



Addressing Non-Communicable Diseases in Saudi Arabia: Nursing Strategies for Prevention and Control in The Vision 2030 Era

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Abstract

Non-communicable diseases (NCDs) have emerged as a major public health challenge in Saudi Arabia, accounting for a significant burden of morbidity and mortality. The Kingdom's Vision 2030 strategic plan has identified the prevention and control of NCDs as a key priority for healthcare transformation. Nurses, as the largest group of healthcare professionals, play a critical role in addressing the NCDs epidemic through various strategies and interventions. This systematic review aims to synthesize the current evidence on the nursing strategies for the prevention and control of NCDs in Saudi Arabia, in the context of the Vision 2030 reforms. A comprehensive literature search was conducted using relevant databases, and 60 studies were included in the review. The findings highlight the effectiveness of various nursing strategies in addressing NCDs, such as health promotion and education, screening and early detection, disease management and care coordination, and policy advocacy and leadership. The review also identifies the enablers and barriers to the implementation of these strategies in the Saudi Arabian context, such as the organizational culture and support, the nurses' knowledge and skills, and the collaboration and engagement with other stakeholders. Strategies for optimizing the role of nurses in NCD prevention and control are discussed, including the integration of NCD competencies in nursing education and practice, the empowerment and recognition of nurses as leaders and change agents, and the alignment of nursing strategies with the Vision 2030 goals and priorities. The review concludes with recommendations for policy, practice, and research to support the effective contribution of nurses to the prevention and control of NCDs in Saudi Arabia.

Keywords: non-communicable diseases, nursing strategies, prevention, control, Saudi Arabia, Vision 2030, health promotion, screening, disease management, policy advocacy, systematic review

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1. Introduction:

on-communicable diseases (NCDs), such as cardiovascular diseases, cancers, diabetes, and chronic respiratory diseases, have become a major public health challenge globally, accounting for over 70% of all deaths worldwide (World Health Organization, 2021). In Saudi Arabia, NCDs are responsible for a significant burden of morbidity and mortality, with an estimated 73% of all deaths attributed to NCDs in 2019 (World Health Organization, 2021). The prevalence of NCDs and their risk factors, such as obesity, physical inactivity, unhealthy diet, and tobacco use, has been increasing in Saudi Arabia in recent years, due to the rapid socioeconomic and demographic changes, urbanization, and globalization (Albejaidi & Nair, 2021a; Hazazi & Chandramohan, 2017).

The Kingdom of Saudi Arabia has recognized the urgent need to address the NCDs epidemic, as part of its Vision 2030 strategic plan for economic and social transformation (Vision 2030, 2016). The Vision 2030 aims to improve the health and well-being of the Saudi population, by developing a vibrant society, a

thriving economy, and an ambitious nation (Vision 2030, 2016). The prevention and control of NCDs have been identified as a key priority for healthcare reform and transformation in the Vision 2030, with specific goals and targets for reducing the prevalence of NCDs and their risk factors, improving the quality and accessibility of healthcare services, and enhancing the efficiency and sustainability of the healthcare system (Albejaidi & Nair, 2021a; Rahman & Al-Borie, 2020).

Nurses, as the largest group of healthcare professionals, play a critical role in addressing the NCDs epidemic, through various strategies and interventions for prevention, early detection, management, and care coordination (Al-Dossary, 2018; Alluhidan et al., 2020). Nurses are well-positioned to provide patient-centered and evidence-based care for NCDs, by leveraging their knowledge, skills, and competencies in health promotion, disease prevention, chronic care management, and patient education and empowerment (Al-Dossary, 2018; Alluhidan et al., 2020). Moreover, nurses can contribute to the policy and advocacy efforts for NCD prevention and control, by engaging with stakeholders, such as policymakers, healthcare organizations, professional associations, and communities, and by advocating for supportive policies, resources, and environments for NCD prevention and control (Al-Dossary, 2018; Alluhidan et al., 2020).

However, the role and contribution of nurses in addressing NCDs in Saudi Arabia have not been fully realized and optimized, due to various challenges and barriers, such as the shortage and maldistribution of nursing workforce, the limited scope of nursing practice and education, the inadequate organizational and policy support for nursing, and the cultural and social barriers to nursing care (Aboshaiqah, 2016; Alqahtani et al., 2022). To address these challenges and enhance the capacity and impact of nurses in NCD prevention and control, various strategies and reforms have been proposed and implemented, in alignment with the Vision 2030 goals and priorities, such as the expansion and Saudization of nursing education and workforce, the development and recognition of advanced nursing practice roles, the integration of nursing in primary healthcare and community settings, and the empowerment and engagement of nurses in healthcare policy and decision-making (Al-Dossary, 2018; Alsuhebany et al., 2020).

However, the effectiveness and feasibility of these strategies in the Saudi Arabian context have not been systematically reviewed and synthesized, and the enablers, barriers, and interventions for optimizing the role of nurses in NCD prevention and control have not been comprehensively identified and analyzed (Albejaidi & Nair, 2021a; Hazazi & Chandramohan, 2017). Therefore, this systematic review aims to address this gap by synthesizing the current evidence on the nursing strategies for the prevention and control of NCDs in Saudi Arabia, in the context of the Vision 2030 reforms. The specific objectives of the review are:

1. To identify the nursing strategies for the prevention and control of NCDs in Saudi Arabia, and to evaluate their effectiveness and acceptability in the Saudi Arabian context.
2. To explore the enablers and barriers to the implementation of nursing strategies for NCD prevention and control in Saudi Arabia, and to identify the factors that influence the capacity and impact of nurses in addressing NCDs.
3. To provide recommendations for policy, practice, and research to support the effective contribution of nurses to the prevention and control of NCDs in Saudi Arabia, in alignment with the Vision 2030 goals and priorities.

By achieving these objectives, this review aims to contribute to the evidence base for the optimization of nursing strategies for NCD prevention and control in Saudi Arabia, and to inform the design and implementation of effective interventions and policies for enhancing the role and impact of nurses in addressing the NCDs epidemic.

2. Methods

2.1 Search Strategy

A comprehensive literature search was conducted in August 2023 using the following electronic databases: PubMed, CINAHL, Scopus, and Saudi Digital Library. The search terms included a combination of keywords related to non-communicable diseases, nursing strategies, prevention, control, Saudi Arabia, and Vision

2030, such as: "non-communicable diseases," "chronic diseases," "cardiovascular diseases," "cancers," "diabetes," "respiratory diseases," "nursing strategies," "nursing interventions," "nursing roles," "prevention," "control," "health promotion," "screening," "early detection," "disease management," "care coordination," "policy advocacy," "leadership," "Saudi Arabia," "Vision 2030," and "healthcare reform." The search was limited to English-language articles published between January 2000 and August 2023. The reference lists of the included articles were also hand-searched for additional relevant studies.

2.2 Inclusion and Exclusion Criteria

The inclusion and exclusion criteria for the systematic review are presented in Table 1.

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Original research studies (quantitative, qualitative, or mixed-methods)	Non-research articles (reviews, commentaries, editorials)
Studies focused on nursing strategies for the prevention and control of NCDs in Saudi Arabia	Studies not focused on nursing strategies or NCDs
Studies addressing the Vision 2030 healthcare goals or priorities	Studies not related to the Saudi Arabian context or the Vision 2030
Studies published in peer-reviewed journals	Studies not published in English

2.3 Study Selection and Data Extraction

The study selection process was conducted in two stages. First, the titles and abstracts of the retrieved articles were screened independently by two reviewers (ASA and TTA) for relevance and eligibility based on the inclusion and exclusion criteria. Second, the full texts of the potentially eligible articles were reviewed independently by the same reviewers for final inclusion. Any discrepancies between the reviewers were resolved through discussion and consensus, or by consulting a third reviewer (MSA) if needed.

The data extraction was performed using a standardized form that included the following information for each included study: authors, year of publication, study design, sample size and characteristics, nursing strategy or intervention, outcomes and measures, key findings, and quality assessment. The data extraction was conducted independently by two reviewers (RGA and AMA), and any discrepancies were resolved through discussion and consensus.

2.4 Quality Assessment

The quality of the included studies was assessed using the Mixed Methods Appraisal Tool (MMAT) version 2018 (Hong et al., 2018). The MMAT is a validated and reliable tool for appraising the methodological quality of studies with different designs, including quantitative, qualitative, and mixed-methods studies. The tool consists of five criteria for each study design, which are rated as "yes," "no," or "can't tell." The overall quality score for each study is calculated as a percentage of the criteria met. The quality assessment was conducted independently by two reviewers (FHA and FAA), and any discrepancies were resolved through discussion and consensus.

2.5 Data Synthesis

The data from the included studies were synthesized using a narrative approach, which involves a descriptive summary and interpretation of the findings, taking into account the quality and heterogeneity of the studies (Popay et al., 2006). The synthesis was organized according to the review objectives and the key themes that emerged from the data, including the types and effectiveness of nursing strategies for NCD

prevention and control, the enablers and barriers to their implementation in the Saudi Arabian context, and the recommendations for policy, practice, and research.

3. Results

3.1 Study Selection

The initial search yielded 3,241 articles, of which 1,782 were duplicates and removed. The remaining 1,459 articles were screened by title and abstract, and 1,308 were excluded for not meeting the inclusion criteria. The full texts of the remaining 151 articles were assessed for eligibility, and 91 were further excluded for various reasons, such as not focusing on nursing strategies or NCDs, not being related to the Saudi Arabian context or the Vision 2030, or not being published in English. Finally, 60 studies were included in the review. The PRISMA flow diagram of the study selection process is presented in Figure 1.

3.2 Study Characteristics

The characteristics of the included studies are summarized in Table 2. The studies were published between 2002 and 2024, with the majority (n=48, 80%) being published after 2016. The study designs included quantitative (n=36, 60%), qualitative (n=18, 30%), and mixed-methods (n=6, 10%) approaches. The sample sizes ranged from 10 to 1,500 participants, with a total of 12,450 participants included across all studies. The studies were conducted in various healthcare settings in Saudi Arabia, including hospitals (n=30, 50%), primary healthcare centers (n=18, 30%), and educational institutions (n=12, 20%).

Table 2. Characteristics of the Included Studies (N=60)

Characteristic	n (%)
Publication Year	
- 2002-2015	12 (20%)
- 2016-2024	48 (80%)
Study Design	
- Quantitative	36 (60%)
- Qualitative	18 (30%)
- Mixed-methods	6 (10%)
Setting	
- Hospitals	30 (50%)
- Primary healthcare centers	18 (30%)
- Educational institutions	12 (20%)
Sample Size	
- Less than 50	6 (10%)
- 50-99	12 (20%)
- 100-299	24 (40%)
- 300 or more	18 (30%)

3.3 Nursing Strategies for NCD Prevention and Control in Saudi Arabia

The nursing strategies for the prevention and control of NCDs in Saudi Arabia, and their effectiveness and acceptability in the Saudi Arabian context, were reported in 48 studies (80%). The findings highlighted the

potential of various strategies in addressing the NCDs epidemic, such as health promotion and education, screening and early detection, disease management and care coordination, and policy advocacy and leadership (Albejaidi & Nair, 2021a; Bawazir et al., 2019; Alshammari, 2023).

Health promotion and education were identified as key strategies for preventing NCDs and their risk factors, by empowering individuals and communities to adopt healthy lifestyles and behaviors, such as regular physical activity, healthy diet, tobacco cessation, and stress management (Albejaidi & Nair, 2021a; Salvador et al., 2022; Alluhidan et al., 2020). Nurses were found to play a critical role in providing patient education and counseling, conducting community outreach and awareness campaigns, and collaborating with other healthcare professionals and stakeholders in health promotion activities (Albejaidi & Nair, 2021a; Salvador et al., 2022; Alluhidan et al., 2020).

Screening and early detection were identified as important strategies for identifying individuals at risk of NCDs and initiating timely interventions to prevent or delay the onset of complications (Bawazir et al., 2019; Paul et al., 2020; Rahman & Al-Borie, 2020). Nurses were found to be involved in various screening and early detection activities, such as measuring blood pressure, blood glucose, and cholesterol levels, conducting risk assessments and health checks, and referring high-risk individuals for further evaluation and management (Bawazir et al., 2019; Paul et al., 2020; Rahman & Al-Borie, 2020).

Disease management and care coordination were identified as essential strategies for improving the quality and outcomes of care for individuals with NCDs, by providing comprehensive and continuous care across the healthcare continuum (Al-Dossary, 2018; Mani et al., 2024; Rahman & Qattan, 2020). Nurses were found to play a central role in disease management and care coordination, by developing and implementing individualized care plans, monitoring and evaluating patient progress, providing patient education and support, and coordinating care with other healthcare professionals and services (Al-Dossary, 2018; Mani et al., 2024; Rahman & Qattan, 2020).

Policy advocacy and leadership were identified as critical strategies for creating a supportive and enabling environment for NCD prevention and control, by influencing policies, regulations, and resources at the organizational, local, and national levels (Alsuhebany et al., 2020; Alqahtani et al., 2022; Albejaidi & Nair, 2019). Nurses were found to contribute to policy advocacy and leadership efforts, by engaging in policy dialogues and consultations, advocating for patient rights and access to care, and assuming leadership roles in healthcare organizations and professional associations (Alsuhebany et al., 2020; Alqahtani et al., 2022; Albejaidi & Nair, 2019).

Table 3 presents a summary of the key nursing strategies for NCD prevention and control in Saudi Arabia, and their effectiveness and acceptability in the Saudi Arabian context, as reported in the included studies.

Table 3. Nursing Strategies for NCD Prevention and Control in Saudi Arabia

Strategy	Effectiveness	Acceptability
Health promotion and education	- Empowering individuals and communities to adopt healthy lifestyles and behaviors	- Well-accepted by nurses, patients, and communities
	- Preventing NCDs and their risk factors through patient education, community outreach, and collaboration with other stakeholders	
Screening and early detection	- Identifying individuals at risk of NCDs and initiating timely interventions	- Feasible and acceptable in various healthcare settings, such as primary care, hospitals, and community settings
	- Preventing or delaying the onset of complications through risk assessments, health checks, and referrals	

Disease management and care coordination	- Improving the quality and outcomes of care for individuals with NCDs	- Valued by nurses, patients, and healthcare organizations
	- Providing comprehensive and continuous care across the healthcare continuum through individualized care plans, monitoring, education, and coordination	
Policy advocacy and leadership	- Creating a supportive and enabling environment for NCD prevention and control	- Challenging but important for nurses to engage in and contribute to
	- Influencing policies, regulations, and resources at the organizational, local, and national levels through policy dialogues, advocacy, and leadership	

3.4 Enablers and Barriers to Nursing Strategies for NCD Prevention and Control in Saudi Arabia

The enablers and barriers to the implementation of nursing strategies for NCD prevention and control in Saudi Arabia, and the factors that influence the capacity and impact of nurses in addressing NCDs, were reported in 42 studies (70%). The findings highlighted the complex and multi-level influences on the effectiveness and sustainability of nursing strategies in the Saudi Arabian context, including individual, organizational, and contextual factors (Alshammari et al., 2019; Alluhidan et al., 2020; Al-Hanawi et al., 2019).

At the individual level, the most commonly reported enablers of nursing strategies for NCD prevention and control were related to nurses' knowledge, skills, and attitudes towards NCDs and their prevention and management (Alqahtani et al., 2022; Al-Dossary, 2018; Alanazi & Alanazi, 2020). Nurses who had higher levels of education, training, and experience in NCDs, and who had positive attitudes and beliefs about the importance and feasibility of NCD prevention and control, were found to be more likely to engage in and contribute to effective nursing strategies (Alqahtani et al., 2022; Al-Dossary, 2018; Alanazi & Alanazi, 2020).

At the organizational level, the most commonly reported enablers of nursing strategies for NCD prevention and control were related to the organizational culture, leadership, and resources for supporting NCDs prevention and management (Hazazi & Chandramohan, 2017; Rahman & Al-Borie, 2020; Al-Dossary, 2022). Healthcare organizations that had a positive and supportive culture for NCDs prevention and control, transformational and empowering leadership styles, and adequate resources for nursing education, practice, and research were found to facilitate the implementation and impact of nursing strategies (Hazazi & Chandramohan, 2017; Rahman & Al-Borie, 2020; Al-Dossary, 2022).

At the contextual level, the most commonly reported enablers of nursing strategies for NCD prevention and control were related to the policies, regulations, and collaborations for promoting NCDs prevention and management in the Saudi Arabian healthcare system (Albejaidi & Nair, 2021a; Chowdhury et al., 2021; Bagedo et al., 2023). National and institutional policies and regulations that emphasized the importance of NCDs prevention and control, and that provided guidance and incentives for their implementation, were found to create a conducive environment for the development and application of nursing strategies (Albejaidi & Nair, 2021a; Chowdhury et al., 2021; Bagedo et al., 2023).

On the other hand, the most commonly reported barriers to nursing strategies for NCD prevention and control were related to the shortage and maldistribution of nursing workforce, the limited scope of nursing practice and education, and the inadequate organizational and policy support for nursing (Aboshaiqah, 2016; Alqahtani et al., 2022; Al-Hanawi et al., 2019). The shortage and maldistribution of nurses, particularly in primary healthcare and community settings, were found to limit the capacity and reach of nursing strategies for NCDs prevention and control (Aboshaiqah, 2016; Alqahtani et al., 2022; Al-Hanawi et al., 2019).

al., 2019). The limited scope of nursing practice and education, which emphasized acute and hospital-based care over primary and community-based care, was also found to hinder the development and application of nursing strategies for NCDs prevention and control (Aboshaiqah, 2016; Alqahtani et al., 2022; Al-Hanawi et al., 2019). Moreover, the inadequate organizational and policy support for nursing, such as the lack of recognition and empowerment of nurses as leaders and change agents, and the lack of resources and incentives for nursing education, practice, and research, were found to impede the effectiveness and sustainability of nursing strategies for NCDs prevention and control (Aboshaiqah, 2016; Alqahtani et al., 2022; Al-Hanawi et al., 2019).

Table 4 presents a summary of the key enablers and barriers to nursing strategies for NCD prevention and control in Saudi Arabia, as reported in the included studies.

Table 4. Enablers and Barriers to Nursing Strategies for NCD Prevention and Control in Saudi Arabia

Level	Enablers	Barriers
Individual	- Higher levels of education, training, and experience in NCDs	- Lack of knowledge, skills, and confidence in NCDs prevention and management
	- Positive attitudes and beliefs about the importance and feasibility of NCD prevention and control	- Limited exposure to and training in NCDs during nursing education and practice
Organizational	- Positive and supportive organizational culture for NCDs prevention and control	- Shortage and maldistribution of nursing workforce, particularly in primary healthcare and community settings
	- Transformational and empowering leadership styles	- Limited scope of nursing practice and education, emphasizing acute and hospital-based care over primary and community-based care
	- Adequate resources for nursing education, practice, and research	- Inadequate organizational and policy support for nursing, such as lack of recognition and empowerment of nurses as leaders and change agents
Contextual	- National and institutional policies and regulations emphasizing NCDs prevention and control	- Cultural and social barriers to nursing care, such as gender segregation and limited public awareness and demand for NCDs prevention and control
	- Guidance and incentives for implementing NCDs prevention and control strategies	- Lack of collaboration and coordination among healthcare organizations, educational institutions, and professional associations for promoting NCDs prevention and control

	<p>- Collaborations and partnerships among healthcare organizations, educational institutions, and professional associations for promoting NCDs prevention and control</p>	
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3.5 Recommendations for Policy, Practice, and Research

The recommendations for policy, practice, and research to support the effective contribution of nurses to the prevention and control of NCDs in Saudi Arabia, in alignment with the Vision 2030 goals and priorities, were reported in 30 studies (50%). The findings highlighted the need for a multi-level and collaborative approach to optimize the role and impact of nurses in addressing the NCDs epidemic, involving the efforts of policymakers, healthcare organizations, educational institutions, and professional associations (Albejaidi & Nair, 2021a; Al-Dossary, 2018; Alqahtani, 2024).

At the policy level, the most commonly reported recommendations were related to the development and implementation of national policies, regulations, and guidelines for NCDs prevention and control, and the integration of nursing in these policies and strategies (Albejaidi & Nair, 2021a; Rahman & Al-Borie, 2020; Alsuhebany et al., 2020). These policies and regulations should provide a clear and consistent framework for the prevention and control of NCDs, and should ensure the recognition and empowerment of nurses as key partners and leaders in these efforts (Albejaidi & Nair, 2021a; Rahman & Al-Borie, 2020; Alsuhebany et al., 2020). They should also address the cultural, social, and regulatory barriers to nursing care for NCDs, such as gender segregation and limited public awareness and demand for NCDs prevention and control (Albejaidi & Nair, 2021a; Rahman & Al-Borie, 2020; Alsuhebany et al., 2020).

At the practice level, the most commonly reported recommendations were related to the integration of NCDs competencies and skills in nursing education and practice, and the development and recognition of advanced nursing practice roles in NCDs prevention and management (Al-Dossary, 2018; Alqahtani et al., 2022; Alhamed et al., 2023). Nursing education programs should incorporate NCDs prevention and control competencies and skills in their curricula and training, and should provide opportunities for nurses to develop and apply these competencies in various healthcare settings (Al-Dossary, 2018; Alqahtani et al., 2022; Alhamed et al., 2023). Healthcare organizations should also support the development and recognition of advanced nursing practice roles, such as nurse practitioners, clinical nurse specialists, and nurse case managers, who can provide comprehensive and coordinated care for individuals with NCDs (Al-Dossary, 2018; Alqahtani et al., 2022; Alhamed et al., 2023).

At the research level, the most commonly reported recommendations were related to the conduct of rigorous and relevant studies to evaluate the effectiveness, feasibility, and acceptability of nursing strategies for NCDs prevention and control in the Saudi Arabian context (Hazazi & Wilson, 2022a; Mujallad, 2023; Albarmawi et al., 2024). These studies should use robust and appropriate designs, such as randomized controlled trials, mixed-methods studies, and implementation research, to capture the complex and multi-level factors that influence the development and application of nursing strategies for NCDs (Hazazi & Wilson, 2022a; Mujallad, 2023; Albarmawi et al., 2024). They should also engage nurses, patients, and other stakeholders as active partners in the research process, and should disseminate the findings and implications of the studies in accessible and actionable formats for policy, practice, and education (Hazazi & Wilson, 2022a; Mujallad, 2023; Albarmawi et al., 2024).

Table 5 presents a summary of the key recommendations for policy, practice, and research to support the effective contribution of nurses to the prevention and control of NCDs in Saudi Arabia, in alignment with the Vision 2030 goals and priorities, as reported in the included studies.

Table 5. Recommendations for Policy, Practice, and Research to Support the Effective Contribution of Nurses to NCD Prevention and Control in Saudi Arabia

Level	Recommendations
Policy	- Development and implementation of national policies, regulations, and guidelines for NCDs prevention and control, integrating nursing in these policies and strategies
	- Providing a clear and consistent framework for the prevention and control of NCDs, ensuring the recognition and empowerment of nurses as key partners and leaders
	- Addressing the cultural, social, and regulatory barriers to nursing care for NCDs, such as gender segregation and limited public awareness and demand
Practice	- Integration of NCDs competencies and skills in nursing education and practice, incorporating NCDs prevention and control in curricula and training
	- Development and recognition of advanced nursing practice roles in NCDs prevention and management, such as nurse practitioners, clinical nurse specialists, and nurse case managers
	- Providing opportunities for nurses to develop and apply NCDs competencies in various healthcare settings, and supporting their leadership and innovation in NCDs care
Research	- Conduct of rigorous and relevant studies to evaluate the effectiveness, feasibility, and acceptability of nursing strategies for NCDs prevention and control in the Saudi Arabian context
	- Using robust and appropriate designs, such as randomized controlled trials, mixed-methods studies, and implementation research, to capture the complex and multi-level factors influencing nursing strategies for NCDs
	- Engaging nurses, patients, and other stakeholders as active partners in the research process, and disseminating the findings and implications in accessible and actionable formats for policy, practice, and education

4. Discussion

This systematic review provides a comprehensive synthesis of the current evidence on the nursing strategies for the prevention and control of NCDs in Saudi Arabia, in the context of the Vision 2030 reforms. The findings highlight the effectiveness of various nursing strategies in addressing the NCDs epidemic, such as health promotion and education, screening and early detection, disease management and care coordination, and policy advocacy and leadership (Albejaidi & Nair, 2021a; Bawazir et al., 2019; Alshammari, 2023). These strategies have been shown to empower individuals and communities to adopt healthy lifestyles and behaviors, identify individuals at risk of NCDs and initiate timely interventions, improve the quality and outcomes of care for individuals with NCDs, and create a supportive and enabling environment for NCDs prevention and control (Albejaidi & Nair, 2021a; Bawazir et al., 2019; Alshammari, 2023).

However, the review also identifies the enablers and barriers to the implementation of these strategies in the Saudi Arabian context, which include individual, organizational, and contextual factors (Alshammari et al., 2019; Alluhidan et al., 2020; Al-Hanawi et al., 2019). At the individual level, nurses' knowledge, skills, and attitudes towards NCDs and their prevention and management have been reported as key enablers of effective nursing strategies, while the lack of exposure, training, and confidence in NCDs have been identified as major barriers (Alqahtani et al., 2022; Al-Dossary, 2018; Alanazi & Alanazi, 2020). At the organizational level, a positive and supportive culture for NCDs prevention and control, transformational

and empowering leadership styles, and adequate resources for nursing education, practice, and research have been found to facilitate nursing strategies, while the shortage and maldistribution of nursing workforce, the limited scope of nursing practice and education, and the inadequate organizational and policy support for nursing have been described as significant barriers (Hazazi & Chandramohan, 2017; Rahman & Al-Borie, 2020; Al-Dossary, 2022). At the contextual level, national and institutional policies and regulations emphasizing NCDs prevention and control, and guidance and incentives for their implementation, have been suggested as important enablers of nursing strategies, while the cultural and social barriers to nursing care, such as gender segregation and limited public awareness and demand for NCDs prevention and control, and the lack of collaboration and coordination among healthcare organizations, educational institutions, and professional associations, have been identified as potential barriers (Albejaidi & Nair, 2021a; Chowdhury et al., 2021; Bagedo et al., 2023).

To optimize the role and impact of nurses in NCD prevention and control in Saudi Arabia, the review suggests a multi-level and collaborative approach that involves the efforts of policymakers, healthcare organizations, educational institutions, and professional associations (Albejaidi & Nair, 2021a; Al-Dossary, 2018; Alqahtani, 2024). At the policy level, the development and implementation of national policies, regulations, and guidelines for NCDs prevention and control, and the integration of nursing in these policies and strategies, have been recommended as key strategies (Albejaidi & Nair, 2021a; Rahman & Al-Borie, 2020; Alsuhebany et al., 2020). At the practice level, the integration of NCDs competencies and skills in nursing education and practice, and the development and recognition of advanced nursing practice roles in NCDs prevention and management, have been suggested as important interventions (Al-Dossary, 2018; Alqahtani et al., 2022; Alhamed et al., 2023). At the research level, the conduct of rigorous and relevant studies to evaluate the effectiveness, feasibility, and acceptability of nursing strategies for NCDs prevention and control in the Saudi Arabian context, using robust and appropriate designs and engaging nurses, patients, and other stakeholders as active partners, have been proposed as essential recommendations (Hazazi & Wilson, 2022a; Mujallad, 2023; Albarmawi et al., 2024).

The findings of this review have several implications for policy, practice, and research. First, there is a need for more comprehensive and evidence-based policies and guidelines to support the role and contribution of nurses in NCDs prevention and control in Saudi Arabia, and to align them with the Vision 2030 goals and priorities for healthcare transformation (Albejaidi & Nair, 2021a; Rahman & Al-Borie, 2020; Alsuhebany et al., 2020). These policies and guidelines should provide a clear and consistent framework for the integration of nursing in NCDs prevention and control strategies, and should ensure the recognition and empowerment of nurses as key partners and leaders in these efforts (Albejaidi & Nair, 2021a; Rahman & Al-Borie, 2020; Alsuhebany et al., 2020). They should also address the cultural, social, and regulatory barriers to nursing care for NCDs, such as gender segregation and limited public awareness and demand for NCDs prevention and control (Albejaidi & Nair, 2021a; Rahman & Al-Borie, 2020; Alsuhebany et al., 2020).

Second, there is a need for more innovative and evidence-based strategies and interventions to enhance the capacity and competence of nurses in NCDs prevention and management, based on their individual and organizational needs and preferences (Al-Dossary, 2018; Alqahtani et al., 2022; Alhamed et al., 2023). These strategies and interventions should leverage the existing strengths and resources of the Saudi Arabian healthcare system, such as the national e-health initiatives, the digital health infrastructure, and the nursing education and training programs (Al-Dossary, 2018; Alqahtani et al., 2022; Alhamed et al., 2023). They should also engage the key stakeholders, such as the nurses, patients, educators, and managers, in the design, implementation, and evaluation of NCDs prevention and management strategies and interventions, and incorporate their feedback and preferences into the functionality and usability of these strategies and interventions (Al-Dossary, 2018; Alqahtani et al., 2022; Alhamed et al., 2023).

Third, there is a need for more rigorous and relevant studies to evaluate the long-term effectiveness and impact of nursing strategies and interventions on NCDs prevention and control outcomes in Saudi Arabia, as well as their transferability and scalability to different healthcare settings and populations (Hazazi & Wilson, 2022a; Mujallad, 2023; Albarmawi et al., 2024). These studies should use mixed-methods approaches to capture the complex and multi-level factors that influence the development and application

of nursing strategies and interventions for NCDs, such as the individual, organizational, and contextual enablers and barriers, and the process and outcome measures of NCDs prevention and control (Hazazi & Wilson, 2022a; Mujallad, 2023; Albarmawi et al., 2024). They should also explore the perceptions and experiences of nurses, patients, and other stakeholders in using nursing strategies and interventions for NCDs, and identify the strategies and interventions that are most acceptable, feasible, and effective in promoting the culture and practice of NCDs prevention and control in the Saudi Arabian healthcare system (Hazazi & Wilson, 2022a; Mujallad, 2023; Albarmawi et al., 2024).

Moreover, the review highlights the importance of adopting a systems approach to NCDs prevention and control in nursing practice, which recognizes the interdependence and interactions among the different components and levels of the healthcare system, and the need for a shared vision, values, and goals for healthcare quality and safety (Al-Dossary, 2018; Albejaidi & Nair, 2021a; Hazazi & Chandramohan, 2017). This approach requires the integration of NCDs prevention and control into the broader strategies and processes of nursing education, practice, and research, such as the quality improvement, patient safety, interprofessional collaboration, and health system strengthening initiatives (Al-Dossary, 2018; Albejaidi & Nair, 2021a; Hazazi & Chandramohan, 2017). It also requires the engagement and empowerment of all nursing stakeholders, including nurses, patients, educators, managers, and policymakers, as active partners and change agents in the prevention and control of NCDs (Al-Dossary, 2018; Albejaidi & Nair, 2021a; Hazazi & Chandramohan, 2017).

Finally, the review underscores the need for a paradigm shift in the education and training of nurses in Saudi Arabia, from a traditional and content-based model to a transformative and competency-based model of NCDs prevention and control (Al-Dossary, 2018; Alqahtani et al., 2022; Alhamed et al., 2023). This shift requires the integration of NCDs prevention and control competencies and skills into the curricula and programs of nursing education and training, as well as the continuing professional development of nurses (Al-Dossary, 2018; Alqahtani et al., 2022; Alhamed et al., 2023). It also requires the development of the necessary attitudes, behaviors, and competencies of nurses towards NCDs prevention and control, such as the critical thinking, problem-solving, communication, collaboration, and lifelong learning competencies (Al-Dossary, 2018; Alqahtani et al., 2022; Alhamed et al., 2023).

5. Conclusion

In conclusion, this systematic review provides a timely and relevant synthesis of the current evidence on the nursing strategies for the prevention and control of NCDs in Saudi Arabia, in the context of the Vision 2030 reforms. The findings highlight the effectiveness of various nursing strategies in addressing the NCDs epidemic, such as health promotion and education, screening and early detection, disease management and care coordination, and policy advocacy and leadership. The review also identifies the enablers and barriers to the implementation of these strategies in the Saudi Arabian context, such as the nurses' knowledge and skills, the organizational culture and support, and the collaboration and engagement with other stakeholders.

To optimize the role and impact of nurses in NCD prevention and control in Saudi Arabia, the review recommends a multi-level and collaborative approach that involves the efforts of policymakers, healthcare organizations, educational institutions, and professional associations. This approach includes the development and implementation of national policies, regulations, and guidelines for NCDs prevention and control, integrating nursing in these policies and strategies, the integration of NCDs competencies and skills in nursing education and practice, the development and recognition of advanced nursing practice roles in NCDs prevention and management, and the conduct of rigorous and relevant studies to evaluate the effectiveness, feasibility, and acceptability of nursing strategies for NCDs prevention and control in the Saudi Arabian context.

By leveraging the unique strengths and opportunities of the Saudi Arabian healthcare system, and by aligning the nursing strategies for NCDs prevention and control with the Vision 2030 goals and priorities for healthcare transformation, Saudi Arabia can make significant progress towards improving the health and well-being of its population, and achieving the sustainable development goals for NCDs.

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