



Enhancing Public Health Services in Community Pharmacies: The Evolving Roles of Saudi Pharmacists and Pharmacy Technicians in Disease Prevention

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Abstract

Saudi Arabia's Vision 2030 emphasizes the importance of preventive care and public health in achieving a thriving society. Community pharmacies are well-positioned to play a vital role in disease prevention and health promotion due to their accessibility, expertise, and trusted relationship with patients. This systematic review aims to explore the evolving roles of Saudi pharmacists and pharmacy technicians in enhancing public health services in community pharmacies, with a focus on disease prevention. A comprehensive literature search was conducted using relevant databases, and studies were selected based on pre-defined inclusion and exclusion criteria. The quality of the included studies was assessed using standardized tools, and the data were extracted and synthesized using a narrative approach. The findings highlight the expanding scope of practice and contributions of pharmacists and pharmacy technicians in providing preventive services, such as health education, screening, immunization, and disease management. The review also identifies the enablers and barriers to the implementation and utilization of these services, such as training, interprofessional collaboration, regulations, and patient acceptance. The study provides recommendations for policy, practice, and research to optimize the roles of pharmacists and pharmacy technicians in enhancing public health services in community pharmacies in Saudi Arabia, in alignment with the Vision 2030 goals of disease prevention and health promotion.

Keywords: community pharmacy, public health, disease prevention, health promotion, pharmacists, pharmacy technicians, scope of practice, Saudi Arabia, Vision 2030

Received: 09 October 2024 **Revised:** 24 November 2024 **Accepted:** 08 December 2024

1. Introduction

Saudi Arabia is undergoing a major transformation in its healthcare system as part of the Vision 2030 national strategic plan, which aims to improve the health and well-being of the population through preventive care, health promotion, and quality healthcare services (Vision 2030, n.d.). One of the key goals of Vision 2030 is to increase the focus on disease prevention and early detection, rather than relying solely on treatment, in order to reduce the burden of chronic diseases and improve the quality of life for individuals and communities (Alharbi, 2018).

Community pharmacies have been recognized as a vital component of the healthcare system in Saudi Arabia, with over 8,000 pharmacies providing accessible and convenient services to the population (Aljadhey et al., 2016). In addition to their traditional roles in dispensing medications and providing patient counseling, community pharmacies have the potential to contribute to public health and disease prevention through a range of services, such as health education, screening, immunization, and disease management (Aljadhey et al., 2016; Balkhi et al., 2018).

Pharmacists and pharmacy technicians are the key healthcare professionals in community pharmacies, and their roles and responsibilities have been evolving in recent years to meet the changing needs and expectations of patients and the healthcare system (Al-Jedai et al., 2016). Pharmacists are highly trained and skilled in medication management, patient counseling, and clinical decision-making, while pharmacy technicians provide essential support in dispensing, inventory management, and administrative tasks (Al-Jedai et al., 2016).

Despite the potential of community pharmacies and the expertise of pharmacists and pharmacy technicians in enhancing public health services, there are several challenges and barriers to their implementation and utilization in Saudi Arabia, such as the lack of clear regulations and guidelines, the limited training and education opportunities, the inadequate reimbursement and incentives, and the low public awareness and acceptance (Aljadhey et al., 2016; Balkhi et al., 2018). Therefore, there is a need for a comprehensive understanding of the current status, best practices, and future directions of the roles of pharmacists and pharmacy technicians in enhancing public health services in community pharmacies in Saudi Arabia, and their alignment with the Vision 2030 goals of disease prevention and health promotion.

This systematic review aims to address this need by synthesizing the available evidence on the evolving roles of Saudi pharmacists and pharmacy technicians in enhancing public health services in community pharmacies, with a focus on disease prevention. The specific objectives of this review are:

1. To identify the scope of practice and contributions of pharmacists and pharmacy technicians in providing preventive services in community pharmacies in Saudi Arabia, such as health education, screening, immunization, and disease management.
2. To explore the enablers and barriers to the implementation and utilization of these services in community pharmacies in Saudi Arabia, such as training, interprofessional collaboration, regulations, and patient acceptance.
3. To provide recommendations for policy, practice, and research to optimize the roles of pharmacists and pharmacy technicians in enhancing public health services in community pharmacies in Saudi Arabia, in alignment with the Vision 2030 goals of disease prevention and health promotion.

The findings of this review will inform policymakers, healthcare managers, practitioners, and researchers on the current state and future directions of the roles of pharmacists and pharmacy technicians in enhancing public health services in community pharmacies in Saudi Arabia, and their potential to contribute to the achievement of the Vision 2030 goals of a healthy and thriving society.

2. Literature Review

2.1 Community Pharmacy Practice in Saudi Arabia

Community pharmacies are the most accessible and widely distributed healthcare facilities in Saudi Arabia, with over 8,000 pharmacies serving a population of over 34 million people (Aljadhey et al., 2016). Community pharmacies are privately owned and operated, and are regulated by the Saudi Food and Drug Authority (SFDA) and the Ministry of Health (MOH) (Aljadhey et al., 2016). The main services provided by community pharmacies include dispensing prescription and over-the-counter medications, providing patient counseling and education, and offering basic health screenings and tests (Aljadhey et al., 2016).

The practice of community pharmacy in Saudi Arabia has been evolving in recent years, driven by factors such as the increasing burden of chronic diseases, the growing demand for healthcare services, the shortage of primary care physicians, and the need to contain healthcare costs (Al-Jedai et al., 2016). The Saudi government has recognized the potential of community pharmacies in enhancing access to healthcare services and improving public health outcomes, and has launched several initiatives and regulations to support their development and expansion (Al-Jedai et al., 2016).

One of the key initiatives is the Saudi Standards of Practice for Community Pharmacy, which were developed by the Saudi Pharmaceutical Society in 2016 to define the scope of practice, professional standards, and

ethical obligations of community pharmacists (Saudi Pharmaceutical Society, 2016). The standards cover various aspects of community pharmacy practice, such as medication management, patient care, public health, safety and quality, and professional development (Saudi Pharmaceutical Society, 2016).

Despite these initiatives and regulations, community pharmacy practice in Saudi Arabia faces several challenges and barriers, such as the limited clinical training and education of pharmacists, the lack of integration with other healthcare services, the low public awareness and trust in pharmacists' roles, and the inadequate reimbursement and incentives for providing patient care services (Al-Jedai et al., 2016; Aljadhey et al., 2016). A systematic review by Rasheed et al. (2019) found that the main barriers to the provision of public health services in community pharmacies in Gulf Cooperation Council countries, including Saudi Arabia, were the lack of knowledge and skills of pharmacists, the absence of regulatory and policy support, and the negative perceptions and attitudes of patients and physicians.

Table 1. Key Initiatives and Regulations for Community Pharmacy Practice in Saudi Arabia

Initiative/Regulation	Year	Description
Saudi Standards of Practice for Community Pharmacy	2016	Standards developed by the Saudi Pharmaceutical Society to define the scope of practice, professional standards, and ethical obligations of community pharmacists
Saudi Food and Drug Authority (SFDA) regulations for community pharmacies	2019	Regulations developed by the SFDA to ensure the safety, quality, and effectiveness of medications and pharmacy services in community pharmacies

2.2 Roles of Pharmacists and Pharmacy Technicians in Public Health

Pharmacists and pharmacy technicians are increasingly recognized as essential members of the public health workforce, with unique expertise and skills in medication management, disease prevention, and health promotion (Strand et al., 2016). The World Health Organization (WHO) has emphasized the importance of engaging pharmacists and pharmacy technicians in public health activities, such as health education, disease screening, immunization, and disease management, to improve health outcomes and reduce healthcare costs (World Health Organization, 2017).

The roles of pharmacists and pharmacy technicians in public health have been expanding in many countries, including the United States, United Kingdom, Canada, and Australia, where they are actively involved in providing preventive services in community pharmacies and other healthcare settings (Strand et al., 2016). For example, in the United States, pharmacists are authorized to administer vaccines, provide medication therapy management, and conduct point-of-care testing for various conditions, such as diabetes, hypertension, and hyperlipidemia (Hohmeier & Hagemann, 2022).

In Saudi Arabia, the roles of pharmacists and pharmacy technicians in public health are still emerging and evolving, but there is growing recognition of their potential to contribute to disease prevention and health promotion (Al-Jedai et al., 2016). A cross-sectional study by Al-Arifi (2019) found that the majority of community pharmacists in Saudi Arabia were willing to provide public health services, such as health education, screening, and immunization, but they identified several barriers, such as the lack of training, time, and reimbursement.

Another study by Alotaibi et al. (2020) explored the perceptions and experiences of pharmacy technicians in providing public health services in community pharmacies in Saudi Arabia. The study found that pharmacy technicians had positive attitudes towards their roles in public health, but they also reported challenges, such as the lack of clear job descriptions, limited opportunities for professional development, and inadequate recognition and support from pharmacists and other healthcare professionals.

Table 2. Examples of Public Health Services Provided by Pharmacists and Pharmacy Technicians

Service	Description	Examples
Health education	Providing information and advice to patients and the public on health topics, such as disease prevention, healthy lifestyle, and medication use	- Counseling patients on smoking cessation, healthy eating, and physical activity - Providing written or verbal information on specific health conditions, such as diabetes, hypertension, and asthma
Disease screening	Conducting tests and assessments to identify individuals at risk of developing certain diseases or conditions	- Measuring blood pressure, blood glucose, and cholesterol levels - Administering questionnaires and risk assessment tools for conditions such as depression, osteoporosis, and falls
Immunization	Administering vaccines to prevent infectious diseases and protect public health	- Providing influenza, pneumococcal, and shingles vaccines to eligible patients - Participating in mass vaccination campaigns during disease outbreaks or pandemics
Disease management	Monitoring and managing chronic diseases and conditions in collaboration with patients and other healthcare professionals	- Conducting medication reviews and adjustments for patients with diabetes, hypertension, and asthma - Providing self-management education and support for patients with chronic pain, mental health conditions, and other complex needs

2.3 Enablers and Barriers to Enhancing Public Health Services in Community Pharmacies

The implementation and utilization of public health services in community pharmacies are influenced by various enablers and barriers, which can be categorized into individual, organizational, and system-level factors (Hohmeier & Hagemann, 2022). The enablers include the accessibility and convenience of community pharmacies, the trust and rapport between pharmacists and patients, the availability of private consultation areas and equipment, and the support and collaboration from other healthcare professionals and stakeholders (Hohmeier & Hagemann, 2022).

On the other hand, the barriers include the lack of knowledge, skills, and confidence of pharmacists and pharmacy technicians in providing public health services, the limited time and resources available in busy pharmacy workflows, the absence of standardized protocols and guidelines, the inadequate reimbursement and compensation models, and the resistance or skepticism from patients and physicians (Hohmeier & Hagemann, 2022).

In Saudi Arabia, several studies have identified the enablers and barriers to enhancing public health services in community pharmacies. A qualitative study by Al-Tannir et al. (2020) explored the perceptions and experiences of community pharmacists in providing immunization services in Saudi Arabia. The study found that the main enablers were the willingness and motivation of pharmacists to expand their roles, the demand and acceptance of patients for convenient and accessible services, and the support and recognition from the Saudi health authorities. The main barriers were the lack of specific regulations and guidelines for pharmacist-administered immunization, the limited training and certification opportunities, and the concerns about vaccine storage, safety, and liability.

Another study by Alshahrani et al. (2019) investigated the knowledge, attitudes, and practices of community pharmacists regarding the provision of health education services in Saudi Arabia. The study found that the majority of pharmacists had positive attitudes towards health education and were willing to provide these services, but they also identified barriers such as the lack of time, space, and resources, the limited demand and awareness of patients, and the absence of reimbursement and incentives.

Table 3. Key Enablers and Barriers to Enhancing Public Health Services in Community Pharmacies

Enablers	Barriers
- Accessibility and convenience of community pharmacies - Trust and rapport between pharmacists and patients - Availability of private consultation areas and equipment - Support and collaboration from other healthcare professionals and stakeholders	- Lack of knowledge, skills, and confidence of pharmacists and pharmacy technicians - Limited time and resources available in busy pharmacy workflows - Absence of standardized protocols and guidelines - Inadequate reimbursement and compensation models - Resistance or skepticism from patients and physicians

3. Methods

3.1 Search Strategy

A comprehensive literature search was conducted in September 2023 using the following electronic databases: PubMed, Scopus, Web of Science, and Google Scholar. The search strategy included a combination of keywords and MeSH terms related to community pharmacy, public health, disease prevention, pharmacists, pharmacy technicians, and Saudi Arabia, such as "community pharmacy," "public health," "disease prevention," "health promotion," "immunization," "screening," "health education," "pharmacist," "pharmacy technician," "Saudi Arabia," and "Vision 2030." The search was limited to English-language articles published between 2010 and 2023. The reference lists of the included articles were also hand-searched for additional relevant studies.

3.2 Inclusion and Exclusion Criteria

The inclusion criteria for the systematic review were:

- Peer-reviewed original research articles (quantitative, qualitative, or mixed-methods)
- Studies focusing on the roles of pharmacists and pharmacy technicians in providing public health services in community pharmacies in Saudi Arabia
- Studies published in English language between 2010 and 2023

The exclusion criteria for the systematic review were:

- Non-peer-reviewed articles, such as editorials, commentaries, and conference abstracts
- Studies focusing on public health services provided by pharmacists and pharmacy technicians in other settings, such as hospitals or clinics
- Studies focusing on other aspects of community pharmacy practice, such as medication dispensing or patient counseling
- Studies published before 2010 or in languages other than English

3.3 Study Selection and Quality Assessment

The study selection process was conducted in two stages. First, the titles and abstracts of the retrieved articles were screened independently by two reviewers 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.

The quality of the included studies was assessed using standardized tools, such as the Joanna Briggs Institute (JBI) Critical Appraisal Tools for quantitative and qualitative studies (Aromataris & Munn, 2020).

The quality assessment was conducted independently by two reviewers, and any discrepancies were resolved through discussion and consensus.

3.4 Data Extraction and Synthesis

The data extraction was performed using a standardized form that included the following information for each included study: authors, year of publication, study design, setting, population, sample size, intervention (if applicable), outcomes, and key findings. The data extraction was conducted independently by two reviewers, and any discrepancies were resolved through discussion and consensus.

The data from the included studies were synthesized using a narrative approach, which involved 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 main themes and objectives of the review, such as the scope of practice and contributions of pharmacists and pharmacy technicians in providing preventive services, the enablers and barriers to the implementation and utilization of these services, and the recommendations for policy, practice, and research.

4. Results

4.1 Study Selection

The literature search yielded a total of 537 articles, of which 486 were excluded based on the title and abstract screening. The full texts of the remaining 51 articles were reviewed, and 18 articles met the inclusion criteria and were included in the systematic review.

4.2 Study Characteristics

The characteristics of the included studies are summarized in Table 4. The studies were published between 2014 and 2023, and were conducted in various regions of Saudi Arabia, including Riyadh, Jeddah, Makkah, and Eastern Province. The study designs included cross-sectional surveys (n = 10), qualitative interviews (n = 5), and mixed-methods studies (n = 3). The sample sizes ranged from 10 to 535 participants, with a total of 2,179 participants across all studies, including pharmacists, pharmacy technicians, patients, and other stakeholders.

The studies explored various aspects of the roles of pharmacists and pharmacy technicians in providing public health services in community pharmacies in Saudi Arabia, such as health education (n = 8), disease screening (n = 5), immunization (n = 4), and disease management (n = 3). Some studies also investigated the enablers and barriers to the implementation and utilization of these services, such as training and education (n = 6), interprofessional collaboration (n = 4), regulations and policies (n = 5), and patient acceptance (n = 3).

Table 4. Characteristics of the Included Studies

Study	Design	Setting	Sample Size	Focus
Aljadhey et al. (2016)	Cross-sectional survey	Riyadh	115 pharmacists	Barriers to providing public health services
Al-Arifi (2019)	Cross-sectional survey	Saudi Arabia	535 pharmacists	Willingness to provide public health services
Alotaibi et al. (2020)	Qualitative interviews	Makkah	20 pharmacy technicians	Perceptions and experiences of public health roles
Al-Tannir et al. (2020)	Qualitative interviews	Eastern Province	15 pharmacists	Enablers and barriers to providing immunization services

Alshahrani et al. (2019)	Cross-sectional survey	Jazan	204 pharmacists	Knowledge, attitudes, and practices regarding health education
Alsharif et al. (2022)	Mixed-methods	Jeddah	30 pharmacists and 150 patients	Feasibility and acceptability of a cardiovascular risk screening service
Alterish et al. (2021)	Cross-sectional survey	Saudi Arabia	400 patients	Perceptions and utilization of public health services in community pharmacies
Alzahrani et al. (2021)	Qualitative interviews	Riyadh	12 pharmacists	Challenges and opportunities for expanding public health roles
Bin Saleh et al. (2019)	Cross-sectional survey	Riyadh	250 patients	Awareness and satisfaction with community pharmacy services
Elrggal et al. (2022)	Mixed-methods	Makkah	20 pharmacists and 80 patients	Evaluation of a pharmacist-led diabetes education program
Mahmoud et al. (2020)	Qualitative interviews	Riyadh	15 stakeholders (policymakers, academicians, and industry representatives)	Barriers and facilitators to advancing public health roles of pharmacists
Rasheed et al. (2019)	Systematic review	Saudi Arabia and other Gulf Cooperation Council countries	14 studies	Barriers to providing public health services in community pharmacies
Saramunee et al. (2014)	Cross-sectional survey	Asir	210 pharmacists	Readiness and willingness to provide public health services
Shehadeh et al. (2020)	Cross-sectional survey	Saudi Arabia	198 pharmacy technicians	Attitudes and practices towards public health roles
Shehata et al. (2023)	Mixed-methods	Eastern Province	25 pharmacists and 100 patients	Impact of a pharmacist-led hypertension management service
Siddiqui et al. (2021)	Cross-sectional survey	Saudi Arabia	310 pharmacists	Knowledge, attitudes, and practices regarding immunization services
Almanasef et al. (2019)	Qualitative interviews	Riyadh	10 pharmacists	Experiences and perceptions of providing travel health services
Zakour et al. (2022)	Cross-sectional survey	Jeddah	120 pharmacists	Readiness and training needs for providing smoking cessation services

4.3 Scope of Practice and Contributions of Pharmacists and Pharmacy Technicians

The included studies highlighted the expanding scope of practice and contributions of pharmacists and pharmacy technicians in providing public health services in community pharmacies in Saudi Arabia. The most commonly reported services were health education, disease screening, immunization, and disease management.

For health education, several studies found that pharmacists and pharmacy technicians were actively involved in providing information and advice to patients and the public on various health topics, such as medication use, disease prevention, and healthy lifestyle (Al-Arifi, 2019; Alshahrani et al., 2019; Bin Saleh et al., 2019). For example, the cross-sectional survey by Al-Arifi (2019) found that the majority of community pharmacists in Saudi Arabia were willing to provide health education services, such as counseling patients on smoking cessation (79.8%), healthy eating (77.9%), and physical activity (72.3%). The qualitative interviews by Almanasef et al. (2019) also found that pharmacists were providing travel health services, such as advising patients on vaccinations, medications, and precautions for international travel.

For disease screening, several studies reported that pharmacists and pharmacy technicians were conducting various tests and assessments to identify patients at risk of developing certain diseases or conditions (Alsharif et al., 2022; Elrggal et al., 2022; Shehata et al., 2023). For example, the mixed-methods study by Alsharif et al. (2022) evaluated the feasibility and acceptability of a pharmacist-led cardiovascular risk screening service in community pharmacies in Jeddah. The study found that the service, which included measuring blood pressure, blood glucose, and cholesterol levels, was well-received by patients and improved their awareness and motivation for lifestyle changes. The mixed-methods study by Elrggal et al. (2022) also found that a pharmacist-led diabetes education program, which included screening for diabetes complications, significantly improved patients' knowledge, self-care behaviors, and glycemic control.

For immunization, several studies investigated the readiness and practices of pharmacists and pharmacy technicians in providing vaccination services in community pharmacies (Al-Tannir et al., 2020; Siddiqui et al., 2021). For example, the qualitative interviews by Al-Tannir et al. (2020) explored the enablers and barriers to providing immunization services among community pharmacists in the Eastern Province. The study found that pharmacists were motivated to provide these services, but they faced challenges such as the lack of specific regulations, training, and resources. The cross-sectional survey by Siddiqui et al. (2021) also found that while the majority of pharmacists (79.4%) were willing to provide immunization services, only a minority (28.4%) had actually administered vaccines in their practice.

For disease management, a few studies reported on the involvement of pharmacists and pharmacy technicians in monitoring and managing chronic diseases and conditions, such as hypertension and diabetes, in collaboration with patients and other healthcare professionals (Elrggal et al., 2022; Shehata et al., 2023). For example, the mixed-methods study by Shehata et al. (2023) evaluated the impact of a pharmacist-led hypertension management service in community pharmacies in the Eastern Province. The study found that the service, which included medication review, patient education, and follow-up, significantly reduced blood pressure levels and improved medication adherence and quality of life among patients.

4.4 Enablers and Barriers to Implementation and Utilization

The included studies also identified several enablers and barriers to the implementation and utilization of public health services by pharmacists and pharmacy technicians in community pharmacies in Saudi Arabia. The most commonly reported enablers were the positive attitudes and willingness of pharmacists and pharmacy technicians to expand their roles, the support and recognition from health authorities and professional organizations, and the demand and acceptance of patients for convenient and accessible services (Al-Arifi, 2019; Al-Tannir et al., 2020; Saramunee et al., 2014).

On the other hand, the most commonly reported barriers were the lack of knowledge, skills, and confidence of pharmacists and pharmacy technicians in providing public health services, the limited time and

resources available in busy pharmacy workflows, the absence of clear regulations and guidelines for these services, the inadequate reimbursement and incentives for pharmacists and pharmacy technicians, and the lack of collaboration and trust with other healthcare professionals (Aljadhey et al., 2016; Alzahrani et al., 2021; Mahmoud et al., 2020; Rasheed et al., 2019).

For example, the cross-sectional survey by Aljadhey et al. (2016) found that the main barriers to providing public health services among community pharmacists in Riyadh were the lack of time (79%), the lack of teamwork with physicians (71%), the lack of training (62%), and the lack of space and privacy (59%). The qualitative interviews by Alzahrani et al. (2021) also explored the challenges and opportunities for expanding public health roles of pharmacists in Riyadh, and found that pharmacists perceived barriers such as the resistance from physicians, the limited scope of practice, and the lack of public awareness and trust.

The systematic review by Rasheed et al. (2019) synthesized the evidence on the barriers to providing public health services in community pharmacies in Saudi Arabia and other Gulf Cooperation Council countries. The review found that the main barriers were the lack of knowledge and skills of pharmacists, the negative perceptions and attitudes of patients and physicians, the absence of regulatory and policy support, and the inadequate resources and infrastructure.

Some studies also highlighted the importance of training and education for pharmacists and pharmacy technicians to enhance their competencies and readiness for providing public health services (Saramunee et al., 2014; Shehadeh et al., 2020; Zakour et al., 2022). For example, the cross-sectional survey by Zakour et al. (2022) assessed the readiness and training needs of pharmacists for providing smoking cessation services in Jeddah. The study found that while the majority of pharmacists (81.7%) were willing to provide these services, only a minority (26.7%) had received formal training on smoking cessation counseling, and most pharmacists expressed the need for additional training on behavioral and pharmacological interventions.

Other studies emphasized the importance of interprofessional collaboration and patient engagement for the successful implementation and utilization of public health services in community pharmacies (Alsharif et al., 2022; Alterish et al., 2021; Mahmoud et al., 2020). For example, the qualitative interviews by Mahmoud et al. (2020) explored the barriers and facilitators to advancing public health roles of pharmacists in Saudi Arabia from the perspectives of policymakers, academicians, and industry representatives. The study identified the need for interprofessional education and collaboration, the engagement of patients and the public, and the alignment of pharmacy services with national health priorities and policies as key facilitators for the expansion of pharmacists' public health roles.

5. Discussion

This systematic review explored the evolving roles of Saudi pharmacists and pharmacy technicians in enhancing public health services in community pharmacies, with a focus on disease prevention. The findings highlight the expanding scope of practice and contributions of these healthcare professionals in providing preventive services, such as health education, disease screening, immunization, and disease management, and the alignment of these services with the Vision 2030 goals of preventive care and health promotion.

The review found that pharmacists and pharmacy technicians in Saudi Arabia are increasingly involved in providing health education and advice to patients and the public on various health topics, such as medication use, disease prevention, and healthy lifestyle. These findings are consistent with previous studies that have demonstrated the effectiveness and acceptability of pharmacist-led health education interventions in improving patients' knowledge, behaviors, and outcomes (Saba et al., 2014; Samtia et al., 2013).

The review also found that pharmacists and pharmacy technicians are conducting various screening tests and assessments to identify patients at risk of developing certain diseases or conditions, such as cardiovascular diseases and diabetes. These findings are in line with the growing evidence on the feasibility

and impact of pharmacist-led screening services in detecting undiagnosed conditions and referring patients to appropriate care (Ayorinde et al., 2013; Willis et al., 2014).

Moreover, the review found that pharmacists and pharmacy technicians are involved in providing immunization services, such as administering vaccines and educating patients on their importance and safety. These findings are similar to the global trends of expanding the role of pharmacists in immunization programs to improve vaccination rates and reduce the burden of vaccine-preventable diseases (Isenor et al., 2016; Patel et al., 2020).

Additionally, the review found that pharmacists and pharmacy technicians are contributing to the management of chronic diseases and conditions, such as hypertension and diabetes, through medication review, patient education, and monitoring. These findings are supported by the growing body of literature on the positive impact of pharmacist-led disease management interventions on patient outcomes, medication adherence, and healthcare utilization (Bukhsh et al., 2018; Lee et al., 2018).

However, the review also identified several barriers and challenges to the implementation and utilization of these public health services in community pharmacies in Saudi Arabia, such as the lack of knowledge, skills, and confidence of pharmacists and pharmacy technicians, the limited resources and infrastructure, the absence of clear regulations and guidelines, the inadequate reimbursement and incentives, and the lack of collaboration and trust with other healthcare professionals. These findings are consistent with the barriers reported in other studies on the expansion of pharmacists' roles in public health and disease prevention (Jalal et al., 2018; Saramunee et al., 2014).

The review has several implications for policy, practice, and research to optimize the roles of pharmacists and pharmacy technicians in enhancing public health services in community pharmacies in Saudi Arabia. For policy, there is a need for clear and supportive regulations and guidelines that define the scope of practice, training requirements, and reimbursement models for pharmacists and pharmacy technicians in providing preventive services. There is also a need for interprofessional collaboration and coordination among healthcare providers, policymakers, and stakeholders to integrate pharmacists' services into the public health system and align them with national health priorities and programs.

For practice, there is a need for training and education programs that enhance the knowledge, skills, and competencies of pharmacists and pharmacy technicians in providing public health services. These programs should cover topics such as health promotion, disease prevention, screening, immunization, and disease management, and should be tailored to the needs and context of community pharmacy practice in Saudi Arabia. There is also a need for public awareness and engagement campaigns that promote the role and value of pharmacists and pharmacy technicians in disease prevention and encourage patients to seek and utilize these services.

For research, there is a need for more robust and rigorous studies that evaluate the effectiveness, cost-effectiveness, and sustainability of pharmacist-led public health interventions in community pharmacies in Saudi Arabia. There is also a need for qualitative and mixed-methods studies that explore the experiences, perceptions, and preferences of patients, pharmacists, and other stakeholders regarding these services, and identify the facilitators and barriers to their implementation and utilization. Moreover, there is a need for studies that examine the impact of policy and organizational factors, such as regulations, reimbursement, and interprofessional collaboration, on the uptake and quality of these services.

The review has some limitations that should be acknowledged. First, the review was limited to studies published in English language and may have missed relevant studies published in Arabic or other languages. Second, the review included studies with diverse designs, settings, and populations, which may limit the comparability and generalizability of the findings. Third, the review did not assess the quality of the included studies using a formal tool or checklist, which may affect the reliability and validity of the findings. Fourth, the review focused on the roles of pharmacists and pharmacy technicians in community pharmacies and may not reflect their roles in other settings, such as hospitals or primary care centers.

Despite these limitations, this review provides a comprehensive and evidence-based synthesis of the literature on the evolving roles of Saudi pharmacists and pharmacy technicians in enhancing public health services in community pharmacies, and offers valuable insights and recommendations for policy, practice, and research. The review also highlights the alignment of these roles with the Vision 2030 goals of preventive care and health promotion, and the potential of pharmacists and pharmacy technicians to contribute to the prevention and control of non-communicable diseases and the improvement of population health outcomes in Saudi Arabia.

6. Conclusion

In conclusion, this systematic review explored the evolving roles of Saudi pharmacists and pharmacy technicians in enhancing public health services in community pharmacies, with a focus on disease prevention. The findings suggest that these healthcare professionals are increasingly involved in providing preventive services, such as health education, disease screening, immunization, and disease management, and are contributing to the achievement of the Vision 2030 goals of preventive care and health promotion.

The review also identified several enablers and barriers to the implementation and utilization of these services, such as the positive attitudes and willingness of pharmacists and pharmacy technicians, the support and recognition from health authorities and organizations, the demand and acceptance of patients, the lack of knowledge, skills, and confidence, the limited resources and infrastructure, the absence of clear regulations and guidelines, the inadequate reimbursement and incentives, and the lack of collaboration and trust with other healthcare professionals.

To optimize the roles of pharmacists and pharmacy technicians in enhancing public health services in community pharmacies in Saudi Arabia, there is a need for policy and regulatory frameworks that support and guide their practice, training and education programs that enhance their competencies and readiness, public awareness and engagement campaigns that promote their value and utilization, and research studies that evaluate their effectiveness, cost-effectiveness, and sustainability.

By leveraging the expertise and accessibility of pharmacists and pharmacy technicians in community pharmacies, Saudi Arabia can make significant progress towards achieving the Vision 2030 goals of preventive care and health promotion, reducing the burden of non-communicable diseases, and improving the health and well-being of its population. This will require the collaboration and coordination of all stakeholders, including policymakers, healthcare providers, professional organizations, academia, industry, and the public, to create an enabling environment and a supportive system for the expansion and integration of pharmacists' public health roles in the healthcare system.

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