Community pharmacists' participation in adult vaccination: A cross-sectional survey based on the theoretical domains framework

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Objectives: This study aims to assess Qatar community pharmacists’ practices in advocating and promoting adult vaccination and to characterize and quantify potential determinants of participation in adult vaccination as vaccine administrators, based on the theoretical domains framework (TDF).

Methods: A cross-sectional survey of a randomly selected sample of community pharmacists in Qatar was conducted using a self-administered validated questionnaire. Items in the questionnaire on potential determinants of participation in adult vaccination were based on TDF. TDF items were subjected to principal components analysis.

Results: In total, 271 respondents completed the questionnaire (67.7%). Most respondents (83.5%) did not have any previous training in vaccination administration and were not involved in any vaccine-related advocacy activities (78.9%). Principal components analysis of TDF items gave eight components: pharmacists’ perceived knowledge and skills (median score of 22, interquartile range [IQR] 17–26, possible range: 7–35); perceived confidence (16; IQR 12–20, possible range: 5–25); perceived external support (9; IQR 7–11, possible range: 3–15); professional role identity (38; IQR 33–42, possible range: 11–55); emotions (10; IQR 9–12, possible range: 3–15); perceived consequences (22; IQR 18–24, possible range: 6–30); perceived usefulness (16; IQR 14–18, possible range: 4–20); and behaviour control (6; IQR 4–8, possible range: 2–10).

Conclusion: Pharmacists’ perceived knowledge, skills, confidence and behavioural control are potentially important factors to address to facilitate participation in vaccination administration in Qatar. Along with providing vaccination training to community pharmacists, there is a need to change the current pharmacy practice structure to improve managerial and government support for and to equip pharmacies with resources for this role.

KEYWORDS
immunization, pharmacist, Qatar, vaccination
INTRODUCTION

Infectious diseases are a major public health concern associated with significant societal and economic burden.\(^1\,^2\) Vaccination is shown to be a very safe and effective intervention for many vaccine-preventable diseases.\(^3\) According to the World Health Organization (WHO) data, vaccination prevents 4–5 million deaths yearly and is 1 of the most cost-effective public health interventions.\(^4\) The coverage of adult vaccination is, however, universally low,\(^5\,^6\) with pre-COVID data from the USA confirming that 3/4 of adults are missing 1 or more recommended vaccines.\(^7\) This is particularly worrying for those vulnerable patients with chronic medical conditions.\(^8\)

Associated barriers and factors relating to the individual include lack of awareness of vaccination benefits and current recommendations, finance, cultural and religious beliefs, fear of vaccination efficacy and side effects, and lack of trust in healthcare systems and healthcare professionals and others.\(^9\)–\(^11\) System-related barriers are the lack of a strategic and integrated response from all healthcare professionals and their poor accessibility to vaccination.\(^9\)–\(^12\) Several corrective strategies have been proposed including vaccine administration by a wider range of healthcare professionals than the traditional vaccination providers of physicians and nurses.\(^13\) Given that community pharmacists are trusted, qualified and geographically accessible, they would as also be appropriate.\(^14\) Several organizations advocate for the pharmacist’s role in immunization including the American Society of Health System Pharmacists, the International Pharmaceutical Federation (FIP) and others.\(^15\,^16\)

The use of pharmacists as vaccine administrators has contributed to higher vaccination rates and accessibility and better clinical outcomes in several countries.\(^17\,^18\) For instance, Isenor et al. conducted a review on the impact of pharmacists as immunizers vs. provision by traditional providers with no pharmacy involvement. Pharmacist involvement in immunization led to increased uptake of immunizations. In addition, there was a positive impact of pharmacists as immunizers irrespective of their role or the type of vaccine given.\(^17\) A systematic review published in 2021 by Murray et al., which included 12 studies on pharmacy-based interventions on influenza vaccination acceptance, demonstrated the pharmacist impact on improving vaccination acceptance of up to 27% compared with standard of care and up to 117% for those who did not obtain influenza vaccination in the previous year.\(^18\)

Several studies have assessed pharmacists’ experiences, practices and attitudes towards vaccination around the globe. However, many of these studies had limitations including small sample size and lack of theoretical frameworks to drive the research.\(^19\)–\(^26\)

There are varying policies and regulations regarding community pharmacists’ involvement in vaccination worldwide; however, there is a trend to expand their role as vaccination administrators especially after the COVID-19 (Coronavirus disease) pandemic. FIP published an updated global report in 2020 regarding pharmacists’ role in immunization, which involved 99 countries and territories.\(^27\) According to the report, at least 36 countries and territories used pharmacy-based vaccinations; 16 new countries were identified compared with the 2016 report (80% increase).\(^27\) The report also indicated that immunization services at community pharmacies were accessible by 1.8 billion people around the world.\(^27\)

In Qatar, consistent with other countries in the Middle East region, non-COVID-19-related vaccination rate for adults is low. Data from a cross-sectional survey conducted in the Gulf Cooperation Council (GCC) countries highlighted that <25% of residents received the seasonal influenza vaccine. The most common barriers were lack of awareness about the vaccine and relying on body immunity and lifestyle.\(^28\)

As a result, Qatar Ministry of Public Health (MOPH) has emphasized the need for widening vaccination coverage through the National Immunization Program and hosting vaccination promotion and administration campaigns.\(^29\) Despite Qatar community pharmacies being a vital component of the healthcare system and the first point of contact for the public, representing 67.8% of pharmaceutical establishments in the country, they are not considered as part of these initiatives.\(^30\)

Community pharmacists in both independent and chain pharmacies are not involved in administering vaccines in Qatar, and no published information is available regarding the role of Qatar community pharmacists in advocating or promoting vaccination for adults and the determinants of their involvement in vaccine administration. Moreover, it is not clear
if community pharmacists in Qatar would be willing to serve as vaccine administrators if they are given the chance to. Moreover, translating studies conducted elsewhere to the Qatari pharmacy practice contact is not possible because it is a unique and a different environment. Therefore, the objectives of this study were to assess Qatar community pharmacists’ practices in advocating and promoting adult vaccination, and to characterize and quantify potential determinants of participation in adult vaccination as vaccine administrators.

To achieve the second objective, the theoretical domains framework (TDF) was used.

The TDF is a comprehensive framework that is derived from 33 psychological theories and 128 theoretical constructs to cover a total of 14 domains of the factors that may influence behaviours and desired behavioural changes.31 It “provides a theoretical lens through which to view the cognitive, affective, social and environmental influences on behavior”.31 TDF is 1 of the most commonly used frameworks in implementation science, especially in the field of health-related psychology and behaviours.32 Given its comprehensive coverage of potential influences on behaviour, it is appropriate to use in this study to determine the factors that need attention for planning any behaviour change strategies for improving pharmacist vaccination services in Qatar in the future.

2 | METHODS

2.1 | Study design

A cross-sectional survey of a randomly selected sample of community pharmacists was conducted using a self-administered validated questionnaire tool.

2.2 | Participants

Eligible participants were practicing community pharmacists in Qatar. No specific exclusion criteria were applied.

2.3 | Population and sampling

The list of all community pharmacists was obtained from Qatar MOPH (1296 community pharmacists at the time of conducting the study, accounting for more than half of all practicing pharmacists in Qatar). With an assumed error of 5% and a confidence level of 95%, a minimum sample size was estimated as 296 pharmacists. To account for possible attrition rate, the target was 400 pharmacists.

2.4 | Questionnaire development and validation

A draft questionnaire was developed identifying relevant questions from related studies,19–23 which were then adapted for the Qatar pharmacy practice setting. The questionnaire contained 35 questions and was divided into 3 sections: pharmacist sociodemographic and practice characteristics; pharmacist current vaccination-related advocacy and promotion practices; and pharmacist potential determinants of participation in adult vaccination. Items on potential determinants of participation in adult vaccination were based on the Determinants of Implementation Behavior Questionnaire, which is derived from TDF.33 The questionnaire was formatted using the online survey software program SurveyMonkey.

The draft questionnaire was reviewed for face and content validity by 5 Qatar pharmacy academics with expertise in pharmacy practice research and use of TDF. This was followed by piloting in a sample of 10 community pharmacists who were then excluded from the study.

2.5 | Questionnaire dissemination

Data were collected from April 2020 to December 2020 (pre-COVID-19). Initially, all selected pharmacists were contacted by phone to explain the study objectives and to request their participation. The pharmacists' phone numbers were retrieved from Qatar MOPH database. Following the phone call, pharmacists who agreed to participate received an email with the questionnaire URL through the survey software program (SurveyMonkey). No information about the participants' identities was collected during the administration of the questionnaire. At intervals of 2–4 weeks, 3 reminders were sent by email to remind participants to complete the questionnaire. The target sample size of 400 was maintained by randomly selecting other pharmacists from the list to compensate for pharmacists who refused to participate.

2.6 | Ethical approval

The study was ethically approved by the Qatar University Institutional Review Board under the approval number: (QU-IRB 1267-EA/20s).

2.7 | Data analysis

Data were analysed using descriptive and inferential statistics. The items in the TDF were subjected to principal components analysis (PCA) to decrease the number of items to a small and practical number of components.34 To assess the suitability of using PCA, the following criteria were used: correlation matrix for coefficients (≥.3); Kaiser–Meyer–Olkin measure of sampling adequacy (≥.6); and Bartlett’s test of sphericity (≤.05). To determine how many components to extract, components with eigenvalues >1 were considered and the Screeplot was visually examined. To help in interpretation of components, varimax rotation was applied with missing data excluded pairwise.35 The component with the highest loading was chosen for items that loaded into >1 component. Internal consistency of each component was assessed using Cronbach’s α, while considering .7 and
above a sufficient measure to confirm reliability. The total score of each component was calculated by assigning a score of 1 (strongly disagree) to 5 (strongly agree) for each of the Likert responses, with negatively worded items reverse scored. To test for differences in component scores between different sociodemographic and practice characteristics, Mann–Whitney U test was used in case of 2 groups and Kruskal–Wallis in case of >2 groups.

3 | RESULTS

In total, 355 questionnaires were received, of which 84 were incomplete and excluded leaving 271 usable responses (67.7% response rate).

3.1 | Sociodemographic and practice characteristics

Table 1 gives respondents’ demographic and practice characteristics. The mean age was 34.7 years with an equal split of male and female respondents. The majority were from an Arabic-speaking country (52.5%, n = 142) and most (80.4%, n = 213) had pharmacist work experience from other countries.

3.2 | Vaccination-related training and experience

The majority of respondents (83.5%, n = 218) had no training on vaccination administration. Of those who had received training, for 3/4 (75.6%, n = 31), this related to tetanus vaccine administration and 2/3 (63.4%, n = 26) to influenza vaccine administration. Most pharmacists did not have experience in vaccine administration (71.7% n = 170). Among those who had experience, the most commonly administered vaccines were influenza (47.8%, n = 32), tetanus (41.8%, n = 28) and hepatitis B (38.8%, n = 26).

3.3 | Vaccination-related activities

Table 2 summarizes the different activities of respondents about adult vaccination. Pharmacists reported that they did not participate in any vaccine-related advocacy activities at their community pharmacy (78.9%, n = 213). Of those who advocated for adult vaccination, 80.7% (n = 46) and 78.9% (n = 45) advocated for tetanus and influenza vaccination, respectively.

3.4 | Potential determinants of participation in adult vaccination as vaccine administrators

The Kaiser–Meyer–Olkin measure of sampling adequacy was .879 and Bartlett’s test of sphericity significance was <.01. Based on the visualization of the Screeplot that was run to determine the number of potentially eligible factors to retain in the exploratory factor analysis together with the number of components with Eigenvalues above 1.0 suggested, components explaining 67.26% of the variance were retained. The eight components were labelled: pharmacists’ perceived knowledge and skills (Cronbach’s α .875); perceived confidence (Cronbach’s α .917); perceived external support (Cronbach’s α .829); professional role identity (Cronbach’s α .918); emotions (Cronbach’s α .804); perceived consequences (Cronbach’s α .845); perceived usefulness (Cronbach’s α .904); and behaviour control (Cronbach’s α .843).

3.4.1 | Component 1: Pharmacists’ perceived knowledge and skills (Table 3)

In general, respondents had low agreement with statements related to their knowledge and skills about adult vaccination. Overall, the median score was 22 (interquartile range [IQR] 17–26), with 35 being the highest positive score. The statement with the least agreement was ‘I know how to administer vaccinations’ (agree/strongly agree n = 90, 37.4%). The component scores of pharmacists working in pharmacies located in gas stations were statistically significantly lower than those working in pharmacies in other sites (Kruskal–Wallis, P < .05).

3.4.2 | Component 2: Pharmacists’ perceived confidence (Table 4)

Respondents generally gave negative responses with a median score of 16 and an IQR of 12–20. The statements with the lowest levels of agreement were ‘I am confident that I can administer vaccinations even if patients are not motivated’ (agree/strongly agree n = 78, 31.7%) and ‘I am confident that I can administer vaccinations even if the time is limited’ (agree/strongly agree n = 94, 42%). Male pharmacists scored significantly higher on component 2 (Mann–Whitney U, P < .05). Pharmacists who work in pharmacies in private hospitals scored statistically significantly higher than pharmacists who work in pharmacies in clinics or shopping malls (Kruskal–Wallis, P < .05).

3.4.3 | Component 3: Pharmacists’ perceived external support (Table 5)

Community pharmacists perceived low levels of external support to administer vaccinations, with a median overall score of 9 and an IQR of 7–11. The statement ‘My community pharmacy has the resources needed for me to administer vaccination’ (agree/strongly agree n = 59, 29.8%) had the lowest percentage of agreement. The pharmacists working in pharmacies located in private hospitals had statistically significantly higher scores than pharmacists working in pharmacies located in gas stations (Kruskal–Wallis, P < .05).
| Characteristic                                      | Mean (SD) |
|---------------------------------------------------|-----------|
| **Age (y)**                                       | 34.6 (6.9) |
| **Sex, n (%) N = 270**                            |           |
| Male                                              | 132 (48.9) |
| Female                                            | 138 (51.1) |
| **Nationality, n (%) N = 271**                     |           |
| Qatar                                             | 7 (2.6)    |
| Syria                                             | 8 (3.0)    |
| Jordan                                            | 11 (4.1)   |
| Egypt                                             | 99 (36.5)  |
| Sudan                                             | 17 (6.3)   |
| India                                             | 101 (37.3) |
| Philippines                                       | 18 (6.6)   |
| Pakistan                                          | 5 (1.8)    |
| Other countries<sup>a</sup>                        | 5 (1.8)    |
| **Highest pharmacy degree, n (%) N = 271**         |           |
| BSc                                               | 210 (77.5) |
| Graduate Diploma                                  | 2 (0.7)    |
| MSc                                               | 9 (3.3)    |
| Pharm D                                           | 16 (5.9)   |
| PhD                                               | 2 (0.7)    |
| **Country of pharmacy degree certification, n (%) N = 271** | |
| Qatar                                             | 4 (1.5)    |
| Syria                                             | 6 (2.2)    |
| Jordan                                            | 11 (4.1)   |
| Egypt                                             | 96 (35.4)  |
| Sudan                                             | 15 (5.5)   |
| India                                             | 109 (40.2) |
| Philippine's                                      | 18 (6.6)   |
| Pakistan                                          | 7 (2.6)    |
| Other countries<sup>b</sup>                        | 5 (1.8)    |
| **Time in practice in Qatar, n (%) N = 270**       |           |
| <5 y                                               | 117 (43.4) |
| 5–10 y                                            | 99 (36.7)  |
| >10 y                                             | 54 (20.0)  |
| **Work experience, n (%) N = 265**                 |           |
| Inside Qatar only                                 | 52 (19.6)  |
| Outside Qatar                                     | 213 (80.4) |
| **Current position in pharmacy, n (%) N = 270**     |           |
| Pharmacist in training                            | 3 (1.1)    |
| Staff pharmacist                                   | 160 (59.3) |
| Pharmacy manager                                  | 78 (28.9)  |
| Pharmacy supervisor                               | 28 (10.4)  |
| Other                                             | 1 (0.4)    |
| **Pharmacy type, n (%) N = 271**                   |           |
| Independent pharmacy                              | 72 (26.6)  |
| Chain pharmacy                                    | 199 (73.4) |

(Continues)
Pharmacists working in pharmacies located on commercial streets had statistically significantly higher scores than pharmacists working in pharmacies located in gas stations (Kruskal–Wallis, \( P < .05 \)).

3.4.4 | Component 4: Pharmacists’ professional role identity (Table 6)

The role of community pharmacists in adult vaccination was generally viewed positively by pharmacists. Overall, the median score was 38, with an IQR of 33–42. It was the statement ‘Other work tasks are higher priority for me than administering vaccinations’ that received the lowest agreement level (agree/strongly agree \( n = 61, 29.9\% \)).

3.4.5 | Component 5: Pharmacists’ emotions (Table 7)

Respondents had positive emotions regarding vaccination with a median score of 10 and an IQR of 9–12. The highest level of
agreement was for the negatively worded statement ‘I’d feel sad if I administer vaccinations’ (disagree/strongly disagree n = 133, 67.2%). Pharmacists with pharmacy practice experience outside Qatar scored significantly higher on this component (Mann–Whitney U, P < .05).

3.4.6  |  Component 6: Pharmacists’ perceived consequences (Table 8)

In general, respondents were very positive about the consequences of pharmacists administering adult vaccinations. With an IQR of 18–24,
TABLE 5  Pharmacists’ perceived external support

| Statement                                                                 | Strongly disagree n (%) | Disagree n (%) | Neither disagree nor agree n (%) | Agree n (%) | Strongly agree n (%) | Median (IQR) |
|--------------------------------------------------------------------------|-------------------------|----------------|----------------------------------|------------|----------------------|-------------|
| My manager would listen to my problems if I will administer vaccination (N = 198) | 16 (8.1)                | 41 (20.7)      | 60 (30.3)                        | 72 (36.4)  | 9 (4.5)               |             |
| My manager would be supportive and helpful if I will administer vaccination (N = 198) | 12 (6.1)                | 31 (15.7)      | 61 (30.8)                        | 82 (41.4)  | 12 (6.1)              |             |
| My community pharmacy has the resources needed for me to administer vaccination (e.g., private space, printed material; N = 198) | 27 (13.6)               | 70 (35.4)      | 42 (21.2)                        | 47 (23.7)  | 12 (6.1)              |             |
| Cronbach’s α                                                            | 0.829                   |                |                                  |            |                      |             |
| Total domain score                                                      | 9 (7–11)                |                |                                  |            |                      |             |

Component statistics, sum of allocating 1 (strongly disagree) to 5 (strongly agree). Minimum: 3; maximum representing best positive score: 15.

TABLE 6  Pharmacists’ professional role identity

| Statement                                                                 | Strongly disagree n (%) | Disagree n (%) | Neither disagree nor agree n (%) | Agree n (%) | Strongly agree n (%) | Median (IQR) |
|--------------------------------------------------------------------------|-------------------------|----------------|----------------------------------|------------|----------------------|-------------|
| I believe that administering vaccinations is simple for me (N = 202)      | 8 (4.0)                 | 30 (14.9)      | 57 (28.2)                        | 94 (46.5)  | 13 (6.4)             |             |
| I'd get professional satisfaction if I administer vaccinations for adult patients (N = 198) | 7 (3.5)                 | 20 (10.1)      | 41 (20.7)                        | 101 (51.0) | 29 (14.6)            |             |
| I believe that administering vaccinations is compatible with my daily practice (N = 202) | 6 (3.0)                 | 36 (17.8)      | 48 (23.8)                        | 96 (47.5)  | 16 (7.9)             |             |
| I believe that administering vaccinations will not take me much time (N = 201) | 5 (2.5)                 | 25 (12.4)      | 54 (26.9)                        | 105 (52.2) | 12 (6.0)             |             |
| I believe that most people who are important to me think that I should administer vaccination for adults in my community pharmacy (N = 198) | 7 (3.5)                 | 31 (15.7)      | 61 (30.8)                        | 87 (43.9)  | 12 (6.1)             |             |
| Other professionals (who are also involved in administering vaccinations) would support me when administering vaccinations for adult patients in my community pharmacy (N = 199) | 9 (4.5)                 | 30 (15.1)      | 64 (32.2)                        | 83 (41.7)  | 13 (6.5)             |             |
| I believe that patients would be positive about having their vaccinations in community pharmacies by me (N = 198) | 10 (5.1)                | 32 (16.2)      | 40 (20.2)                        | 95 (48.0)  | 21 (10.6)            |             |
| I'd feel comfortable if I administer vaccinations to adult patients (N = 198) | 6 (3.0)                 | 30 (15.2)      | 43 (21.7)                        | 104 (52.5) | 15 (7.6)             |             |
| Other work tasks are higher priority for me than administering vaccinationsa (N = 204) | 11 (5.4)                | 50 (24.5)      | 63 (30.9)                        | 72 (35.3)  | 8 (3.9)              |             |
| I'd feel elated if I administer vaccinations to adult patients (N = 198) | 5 (2.5)                 | 25 (12.6)      | 66 (33.3)                        | 86 (43.4)  | 16 (8.1)             |             |
| I believe that patients would be feel safe for getting their vaccinations in community pharmacies by me (N = 198) | 7 (3.5)                 | 42 (21.2)      | 42 (21.2)                        | 84 (42.4)  | 23 (11.6)            |             |
| Cronbach’s α                                                            | 0.918                   |                |                                  |            |                      |             |
| Total domain score                                                      | 38 (33–42)              |                |                                  |            |                      |             |

Component statistics, sum of allocating 1 (strongly disagree) to 5 (strongly agree). Minimum allowed: 11; maximum allowed representing best positive score: 55.

*Reverse scored.
the overall median score was 22. The statement ‘I think that if I administer vaccinations, I will get financial reimbursement’ received the least agreement (agree/strongly agree \( n = 79, 38.3\% \)).

**3.4.7 | Component 7: Pharmacists' perceived usefulness (Table 9)**

The perceived usefulness of pharmacist administered vaccinations was high with a median of 16 and an IQR of 14–18. Most respondents disagreed with the negatively worded statement ‘I think that administering vaccinations is not useful at all for the national economy’ (disagree/strongly disagree \( n = 166, 79.8\% \)). Pharmacists with pharmacy practice experience outside Qatar scored significantly higher on component 7 (Mann–Whitney \( U, P < .05 \)).

**3.4.8 | Component 8: Pharmacists' behaviour control (Table 10)**

Behavioural control of pharmacists regarding adult vaccinations was generally low: a median score of 6 with an IQR of 4–8 with <35% agreeing or strongly agreeing with both statements. Pharmacists from non-Arabic countries and pharmacists who earned their degrees from non-Arabic countries scored higher on component 8 (Mann–Whitney \( U, P < .05 \)).

4 | DISCUSSION

This study is the first in Qatar and in the Middle East to assess community pharmacists’ practices in relation to adult vaccination and to
Table 9: Pharmacists’ perceived usefulness

| Statement                                                                 | Strongly disagree n (%) | Disagree n (%) | Neither disagree nor agree n (%) | Agree n (%) | Strongly agree n (%) | Median (IQR) |
|---------------------------------------------------------------------------|-------------------------|---------------|---------------------------------|-------------|---------------------|--------------|
| I think that administering vaccinations does not advance pharmacist role (N = 208)¹ | 45 (21.6)               | 83 (39.9)     | 43 (20.7)                       | 34 (16.3)   | 3 (1.4)             |              |
| I think that administering vaccinations is not useful at all for the patient health outcomes (N = 208)² | 60 (28.8)               | 93 (44.7)     | 29 (13.9)                       | 33 (11.1)   | 3 (1.4)             |              |
| I think that administering vaccinations is not useful at all for the national economy (N = 208)³ | 69 (33.2)               | 97 (46.6)     | 27 (13.0)                       | 13 (6.3)    | 2 (1.0)             |              |
| I think that administering vaccination is not useful at all for the society (N = 208)⁴ | 66 (31.7)               | 94 (45.2)     | 20 (9.6)                        | 27 (13.0)   | 1 (0.5)             |              |

Cronbach’s α: .90
Total domain score: 16 (14–18)

Component statistics, sum of allocating 1 (strongly disagree) to 5 (strongly agree). Minimum: 4; maximum representing best positive score: 20.

¹Reverse scored.

Table 10: Pharmacists’ behaviour control

| Statement                                                                 | Strongly disagree n (%) | Disagree n (%) | Neither disagree nor agree n (%) | Agree n (%) | Strongly agree n (%) | Median (IQR) |
|---------------------------------------------------------------------------|-------------------------|---------------|---------------------------------|-------------|---------------------|--------------|
| If I am authorized by Qatar law, administering vaccinations to adult patients would be something that I would do without having to consciously remember (N = 196) | 15 (7.7)                | 58 (29.6)     | 57 (29.1)                       | 55 (28.1)   | 11 (5.6)            |              |
| If I am authorized by Qatar law, I would administer vaccinations to adult patients by default (i.e., without a need for further motivation/directions/or instructions; N = 197) | 20 (10.2)               | 68 (34.5)     | 40 (20.3)                       | 57 (28.9)   | 12 (6.1)            |              |

Cronbach’s α: .843
Total domain score: 6 (4–8)

Component statistics, sum of allocating 1 (strongly disagree) to 5 (strongly agree). Minimum: 2; maximum representing best positive score: 10.

characterize the main determinants of their participation in adult vaccination as vaccine administrators.

The study findings indicated that most surveyed community pharmacists were not involved in advocacy related activities for adult vaccination. These results are dissimilar to studies conducted in other countries. Yemeke et al. conducted a systematic review of published literature describing pharmacists’ role in providing vaccination services in low- and middle-income countries.³⁷ Vaccine advocacy and education was the most commonly reported role of pharmacists in vaccination from 15 countries (Argentina, Bolivia, China, Costa Rica, Democratic Republic of Congo, Ethiopia, Iraq, Jordan, Lebanon, Malaysia, Nigeria, Philippines, Russia, Senegal and South Africa).³⁸ Moreover, the FIP published a report in 2016 entitled ‘An overview of current pharmacy impact on immunization’ in order to gain a general understanding of pharmacists’ role in immunization around the world.³⁸ According to this report, pharmacists in 32 countries and territories engage in support and advocacy activities related to immunizations.³⁸ The high accessibility of Qatar community pharmacists makes them ideal candidates to lead vaccination campaigns, advocate for vaccination and educate the general public about vaccination. As a result, they can identify high-risk patients and provide them with the guidance they need to achieve and meet their vaccination targets.³⁸ To improve pharmacists’ roles in vaccination in Qatar, it is recommended that they follow and implement FIP’s advocacy toolkit, ‘Supporting and expanding immunization coverage through pharmacists’.³⁹ FIP proposes a strategic plan for implementing vaccination services by community pharmacies. The plan starts with basic advocacy activities and later moves for more advanced services. There are several tactics included in the plan, including the involvement of pharmacists, schools of pharmacy, health authorities, pharmaceutical companies, medical centres and professional organizations.³⁹

PCA of the TDF potential determinants for vaccine administration ended up with 8 components: pharmacists’ perceived knowledge and skills; perceived confidence; perceived external support; professional role identity; emotions; perceived consequences; perceived usefulness; and behaviour control.
In general, pharmacists’ perceived knowledge, skills, confidence and behavioural control were low. Pharmacists’ responses regarding their ability to administer vaccinations and assess their patients’ vaccination needs were negative. This was also reflected by the high percentage of pharmacists who never had any training or experience in vaccination administration (83.5% and 71.7%, respectively). In fact, community pharmacists, whether they graduated from Qatar or from another country, are not mandated to receive vaccination training. A lack of knowledge or training has also been reported as a barrier to vaccination administration in multiple studies.\textsuperscript{20–43} Community pharmacists can be prepared to provide vaccination services through undergraduate pharmacy education or through training programmes tailored to the professional and practice requirements of each state or country.\textsuperscript{14} For instance in Canada and the USA, several immunization-training programmes were developed to ensure safe and effective administration of vaccines by pharmacists.\textsuperscript{44,45} Moreover, several studies have shown the positive impact of vaccination training programmes. A randomized controlled trial conducted among US pharmacists and pharmacy technicians working in community pharmacies assessed the effect of a structured immunization training on pneumococcal and herpes zoster vaccination services in community pharmacies.\textsuperscript{46} For the intervention group, the training programme resulted in a statistically significant increase in pneumococcal vaccine doses (7.50–12.00 doses, \(P = .007\)) and total vaccine doses (12.50–28.00 doses, \(P = .014\)) when compared with baseline.\textsuperscript{46} The same randomized controlled trial also evaluated the impact of the programme on participants’ vaccination-related confidence, perceived barriers and perceived influence on immunization services using a pre- and post-intervention survey.\textsuperscript{47} The training programme significantly improved the intervention pharmacists’ confidence in determining the appropriateness of pneumococcal vaccine (\(P = .027\)), confidence in patient interactions related to pneumococcal vaccine (\(P = .041\)) and perceived influence on immunization services (\(P < .001\)).\textsuperscript{47} Another study conducted among US community pharmacists evaluated the effectiveness of an intensive coaching session compared with a self-directed webinar on immunization.\textsuperscript{48} Compared with the other group, pharmacists in the coaching group administered more pneumococcal vaccines in the 12-month period after the programme.\textsuperscript{48} Caroll et al. evaluated the perceptions of provisionally registered pharmacy graduands regarding a vaccination training course by The University of Sydney School of Pharmacy. The course led to significant increases in the graduands’ perceived knowledge of influenza vaccinations (24.4% increase, \(P < .001\)), skills in managing patients receiving influenza vaccines (27.1% increase, \(P < .001\)) and confidence level to administer influenza vaccines (80.7% increase, \(P < .001\)).\textsuperscript{49} In addition in Queensland, the process of immunization by community pharmacists has started with a structured training, The Queensland Pharmacist Immunization Pilot. This pilot produced pharmacists who are competent and confident immunizers.\textsuperscript{50}

Therefore, evidence-based multifaceted training programmes are needed to improve Qatar community pharmacists’ knowledge, skills and confidence about vaccinations, along with evaluating their self-efficacy before and after such programmes. To further improve the pharmacists’ behavioural control scores, these training programmes should not only cover the information needed for vaccine administration, such as aseptic techniques, patient screening and managing adverse drug reactions related to vaccines, but also include motivational interviewing techniques and theory-based behavioural strategies in order to motivate pharmacists to prioritize vaccination administration and design action plans for achieving this goal.

Pharmacists perceived external support for vaccination services as low. For instance, they disagreed with the statement about the availability of resources in the pharmacy. Several studies conducted outside Qatar have reached similar conclusions. In a study by Islam et al. on the identification of opportunities and challenges of adolescent and adult vaccination administration within pharmacies in the USA, availability of administration area and vaccine shortage were considered challenges by 43% of surveyed pharmacists.\textsuperscript{51}

The community pharmacies in Qatar need a private space, educational materials, electronic tools, vaccines and other resources. Additionally, pharmacists’ access to patients’ electronic health records can enhance their communication with other healthcare professionals and provide them with clinical alerts to remind them of their patients’ immunization needs. A documentation system should also be in place before pharmacist vaccination services can be implemented in the country.

In addition, lack of managerial support for pharmacist involvement in vaccine administration was identified by pharmacists. This could be due to the absence of governmental jurisdictions or policies for pharmacists to administer vaccination in community pharmacies. Managers and leaders should support their staff as they work towards achieving their goals. In light of the high impact Qatar community pharmacists could have on adult vaccination rates, the Ministry of Public Health, health stakeholder groups and owners and managers of large pharmacy chains should collaborate together to expand the scope of practice of community pharmacists to include immunization and potential reimbursements in addition to setting legislations that authorize pharmacists in Qatar to be immunizers and obtaining the resources to set up this advanced service in the pharmacy as currently pharmacists are not recognized as vaccine administrators in the country.

By contrast, community pharmacists in Qatar demonstrated overall positive emotions regarding administration of vaccines as well as high perceived consequences and usefulness of vaccinations. These results are in line with those of other similar studies. Hastings et al. concluded in his study about community pharmacists’ attitudes towards human papillomavirus (HPV) vaccine in Alabama, USA, that the majority of pharmacists (47.3%) strongly agree that vaccination against HPV is the best protection against cervical cancer.\textsuperscript{52} Koskan et al. assessed community pharmacists’ and pharmacy interns’ (HPV) vaccine administration behaviours and influences using a cross-sectional survey informed by the theory of planned behaviour.\textsuperscript{53} Pharmacists had overall positive attitudes towards HPV and the consequences of vaccination. Moreover, there was a statistically significant correlation between pharmacists’ positive attitudes towards vaccination and their intention to vaccinate.\textsuperscript{53}
The positive responses of pharmacists in the domains of professional role identity and perceived consequences and usefulness indicate that pharmacists in Qatar are aware of the importance of vaccinations and acknowledge their valuable role as educators and administrators within the community. Moreover, pharmacists’ positive emotions found in this study are very encouraging, since negative emotions can dampen pharmacists’ enthusiasm and motivation to administer vaccinations.

It is worth noting that the data were collected pre-COVID-19 pandemic. The pandemic could have shifted the pharmacists’ perceptions more positively as there has been lots of global attention on the role of pharmacists in COVID-19 vaccine administration.

4.1 | Limitations

The results of this study may be affected by social desirability bias, similar to other cross-sectional studies that use questionnaires. There is the possibility of recall bias. The number of study respondents is lower than the target sample size, yet the sociodemographic characteristics of respondents reflect those of Qatar, which makes the study results generalizable. The number of survey respondents is a bit less than the target sample size yet the sociodemographic characteristics of respondents reflect those of Qatar, which makes the study results generalizable. While survey responses provided information about potential determinants of pharmacist vaccination behaviour, semi-structured interviews conducted as part of a qualitative study design may have provided more information. Despite these limitations, the findings from our study offer a detailed and theory-based understanding of the potential determinants of pharmacist involvement in vaccine administration using TDF. In fact, the PCA applied in this study identified the determinants that would need attention the most when planning theory based behaviour change interventions to improve Qatar pharmacists’ role in vaccine administration.

5 | CONCLUSION

Using TDF, this study identified potential determinants to pharmacists’ participation in vaccination administration in Qatar. The study results showed that pharmacists’ knowledge, skills, confidence and behavioural control are important factors to address before pharmacists administer vaccines. The pharmacy practice structure also needs to be changed to improve managerial support for pharmacists and to equip pharmacies with the resources needed for this advanced role. Future studies should target designing theory multifaceted interventions based on TDF for pharmacists to contribute to vaccination administration in Qatar.

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COMPETING INTERESTS

All authors have no competing interests.

CONTRIBUTORS

All authors contributed to the work and approved the final submitted manuscript. M.H. is the study principal investigator and was responsible for the study concept and design. N.Z. and M.H. participated in data collection. N.Z. and M.H. analysed and interpreted the data. D.S. contributed to the manuscript editing.

DATA AVAILABILITY STATEMENT

Data are available on a reasonable request.

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