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ORIGINAL RESEARCH article

Assessing the readiness of community pharmacists in Libya for vaccine administration: Barriers and opportunities

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Abstract: Vaccination effectively reduces morbidity and mortality from infectious diseases. Several countries allow pharmacists to administer vaccines, and community pharmacists are considered as accessible providers of these services. In Libya, however, pharmacists lack the authority to administer vaccines, unlike their counterparts elsewhere. Involving pharmacists in vaccination efforts could enhance the healthcare system. This observational study aimed to evaluate the readiness and willingness of community pharmacists, supported by pharmacy technicians, to provide vaccination services and to identify barriers and supportive factors for implementation in Libya. A descriptive, self-administered online questionnaire was distributed via social media, specifically in pharmacy-focused closed groups. Participants were recruited from various community pharmacies in Tripoli, Libya. The questionnaire was completed by 130 respondents. Most respondents (88.0%) recognized the important role of the community pharmacist in advertising and promotion of vaccination and 79.0% recognized the accessibility of community pharmacies. Major barriers included a lack of training (85.0%) and increased workloads (75.0%). Cooperation between pharmacists and health professionals and support of medical and nursing associations were highlighted, with 93.0% of respondents agreeing on the importance of these initiatives, followed by the need for improved education and ongoing training workshops on vaccination administration (92.0%). In conclusion, most respondents expressed readiness to initiate pharmacy-based vaccination services. Those willing to participate are open to the necessary training and believe that vaccinations in community pharmacies would be safe. To enhance pharmacists' readiness for vaccination services, regulators must emphasize the significance of training and its impact on patient safety and satisfaction. Appropriate laws and regulations are also essential to support the development of community pharmacy services.

Introduction

The pharmacy profession is *a* vital component of healthcare, addressing patients' medication needs. Historically, pharmacists primarily focused on dispensing medications [1]. However, in recent decades, they have increasingly provided direct patient care alongside their traditional roles in drug distribution. Patients often see pharmacists as

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accessible healthcare providers [2]. The establishment of clinical services marked a significant shift from a purely product-centric approach to one that evaluates the effectiveness of pharmacotherapy for patients [3]. Between the 1960s and 1990s, the role of clinical pharmacists expanded significantly [4]. While developed countries have seen gradual changes, the pharmacist's role remains traditional in many developing nations, hindering effective healthcare delivery [5]. Community pharmacists (CPs) are specialists who offer various medication management services. Their advanced training equips them for collaborative, direct patient care [6]. Collaboration is essential in healthcare due to the complexity of managing various diseases [7]. Given their shared expertise in medications and their accessibility, it is logical for CPs to develop many patient care services that aim at improving patient outcomes, identifying medication-related issues, and optimizing drug use and costs [8]. Vaccination involves introducing a vaccine to protect against specific diseases. Vaccines may include weakened, live, or killed microorganisms, or their proteins or toxins [9]. The World Health Organization (WHO) estimates that vaccinations save between 3.5 and 5.0 million lives per year [10]. The COVID-19 pandemic highlighted challenges in healthcare delivery, including vaccination. It also demonstrated the CP's ability to remain accessible and provide essential services during extraordinary demand [11]. Many countries have adopted pharmacy-based vaccination strategies to improve access and increase community vaccination rates [12]. Community pharmacies are often the first point of contact for patients with minor health issues, thanks to their convenient locations and extended hours. Their accessibility positions CPs well to promote and deliver vaccination services [2]. Although CPs in Libya do not currently offer vaccinations, studies from Jordan, United Arab Emirates, and Saudi Arabia indicate a strong willingness among pharmacists in the region to provide these services [13-15]. This observational study aims to assess the readiness and willingness of CPs, along with pharmacy technicians, to offer vaccination services in Libya. It will identify barriers and supportive factors affecting the implementation of these services in community pharmacies. By exploring pharmacists' views on their role in vaccination and their training needs, the research intends to provide policy recommendations to better integrate pharmacists into the healthcare system and enhance public access to vaccinations.

Materials and methods

Study design: This study is a cross-sectional observational pilot study of licensed and practicing community pharmacists in Tripoli, Libya.

Study setting and participants: All practicing CPs in Tripoli, Libya were eligible for this study. A minimum sample of 100 respondents was determined to allow proper analysis of responses.

Survey distribution: The self-administered questionnaire used in this study was developed based on a prior cross-sectional paper-based survey conducted in Riyadh, Saudi Arabia to determine the CP's readiness and willingness to provide immunization services [16]. The current study was carried out between September 2023 and October 2023. Participants were pharmacists and pharmacy technicians working in community pharmacies in Tripoli. A survey instrument was developed online using Google Forms to gather information from the participants. The link for the questionnaire was distributed via social media specifically in pharmacy- or pharmacist-themed closed private groups on Facebook and other social media. The questionnaire was written in Arabic language. It is divided into four main sections: sociodemographic, willingness reasons (6 items), barriers (9 items), and influencing factors (10 items) for the implementation of pharmacy vaccination services. Each questionnaire item was assessed using a five-point Likert scale (1: strongly disagree; 2: disagree 3: neutral or unsure 4: agree 5: strongly agree).

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Statistical analysis: Following data collection, data were extracted and logged in an Excel® workbook (Microsoft Office MS, 2013). Data analysis was carried out using GraphPad Prism software, version 9.0. Findings were presented as numbers and proportions or median and interquartile range (IQR) as appropriate. The data were tested for normality using Shapiro-Wilk and Kolmogorov test and comparisons were assessed using Fisher's Exact test or Mann-Whitney *U*-test, as appropriate. A confidence interval (CI) of 95% was considered statistically significant and all tests were two-tailed.

Results

Sample characteristics: In total, 130 participants completed the questionnaire. Out of 130 participants, 90.0% were females, and the age of the majority of the participants was < 30 years (85.0%). 91.0% of the participants had a bachelor's degree. Participants' demographics are summarized in **Table 1**.

Table 1: Participants' demographics and relevant characteristics

Parameters		n (%)
Age, *n (%)*	**< 30 yrs**	110 (85)
	31 - 40 yrs	13 (10)
	41 - 50 yrs	07 (05)
Gender, *n (%)*	**Male**	13 (10)
	Female	117 (90)
Education level, *n (%)*	**Bachelor's**	118 (91)
	Diploma	12 (09)

Community pharmacy's attitude toward providing vaccination services: The attributes of CP's willingness to provide vaccination services are shown in **Table 2** and **Figure 1**. Participants either responded agree or strongly agreed to the statement "Community pharmacists can play an important role in advertising and promotion of vaccination" in a total of 88.0% followed by "Community pharmacists are easily accessible to the community" by 79.0%.

Table 2: Attributes of community pharmacists' willingness to provide vaccination services

Statements	Strongly Agree *n (%)*	Agree *n (%)*	Neutral or Unsure *n (%)*	Disagree *n (%)*	Strongly Disagree *n (%)*	*p* value
Community pharmacists have good knowledge of vaccine and their indications	16 (12%)	71 (55%)	25 (19%)	10 (08%)	08 (06%)	**< 0.001**
Community pharmacists are easily accessible to the community	30 (23%)	73 (56%)	15 (11%)	06 (05%)	06 (05%)	
Providing immunization through community pharmacy will improve the overall vaccination coverage rate	21 (16%)	62 (47%)	15 (12%)	17 (13%)	15 (12%)	
Providing immunization through community pharmacies will improve the rate of vaccination in a certain group of patients	19 (15%)	71 (55%)	17 (13%)	12 (09%)	11 (08%)	
The vaccination program administered in community pharmacies is cost-effective	06 (05%)	46 (35%)	35 (27%)	30 (23%)	13 (10%)	
Community pharmacists can play an important role in advertising and promoting vaccination	37 (29%)	77 (59%)	07 (05%)	08 (06%)	01 (01%)	

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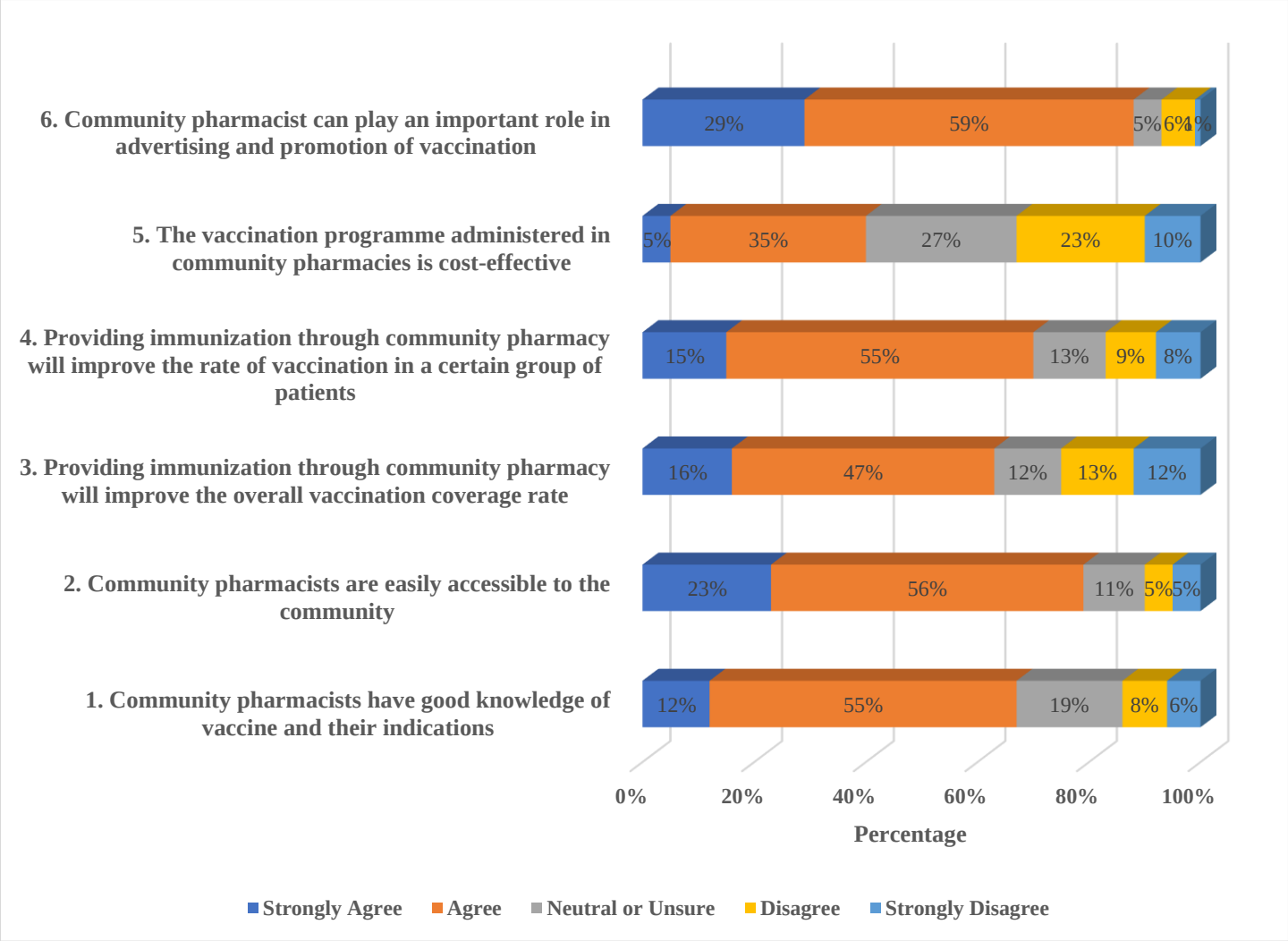

Figure 1: Attitude toward providing vaccination services

Barriers to providing immunization vaccination services in the community pharmacies: Pharmacists were asked to rate nine statements on barriers to providing vaccination at community Pharmacies. Pharmacists either responded agree or strongly agreed in total to the statement "Lack of pharmacists training in vaccination" 85.0%, followed by ''Vaccination will add more work to pharmacists" (75.0%). Interestingly, participants rated "Pharmacists are less trusted by patients to provide vaccination services" and "Pharmacists are not comfortable using needles" as being the least agreed (42.0% and 30.0%, respectively). **Table 3** and **Figure 2** show the barriers for community pharmacies to provide vaccination services.

Important factors for the implementation of pharmacy vaccination services: **Table 4** and **Figure 3** show the reasons for CP's willingness to provide vaccination services with a $p < 0.001$. Participants either responded agree or strongly agreed to the statement "Cooperation between pharmacists and health professionals" and "Support of medical and nursing associations" (93.0%), followed by ''More university education and training on vaccination administration for pharmacists" and "Continuous education and training workshops on vaccination" (92.0%). Interestingly, participants rated "Reduce the workload of technical tasks for pharmacists (e.g., entering invoices, verifying supplies) to allocate more time for vaccination services" (77.0%).

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Table 3: Barriers to provide vaccination services in community pharmacies

Statements	Strongly Agree *n (%)*	Agree *n (%)*	Neutral or Unsure *n (%)*	Disagree *n (%)*	Strongly Disagree *n (%)*	*p* value
Pharmacists are busy and they have no time to provide vaccination	19 (15%)	52 (40%)	27 (20%)	26 (20%)	6 (5%)	< 0.001
Vaccination will add more work to pharmacists	27 (20%)	71 (55%)	15 (12%)	16 (12%)	1 (1%)	
Patient safety is a concern	20 (15%)	68 (52%)	20 (15%)	15 (12%)	7 (6%)	
Lack of pharmacists' training in vaccination	41 (32%)	69 (53%)	10 (7%)	9 (7%)	1 (1%)	
Pharmacists are less trusted by patients to provide vaccination services	9 (7%)	46 (35%)	20 (15%)	37 (29%)	18 (14%)	
The pharmacy is not equipped to provide vaccination service	27 (21%)	68 (52%)	17 (13%)	17 (13%)	1 (1%)	
Conflicts with other professionals who eligible to vaccinate	19 (15%)	59 (45%)	29 (22%)	21 (16%)	2 (2%)	
Concerns about handling vaccines, storage, and disposal of sharps	24 (18%)	68 (52%)	10 (8%)	25 (19%)	3 (3%)	
Pharmacists are not comfortable using needles	8 (6%)	31 (24%)	27 (20%)	47 (37%)	17 (13%)	

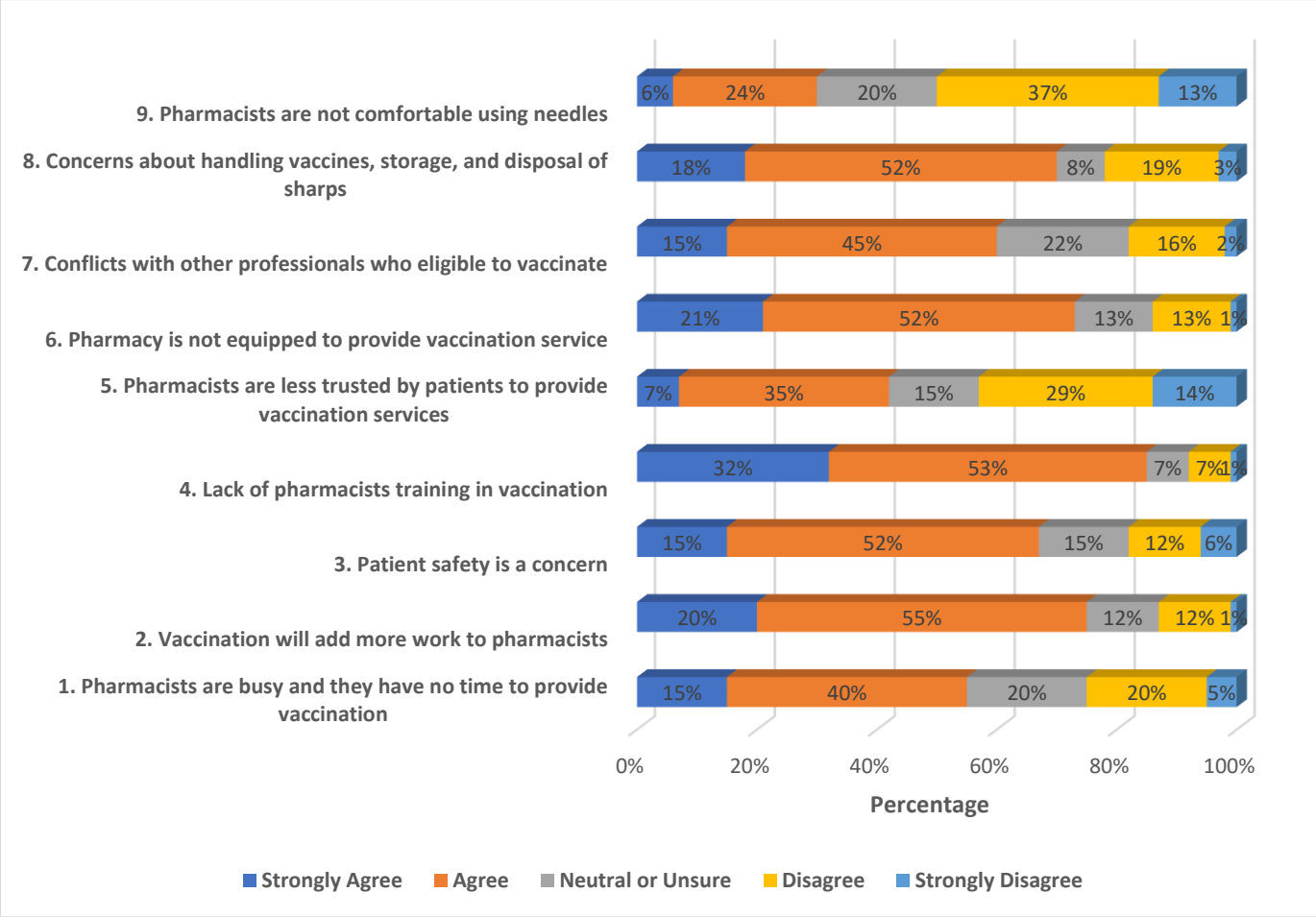

Figure 2: Perceived agreement on the barriers that influence pharmacists' readiness to provide vaccination

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Table 4: Important factors for the implementation of pharmacy vaccination services

Statements	Strongly Agree *n (%)*	Agree *n (%)*	Neutral or Unsure *n (%)*	Disagree *n (%)*	Strongly Disagree *n (%)*	*P* value
More university education and training on vaccination administration for pharmacists	61 (47%)	59 (45%)	09 (07%)	01 (01%)	0 (0%)	
Continuous education and training workshops on vaccination	63 (49%)	56 (43%)	10 (07%)	01 (01%)	0 (0%)	
Financial reimbursement or adequate remuneration	42 (32%)	62 (47%)	22 (17%)	03 (3%)	01 (01%)	
Providing a specific space for vaccination in the pharmacies	51 (39%)	57 (44%)	12 (09%)	07 (5%)	03 (03%)	
Providing a specific space to store vaccine	62 (47%)	54 (41%)	06 (05%)	5 (4%)	03 (03%)	
More pharmacists and staff in pharmacies to allocate time and provide an individual approach to patients for vaccination services	53 (41%)	57 (44%)	11 (8%)	05 (04%)	04 (03%)	**0.001**
Reduce the workload of technical tasks for pharmacists (e.g., entering invoices, verifying supplies) to allocate more time for vaccination services	45 (35%)	54 (42%)	20 (15%)	07 (05%)	04 (03%)	
Cooperation between pharmacists and health professionals	58 (44%)	64 (49%)	06 (05%)	02 (02%)	0 (0%)	
Support of medical and nursing associations	51 (39%)	70 (54%)	07 (05%)	01 (01%)	01 (01%)	
Certification of pharmacists in providing vaccination services	57 (44%)	57 (44%)	07 (05%)	05 (04%)	04 (03%)	

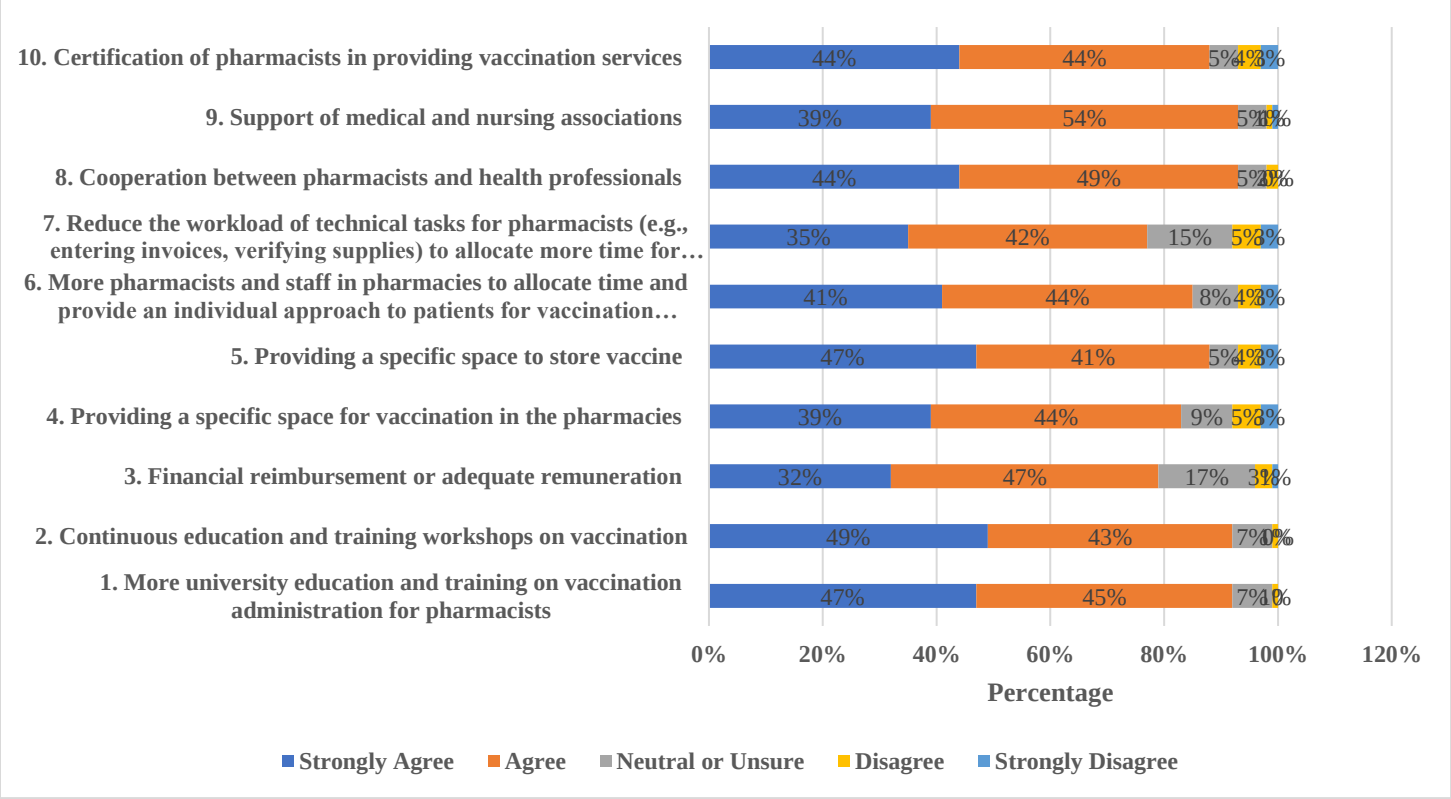

Figure 3: Perceived agreement on the important factors for the implementation of pharmacy vaccination services

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Discussion

To the best of our knowledge, this is the first study in Libya that aimed to investigate the readiness and willingness of CPs and pharmacy technicians to provide vaccination services. This study serves as a valuable instrument for stakeholders attempting to implement a pharmacist-provided immunization service by highlighting critical requirements and important barriers. Thus, regarding the attributes of CP's willingness to provide vaccination services, our findings showed that 88.0% agreed that they could play an important role in advertising and promoting vaccinations, and 79.0% of the participants agreed with the accessibility of community pharmacies to the public. These findings are consistent with several studies that demonstrate the benefit of authorizing the pharmacist to administer vaccines in community settings. In a study conducted by Bander Balkhi and colleagues in Saudi Arabia [16], it was reported that more than half of the participating pharmacists showed their willingness to provide this service. Similarly, most participants of the current study believed that providing immunization through community pharmacies will improve the overall vaccination coverage rate (83.0%) as reported in the previous studies conducted in Jordan and UAE [13, 15]. In addition, CPs believed that they have a strong role in increasing the rate of vaccination particularly for older patients (70.0%) besides their role in advertising, promoting, and improving the vaccination service through community settings (88.0%). The same results were reported in a survey study among CPs in immunization during the COVID-19 Pandemic in Poland [17]. According to a similar study, out of 492 CPs who were recruited across Malaysia, 439 (89.2%) said they would be willing to offer vaccination services to the general public, 81.0% agreed that community pharmacies are easily accessible to the public, and 73.4% agreed that their involvement in vaccination could contribute to an increase in the overall vaccination coverage rate [18]. These findings highlight how prepared and easily accessible community pharmacies are to play such a significant public role in immunization in Libya.

Regarding the barriers to providing vaccination at community pharmacies, several limiting factors were also identified in this study. Most participants agreed that lack of training in vaccination and the vaccination will add more work are the major barriers to providing vaccination services in community pharmacies. The current results are consistent with the previously cited studies regarding barriers that influence the implementation of vaccination services. In Saudi and Malaysian studies, lack of training (75.4% and 52.8%, respectively) and concerns about maintaining patient safety (67.4% and 47.8%, respectively) were considered barriers to delivering immunization services in both studies [16, 18]. In the Polish study, participants mainly pointed out that vaccination services would result in a significant workload increase and that there were not enough training courses for pharmacists [17]. Conflicts with other medical specialists who are certified to provide immunizations, however, can also pose significant difficulties. The main barrier to the adoption of clinical pharmacy practice in the Philippines, Kuwait and Egypt has been identified as the absence of support from physicians and other medical professionals [19-21]. When beginning the process of implementing immunization services in community pharmacies, this should also be considered. According to a related study investigating the attitudes, knowledge, and perceived barriers regarding immunization services at Saudi Arabian community pharmacies, in addition to the fact that the service will increase workload (72.94%), one significant barrier is the lack of necessary supplies and equipment (74.11%) [19]. In Saudi and Malaysian studies, continuous professional education and training workshop on immunization and pharmacist's interest were the main drivers of immunization service implementation. This matches our results; where 47.0% and 49.0% of the respondents strongly agreed on more university education and training on vaccination administration and continuous education and training workshops on vaccination, respectively. In addition, 47.0% of the respondents strongly agreed on the importance of providing a specific space to store vaccines and 54.0% agreed on the support of medical and nursing associations. This

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highlights the importance of having a designated area for vaccine storage, which has been supported by medical and nursing societies, as well as the necessity of ongoing professional education and training workshops on vaccination. Many studies indicate the positive effects of implementing vaccinations in community pharmacies. The results of these studies prove that pharmacists increase the availability of vaccinations, accelerate immunization, effectively educate patients, affect the vaccination coverage rate, prevent new cases of diseases, and by reducing the number of diseases or complications, they bring savings to the healthcare system [20, 21]. Experiences in many countries as England, Portugal, and the United States proved the benefits of providing vaccination services for both patients and the healthcare system [22].

The findings of a recent qualitative study highlight unique strategies community pharmacies in the United States use to contribute to equitable vaccination efforts in communities and further emphasize the importance of their role in public health initiatives [23]. Many international organizations such as the American Public Health Association (APHA) and the International Pharmaceutical Federation (FIP) encourage pharmacists to get involved in administering vaccinations. The WHO has adopted the Global Vaccine Action Plan (GVAP), whose main objective is to increase access to vaccinations for people around the world to reduce the incidence and mortality of infectious diseases. Many countries have permitted pharmacists to administer vaccinations. Vaccinations administered by pharmacists are common in community pharmacies in 13 European countries, including the United Kingdom, Norway, Greece, Portugal, Estonia, and other countries that want to join in these activities [24]. Considering the aforementioned, it appears that vaccinating patients in community pharmacies will reduce a number of obstacles. Aiming to effectively increase the patient vaccination coverage rate and make the community pharmacy a comfortable place to receive a vaccination, there should be a lot of pharmacies, convenient locations, long opening hours, few waiting people, and the ability to educate patients and explain any upsetting information [25]. To successfully implement such a service, small-scale pilot programs will be required to assess the results and identify areas that can be improved when preparing larger-scale activities. Great attention should be paid to the development of a guideline that embraces pharmacist's immunization practice in the community. This guideline may consist of a range of issues such as the requirement for practice (e.g., licensure, certification, and training), vaccines and patients involved (e.g., influenza vaccine, oral, adult), the confidentiality of the vaccination data, and how such data would be stored and used to evaluate the effectiveness of pharmacy vaccination programs. Also, the guideline should include policy details regarding the potential safety and severe complications of vaccination services provided by pharmacists and how they will deal with it when this happens. There is a need to review the policies and practices of other countries that implement vaccine administration by pharmacists for the implementation in Libya [26]. More studies could target the attitude of other healthcare professionals and policymakers toward the implementation of a pharmacist-provided immunization service. The patient acceptance of vaccination by pharmacists should also be addressed. Pharmacists wishing to administer vaccinations must obtain appropriate qualifications and adequate training. Standard operating procedures should be placed in line with other countries, where pharmacist-provided vaccination is already implemented.

Conclusion: The implementation of vaccinations administered by suitably prepared and trained pharmacists will be possible after setting detailed standards for such services and precise guidelines for vaccinations administered in pharmacies. Pharmacists can provide a major contribution to public health by playing active roles in vaccination. However, highlighting important requirements and barriers towards service implementation is a key to success in any future planning for implementing vaccination services in community pharmacies. It will be necessary to establish strict educational requirements to be met by pharmacists to administer vaccinations.

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Ethical issues: Including plagiarism, informed consent, data fabrication or falsification, and double publication or submission were completely observed by the authors.
Data availability statement: The raw data that support the findings of this article are available from the corresponding author upon reasonable request.
Author declarations: The authors confirm that they have followed all relevant ethical guidelines and obtained any necessary IRB and/or ethics committee approvals.