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Review Article

Barriers to Cardiac Rehabilitation in Saudi Arabia: A Scoping Review

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Abstract

Background: Cardiac rehabilitation (CR) is considered a cornerstone of secondary prevention for cardiovascular disease (CVD); however, it remains underutilized and underdeveloped in Saudi Arabia. **Objective:** This scoping review aimed to analyze the existing evidence on barriers affecting the implementation and participation in CR programs across Saudi Arabia. **Methods:** A comprehensive search was conducted in MEDLINE, PubMed, Google Scholar, and ScienceDirect for studies published between 2015 and 2025. Eight national studies were included, examining perspectives from physicians, nurses, physiotherapists, and patients. Data were thematically analyzed and categorized into four domains—service delivery and policy, workforce and training, awareness and culture, and patient-related factors—classified under two levels: system and personal. **Results:** Findings from eight included studies revealed system-level barriers, including a shortage of CR centers, insufficient workforce training, fragmented policies, and limited funding. Personal-level barriers included low awareness, cultural constraints, and patient-related factors such as fatigue, anxiety, comorbidities, and limited access. Together, these challenges delay the normalization of CR within cardiac care pathways. **Conclusions:** A coordinated national framework is needed to integrate CR into post-cardiac care, supported by professional training, sustainable funding, and culturally sensitive public engagement. The most urgent priorities include establishing national CR guidelines, expanding workforce development pathways, and improving awareness of CR among patients and healthcare providers. Addressing these barriers is essential to expanding CR services, enhancing patient outcomes, and aligning healthcare priorities with Saudi Arabia's Vision 2030 goal of an equitable and prevention-oriented healthcare system.

Keywords: Cardiac Rehabilitation; CR; Barriers; Saudi Arabia; Cardiovascular Disease; Scoping Review.

Introduction

Cardiovascular disease (CVD) is the leading causes of death globally (World Health Organization [WHO], 2021). CVD is a comprehensive term that refers to a group of disorders affecting the heart and blood vessels (Adam et al., 2023). It is accountable for 32% of all deaths around the world and causes

approximately 17.9 million deaths annually (WHO, 2021). More recent estimates from the Global Burden of Cardiovascular Diseases 2023 analysis confirm that CVD remains the top global cause of mortality, responsible for nearly one in three deaths worldwide (Global Burden of Cardiovascular Diseases Collaborators, 2025). In Saudi Arabia, the prevalence of people with CVD are reflectively high and responsible for 45.7% of all cases of death (Alqahtani & Alenazi, 2024). Recent national survey data also indicate that CVD prevalence is higher in specific regions and demographic groups, emphasizing the need for targeted prevention and rehabilitation strategies (Alqahtani & Alenazi, 2024). CVD can affect the normal function of vital organs like heart, kidneys, eyes and brain due to pathological changes (e.g., coronary artery and thrombus blocks formation) (Adam et al., 2023). These changes can lead to stroke, diabetes mellitus, visual impairment, reduced physical function, mental health difficulties, accelerated aging, and increased mortality (Altowaijri et al., 2020). Several risk factors are contributing to the development of heart disease in Saudi Arabia such as aging (Giri et al., 2018), diabetes, hypertension, smoking, elevated cholesterol levels (Aljefree & Ahmed, 2015), and obesity (Althumiri et al., 2021).

Although Saudi Arabia has advanced its medical management of CVD, gaps remain between national practice and international recommendations (Alsaidan, 2025). Surgical and interventional procedures such as coronary artery bypass grafting and cardiac catheterization are routinely performed, as reflected by data from major cardiac centers (Babgi et al., 2023; King Fahad Medical City [KFMC], 2016). According to the Ministry of Health (MOH) in 2020, treatment options include coronary artery bypass, catheterization, valve replacement, heart transplantation, and artificial heart implantation (MOH, 2020). Recent reports from the Saudi Heart Association (SHA) in 2024 also categorize CVD—particularly when combined with diabetes—as a major national health priority requiring urgent enhancement of secondary prevention pathways (Alhabeeb et al., 2024).

Cardiac rehabilitation (CR) is recognized internationally as a core component of secondary prevention for CVD (Piepoli et al., 2016; Smith et al., 2011). CR is associated with reduced mortality, fewer hospital readmissions, and improved quality of life (Shah et al., 2018; Sumner et al., 2017), including a 42% reduction in all-cause mortality (Buckley et al., 2021). CR can be defined as a combination of various interventions integrated to support patients with cardiac disease. It is tailored to each individual and includes personalized exercise programs, education sessions, cardiovascular risk management, and psychological counseling (Anderson et al., 2016) and it is delivered across three phases: in-hospital (Phase I), early outpatient (Phase II), and long-term maintenance (Phase III) (AACVPR, 2020; Jegier et al., 2021; Suaya et al., 2007). More recent recommendations from the 2023 AHA/ACC Chronic Coronary Disease Guideline and the 2024 AHA Scientific Statement on Core Components of CR further reinforce CR as a class I, evidence-based intervention requiring an organized, multidisciplinary care model (Brown et al., 2024; Virani et al., 2023)

Despite these benefits, global CR participation remains low, with only 25% of eligible U.S. patients enrolling and a quarter completing the program (Ritchey et al., 2020; Ruano-Ravina et al., 2016). Barriers occur at patient, provider, and system levels and include limited program availability, socioeconomic barriers, insufficient referrals, transportation problems, and physical and psychological limitations (Gaalema et al., 2019;

Middleton et al., 2022; Neubeck et al., 2012; Schopfer et al., 2020; Supervia et al., 2021; Whitmarsh et al., 2003).

In Saudi Arabia, CR remains significantly underdeveloped and limited in accessibility (Adam et al., 2023; Kinsara et al., 2023). A 2024 study emphasized ongoing challenges including inadequate program availability, resource constraints, low provider and patient awareness, and weak integration of CR into routine cardiac care pathways (Hadi Ahmed & Bugis, 2023). National initiatives under Saudi Vision 2030 aim to reduce the burden of noncommunicable diseases through the introduction of accredited CR programs and standardized guidelines; however, progress in implementing these programs has remained slow, with persistent gaps in availability, integration into routine care, and nationwide service delivery (Hadi Ahmed & Bugis, 2023).

There is an urgent need to systematically identify and address the barriers limiting CR delivery and participation in Saudi Arabia. Few studies have comprehensively investigated these issues, creating a significant knowledge gap. Therefore, this scoping review aims to synthesize existing evidence regarding these barriers by categorizing them into four domains—service delivery and policy, workforce and training, awareness and culture, and patient factors—under two overarching levels: system level and personal level. This review also highlights consistent trends across studies and discusses their implications for service improvement and health policy within the Saudi context.

Methodology

Study Design and Setting

The literature research was done throughout many research databases such as Medline, PubMed, Google Schouler, ScienceDirect from 2015 to 2025 to enhance the outcomes and minimize the chance of missing any qualified studies that might be utilized in our final evaluation. The year range (2015–2025) was selected to ensure inclusion of recent evidence reflecting the modernization of CR services in Saudi Arabia and the evolving national health reforms under Vision 2030. The search terms used were cardiac rehabilitation (barrier OR limitation) AND (“Saudi Arabia” OR SA). Grey literature, including government reports and national health strategy documents, was also screened to ensure no relevant non–peer-reviewed evidence was overlooked.

Study selection

In this study, articles were included if they were written in English and focused solely on barriers to cardiac rehabilitation (CR) in Saudi Arabia, regardless of the research design. Studies discussing any type of cardiac disease in the context of CR barriers in Saudi Arabia were also considered eligible. All articles that were not focus on the CR barriers, did not conduct in Saudi Arabia, study protocol and dissertation that not published were excluded. The identification and selection of relevant studies were conducted in accordance with the PRISMA-ScR framework and are visually represented in Figure 1. Two reviewers independently screened titles, abstracts, and full texts. Any disagreements between reviewers were resolved through discussion and consensus, and when needed, a third reviewer provided the final decision.

Data synthesis and analysis

Information from the selected studies was collected using a standardized data extraction method and organized into summary tables. The characteristics of each study were documented

according to the study design, author, year, sample, and reported barriers (Table1). A thematic analysis approach was employed to identify and synthesize key patterns across the included studies.

The thematic analysis followed Braun and Clarke's six-step framework. First, all included studies were read repeatedly to ensure familiarization with the data. Initial codes were then generated independently by two reviewers using a line-by-line coding approach. These codes were collated into potential themes, which were subsequently reviewed, refined, and organized under the predefined domains. Themes were checked against the extracted data to confirm consistency and accuracy. Any discrepancies in coding or theme classification were resolved through consensus among the reviewers.

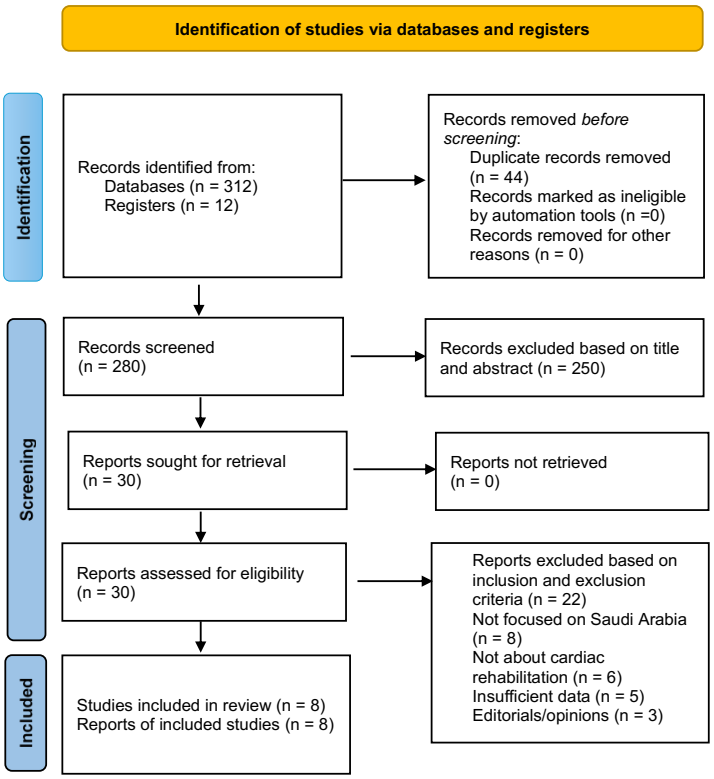

Figure 1. PRISMA flow diagram of study selection

Following this process, the results were classified into two overarching themes—system-level and personal-level factors—which encompassed four main domains: service delivery and policy, workforce and training, awareness and culture, and patient-related factors (Table2). Data within these primary themes were then further categorized into subthemes for deeper interpretation. Potential sources of bias were acknowledged, including publication bias because most included studies were cross-sectional or narrative reviews, regional bias since many studies originated from major cities such as Riyadh and Jeddah, and thematic interpretation bias due to the limited evidence base.

Ethical Consideration

Since this research relied on secondary data from published sources, there were no ethical issues.

Results

Identification and Selection of Literature

The records from four principal databases were divided by the researcher, each of whom carried out systematic electronic searches by predefined keywords, to identify a total of 324 studies. 44 duplicate records were then excluded. Title and abstract screening were then carried out, excluding 250 studies. The 30 studies that were Remaining were then evaluated for eligibility, from where 22 studies were found to exclude the inclusion and the exclusion criteria, leaving 8 studies including the final analysis, figure1 show PRISMA flow diagram of study selection. The characteristics of the included studies are shown below in Table 1. Four studies were cross sectional studies(Aldhahir, 2022; Aldhahir et al., 2022a; Aldhahir et al., 2022b; Khushhal & Alsubaiei, 2023) and three were narrative review(Adam et al., 2023; Osailan, 2024; Rashed et al., 2020) and one study was scoping review(Alqahtani, 2023). These studies together revealed an interlocked set of CR barriers that were structured into the following domains, namely,

Service Delivery and Policy, Workforce and Training, Awareness and Culture, and Patient Factors in Table 2. All four domains go under two levels: system level and personal level. Also, Figure 2 provides the most common CR barriers found in Saudi Arabia.

Table 1. Characteristics of Included Studies (n=8)

Study Title	Author, Year, Country	Design	Study Subjects (n)	Barriers
Cardiac Rehabilitation: The Future of Heart Health in Saudi Arabia	Rashed et al., 2020 (Saudi Arabia)	Narrative Review	—	Under-utilization of CR; lack of policy support; limited CR culture; call for capacity building and education
Nurses' Perception of, and Barriers to, Delivering Cardiopulmonary Rehabilitation for Heart Failure Patients in Saudi Arabia	Aldhahir, 2022 (Saudi Arabia)	Cross-sectional Study	≈ 1,056 nurses	Limited CR availability; lack of trained staff; patients' doubts; low awareness; breathlessness / mobility and transport issues
Physiotherapists' Attitudes and Barriers of Delivering Cardiopulmonary Rehabilitation for Patients with Heart Failure in Saudi Arabia	Aldhahir et al., 2022a (Saudi Arabia)	Cross-sectional Study	≈ 553 physiotherapists	Few centers; lack of standardized referral protocol; cost; transport / timing barriers; limited experience; patient anxiety, fatigue, and comorbidities
Physicians' Perceptions of and Barriers to Cardiopulmonary Rehabilitation for Heart Failure Patients in Saudi Arabia	Aldhahir et al., 2022b (Saudi Arabia)	Cross-sectional Study	≈ 513 physicians	Limited CR centers; weak referral system; shortage of trained staff; variable awareness of CR benefits; fatigue / symptom burden among patients
Barriers to Establishing Outpatient Cardiac Rehabilitation in the Western Region of Saudi Arabia	Khushhal & Alsubaiei, 2023 (Saudi Arabia)	Cross-sectional Study	141 healthcare professionals	Absence of outpatient CR; no Arabic guidelines; limited funding; logistical barriers; low awareness among HCPs / patients
The State of Cardiac Rehabilitation in Saudi Arabia: Current Practice, Challenges, and Future Perspectives	Adam et al., 2023 (Saudi Arabia)	Narrative Review	—	Very few programs; accreditation and capacity gaps; cost constraints; workforce shortage; evidence-to-practice gap

A Review of the Scope, Future, and Effectiveness of Using Artificial Intelligence in Cardiac Rehabilitation	Alqahtani, 2023 (Saudi Arabia)	Scope Review	—	Scarcity of CR services; low digital adoption; recommends AI/virtual CR; need to raise awareness about technology-enabled CR
Cardiac Rehabilitation in Saudi Arabia: Current Status and Future Directions	Osailan, 2024 (Saudi Arabia)	Narrative Review	—	Shortage of CR centers and trained providers; logistical constraints; limited awareness; sociocultural / gender influences

CR: Cardiac Rehabilitation, HCPs: Healthcare Professionals, AI: Artificial Intelligence.

Table 2 Four Domains' Barriers to Cardiac Rehabilitation in Saudi Arabia.

Study (Year)	System level		Personal level	
	Service Delivery & Policy	Workforce & Training	Awareness & Culture	Patient Factors
Rashed et al. (2020)	Under-utilization; weak policy support; limited CR culture	Need for capacity building	Public skepticism; cultural norms	Sociocultural influences
Aldhahir (2022)	Limited CR centers	Lack of experienced staff	Patients' doubts; HCP knowledge gaps	Breathlessness; refusal; transport
Aldhahir et al. (2022a)	Limited centers; referral protocol gaps; cost; transport/timing	Lack of experienced staff	Insufficient CR knowledge; patient doubts	Comorbidities; fatigue; anxiety/depression
Aldhahir et al. (2022b)	Limited CR centers; referral gaps	Shortage of staff	Variable awareness; need for HF knowledge	Fatigue & symptom burden
Khushhal & Alsubaiei (2023)	Lack of outpatient CR; no Arabic guidelines; funding gaps; logistics	Shortage of CR-trained staff	Low awareness among HCPs/patients	Not primary focus
Adam et al. (2023)	Few programs; capacity/accreditation gaps; high costs	Shortage of qualified HCPs	Evidence–practice gap	Delayed initiation post-discharge
Alqahtani (2023)	Scarcity of CR services nationally	AI to augment limited workforce	Need for awareness of digital CR	Technology to reduce travel/mobility barriers
Osailan (2024)	Shortage of centers; logistical constraints	Deficit of trained providers	Limited awareness; sociocultural/gender issues	Cultural influences

CR: Cardiac Rehabilitation, HCPs: Healthcare Professionals, AI: Artificial Intelligence.

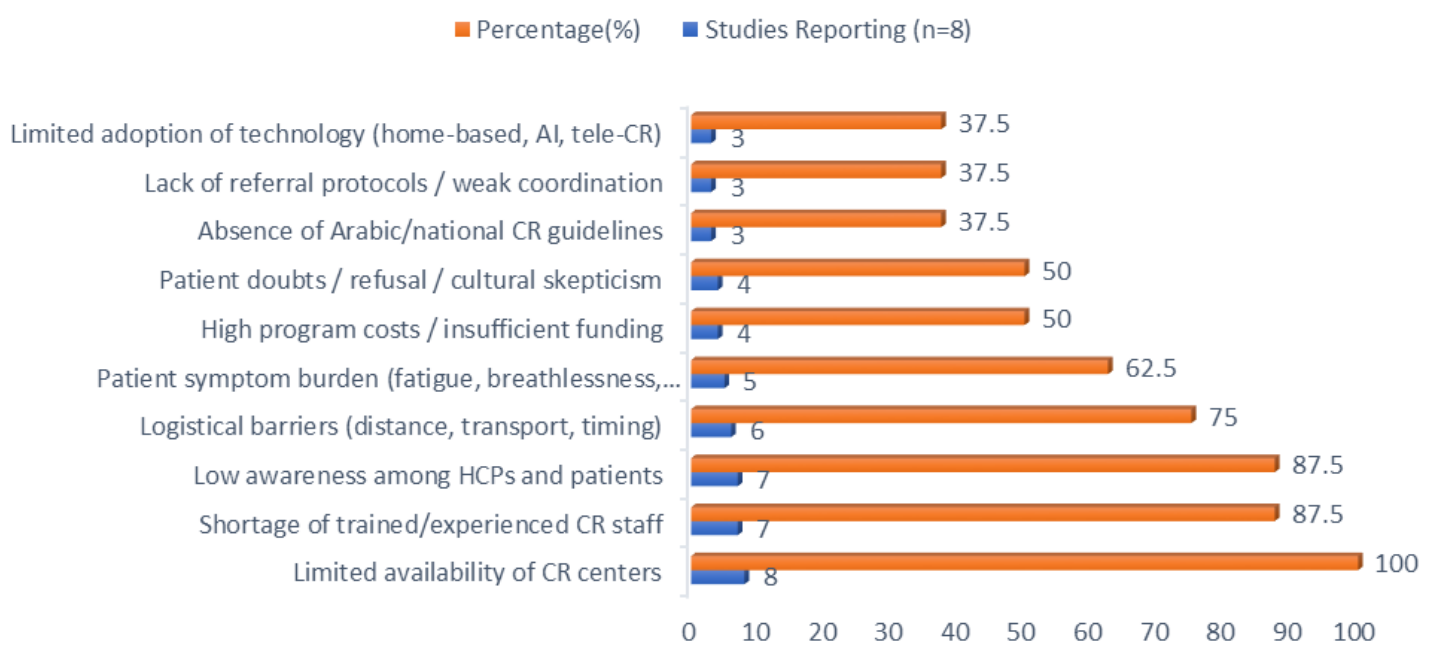

Figure 2. Most Common Cardiac Rehabilitation Barriers Identified in Saudi Arabia (n = 8 studies). This figure illustrates the ten most frequently reported barriers to cardiac rehabilitation across the included studies. Percentages represent how often each barrier was identified during data extraction.

The barriers span both system-level factors (e.g., limited CR center availability, insufficient workforce training, weak referral systems) and personal-level factors (e.g., low patient awareness, cultural influences, psychological and physical limitations).

System level

Service Delivery and Policy

The most frequently reported system-level obstacles were the limited number of CR centers, lack of funding, and absence of national CR guidelines. Limited CR availability was reported in all studies, with fewer than five comprehensive centers operating nationwide and serving less than 10% of eligible patients (Adam et al., 2023). Lack of funding was cited by 82.3% of respondents in the Western region study(Khushhal & Alsubaiei, 2023). The absence of Arabic-language guidelines and poor referral protocols were highlighted by 74.5% of healthcare professionals (Khushhal & Alsubaiei, 2023). In addition, transport and scheduling difficulties were noted as persistent logistical barriers (Osailan, 2024). These findings reflect ongoing policy fragmentation and the need for structured national CR frameworks and accreditation standards (Adam et al., 2023; Osailan, 2024).

Workforce and Training

A shortage of trained staff, insufficient CR training, and lack of professional development were consistent findings across all eight studies. Over 55% of nurses and physiotherapists reported staff shortages and limited training opportunities (Aldhahir, 2022; Aldhahir et al., 2022a). Many clinicians expressed low confidence in prescribing and monitoring exercise for cardiac patients(Aldhahir, 2022; Aldhahir et al., 2022a). Adam et al., (2023) and Rashed et al., (2020) emphasized the need for structured CR education and certification pathways, while Osailan recommended integrating CR competencies into undergraduate and postgraduate curricula to ensure workforce sustainability (Osailan, 2024).

Personal Level

Awareness and Culture

Low awareness of CR benefits and cultural restrictions were identified in seven studies. In the Western region, over 90% of participants reported poor awareness among healthcare professionals and patients (Khushhal & Alsubaiei, 2023). Unclear referral processes and limited physician promotion of CR were frequently cited barriers (Aldhahir, 2022; Aldhahir et al., 2022a, 2022b). Gender norms and cultural constraints were highlighted as key determinants limiting female participation (Adam et al., 2023; Osailan, 2024). Rashed et al., (2020) described CR as having a "low cultural presence" in Saudi Arabia and emphasized public education and community engagement to promote participation.

Patient Factors

The most common patient-level barriers included symptom burden, fatigue, comorbidities, transport limitations, and psychological distress. Physiotherapists and nurses reported that fatigue, breathlessness, and low exercise tolerance were primary reasons for poor adherence (Aldhahir, 2022; Aldhahir et al., 2022a). Anxiety, depression, and low motivation further reduced participation rates (Aldhahir et al., 2022a). Financial constraints and scheduling conflicts were also noted (Adam et al., 2023; Khushhal & Alsubaiei, 2023). Alqahtani (2023) proposed the use of digital and AI-supported home-based CR programs to address mobility and access barriers, particularly for remote or high-risk patients.

Discussion

This scoping review explored and analyzed the barriers hindering the delivery and uptake of CR services in Saudi Arabia. These barriers were categorized into four main domains—service delivery and policy, workforce and training, awareness and culture, and patient-related factors—and were further grouped into system-level and personal-level influences. Eight studies were included, most of which examined barriers from the perspectives of healthcare professionals, particularly physicians, physiotherapists, and nurses, with fewer incorporating patient insights. Overall, the findings demonstrate that CR barriers in Saudi Arabia are multifactorial and interconnected, spanning structural constraints, professional preparedness, cultural awareness, and patient-related challenges.

At the system level, the most significant barriers relate to the limited availability of CR infrastructure, insufficient workforce capacity, funding constraints, and gaps in national policies. Fewer than five fully operational CR facilities currently serve less than 10% of eligible cardiac patients annually in Saudi Arabia (Adam et al., 2023). This clearly demonstrates a significant imbalance between the increasing prevalence of CVD in the Kingdom and the limited number of available CR services. Other barriers, such as a lack of knowledge regarding referral processes and the absence of Arabic-language CR standards, were reported by 74.5% of healthcare professionals, while 82.3% cited inadequate funding as a primary obstacle to developing CR programs (Khushhal & Alsubaiei, 2023). The delivery of CR services remains fragmented and uneven due to the absence of national policy frameworks and accreditation processes, particularly outside major cities. Similar system-level challenges have been documented across the broader of Middle East and North Africa (MENA) region, including fragmented governance, limited nationwide CR strategies, and insufficient financial investment (Al-Ajlouni et al., 2024) . A regional survey further found that only 4 out of 22 MENA countries offered structured CR

programs, and existing services served fewer than 10% of eligible patients (Turk-Adawi et al., 2019). Collectively, these findings suggest that Saudi Arabia's challenges align with regional patterns of low CR preparedness, fragmented policies, and limited integration of CR into cardiovascular care pathways. Establishing unified policy direction, standardized accreditation procedures, and equitable funding is therefore essential for sustainable CR expansion.

Workforce and training barriers also featured prominently across the included studies. The shortage of qualified health professionals and limited access to specialized CR training represent major constraints. More than 55% of physiotherapists and nurses reported staff shortages and limited access to professional development programs (Aldhahir, 2022; Aldhahir et al., 2022a) Many healthcare providers expressed low confidence in prescribing and monitoring exercise for cardiac patients, largely due to insufficient clinical experience and the absence of structured CR training within institutions. Turk-Adawi et al. (2019) similarly highlighted severe shortages of trained multidisciplinary CR personnel across the MENA region, limited educational pathways, and minimal workforce capacity—indicating that Saudi Arabia's challenges reflect a broader regional deficit in CR training infrastructure. The MENA narrative review by Al-Ajlouni et al. (2024) also emphasized that the absence of formal CR educational pathways, inadequate regional training programs, and limited CR specialization opportunities are among the most critical obstacles hindering service expansion. Adam et al. (2023) and Rashed et al. (2020) suggested that establishing formal certification pathways, promoting a multidisciplinary teamwork approach, and integrating CR-specific education into institutional training programs are essential steps to improve CR quality and sustainability. Without sustained investment in professional training, CR programs in Saudi Arabia will likely remain restricted in both reach and effectiveness, continuing to rely on unplanned initiatives rather than structured, evidence-based care.

Throughout the reviewed studies, one of the most commonly cited personal-level barriers was low professional and public awareness of the value of CR. In the Western region, over 90% of clinicians surveyed admitted that patients and healthcare providers had limited knowledge of CR objectives and benefits (Khushhal & Alsubaiei, 2023). Similar patterns were observed in national surveys of physicians, nurses, and physiotherapists, which reported ambiguity about referral protocols and inconsistent promotion of CR after cardiac incidents (Aldhahir, 2022; Aldhahir et al., 2022a, 2022b). These findings pinpoint the lack of integration and shared understanding among the multidisciplinary team regarding CR. Such differences were further aggravated by cultural expectations, particularly concerning female participation in CR, where social norms and logistical constraints restricted attendance (Adam et al., 2023; Osailan, 2024). This phenomenon was described by Rashed et al. (2020) as a "low CR culture" in the Saudi Arabian context—an ongoing struggle that requires public involvement, broader community education, and culturally sensitive health communication strategies to achieve real progress. Comparable patterns were identified across the MENA region, where gender norms, transportation limitations, and societal expectations similarly reduced participation and referral rates (Al-Ajlouni et al., 2024; Turk-Adawi et al., 2019). These findings illustrate how limited awareness and deeply rooted cultural norms

interact to reduce CR engagement and delay its integration into routine cardiovascular care.

The patient-level factors contain many different types of barriers. Across the studies, symptom burden, fatigue, dyspnea, and comorbidities limited patient engagement and attendance levels at CR, as identified by therapists. Also, patient psychological aspects or diseases such as anxiety, depression, and low motivation were frequently observed and cited, showing how the emotional stress that follows cardiac events can affect the patient's long-term engagement in CR (Aldhahir et al., 2022a). Furthermore, other real-world limitations like transportation difficulties, financial restrictions, and scheduling conflicts reduced patients' attendance, especially for those who live outside major cities (Adam et al., 2023; Khushhal & Alsubaiei, 2023). Evidence from the MENA narrative review also highlighted similar patient-level barriers across the region, noting that psychosocial distress, travel restrictions, and symptom intensity are among the most common factors limiting adherence (Al-Ajlouni et al., 2024). These findings emphasize that patient willingness is shaped by physical, emotional, and socioeconomic factors rather than clinical status alone. Recognizing these challenges, Alqahtani (2023) proposed home-based CR supported by tele-rehabilitation or AI-enabled monitoring. Evidence from the broader region supports this approach; for example, Aljabri et al. (2021) demonstrated that digital CR models are feasible and increasingly adopted in countries undergoing digital health transformation. Given Saudi Arabia's rapid technological progress under Vision 2030—including expanded telehealth infrastructure, national digital health records, and AI-supported clinical tools—AI-enabled and remote CR models represent realistic and promising strategies to improve access and adherence in the near future.

Recommendation and call for action

To overcome the identified barriers, a coordinated call to action is required. At the system level, aligning policy, infrastructure, and workforce planning is essential to establish a unified national strategy for CR expansion in Saudi Arabia. The Ministry of Health (MOH) should prioritize integrating CR into standard post–cardiac event pathways to ensure consistent referral and service provision. Achieving service quality and regional equity will require the development of national referral protocols, accreditation standards, and secure funding mechanisms supported at the governmental level. Additionally, establishing national CR registries and data-driven monitoring systems is critical for evaluating outcomes, tracking resource utilization, and addressing the current gap between cardiovascular disease burden and CR service (Adam et al., 2023; Khushhal & Alsubaiei, 2023; Osailan, 2024).

Continued investment in CR workforce development remains a key priority. Structured CR training programs and ongoing professional development opportunities for physicians, physiotherapists, and nurses are needed to strengthen competencies in exercise prescription, patient monitoring, and multidisciplinary collaboration. Incorporating CR modules within undergraduate and postgraduate curricula would further enhance future workforce sustainability and reduce reliance on isolated or ad hoc initiatives (Adam et al., 2023; Khushhal & Alsubaiei, 2023; Osailan, 2024).Collaboration between universities, professional associations, and regulatory bodies—such as the Saudi Commission for Health Specialties (SCFHS)—can facilitate the establishment of formal CR certification pathways and help promote a unified and evidence-informed CR culture across disciplines.

At the personal and community levels, national initiatives should emphasize improving awareness and cultural acceptance of CR. Tailored public health campaigns and patient-centered educational strategies can enhance understanding of CR benefits, motivate referrals, and support adherence. Addressing gender- and geography-related disparities is equally important, particularly for women and individuals in rural settings who face logistical and cultural barriers. Expanding home-based, tele-rehabilitation, and AI-supported CR programs can offer safe, accessible, and culturally appropriate alternatives that complement center-based services (Alqahtani, 2023). These innovations align with Saudi Arabia's digital health transformation and have the potential to significantly improve access and participation.

Ultimately, creating a national CR framework grounded in evidence, collaboration, and equity will be essential for integrating CR as a standard component of cardiac care and advancing the goals of Saudi Arabia's Vision 2030 health transformation agenda.

Limitations

Although this scoping review provides a comprehensive analysis of the barriers that affect the participation and implementation of CR in Saudi Arabia, there are several limitations that must be acknowledged. First, only eight studies were included, most of which were cross-sectional or narrative in design, limiting the ability to establish causal relationships. Second, patient-level evidence was limited, as most data were obtained from healthcare professionals, increasing the potential for response bias and overrepresentation of provider perspectives. Third, no qualitative Saudi studies exploring patient or provider experiences were identified, reducing contextual depth. Fourth, CR outcomes—such as functional improvement, adherence, or mortality reduction—could not be evaluated due to insufficient local data. Fifth, most studies were conducted in large urban centers, which restricts generalizability to rural and underserved regions. Lastly, although regional comparisons were included, variability across MENA countries may limit the direct applicability of some findings to the Saudi setting.

Conclusion

CR services in Saudi Arabia are hindered by complex and interconnected system-level and personal-level barriers. Limited infrastructure, workforce shortages, fragmented policies, insufficient awareness, cultural constraints, and diverse patient-related factors collectively contribute to low CR availability and participation. These findings indicate that CR underutilization stems from broad structural and behavioral challenges rather than isolated issues. Strengthening CR in Saudi Arabia will require a unified national framework supported by policy reform, workforce development, adequate funding, and culturally appropriate awareness strategies. Given the Kingdom's rapid digital health transformation, integrating tele-rehabilitation and AI-supported CR models provides a promising pathway to enhance accessibility, particularly for women, rural populations, and patients facing logistical barriers. Implementing these strategies is essential to achieving Vision 2030 goals for preventive healthcare and improved cardiovascular outcomes nationwide.

Author Contributions

All authors significantly contributed to the work reported, including conception, study design, execution, data acquisition, analysis, and interpretation. They actively participated in drafting, revising, or critically reviewing the

manuscript, provided final approval of the version to be published, agreed on the journal submission, and accepted accountability for all aspects of the work.

Data Availability Statement

The authors will transparently provide the primary data underpinning the findings or conclusions of this article, without any unjustified reluctance. If need from editorial team.

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Conflicts of Interest

The authors declare no potential conflicts of interest related to the research, writing, or publication of this work

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