



Level of involvement of community pharmacists in adult vaccination services in Nigeria

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Abstract

Vaccination prevents between 3.5 and 5 million deaths annually and is critical to the prevention and control of infectious diseases. Although vaccination is a cost-effective intervention that has saved millions of lives, coverage of adult vaccination remains universally low. Community pharmacists are a valuable resource for expanding adult vaccination coverage. This study aimed to determine community pharmacists' level of involvement in adult vaccination services in Nigeria. A cross-sectional study was conducted among 549 community pharmacists in each of the six geopolitical zones of Nigeria, including Lagos State and the FCT, using a self-administered questionnaire to collect data. Descriptive statistics using frequencies and percentages were used to describe the level of involvement, while inferential statistics using the chi-square test was used to examine associations. A probability value of $p \leq 0.05$ was considered statistically significant, and the data were analysed using SPSS software version 25. A substantial proportion of community pharmacists 358(65.2%) in Nigeria report involvement in adult vaccination services. Statistically significant observations were observed between geopolitical zones ($p=0.000$), years of practice ($p=0.000$), and level of involvement. Region-specific training and policy support may be essential to enhance equitable pharmacist participation in adult vaccination.

Keywords: Adult Vaccination; Community Pharmacy; Nigeria; Vaccination Services

INTRODUCTION

Vaccination has played a major role in reducing the risk of developing diseases. Currently, 3.5 to 5 million deaths are prevented every year through vaccination [1]. Vaccines are available to prevent more than 20 life-threatening diseases, enabling individuals to live longer and healthier lives. They are critical in the prevention and control of infectious diseases [2]. Although vaccination is a cost-effective intervention that has saved millions of lives, the coverage of adult vaccination is still universally low [3]. Global vaccination

efforts have heavily focused on infants and children, and little effort is placed on adult vaccination. With aging populations, shifting disease epidemiology, and new vaccine technologies, there is an increased interest in life-course vaccination, which is the deliberate expansion of vaccine delivery to adolescents and adults to sustain immunity and prevent morbidity in later life [4]. Adults may require additional vaccines based on age, health condition, and vaccines received in childhood. They include those for chickenpox, hepatitis A, hepatitis B, Human Papillomavirus (HPV),

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Meningococcal, Pneumococcal, and Shingles [4,5].

Pharmacists are the third largest healthcare professional group in the world and often the most frequently consulted healthcare professionals for many individuals, the first point of contact for some patients, and the only contact point for a few [6]. The community pharmacy is one of those settings where adult vaccines can be administered. They are often consulted for healthcare advice and implement positive healthcare initiatives, such as vaccination [7]. The ease of accessibility to vaccines has been identified as a major barrier to vaccine uptake and is one of the modifiable determinants of vaccine uptake. As such, providing diverse settings for the provision of vaccination could likely increase available opportunities for vaccination, thus increasing the rate of vaccine coverage [8]. Providing vaccination in community pharmacies may also help reduce the burden on the healthcare system [9]. Community pharmacists are essential contributors for expanding vaccination coverage and overcoming the challenges necessary to improving vaccination compliance [10]. In many high-income settings, community pharmacists have become integral to achieving adult vaccination goals. In the United States of America, every State allows pharmacists to administer vaccines, but laws vary in the details of the authorisation, such as what vaccines pharmacists can administer and patient age limitations [11]. Pharmacists in the United States, United Kingdom, Canada, and Australia have been authorised and trained to administer a range of vaccines, such as influenza, COVID-19 booster, and pneumococcal vaccines, often reaching populations less likely to attend traditional primary-care clinics, and this shift has been shown to increase vaccine accessibility and uptake [12].

Level of involvement in adult vaccination services in community pharmacies refers to the extent to which community

pharmacists actively participate in the planning, promotion, delivery, and evaluation of vaccination services [12]. Studies have shown that pharmacist involvement is associated with higher vaccination rates, reduced missed opportunities for vaccination, and improved patient awareness of recommended adult vaccines [12–14]. Community pharmacies, through their setup of extended working hours and walk-in access, are able to provide a community-based setting for expanding access to vaccination. Pharmacists also provide confidentiality and counselling, which facilitates uptake [15,16].

Low- and middle-income countries (LMICs), including many in sub-Saharan Africa, have shown a growing interest in adapting pharmacy-based vaccination; yet implementation has been uneven [17]. The COVID-19 emergency response allowed pharmacies to provide vaccines, which improved the reach of the vaccines, but it also highlighted the need for clear policy frameworks, workforce training, and possible integration with national vaccination registries [18–20]. In Ghana, a set of guidelines was developed for the administration of COVID-19 and other vaccine-preventable diseases in community pharmacies, but they have yet to be approved by the Ministry of Health for implementation [21].

In Nigeria, community pharmacists have shown willingness to be involved in vaccination services, but the operational procedures are not standardised [22]. Over the years, there had been no official restriction limiting community pharmacists from providing vaccination services, but there had also been no policy direction or law towards their involvement [19,23]. The National Primary Health Care Development Agency (NPHCDA), in collaboration with the Association of Community Pharmacists of Nigeria (ACPN), officially approved community pharmacists to administer vaccines, including the COVID-19 vaccines,

within community pharmacies in Nigeria, demonstrating their reach and community trust [20].

Several studies have looked at the level of involvement of community pharmacists in vaccination services in individual states in Nigeria; the majority of these studies were carried out in the South-East, South-West, and South-South regions of Nigeria [22,24–26]. In order to formulate national policies or targeted training and source financial interventions to mainstream pharmacy-based adult vaccination, it is crucial that the level of involvement of community pharmacies in adult vaccination be assessed nationwide. This study sought to determine the level of involvement of community pharmacists in adult vaccination services in Nigeria.

METHODS

Background of the study area. Nigeria is a West African country comprised of 36 states and the Federal Capital Territory (FCT), Abuja. Administratively and politically, the nation is divided into six geopolitical zones: North-Central, North-East, North-West, South-East, South-South, and South-West. Each zone has distinctive demographic, economic, cultural, and health system characteristics that influence healthcare delivery, including the structure and operations of community pharmacies. Understanding these regional variations is crucial for accurately interpreting the distribution, accessibility, and functionality of community pharmacy services nationwide [27,28].

Study design and study population. This was a descriptive, cross-sectional study. The study population consisted of registered community pharmacists within community pharmacies in one state from each of the six geopolitical zones of Nigeria, including Lagos State and the Federal Capital Territory (FCT), because they are economically important in Nigeria, with high numbers of community pharmacists, who gave their consent. From the North-West zone,

Kaduna State, the North-East zone, Gombe State, the North-Central zone, Plateau State, the South-West zone, Ekiti State, the South-East zone, Enugu State, and the South-South zone, Rivers State.

Sample size determination, sampling, and data collection. The study sample size was determined using the formula for determining sample size when conducting a cross-sectional study [29].

$$\left\{ n = \frac{z^2 p q}{d^2} \right\}$$

Where n = the desired sample size, z = the standard normal deviate = 1.96, p = Proportion of community pharmacists involved in vaccination services in Nigeria. Using the Cochran formula is assumed to be 50% (0.5) to obtain maximum variability because no similar studies were found, $q = 1-p = 1-0.5=0.5$, d = absolute precision or accuracy = 0.05. Allowing for an estimated 20% non-response, the sample size for the study was 463, and including an estimated 200 pharmacies from Lagos State and 100 pharmacies from FCT, the final sample size for the study was 763. The study included all community pharmacies registered with the Pharmacy Council of Nigeria in the chosen States of the six geopolitical zones in Nigeria and excluded community pharmacies without a superintendent pharmacist. From data from the Pharmacy Council of Nigeria 2023 register, the total number of community pharmacies in Kaduna was one hundred and sixty-nine (169), Gombe State, thirty-eight (38), Plateau State, one hundred and forty-two (142), Ekiti, eighteen (18), Enugu State, two hundred and ten (210), Rivers State five hundred and thirty (530). Respondents were chosen as shown below:

Total number of community pharmacies in

- Kaduna State (North-West) $169/1,107 \times 463=71$
- Gombe State (North- East) $38/1,107 \times 463=16$
- Plateau State (North- Central) $142/1,107 \times 463=59$
- Ekiti State (South-West) $18/1,107 \times 463=8$
- Enugu State (South- East) $210/1,107 \times 463=88$

- Rivers State (South -South) 530/1,107 X 463 =221
- Lagos State (South-West) – 200
- Federal Capital Territory (FCT)-100

A stratified sampling technique was adopted based on the number of community pharmacies per state chosen from the six geopolitical zones. Data were collected with the aid of a structured, self-administered questionnaire. The questionnaire was adapted from similar studies in Cross River and Lagos States [24,30]. The questionnaire had three sections: -Section A: Socio-demographic data of respondents, Section B: Opinion regarding the administration of adult vaccination in community pharmacies, Section C: Involvement of community pharmacists in adult vaccination services in Nigeria. The questionnaire was a 28-item instrument. The section on level of involvement had nine questions on a Likert scale except for the questions to indicate which vaccines were presently stocked in the pharmacy.

To ensure that the instrument actually measured what was desired, content validity was employed. Questions were rated based on Relevance, Clarity, Simplicity, and Comprehension.

For face validity, the questionnaire was pretested among five (5) experts in the field to enable the language, structure, and sequencing of the questions to be examined and to make modifications where necessary. A pilot study was conducted among 50 community pharmacists in Plateau State. All questions were retained with a few statements reworded for clarity. Reliability of the instrument was determined, and a Cronbach alpha score of 0.801 was obtained.

Data were collected both physically and online via a Google Form using the following link: <https://forms.gle/fAt9QbgLKhT3zfWY8> between January 2025 and July 2025. The researcher and eight (8) trained research assistants collected the data. The physical questionnaires were administered to the

respondents by trained members of the research team, while the online form was posted on WhatsApp platforms of the Association of Community Pharmacists of Nigeria (ACPN) of chosen states, with a note that pharmacists who had filled the physical copy were not to fill the online form.

Data grading, scoring, and analysis. Data was analysed using Statistical Package for Social Sciences (SPSS version 25). Demographic characteristics, such as age, sex, and employment qualifications, were analysed using descriptive statistics and reported as frequencies and percentages, then presented as a table. The level of involvement in adult vaccination was analysed using frequencies and percentages of the participants in vaccination services and reported using tables and graphs (pie chart and bar chart). There were 9 questions on level of involvement and a Likert-type scale of 0 to 5 was used to assess the level of involvement of participants and scored as 0- never, 1-less than once a month, 2- once a month, 3-once a week, 4- once a day, 5-more than once a day. Level of involvement was categorised as high, average, or low. The total score possible ranged from 0 to 45. A score of 32 and above, which corresponds to above 70%, was considered high, 23 to 31, average, and 22 and below, low involvement.

Ethical considerations. Ethical approval was obtained from the Jos University Teaching Hospital Human Ethics Research Committee (Ethical approval number is JUTH/DCS/IREC/127/XXXI/2818).

An informed consent form was given to respondents explaining the purpose of the study, clarifying questions and concerns, and respondents were allowed to decline participation in the study. All data was entered into a password-protected computer. Anonymity and confidentiality were ensured. The study instrument was anonymous, respondents were asked to write only their initials to avoid tracking, and no code was used to identify respondents.

RESULTS

Out of a sample size of seven hundred and sixty-three (763), five hundred and forty-nine (549) questionnaires were filled out and returned by community pharmacists around Nigeria. Giving a percentage response rate of 72%.

Socio-demographic characteristics of study participants. An assessment of the demographic characteristics of the respondents revealed that the majority of respondents were aged between 30 and 39 years ($n = 231$, 42.1%). Most of the respondents were male ($n=302$, 55.0%) and held a Bachelor of Pharmacy (B. Pharm) as their highest degree ($n=284$, 51.7%), with the majority ($n=288$, 52.5%) having practiced in community settings for 10-19 years. Additionally, 212 (38.6%) were employed as superintendent pharmacists (Table 1).

Level of involvement of community pharmacists in adult vaccination services in Nigeria. Majority of the respondents (358, 65.2%) offer vaccination services, as shown in Figure 1. Out of the 65.2% who offer vaccination services, ($n=224$, 62.2%) had high involvement, ($n=65$, 18.2%) had average involvement, while ($n=18$, 5.0%) had low involvement in offering vaccination services, as shown in Figure 2. The most common vaccines stocked were Tetanus toxoid (79.6%), Hepatitis B vaccine (78.2%), and Rabies vaccine (76.3%), as shown in Figure 3.

Test of association between geopolitical zones and level of involvement in adult vaccination services in Nigeria. Table 2 presents the relationship between Nigeria's geopolitical zones (each represented by one state) and pharmacists' involvement in adult vaccination services. A statistically significant association was found between the geopolitical zone and level of involvement ($p = 0.000$), as confirmed by Fisher's exact test.

Table 1: Sociodemographic characteristics of participants ($n=549$)

Variable	Sub-Group	Frequency	Percent (%)
Age	20-29	18	3.3
	30-39	231	42.1
	40-49	187	34.1
	50-59	86	15.7
	≥ 60	18	3.3
Sex	Male	302	55.0
	Female	238	43.4
Employment Status	Employed Superintendent Pharmacist	212	38.6
	Owner Superintendent Pharmacist	211	38.4
	Owner non-Superintendent Pharmacist	25	4.6
	Locum Pharmacist	93	17.0
Years of practice as a community pharmacist	0-9	223	40.6
	10-19	288	52.5
	20-29	18	3.3
	≥ 30	6	1.1
Educational qualification	B. Pharm	284	51.7
	Pharm. D	109	19.9
	WAPCP	72	13.1
	M.SC.	74	13.5
	PhD	3	0.5

n : number of respondents, cumulative percentage less than 100% due to non-response

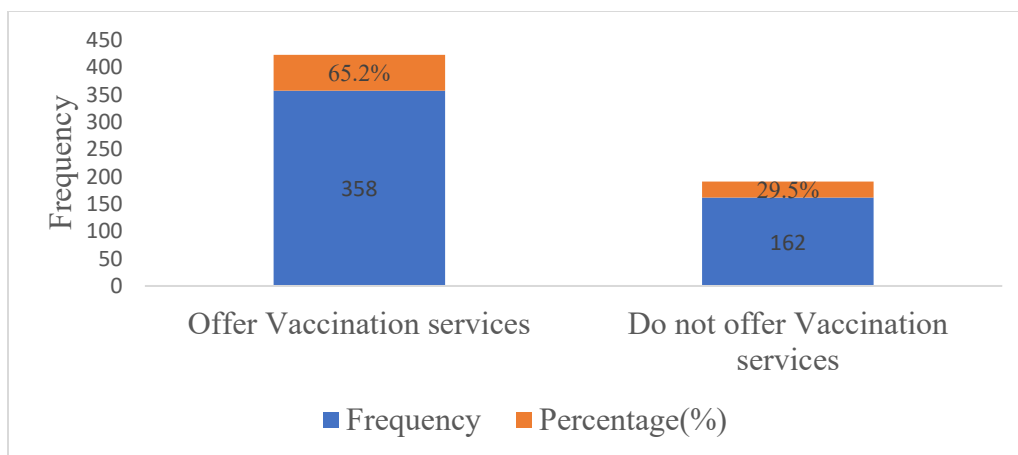


Figure 1: Community pharmacists who offer vaccination services in Nigeria (n=549)

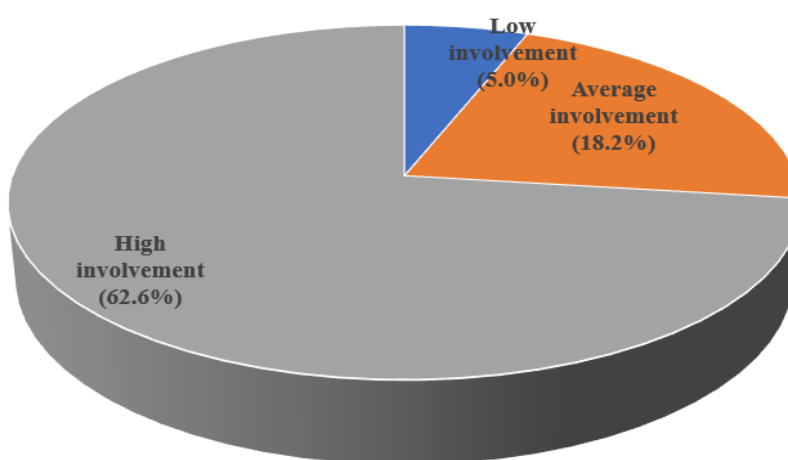


Figure 2: Involvement of community pharmacists in adult vaccination services in Nigeria (n=358)

Table 2: Association between a representative state from each geopolitical zone of Nigeria and level of community pharmacists' involvement in adult vaccination services

Variable	Level of Involvement			P-value
	High n (%)	Average n (%)	Low n (%)	
Geopolitical Zone of Nigeria				
Ekiti (South-West)	5 (83.3)	1 (16.7)	0 (0.0)	0.000*
Gombe (North-East)	12 (75.0)	4 (25.0)	0 (0.0)	
Kaduna (North-West)	104 (73.8)	37 (26.2)	0 (0.0)	
Rivers (South-South)	54 (81.8)	12 (18.2)	0 (0.0)	
Enugu (South-East)	57 (89.1)	7 (10.9)	0 (0.0)	
Plateau (North-Central)	3 (8.8)	13 (38.2)	18 (52.9)	
Lagos	104 (73.8)	4 (25.0)	0 (0.0)	
FCT	15 (78.9)	4 (21.1)	0 (0.0)	

*P≤0.05 Statistically significant, Fisher's exact test used as at least one cell<5 units, n=number of respondents

Table 3: Association between years of practice as a pharmacist and level of involvement of community pharmacists in adult vaccination services

Variable	Level of Involvement			P-value
	High n (%)	Average n (%)	Low n (%)	
Years of Practice as a Pharmacist				
0-9	127 (71.3)	44 (24.7)	7 (3.9)	0.000*
10-19	164 (78.1)	39 (18.6)	7 (3.3)	
20-29	0 (0.0)	3 (50.0)	3 (50.0)	
30+	0 (0.0)	1 (50.0)	1 (50.0)	

*P≤0.05 Statistically significant, Fisher's exact test used as at least one cell<5 units, n=number of respondents

Pharmacists from southern states, especially Enugu (South-East, 89.1%), Ekiti (South-West, 83.3%), and Rivers (South-South, 81.8%), showed a notably higher level of involvement in adult vaccination services than their northern counterparts. Similarly, pharmacists from Kaduna (North-West, 73.8%), Gombe (North-East, 75.0%), and the FCT (78.9%) also demonstrated considerable engagement, though slightly lower than those in the South-East and South-West. In contrast, Plateau State (North-Central) displayed a distinct pattern, with only 8.8% of respondents reporting high involvement, while 52.9% reported low involvement.

Test of association between years of practice and level of involvement in adult vaccination services in Nigeria. Table 3 presents the association between years of practice as a pharmacist and level of involvement in adult vaccination services. The relationship was statistically significant ($p = 0.000$), indicating that experience level influences the degree of involvement. Pharmacists with 0–9 years and 10–19 years of practice demonstrated high involvement rates of 71.3% and 78.1%, respectively. In contrast, pharmacists with 20–29 years of experience showed no high involvement; instead, 50% reported average and 50% low involvement.

DISCUSSION

This study showed that the majority of the pharmacists had high involvement in vaccination services. This finding is similar to single-state studies carried out in Lagos, Cross River, and Edo State, Nigeria, regarding the involvement of community pharmacists in vaccination services [24,26,30]. Pharmacists were largely involved in providing vaccination services but they focused their involvement on both child and adult vaccines, while the present study focus was on community pharmacists' involvement in only adult vaccines. This finding is also similar to studies in England and

Northern Ireland, where community pharmacists were also highly involved in adult vaccination services [13,14]. The study finding implies the willingness and readiness of community pharmacists in Nigeria to be involved in adult vaccination. These community pharmacists carried out vaccination activities, but to varying extents, possibly because there are no set guidelines for their involvement, also highlighting the need for clearly defined policies on adult vaccination within community pharmacies in Nigeria [18].

Tetanus toxoid was the most common vaccine administered within the community pharmacies that offered vaccination services. This study differed from the studies carried out in England and Northern Ireland, where the Influenza vaccine was the most commonly administered. Tetanus toxoid is usually recommended for deep cuts, which are common occurrences in communities within Nigeria, and could explain its stocking in most pharmacies [30].

Community pharmacists in Nigeria were involved in the rollout of the COVID-19 vaccines, with a resultant increase in the number of persons vaccinated, and hence the improved coverage [18,32]. Studies in England and the United States of America have shown that when pharmacists are involved, uptake of vaccines increases, as seen with the seasonal influenza and Hepatitis B vaccines, but have also shown that policies and stakeholder involvement are crucial to increase uptake [14,15,32,33]. Community pharmacists need to be deployed in times of emergencies as a valuable resource for public health threats requiring vaccine interventions. Despite not having formal guidance, they were involved, which further shows the need to understand current practices and competencies.

The observed statistically significant association between the level of involvement of community pharmacists in adult vaccination services and Nigeria's geopolitical zones likely

reflects underlying structural and contextual disparities across those zones. It suggests regional disparities in awareness, access, or infrastructure for adult vaccination services across Nigeria's geopolitical zones. The significant relationship highlights that geographic and contextual factors may significantly influence pharmacists' participation in adult immunisation initiatives. Workforce distribution is markedly uneven: the most recent comprehensive assessment of the pharmacy profession in Nigeria indicated that the South-West region hosts 41% of licensed pharmacists, while the North-East and North-West regions account for only 3.6% and 7.2% respectively [28]. This concentration of pharmacists and community pharmacies in southern zones suggests that pharmacies in those regions are more numerous, more accessible, and therefore more likely to engage in expanded services such as adult vaccination. In contrast, zones with few pharmacists and pharmacies face a scarcity of potential service providers; this scarcity acts as a structural barrier to pharmacist involvement. Vaccine acceptance and immunisation culture vary geographically. In a national survey of vaccine hesitancy in Nigeria, residence in the North-East and North-West zones was associated with significantly higher odds of hesitancy compared with other zones [34]. When public demand for vaccines is low or public trust is weak, community pharmacists may be less willing or able to incorporate adult vaccination into their services, thereby reducing involvement in those zones. The infrastructure and policy environment for vaccination services also differ regionally. For example, though there is no official national prohibition on community pharmacists administering vaccines, in practice, Nigeria lacks a uniform legal framework allowing pharmacists to vaccinate, and states have yet to implement policy, training, or infrastructure (e.g., cold-chain, anaphylaxis kits) that would support pharmacy-based vaccination [35].

The significant association between years of practice as a community pharmacist and a high level of involvement in adult vaccination services by those who had been in practice for 0-9 and 10-19 years suggests that early- to mid-career pharmacists are more actively engaged in vaccination-related services, possibly due to recent educational curricula emphasising vaccination roles, greater adaptability to evolving public health responsibilities, or higher exposure to continuing professional development programs [19,35]. Pharmacists with 20–29 years of experience showed no high involvement, which may reflect reduced participation due to administrative responsibilities, limited training opportunities in adult vaccination during earlier professional education, or resistance to expanding traditional pharmacy roles [19,36,37]. A limitation of this study is that the data was self-reported, which is not without bias.

Conclusion. The study showed that a large proportion of community pharmacists in Nigeria are involved in adult vaccination services, implying that the presence of a national policy on adult vaccination for community pharmacists will enhance both coverage and efficiency of adult vaccination in Nigeria. Geopolitical location and years of professional experience significantly influenced pharmacists' engagement in adult vaccination services in Nigeria. Targeted interventions such as region-specific training, awareness programs, and policy support may therefore be essential to enhance equitable and widespread pharmacist participation in adult vaccination efforts.

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