



Role of Community Pharmacist in Public Health Services, Riyadh, Saudi Arabia

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Authors' contributions

This work was carried out in collaboration between both authors. Authors AB and HZAD did conceptualization, wrote review and edited of the manuscript. Author HZAD performed data collection, author AB formal analysis of the manuscript. Authors AB wrote original draft of the manuscript. Both authors agree to the final version of the manuscript.

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ABSTRACT

Background and Aims: Currently, the scope of practice has allowed pharmacists to engage in the clinical aspects of direct patient care and public health services to the patient. This study's main objective is to investigate community pharmacists' involvement in public health services and the barriers in the health system that hinder the integration of community pharmacy professionals into the public health task in the local context of Saudi Arabia.

Methods: A cross-sectional survey was conducted in community pharmacies in a different region of Riyadh, Saudi Arabia (June and July 2019). A sample was calculated to include 431 pharmacists working in different community pharmacies proportionally randomly selected from the five areas in Riyadh city. A multistage, stratified, random sample method was used. Data analysis was performed using SPSS software. A P value < 0.05 considered as statistically significant.

Results: The 431 participants showed the dominance of male pharmacists (97.2%), non-Saudi (84.9%), and Bachelor's pharmacy degrees (81.2%). Most of the participants were involved in smoking cessation (83.1%) as public health services, weight management (62.4%), but less

involvement in activities related to physical activities or dietary intake (33.0%, 31.8%, respectively). More likely the involvement of the Saudi pharmacist in lifestyle activities in comparison to non-Saudi (AOR:1.932; 95% CI: 1.125 - 3.320). Moreover, the perceived barrier in the involvement level was more associated with years of experience.

Conclusion: This study showed that community pharmacists should play an important role in health promotion and prevention; they recognize a wide gap between ideal and actual levels of participation. The researcher presents the main barriers to the role of the pharmacist to improve the level of the individual and society because many obstacles limit the role of the pharmacist in public health.

Keywords: Pharmacist; community pharmacy; public health; Saudi Arabia.

1. INTRODUCTION

Since time, the Pharmacist activity has traditionally been an isolated profession, with less ability to emerge determine success or any other role in public health. This traditional role of the pharmacist is mainly focused on dispensing medicines written by doctors and following-up doses with patients, and knowing the side effects of their medicines [1,2]. With the emerging need of the pharmacist to be involved strongly in the different activities related to health care at his community level, this concept was changed and other functions were added to their daily practices. These practices addressed the emergence of what is called community pharmacies that can be linked to the provision of general clinical services, which should optimize medication therapy, prevent diseases, and promote wellness. Moreover, pharmacists could be involved in health screenings, including diseases like diabetes mellitus, osteoporosis, and cholesterol [3,4], immunizations and pain control [5,6], clinical research, counseling, and health education [7].

Nowadays, community pharmacies are vital to any local health in the neighborhood even during the COVID-19 Pandemic [8]. In many countries, for example, the role of community pharmacists has been emphasized as an important pillar in health services in the community, who act as information resources on lifestyle changes and directly influence health outcomes [9,10]. In addition, the role of the community pharmacist would include activities aimed to provide details about the management of self-health, for example in such cases of increasing blood pressure, difficulty of breathing, low immune system, quitting smoking [11,12] and different drugs using for prevention, family planning [13]. Moreover, community pharmacy allows the public access to their medications, advice about their health, and has to treating minor ailments

with over-the-counter products, where hospital pharmacy miss these activities. Therefore, we use to conduct this work in community pharmacies rather than in hospital pharmacies.

In Saudi Arabia, community pharmacy has greatly improved as the healthcare system in the country has improved too. This matter has reflected the significant effect of the pharmacists on the successful integration into the different activities in the local health system that aim to optimize medication therapy, prevent diseases, and promote wellness [14-16]. However, very few studies were conducted in the country, and their focus was on hospital pharmacists who provide educational sessions to the patients for improving the use of medication or to control medical errors and odds of prescriptions [17,18]. Therefore, our study was the first study investigating the role of community pharmacists in public health to investigate the involvement of community pharmacists in public health services and identify the main barriers in the health system facing the integration of community pharmacy professionals into the public health task in the local context of Saudi Arabia. Thus, findings from our study will address the gap in the information about the role of community pharmacists and their daily practice and how to make a better integration of community pharmacy professionals into public health tasks.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

In this cross-sectional survey, a self-administered questionnaire was distributed to all community pharmacists and pharmacy technicians practicing in community drug retail outlets found in Riyadh, the capital of Saudi Arabia. According to the Saudi Commission for Health Specialties report in 2018, around 29,000 pharmacists are working in different types of pharmacies in the Kingdom

[19]. The largest number of pharmacists, 8419, are employed in community pharmacies, hence, pharmacies are run only by a pharmacist (with qualification of a university degree or above).

2.2 Study Subjects and Sampling

All pharmacists and pharmacist technicians who work in community pharmacies in Riyadh city were included in this survey. While all other pharmacist staff and pharmacist technicians who work in governmental, private hospitals, and medical centers were excluded.

A minimum sample size of 384 was calculated (50% prevalence and 95% confidence interval), however, for a better representation of the study population it was increased by 15% up to 442 participants. Riyadh city was classified geographically into 4 zones (East, west, north, and south) and pharmacies were randomly selected according to the availability of the pharmacist in each zone. A pharmacist who was eligible for the study inclusion criteria and agreed to participate in the survey was enrolled and a self-administered questionnaire was given to be filled immediately. This study was conducted in the period from June to July 2019.

2.3 Data Collection

A pharmacist who was eligible for the study inclusion criteria and agreed to participate in the survey was enrolled and a self-administered questionnaire was given to be filled immediately.

2.4 The Study Tool and Measurements

The questionnaire was constructed based on previously implemented instruments looking at the role of community pharmacists in health promotion and diseases prevention [20,21]. However, some items were modified to cope with the local context of Saudi Arabia. The questionnaire was reviewed for relevance by a team of experts including 3 experienced pharmacists and 2 public health experts. Comments and reflections were analyzed and used to develop the last version questionnaire. A pilot test was also used to validate the reliability of the contents using 22 voluntary community pharmacists working in Riyadh city, but they were not included in the final survey. Their comments and suggestions were considered, and a slight modification of the questionnaire was done.

The questionnaire contains three parts: the first part was the sociodemographic characteristics of the participants (age, gender, nationality, years of experience, and professional degree); the second part measured the pharmacist's role of involvement in public health services (health promotion and preventive). This part was measured using a Likert scale of 5 scores (from 1=never involved to 5 very involved). However, services under this domain were subclassified as services related to Lifestyle (which includes smoking cessation, physical activity promotion, healthy eating, and weight management), Screening (including hypertension, diabetes, and dyslipidemia), and Miscellaneous public health services which include involvement in the management and screening of infectious diseases, promoting antimicrobial stewardship programs, counseling with the public on the type of contraceptive tools to be used or conducting needs assessments to identify health risks in the community. Respondents were asked to indicate the frequency of the services provided as well as the staff involved in the delivery (pharmacist, pharmacy technician or others). The third part of the questionnaire contained questions on the perceived barriers to the delivery of such services in their practice settings. Questions in this part include elements related to the lack of time, clinical tools, personnel or resources, training programs, patient demand for services, pharmacists' knowledge, pharmacist's salary, patient not interest in preventive activities. Also, the assessment of the answer was based on the Likert scale of 5 scores (from 1=never involved to 5 very involved).

2.5 Statistical Analyses

The data collected were cleaned, entered, and analyzed using Statistical Package for the Social Sciences (SPSS) software for Windows version 23. Data normality was assessed using the Shapiro-Wilk test. Descriptive statistics were performed for demographic variables, while means and standard deviations (SD) was used for continuous variables. For further analysis of the data, Likert scores were merged into two categories of not involved (score 1+2+3) and involved (scores 4 and 5) to generate a statistical association between the sum-up of the domain related to community pharmacy professionals' involvement in public health services and the other domain on perceived barriers to the provision of such services using Pearson's chi-square test. To assess the overall level of involvement in lifestyle or public health services

of the community pharmacy, sum-up up all the scores in the domain and then recoded as 0 noninvolved or 1 = involved using the median value as a cut-off point. Further, the same overall values of both domains were used to generate the predicted variables represented with the significant odds ratio using the regression analysis. A p-value of less than 0.05 was considered statistically significant.

3. RESULTS

From the total sample of 442, 431 questionnaires were completed with a response rate of 97.5%. Among the respondents, 97.2% were males, 84.9% non-Saudi, 81.2% with a bachelor's pharmacy degree, 46.4% with good work experience, 51.5% were with daily prescription frequency, and a mean age of 28.5 years (\pm SD 2.9), as seen in Table 1.

3.1 Level of Involvement of the Pharmacist in the Lifestyle of Their Customers

Involvement of the pharmacist in community services was measured by using either the involvement in the four community lifestyle elements such as counseling on smoking cessation, weight management, physical activity, and dietary intake, or in the seven elements of the public health services such as medication therapy, immunizations, pain management, prescription medication, explanation of adverse drug reactions (ADRs), insulin handling, and antidiabetic medication, as seen in Table 2. Most of the respondents reported their community

pharmacy were highly involved in smoking cessation (83.1%), as well as in activities related to weight management (62.4%), while the less involved practices were related to physical activities and dietary intake (32.9%, and 31.8%, respectively). Moreover, the overall involvement in the lifestyle domain was low (32.3%). The proportion of community pharmacy professionals who reported their community pharmacy as being involved in medication therapy, immunizations were found as a higher proportion involvement (62.9%, 60.3%, respectively). However, the rest of the services were found with a range of involvement from prescription medication (48.3%) to least one antidiabetic medication (14.8%). The overall proportion of the involvement of the community pharmacies in public health services was also low (36.2%).

3.2 Involvement Pharmacist Participation in Perceived Barriers

As depicted in Table 3, patient demand for services (61.9%), followed by pharmacists' knowledge (58.7%) was the more commonly perceived as a serious problem for delivering public health services in the pharmacy. However, other factors such as lack of interest of the patient in preventive activities, lack of time, personnel resources, and pharmacist's salary were less likely reported as perceived barriers (16.7%, 35%, 36.7%, 37.6%, and 42%, respectively). The proportion of overall perceived barriers was found high (59.9%) among different pharmacies.

Table 1. Sociodemographic characteristics of the participants (n=431)

Variables	Categories	Frequency (%)
Age	Mean years (\pm SD)	28.5 (\pm 2.9)
Gender	Male	419 (97.2)
	Females	12 (2.8)
Nationality	Saudi	65 (15.1)
	Non-Saudi	366 (84.9)
Pharmacy Degree	Bachelors	350 (81.2)
	Doctor of pharmacy	60 (13.9)
	MSc, Ph.D. degree	21 (4.9)
Experience	< 5 years	200 (46.4)
	5-10 years	146 (33.9)
	>10 years	85 (19.7)
Prescription frequency per day	\leq 200 prescriptions	209 (48.5)
	> 200 prescriptions	222 (51.5)

Table 2. Involvement of the pharmacist in lifestyle and public health services of their customers

Variables	Involved	Not involved
Lifestyle activities	N (%)	N (%)
Smoking cessation	358 (83.1)	73 (16.9)
Weight management	269 (62.4)	162 (37.6)
Physical activity	142 (32.9)	289 (67.1)
Dietary intake	137 (31.8)	294 (68.2)
Overall involvement in lifestyle activities	139 (32.3)	292 (67.7)
Public health services		
Medication Therapy	271 (62.9)	160 (37.1)
Immunizations	260 (60.3)	171 (39.7)
Prescription Medication	208 (48.3)	223 (51.7)
Pain Management	207 (48.0)	224 (52.0)
Adverse drug reactions	156 (36.2)	275 (63.8)
Insulin handling	124 (28.8)	307 (71.2)
Antidiabetic Medication	64 (14.8)	367 (85.2)
Overall involvement in public services	156 (36.2%)	275 (63.8%)

Table 3. Involvement pharmacist participation in perceived barriers

Variables	Barrier	Fewer barriers
Perceived barriers	N (%)	N (%)
Lack of time	151 (35.0)	280 (65.0)
Clinical tool	158 (36.7)	273 (63.3)
Personnel or resources	162 (37.6)	269 (62.4)
Training programs	207 (48.0)	224 (52.0)
Patient demand for services	267 (61.9)	164 (38.1)
Pharmacists' knowledge	253 (58.7)	178 (41.3)
Pharmacist's salary	181 (42.0)	250 (58.0)
The patient is not interested in preventive activities	72 (16.7)	359 (83.3)
Overall perceived barriers	258 (59.9)	173 (40.1)

Table 4 showed a strong association demographic variables except the variable between the involvement of pharmacists in related to the frequency of prescriptions lifestyle activities with almost all their (p<0.05).

Table 4. Involvement of pharmacist in lifestyle with association to demographic variables

Variables	Categories	Involved	None involved	P-value
		Frequency (%)	Frequency (%)	
Gender	Male	288 (98.6)	131 (94.2)	0.010
	Female	4 (1.4)	8 (5.8)	
Age	Years	28.9 (\pm 3.6)	28.3 (\pm 2.5)	0.028
Nationality	Saudi	37 (12.7)	28 (20.1)	0.043
	Non-Saudi	255 (87.3)	111 (79.9)	
Pharmacy Degree	Bachelors	247 (84.6)	103 (74.1)	0.031
	Doctor of pharmacy	34 (11.6)	26 (18.7)	
	MSc, Ph.D. degree	11 (3.8)	10 (7.2)	
Experience	< 5 years	132 (45.2)	68 (48.9)	0.012
	5-10 years	111 (38.0)	35 (25.2)	
	>10 years	49 (16.8)	36 (25.9)	
Frequency	\leq 200 prescriptions	135 (46.2)	74 (53.2)	0.174
	> 200 prescriptions	157 (53.8)	65 (46.8)	

The level of involvement of pharmacist participants in delivering public health services indicated no statistically significant differences between the different sociodemographic characteristics of the participants except the years of experience showed a significant association between those with longer experience compared to those with short years of experience ($p < 0.014$), as seen in Table 5.

As depicted in Table 6, some demographic variables such as age (older vs. younger), years of experience (longer years of experience vs. short experience), and frequency of prescriptions (prescribing more than 200 prescriptions a day compared to fewer prescriptions) were found with association with barriers in performing the public health services ($p < 0.05$).

The regression model after being adjusted with some demographic variables was used to test the involvement of the three studied domains in life study services, public health services in the community, and the level of perceived barriers as part of community services. Male pharmacists were more prone to work in lifestyle activities than females (AOR: 1.10, 95% CI: 1.00-1.20, $p: 0.039$), as well as elder pharmacists than the younger group (AOR: 0.21, 95%CO: 0.06-0.76, $p: 0.017$). The factors related to the involvement in public health activities were found two times more among those in the middle years of experience (5-10 years) than the rest of different years of experience (AOR: 2.29, 95% CI: 1.28-4.12, $p: 0.005$). On the other hand, the most influential variables on the involvement of

Table 5. Involvement of pharmacist in services frequency in delivery with association to demographic variables

Variables	Categories	Involved	None involved	P-value
		Frequency (%)	Frequency (%)	
Gender	Male	152 (97.4)	267 (97.1)	.834
	Female	4 (2.6)	8 (2.9)	
Age	Years	28.4 (3.0±)	28.5 (2.8±)	.605
Nationality	Saudi	26 (16.7)	39 (14.2)	.488
	Non-Saudi	130 (83.3)	236 (85.8)	
Pharmacy Degree	Bachelors	129 (82.7)	221 (80.4)	.480
	Doctor of pharmacy	18 (11.5)	42 (15.3)	
	MSc, Ph.D. degree	9 (5.8)	12 (4.4)	
Experience	< 5 years	69 (44.2)	131 (47.6)	.014
	5-10 years	65 (41.7)	81 (29.5)	
	>10 years	22 (14.1)	63 (22.9)	
Frequency	≤ 200 prescriptions	72 (46.2)	137 (49.8)	.464
	> 200 prescriptions	84 (53.8)	138 (50.2)	

Table 6. Association between perceived barriers seen by the pharmacists with demographic variables

Variables	Categories	Barrier	Less barrier	P-value
		Frequency (%)	Frequency (%)	
Gender	Male	169 (97.7)	250 (96.9)	.626
	Female	4 (2.3)	8 (3.1)	
Age	Years	28.0 (± 3)	29 (±3)	0.009
Nationality	Saudi	21 (12.1)	44 (17.1)	.162
	Non-Saudi	152 (87.9)	214 (82.9)	
Pharmacy Degree	Bachelors	143 (82.7)	207 (80.2)	.671
	Doctor of pharmacy	21 (12.1)	39 (15.1)	
	MSc, Ph.D. degree	9 (5.2)	12 (4.7)	
Experience	< 5 years	93 (53.8)	107 (41.5)	.027
	5-10 years	54 (31.2)	92 (35.7)	
	>10 years	26 (15.0)	59 (22.9)	
Frequency	≤ 200 prescriptions	71 (41.0)	138 (53.5)	.011
	> 200 prescriptions	102 (59.0)	120 (46.5)	

Table 7. Multivariate regression analysis model of involved community pharmacies in activities related to life study services, public health services, and perceived barriers with sociodemographic factors

Variables	Categories	Lifestyle			PH services			Barriers		
		AOR	95%CI	P-value	AOR	95%CI	P-value	AOR	95%CI	P-value
Gender	Male	1.101	(1.005-1.205)	.039	-	-	-	-	-	-
	Female	R	-	-	-	-	-	-	-	-
Age	years	.218	(0.062-.760)	.017	-	-	-	1.121	(1.040-1.208)	.003
Nationality	Saudi	1.718	(0.985-2.997)	.056	-	-	-	-	-	-
	Non-Saudi	R	-	-	-	-	-	-	-	-
Pharmacy Degree	Bachelors	-	-	-	-	-	-	-	-	-
	Doctor of pharmacy	-	-	-	-	-	-	-	-	-
	MSc, Ph.D. degree	-	-	-	-	-	-	-	-	-
Experience	< 5 years	1.055	(0.526-2.117)	.879	1.508	(0.856-2.657)	.155	-	-	-
	5-10 years	.623	(0.324-1.198)	.156	2.298	(1.280-4.124)	.005	-	-	-
	>10 years	R	-	-	-	-	-	-	-	-
Frequency	≤ 200 prescriptions	-	-	-	-	-	-	1.837	(1.232-2.739)	.003
	> 200 prescriptions	-	-	-	-	-	-	R	-	-

the perceived barrier to performing public health activities were found more likely among younger pharmacists and those with less frequency of having prescriptions compared to the older age and those with high-frequency prescription activities (AOR: 1.12, 95%CI: 1.04-1.21, p:0.003; and AOR: 1.84, 95%CI: 1.23-2.74, p:0.003, respectively), as seen in Table 7.

4. DISCUSSION

Today a worldwide recognition of the role of the community pharmacy become widely understood as not only dispensing drugs and medication but also contributing positively to some public health services focusing on some degree of health promotion and health prevention. For example, DiPietro Mager [22] addressed the importance of public health in pharmacy education and practice and it is a contribution to activities directed toward health promotion and prevention [22]. Our study aimed to recognize the involvement of our community pharmacy in enhancing its effective contribution to public health services.

Despite the limited studies in Saudi Arabia to identify pharmacy workforce development needs [23], and those tackling the qualitative aspect of the community pharmacy practice change towards patient-centered care [24], or those aimed to measure patients' experience with services provided by community pharmacists and their perceptions toward providing medication therapy management services by the pharmacists [25], our study has to focus on non-hospital pharmacies in Riyadh area as a new trend not studied before and as a least preferred sector by a pharmacist [26].

In this study, 431 community pharmacists participated, with a very low number of female pharmacists. A previous study among female graduates by Al Gazzawi, as well as by Almaghaslah identified that females anticipate challenges in the pharmacy workforce [23,27], with about 4.6% of the total pharmacy professionals which supports our findings of low reported number in this study (2.8%). Employed male pharmacists outnumber females, mainly due to the cultural and social factors that limit the participation of women in community pharmacy in Saudi Arabia [28], but not the case in other countries such as Kuala Lumpur Malaysia or in Ethiopia, where around 57% and 31.1% were females, respectively [29,30].

According to the overall finding of this survey, community pharmacies showed less

engagement in lifestyle activities or public health services, moreover, they have indicated a high level of perceived barriers to involve in such activities. Likely, they were highly engaged in activities related to smoking cessation, weight management as lifestyle activities or medication therapy, and immunization as public health services. The rest of the activities were found less engaged, particularly those related to physical activities, dietary intake, insulin handling, or antidiabetic medication, however, the last two were closer to the daily practice of the community pharmacist. This could be explained by that community pharmacy professionals are mostly involved in activities about the dispensing of medications and have less intense involvement in public health activities. Similar findings were reported among community pharmacists in Ethiopia, and Quebec (Canada) [29,31]. While other countries like Australia reported that around 80% of the community pharmacist had a big role in delivering healthy lifestyle advice [15].

Group differences were found regarding the type of lifestyle activities respondents who involved in based on gender, age, nationality, educational level, experience, and frequency of prescriptions they deal with. Males were significantly more involved than females in providing lifestyle services, older pharmacists than younger, non-Saudi than Saudi, holders of bachelor's degrees of education than the rest, and those with less experience of working after their graduation (P ranged between 0.010 to 0.43). However, community pharmacists with middle-range experience after graduation (5-10 years) were found associated with activities related to public health services ($P=0.014$) such as medication therapy, immunizations, prescription medication, pain management, adverse drug reactions, insulin handling, antidiabetic medication. These findings were consistent with that reported in previous studies in some African countries [32,33]. Although recently, vaccination activities as public health services were implemented during the COVID-19 pandemic on limited scale using community pharmacies as a point for giving COVID-19 vaccination, some countries like Canada has practiced this public health services on a wide scale whereas around 81.3% of community pharmacists were certified to administer vaccines [34].

Predicted factors for the implementation of lifestyle activities by the community pharmacist could be dependent on males as they are more

abundant than females in this profession as well as the majority were non-Saudi expatriates from different countries mainly Arab countries with the majority were Egyptians. This difference would not be more shortly according to the strategic vision 2030 of which working to implement the Saudization in this section too [21]. In addition, regulatory changes include enforcing the renationalization of the community pharmacy sector and permitting females to work in community pharmacies without location restrictions [26]. Moreover, younger age probably had received in their education courses some elements to make them involved in public health services, thus, they showed fewer barriers in performing such activities and services in the community. However, at the practical level, undergraduate pharmacy education needs to include primary pharmaceutical care services in its curriculum. Therefore, the academy must continue to ensure that students are well-equipped to assume roles in public health and population health management [22]. To improve the public health services provided in the community pharmacy, the training should aim to increase the confidence of pharmacists in providing these services. Well-trained pharmacists should be able to provide public health services more proactively, which may have a positive impact on clients' attitudes and health [35].

Other predictors for being involved in public health services where the younger age and less load of work could help in achieving the public health services and could be expressed also as less barrier in the level of community pharmacies. Some studies conducted elsewhere showed that the lack of time, poor training, lack of knowledge, and lack of reimbursement were the most reported barriers to implementing public health into pharmacy practice, which was inconsistent with our findings [30,32,36,37]. Barriers reported in a study from England show consistency with our findings where lack of demand, and expectations of negative reactions from customers [35].

5. LIMITATION

This survey highlights the area of community pharmacy practice in Saudi Arabia; however, some limitations must be stated when interpreting the results. Since the study is a cross-sectional study conducted only in the capital of Saudi Arabia, Riyadh, hence, generalization of the findings should be limited to

the community pharmacies in Riyadh city. Furthermore, findings from the self-administered questionnaire method can affect the quality of answers regarding the practice in their pharmacies. Even with the above limitations, this survey has significant implications for improving the participation of community pharmacies in health promotion and prevention in their communities in Saudi Arabia.

6. CONCLUSION

In conclusion, the current survey showed that community pharmacists' participation was inadequate in lifestyle counseling activities mainly for the promotion of physical activity and healthy eating, as well as in public health services for activities related to pain management for cancer patients, those with end-stage diseases, description of adverse drug reactions, and antidiabetic medication. In addition, most of community pharmacists indicate a high rate of barriers to achieving public health-related services. Therefore, the long-standing program is required to dissolve such barriers and work to improve the contribution of pharmacists to public health services in their community. Moreover, several initiatives and strategies must be developed and implemented to address pharmaceutical workforce gender and diversity balances. In addition, the graduate and undergraduate curriculum in pharmacy should include a significant section concerning the importance of public health services that should be carried out as a principal function of the community pharmacy. This study highlighted the role of the pharmacist in many methods of care for the patient as the community pharmacist is the first destination for the patient. Therefore, to explore the availability of the public health services for patients in the Saudi community, further evidence-based interventions are required to examine the extended roles of community pharmacists.

ETHICS APPROVAL

No identifiers were collected, and all the data were kept in a secure place within the College of Public Health and Health Informatics (CPHHI) premises and accessed by the research team only. The PI received a license for using the data from the General Director of School Health at the (MOH). This study was approved by the IRB of the King Abdullah International Medical Centre (SP19/120/R).

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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