ranged from the late fifties to late sixties.

Through the included studies, multiple factors influencing participation in cardiac rehabilitation programs were consistently identified. Logistical and structural barriers were among the most frequently reported, including transportation difficulties, long distances to rehabilitation

centres, inconvenient locations, and time constraints related to work or class schedules.^{17,18,20–24} Several studies also highlighted financial barriers such as the cost of participation and associated travel expenses.^{16,19,23}

Healthcare system-related factors were also evident, including lack of referral, insufficient physician encouragement, and limited dissemination of information regarding cardiac rehabilitation.^{20,23–24} Patient-related factors included lack of perceived need for rehabilitation, low awareness, comorbidities, fatigue, and perceptions of exercise being tiring or painful.^{15,18,20,22} Psychosocial factors such as anxiety, limited social support, and preference for self-management were also reported.^{15,20}

Sociodemographic influences were identified, with lower levels of education, income, and employment status, as well as immigrant status, being associated with reduced

participation.²⁴ Additionally, factors such as age and family responsibilities were reported to contribute to lower engagement.^{17,19,23} Overall, the findings demonstrate that barriers to cardiac rehabilitation participation are multifaceted, encompassing logistical, financial, healthcare system, psychosocial, and sociodemographic dimensions across different populations and settings.

DISCUSSION

This systematic review highlights the multifactorial and interrelated barriers that hinder patient participation in cardiac rehabilitation programs. Despite well documented benefits, including reduced cardiovascular morbidity and mortality, improved functional capacity, and enhanced psychological well-being, participation remains suboptimal across diverse healthcare settings.^{10,22,25} The identified barriers can be broadly categorized into structural, sociodemographic, psychosocial, healthcare system related, and knowledge and awareness related domains. In addition, technology has emerged as a potential approach to address and overcome these barriers.

Structural and Logistical Barriers

Structural barriers were the most frequently reported and impactful across all reviewed studies. Travel distance exceeding 16 km was the strongest predictor of non-attendance in a large Swedish cohort.²¹ Similarly,²² in Korea and 16 in Malaysia emphasized transportation difficulties, long travel times, and limited parking facilities as major deterrents to participation. These findings align with another study²⁴, who also identified rural residency as a risk factor for non-attendance in the Danish registry.

Moreover, logistical issues like inflexible clinic schedules, lack of transportation for elderly or dependent individuals, and poor public transport connectivity were common. These barriers disproportionately affect patients from rural or underdeveloped areas, a situation particularly relevant in middle-income countries such as Malaysia, where CR centres are centralized in urban hospitals. This centralization limits access for patients in more remote regions, especially when outpatient programs are structured with rigid follow-up protocols.²⁶⁻²⁸

Sociodemographic Barriers

Sociodemographic characteristics such as age, sex, ethnicity, educational background, income level, and employment status consistently influenced CR participation. For instance,²⁴ Patients with lower income and education were significantly less likely to attend CR. Likewise, researchers reported that women faced unique barriers including caregiving responsibilities, cultural expectations, and fear of physical exertion.¹⁷⁻¹⁸

Study also provided compelling evidence that ethnic differences play a role in CR participation in Malaysia.¹⁵ Chinese and Indian patients were less likely to participate compared to Malays. This finding may reflect differences in health beliefs, perceived severity of illness, or trust in healthcare systems. Such disparities emphasize the need for culturally tailored interventions and better patient-health

provider communication.²⁹⁻³⁰ Employment status also influenced attendance. Retired or unemployed individuals often perceived CR as unnecessary or burdensome, while employed patients faced scheduling conflicts. This was corroborated with a study who observed poor follow-up in employed patients due to occupational obligations and inflexible work environments.²³

Psychosocial Barriers

Psychological distress, including anxiety, depression, and lack of motivation, was a recurrent theme. Many studies reported patients experiencing anxiety or depressive symptoms were less likely to attend CR, often due to a lack of confidence or fear of overexertion.^{18,20} However, it had been reported that a surprising finding where higher anxiety levels were associated with increased participation.^{29,31} This suggests that some patients with anxiety may be more engaged with their health, possibly seeking reassurance through structured programs.³⁰⁻³²

Social support also played a critical role as researchers highlighted that patients who lacked encouragement from family, friends, or peers often opted out of CR.^{18,20} Conversely, it was found that perceived support from friends positively correlated with participation.³⁰ These findings underscore the importance of integrating family and community support into CR planning and delivery.³³

Healthcare System Barriers

System-level barriers significantly contributed to low CR participation. Inadequate referral pathways, poor discharge planning, lack of standard follow-up protocols, and limited CR center availability were frequently cited. Several studies noted that many eligible patients were never referred to CR due to unclear guidelines, lack of awareness among healthcare providers, or prioritization of acute over rehabilitative care.^{16,22} It also emphasized the role of institutional inefficiencies such as under-resourced CR teams, long waiting times, and fragmented communication between departments in deterring patients from enrolling.¹⁹ In Malaysia, where public hospitals are often overcrowded, these issues may be magnified.³⁴ Moreover, it had been pointed out that in India, lack of standardized CR programs and trained personnel further impeded program implementation and sustainability.²³

Knowledge and Perceived Need

Patients' perceptions about their illness and the value of CR were repeatedly cited as barriers. Several studies, reported that patients often believed they could manage their condition independently or perceived themselves as "already recovered" after hospitalization.^{16,18,20} This misconception reflects a lack of education about the chronic nature of cardiac conditions and the role of secondary prevention.³⁵ Low cardiac knowledge scores were prevalent and not significantly associated with participation.¹⁵ This suggests that education alone may be insufficient unless it is personalized, repeated, and reinforced by healthcare providers.³⁶ Poor in-hospital education, compounded by early discharge policies, may reduce opportunities for proper CR counseling.³⁷

Technology as a Potential Enabler

While barriers were the primary focus, emerging evidence suggests that technology-assisted CR (e.g., home-based, hybrid, or telehealth models) could be a viable solution.³⁸⁻³⁹ Study demonstrated that 72.9% of patients accepted hybrid CR formats, with high preference for educational videos and video consultations.¹⁶ These findings are supported by¹⁷ a researcher who argued that digital CR can overcome distance, scheduling, and mobility barriers has provided that digital literacy and internet access are addressed. Such models have particular promise in Malaysia and other middle-income countries, where mobile and broadband penetration is high.^{37,39-40} Nonetheless, implementation requires careful design, training of healthcare staff, and integration into existing care pathways to ensure quality and equity of access.⁴⁰

LIMITATIONS

This review integrates data from various geographical and healthcare contexts, providing a comprehensive view of barriers. However, differences in study designs, populations, and measurement tools limit direct comparison. Furthermore, the inclusion of studies primarily from upper-middle-income countries may not fully represent low-resource settings.

CONCLUSION

Cardiac rehabilitation is an essential yet underutilized component of cardiovascular care. Barriers such as distance, lack of awareness, sociodemographic disparities, and weak system support continue to limit participation. Addressing these issues through inclusive, tech-enabled, and patient-centred strategies is crucial for improving outcomes and equity in cardiac care.

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CONFLICT OF INTEREST

The authors also declare no conflicts of interest related to this work.

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