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Assessment of perception, benefits, and barriers to community pharmacies' vaccination services in Nigeria; a cross-sectional study of two south-western states

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ABSTRACT

Background:
With the advent of the COVID-19 pandemic, community pharmacies in many countries have been designated as vaccination centres and pharmacists as vaccinators. However, limited studies in Nigeria have assessed community pharmacists' opinions on this expanded role. This study evaluated their community pharmacist's perception, perceived benefits, and potential barriers to providing vaccination services.

Methods:
A cross-sectional survey using a self-administered questionnaire on a 5-point Likert scale was conducted among 474 selected community pharmacists between March and May 2023. The instrument assessed their perception (6 indicators), perceived benefits, and potential barriers (11 indicators). Data were analysed using descriptive and inferential statistics, including independent t-test, chi-square, and paired t-test, with significance set at $p < 0.05$.

Results:
A total of 411 responses were analysed (response rate: 86.7%). Most respondents supported the involvement of community pharmacies in vaccine administration (98.8%) and the authorization of pharmacists as vaccinators (96.6%), with a high mean perception score (27.93 ± 2.77/30). Perceived benefits were also high (mean score: 51.12 ± 4.28/55), particularly improved vaccination coverage (99.5%) and increased access to vaccines (99.3%). Key barriers included lack of government authorization and unsupportive policies (85.6%) (mean barrier score: 39.96 ± 7.33/55). Perceived benefits and perception were strongly positively correlated ($r = 0.645$, $p < 0.001$).

Conclusion:
Community pharmacists in Nigeria show strong support for vaccination services in community pharmacies. Expanding their role could improve vaccine access and coverage, although policy and regulatory barriers need to be addressed.

INTRODUCTION

Pharmacy engagement in vaccine efforts dated back to the 1800s and it involved primarily the distribution of vaccine materials[1,2,3]. Community pharmacies are highly accessible and cost-effective healthcare facilities that are well positioned to enhance the capacity and efficiency of health services, thereby reducing health inequalities and improving overall health and wellbeing[4]. Community pharmacies have potential to deliver services aimed at promoting health and preventing disease[5]. The extended roles of community pharmacy in the new public health service include the provision of screening and point-of-care services, education on drug and alcohol misuse, promoting healthy lifestyles, prevention of long-term illness, and vaccination services to improve uptake and access[3,5,6].

Since the late 1990s, immunisations (e.g., for influenza or shingles) have been routinely provided in community pharmacies in the United States of America (USA)[7,8]. This practice change required the development of state policies allowing collaborative practice and agreements between physicians and pharmacists whereby pharmacists could provide an agreed scope of services[9-10]. The provision of vaccination services in community pharmacies is an important structural shift in policy and has set the environment for additional pharmacy-based public health access[7]. The International Pharmaceutical Federation (FIP) has also encouraged its member organisation to expand the regulatory scope of practice of appropriately trained and certified pharmacists to permit them to administer a broad range of vaccines beyond infancy[11] to accelerate vaccination equity, access, and sustainability[12].

In Nigeria, pharmacists through the Association of Community Pharmacists of Nigeria (ACPN) have increased their involvement in immunisation programmes to improve coverage as seen in the USA, Switzerland, Jordan, and other parts of the world, which has led to great improvement in vaccination coverage especially during the COVID-19 pandemic[13-17]. A previous study in Nigeria had considered community pharmacies as possible centres for routine immunization[18] but the implementation was not followed. A pre-COVID-19 pandemic study conducted in the south-southern zone of Nigeria by Agbo *et al.*[19] assessed the extent of participation of community pharmacists in immunization services in Calabar Metropolis only, where results showed that administration of vaccines to clients was the least immunisation services provided by the respondents aside from other services like educating clients on immunization and engaging in the mass campaign of immunisation programmes[19]. In a recent commentary by Wada *et al.*[20], the authors called for an urgent need for policy review to involve community pharmacists in immunisation services, noting that pharmacists are well-trained and have long been involved in vaccine production, research and development, safety, pharmacovigilance, storage, logistics, and distribution. The case study of community pharmacy practice during the COVID-19 pandemic could also be seen as evidence of their preparedness to be involved in vaccination services[21].

The COVID-19 pandemic period has exposed many countries including Nigeria to the involvement of community pharmacists in vaccine administration whereby community pharmacies were used as vaccination centres[13-17], hence the ACPN is working assiduously to ensure that community pharmacists and pharmacies are included in the national database as vaccinators and vaccination centres for routine immunisation in Nigeria.

While previous studies strongly agreed that pharmacists' opinions should be considered when expanding the scope of the services to the administration of vaccines to determine their readiness to take up the extended roles[22-23], some individual community pharmacists had been involved in vaccination services at different levels while the ACPN had also encouraged the training and certification of their members[19,24]. Efforts were seen among community pharmacists in Lagos and Oyo States, Nigeria in the provision of vaccination services especially during the COVID-19 pandemic which gave an added advantage for the inclusion of community pharmacies and pharmacists in COVID-19 vaccination administration by the federal government[25-26]. This study assesses the perception, perceived benefits, and barriers to community pharmacy vaccination services in Nigeria. The outcome of the study will serve as part of evidence-based studies that will show the readiness of community pharmacists to take up these extended roles and possibly facilitate the inclusion of community pharmacists as vaccinators in Nigeria.

METHODS

Study design

This study adopted a cross-sectional research design of the perception, perceived benefits, and barriers to community pharmacy vaccination services in Lagos and Oyo States, Nigeria. The study was conducted from March to May 2023 among community pharmacists.

This study is part of the study conducted by the authors to assess if the delivery of vaccination services in community pharmacies (using COVID-19 experience) can lead to improvement in vaccination coverage and possibly use the outcome to pursue policy review for the inclusion of community pharmacists in the national database for routine immunisation in Nigeria.

Study area

Lagos and Oyo States are two major states out of the six states in south-west Nigeria. Though it is the smallest state in Nigeria by size, Lagos state is the most populous state in the zone and second in Nigeria out of 36 states in Nigeria[27]. It is the economic and commercial capital of Nigeria. It consists of twenty (20) local government areas (LGAs) and has the highest urban population with sixteen (16) out of the twenty (20) LGAs. Oyo State has 33 LGAs and consists of both urban and rural communities. Ibadan which is the capital of Oyo State is the largest city in West Africa and consists of eleven (11) LGAs. It is the sixth most populated State in Nigeria according to the National Bureau of Statistics[27].

The Pharmacy Council of Nigeria (PCN) register as of December 31, 2022, showed that 44 % of registered community pharmacies and 38% of community pharmacists in Nigeria are located and practice in the southwest zone of Nigeria[28]. The largest number of community pharmacists in Nigeria practice in Lagos State while Oyo State is third on the list in southwest, Nigeria, next to Ogun State[28].

Inclusion and exclusion criteria

The study participants were licensed community pharmacists working in registered community pharmacies in Lagos and Oyo States, Nigeria. The licensure status was established with the use of PCN register of 2022. They included only superintendent pharmacists of the registered pharmacies while the study excluded community pharmacists who were not licensed with the PCN, locum, intern, and pharmacists undergoing a one-year national mandatory program. These excluded pharmacists were not fully engaged nor responsible for the activities of the pharmacies.

Sample size determination and Sampling

To select the community pharmacists for this study, the community pharmacies where they practice were the target population. The PCN register showed that in the year 2022, 1,986 and 217 community pharmacies were registered in Lagos and Oyo States respectively[28]. Using the Taro Yamane formula to determine the sample size from the population of each state as follows: $n = N/ 1+N(e)^2$, where n = sample size, N = population size, e = margin of error put at 0.05. Hence, for Lagos state, n = 333 and Oyo state n = 141, and the total sample size was 474.

A multi-stage sampling technique was employed in this study, where the population was selected in successive stages using progressively smaller sampling units. In the first stage, community pharmacies in both states were stratified based on the existing administrative zonal structure used by the Pharmacists Council of Nigeria (PCN) for regulatory and operational purposes. Lagos State is organized into 20 PCN regulatory zones, while Oyo State is divided into 5 such zones. In the second stage, simple random sampling was used to select zones. Each zone was assigned a numerical identifier, and 10 zones were randomly selected from Lagos State and 3 zones from Oyo State. In the final stage, community pharmacies within the selected zones were approached using convenience sampling. Registered pharmacists working in these selected community pharmacies constituted the study participants and were invited to complete the questionnaire.

Research Instruments

A structured, self-administered questionnaire was used for the study. The questionnaire was adopted from previous studies and modified to suit the Nigerian context[14,22,29] as attached in the supplementary file. Questions were divided into two sections. Section One surveyed the demographic characteristics of the respondents including age, gender, highest qualification, years of post-graduation experience, and state of practice among others. For Section Two, responses on the perception of respondents on vaccine services in community pharmacies, perceived benefits, and barriers of community pharmacists on vaccination service delivery in community pharmacies were received with the use of a 5-point Likert scale of "(1) strongly disagree, (2) disagree, (3) neutral, (4) agree and (5) strongly agree" for each item. Six (6) indicators were used to assess perception while perceived benefits and barriers were assessed using eleven (11) indicators each.

A group of five researchers from different areas of pharmacy practice who are research experts in public health and pharmacy administration with Ph.D and Masters degrees appraised the questionnaire for face and content validity. The questionnaire was also piloted among twenty (20) community pharmacists in a neighboring State, and the Cronbach alpha results of 0.791, 0.855 and 0.798 were obtained in the three (3) domains from the result of the pretest showed internal reliability or consistency of the survey instrument. The outcome of the pretest study was used to modify few questions before it was distributed to the respondents.

Data Collection Procedure

Researchers and field assistants were involved in the distribution of the self-administered questionnaire. Both hard copies of the questionnaire and Google form, developed by the researchers were used. From the researchers' experience, the fast-paced lifestyle of many

Lagosians mostly results in low response rates, and community pharmacists in Lagos State often have busy schedules, limited time to participate, and, may not prioritize completing surveys. They are mostly bombarded with numerous surveys leading to questionnaire fatigue. Due to this peculiarity of Lagos State, hard copies of the questionnaire were used and the distribution was targeted at the association of community pharmacists' monthly meetings in the zones and in their pharmacies where only one registered pharmacist is surveyed per pharmacy. While in Oyo State, the association of community pharmacists' platform was used to distribute the Google form and reminders were given at interval till the adequate responses were received. This encouraged responses from the participants. The trained research assistants for the study were sent out to distribute the questionnaire. They were allocated a specified number of questionnaires daily and reviewed for completion by the Researchers. Some of the hard copies were retrieved immediately while some required follow-up through text messages before they were retrieved at the agreed time by both the respondents and the research assistants whenever the pharmacist was busy or not on duty.

Data Analysis

The hard copies of the questionnaire received were coded and entered into the Excel spreadsheet with those received through Google form. The data were then exported from Excel to IBM Statistical Package for Social Sciences (SPSS) software (version 23). Categorical variables were presented as frequencies and percentages while continuous variables were presented as means and standard deviations. The demographic variables were analysed both for total sample and by respondents' state of practice. A test of association (Chi-square test) was used to examine associations between categorical variables (i.e. gender, highest qualification, employment status, type of pharmacy, respondents that had undergone vaccination training, and provide vaccination services) and state of practice. An independent t-test was done for continuous dependent variables (i.e. age, years of post-graduation experience, and years community pharmacy experience) to compare the means differences between the two states, with statistical significance set at $p < 0.05$.

Perception, benefits, and barriers to community pharmacy vaccination services were analysed on a 5-point Likert scale scored as "strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, and strongly agree= 5. With the highest score for each indicator, neutral points were taken to be the midpoint between the minimum and maximum scores**.** The midpoint of the scale was calculated as the average of the minimum and maximum scores [(1 + 5) / 2 = 3], corresponding to the neutral response.

Responses on strongly agree and agree were taken as positive responses while the midpoint scores above 3 were taken as positive for individual responses for each indicator. For overall perception indicators, the minimum score was 6 and the maximum score 30 while for both benefits and barriers, the minimum score of 11 and maximum score of 55 were obtainable. The midpoint score was calculated for perception indicators as 18. Hence, scores above 18 was taken as a positive/high perception while less than 18 was taken as a negative/low perception. Similar computation was done for both benefits and barrier indicators with midpoint score of 33.

Paired t-tests was used to compare the mean differences between the following: perception and perceived benefits scores; perception and perceived barriers scores; and perceived benefits and potential barriers scores. Independent t-tests and one-way analysis of variance (ANOVA) were used to assess differences in mean perception, perceived benefits, and potential barrier scores across respondents' sociodemographic characteristics. Independent t-tests and one-way analysis of variance (ANOVA) were used based on the number of categories within each sociodemographic variable. The independent t-test was applied when comparing mean scores between two groups (e.g., gender, provision of vaccination services), while one-way ANOVA was used for variables with more than two categories (e.g., level of education, employment status, type of pharmacy). This approach is appropriate for assessing differences in continuous outcome variables across categorical groups. The p-value < 0.05 was considered significant.

Ethical considerations

Institutional ethics approval was sought and obtained from the ethical committee of the Ministry of Health, Oyo State with reference no. AD 13/479/301. Also, the written consents of the respondents were taken before they answered the questions. The first page of the questionnaire introduced the survey and a consent form to be signed by the respondents before the commencement of the study.

RESULTS

Out of the 474 respondents, 411 responses were received and analysed, giving a response rate of 86.7%. **Table 1** shows the sociodemographic characteristics of the total respondents and is based on the two States under study. The mean age of all the respondents was 43.06$\pm$ 13.09 years. Most of the respondents were male (220, 52.6%), had B.Pharm/B.Sc Pharm as the highest degree (265, 64.5%),

were pharmacy owners (216, 52.6%) and working in independent pharmacies (358, 87.1%). Responses also showed that 165 (40.1%) of the respondents had undergone vaccination training while 129 (31.4%) were providing vaccination services.

Table 1: Demographic characteristics of respondents

Variable	Total respondents N=411	Lagos State N=296	Oyo State N=115	X^2 test / t-test	p-value
Age (year)					
Mean ± SD	43.06 ±13.09	41.71±12.32	46.53±14.39	-3.396	0.001*
Gender				2.689	0.101
Male	220(53.5%)	151(51.0%)	69(60.0%)		
Female	191(46.5%)	145(49.0%)	46(40.0%)		
Highest level of education				8.225	0.084
B.Pharm/ B.Sc. Pharm	265(64.5%)	193(65.2%)	72(62.6%)		
Pharm. D	23(5.6%)	20(6.8%)	3(2.6%)		
Master's degrees	90(21.2%)	64(21.6%)	26(22.6%)		
Fellow WAPCP	27(6.6%)	17(5.7%)	10(8.7%)		
Ph.D	6(1.5%)	2(0.7)%)	4(3.5%)		
Years post-graduation experience					
Mean ± SD	17.61 ±12.58	16.41±12.06	20.72±13.43	-3.154	0.002*
Years community pharmacy experience					
Mean ± SD	12.39 ±10.20	11.58± 9.46	14.46±11.68	-2.585	0.010*
Employment status				8.906	0.003*
Employee pharmacists	195 (47.4%)	154(52.0%)	41(35.7%)		
Pharmacy owners	216 (52.6%)	142(48.0%	74(64.3%)		
Type of pharmacy				8.380	0.004*
Chain	53(12.9%)	47(15.9%)	6(5.2%)		
Independent	358(87.1%)	249(84.1%)	109(4.8%)		
Undergone vaccination training				0.738	0.390
Yes	165(40.1%)	115(38.9%)	50(43.5%)		
No	246(59.9%)	181(61.1%)	65(56.5%)		
Provide vaccination services				1.349	0.245
Yes	129(31.4%)	88(29.7%)	41(35.7%)		
No	282(68.6%)	208(70.3%)	74(64.3%)		

Footnote: SD: Standard deviation; X^2 test= Chi-square test; * significant at <0.05 p-value

The perception of respondents on vaccination services in community pharmacies is presented in Table 2. Overall, there was a high level of agreement with the perception indicators, with over 90% of respondents supporting community pharmacy involvement in vaccination services. The mean perception score (27.93 ± 2.77 out of 30) further indicates a strong positive disposition toward this role. Notably, a statistically significant difference between the two states was observed for the item on 'community pharmacists should be given the authority to administer vaccines' (p=0.027).

Table 2: Perception of respondents regarding vaccination services in community pharmacies

S/N	Response theme (RT)	Total respondents (Strongly agree/ Agree) N=411 F (%)	Mean score	S.D.	Lagos State (Strongly agree/ Agree) N= 296 F (%)	Oyo State (Strongly agree/ Agree) N= 115 F (%)	State of practice p-value
1	Community pharmacies should be involved in administration of vaccines	406(98.8)	4.73	0.48	293(99.0)	113(98.3)	0.382
2	Community pharmacies should be designated as vaccination centres	393(95.6)	4.62	0.61	280(94.6)	113(98.3)	0.139
3	Community pharmacists should be given the authority to administer vaccines	397(96.6)	4.66	0.58	284(95.9)	113(98.3)	0.027*
4	Community pharmacy/ pharmacists' services during the COVID-19 pandemic influenced the inclusion of community pharmacists as COVID-19 vaccine service providers	378(92.0)	4.52	0.69	269(90.9)	109(94.8)	0.164
5	Community pharmacies / pharmacists should be captured in the national database to offer vaccination services beyond just COVID-19 vaccination	403(98.1)	4.70	0.54	291(98.3)	112(97.4)	0.124
6	Community pharmacies inclusion into the national data as vaccinator is a welcomed development	405(98.5)	4.71	0.52	293(99.0)	112(97.4)	0.080
	Total mean score (30)		**27.93**	**2.77**			
	Average score	**96.6%**	**4.65**	0.46			

Footnote: Scale of 1-5: Strongly agree= 5, Agree= 4, Neutral = 3, Disagree=2, Strongly disagree=1. S.D. = Standard deviation; * significant at < 0.05 p-value.

Table 3 presents the perceived benefits of using community pharmacies as vaccination centres. Overall, respondents demonstrated a high level of agreement with the benefit indicators, with over 90% supporting the role of community pharmacies in improving vaccination services. The mean benefit score (51.12 ± 4.28 out of 55) reflects a strong positive perception. A statistically significant difference between the two states was observed only for the item on improving vaccination coverage in Nigeria ($p = 0.041$).

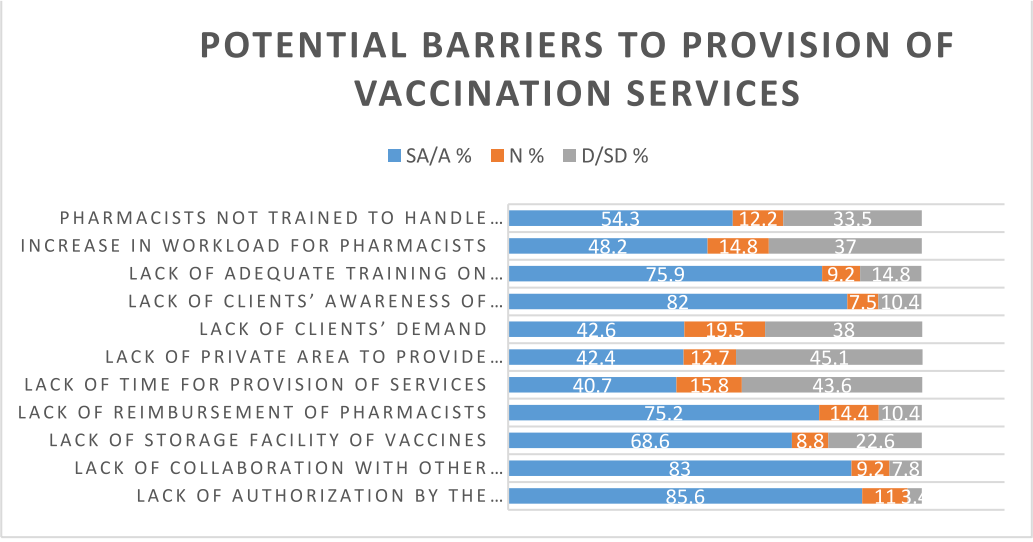
Table 3: Perceived benefits of community pharmacies as vaccination centers

S/N	Response theme (RT)	Total respondents (Strongly agree/ Agree) N=411 F (%)	Mean score	S.D.	Lagos State (Strongly agree/ Agree) N= 296 F (%)	Oyo State (Strongly agree/ Agree) N= 115 F (%)	State of practice p-value
1	Improve the provision of pharmaceutical care service and rational use of medicines	405(98.5)	4.71	0.54	292(98.6)	113(98.3)	0.321
2	Increase accessibility to vaccines	408(99.3)	4.78	0.44	293(99.0)	115(100.0)	0.564

3	Improve vaccination coverage in Nigeria	409(99.5)	4.79	0.43	295(99.7)	114(99.1)	0.041*
4	Reduce vaccine hesitancy	384(93.4)	4.52	0.70	277(93.6)	107(93.0)	0.401
5	Increase patronage of community pharmacies	382(92.9)	4.48	0.67	275(92.9)	107(93.0)	0.928
6	As evidence-based for inclusion of community pharmacies as primary health care provider	401(97.6)	4.64	0.55	288(97.3)	113(98.3)	0.516
7	Reduce workload in health care facilities	378(92.0)	4.56	0.66	273(92.2)	105(91.3)	0.664
8	Increase knowledge of community pharmacists on vaccination services	403(98.1)	4.73	0.49	288(97.3)	115(100.0)	0.229
9	Improve vaccine knowledge and awareness in rural areas	392(95.4)	4.64	0.59	283(95.6)	109(94.8)	0.826
10	A means of support to healthcare system through administration of vaccine	402(97.8)	4.66	0.55	288(97.3)	114(99.1)	0.112
11	Increase professional satisfaction	397(96.6)	4.61	0.58	288(97.3)	109(94.8)	0.457
	Total mean score (55)		**51.12**	**4.28**			
	Average score	**96.5%**	**4.65**	**0.39**			

Footnote: Scale of 1-5: Strongly agree= 5, Agree= 4, Neutral = 3, Disagreed=2, Strongly disagreed=1. S.D. = Standard deviation; * significant at <0.05 p-value.

Responses to the potential barriers to the provision of vaccination services in community pharmacies as vaccination centres are shown in **Figure 1**. Based on the 11 indicators measured, less than 50% of respondents were in agreement that an increase in workload for pharmacists (48.2%), lack of clients' demand (42.6%), lack of private areas to provide vaccination service (42.4%) and lack of time for provision of services (40.7%) could be the barrier to provision of vaccination services in community pharmacies while over 50% of the respondents agreed and strongly agreed to the other 7 indicators measured. These include lack of authorization by the government/ existing policy not in support of the service (85.6%), lack of collaboration with other healthcare professionals (83.0%), lack of clients' awareness of community pharmacy involvement in the service (82.0%), lack of adequate training on vaccination (75.9%) among others.



SA/A = Strongly agree/Agree, N = Neutral, D/SD = Disagreed/Strongly disagreed

Figure 1: Potential barriers to provision of vaccination services in community pharmacies as vaccination centres

An overall average score of 63.5% of respondents agreed and strongly agreed with the potential barrier indicators measured with a total mean score of 39.96 ± 7.33 (range of 11-55; midpoint 33), out of a total score of 55 (minimum score= 19 and maximum score=55 obtainable). A statistically significant relationship was found between perceived barriers RT5; lack of time for provision of services (p=0.013) and RT7; lack of clients' demand (p=0.046) between the two States (**Table 4**).

Table 4: Potential Barriers to Providing Vaccination Services in Community Pharmacies

S/N	Response theme (RT)	Total respondents (Strongly agree/ Agree) N=411 F (%)	Mean score	S.D.	Lagos State (Strongly agree/ Agree) N= 296 F (%)	Oyo State N= 115 (Strongly agree/ Agree) F (%)	State of practice p-value
1	Lack of authorization by the government/ existing policy not in support of the service	352(85.6)	4.31	0.81	257(86.8)	95(82.6)	0.329
2	Lack of collaboration with other healthcare professionals	341(83.0)	4.11	0.90	253(85.5)	88(76.5)	0.270
3	Lack of storage facility of vaccines	282(68.6)	3.78	1.22	204(68.9)	78(67.8)	0.669
4	Lack of reimbursement of pharmacists	309(75.2)	4.01	1.03	225(76.0)	84(73.0)	0.264
5	Lack of time for provision of services	167(40.6)	3.07	1.27	119(40.2)	48(41.7)	0.013*
6	Lack of private area to provide vaccination service	174(42.3)	3.08	1.27	131(44.3)	43(37.4)	0.063
7	Lack of clients' demand	175(42.6)	3.11	1.17	127(42.9)	48(41.7)	0.046*
8	Lack of clients' awareness of community pharmacy involvement in the service	337(82.0)	4.07	0.96	237(80.1)	100(87.0)	0.272
9	Lack of adequate training on vaccination	312(75.9)	3.90	1.05	229(77.4)	83(72.2)	0.647
10	Increase in workload for pharmacists	198(48.2)	3.20	1.19	144(48.6)	54(47.0)	0.296
11	Pharmacists not trained to handle needles	223(54.3)	3.33	1.29	169(57.1)	54(47.0)	0.168
	Total mean score (55)		**39.96**	**7.32**			
	Average score	**63.5%**	**3.63**	**0.67**			

Footnote: Scale of 1-5: Strongly agree= 5, Agree= 4, Neutral = 3, Disagreed=2, Strongly disagreed=1. S.D. = Standard deviation; * significant at < 0.05 p-value.

The results of the paired t-test are presented in Table 5. There was a strong, positive correlation between overall perceived benefits and perception of vaccination services ($r = 0.645$, $p < 0.001$), alongside a significant difference between the two variables ($t_{410} = 143.669$, $p < 0.001$), with perceived benefit scores averaging 23.20 points higher than perception scores (95% CI: 22.88–23.51). In contrast, perceived benefits and potential barriers showed a weak, non-significant positive correlation ($r = 0.073$, $p > 0.05$), although a significant mean difference was observed ($t_{410} = 27.575$, $p < 0.001$), with benefit scores higher by an average of 11.17 points (95% CI: 10.37–11.96). Similarly, potential barriers and perception demonstrated a weak, negative, and non-significant correlation ($r = -0.061$, $p > 0.05$). However, a significant difference existed between the two ($t_{410} = 30.537$, $p < 0.001$), with barrier scores exceeding perception scores by an average of 12.03 points (95% CI: 11.26–12.81).

Table 5: Paired differences of perception, benefits and barriers to vaccination services in community pharmacies

Paired Variables	Mean	SD	Correlation (r)	Paired differences 95% CI		t-test	p-value
				Lower	Upper		
Benefits - Perception	**23.20**	**3.27**	**0.645**	**22.88**	**23.51**	**143.669**	<0.001
Benefits - Barrier	**11.17**	**8.21**	**0.073**	**10.37**	**11.96**	**27.575**	<0.001
Barriers - Perception	**12.03**	**7.99**	**-0.061**	**11.26**	**12.81**	**30.537**	<0.001

Factors associated with perception, perceived benefits, and potential barriers are presented in Table 6. State of practice, employment status, training received, level of education, and provision of vaccination services were significantly associated with respondents' perception of vaccination services in community pharmacies, whereas gender and type of pharmacy showed no significant association ($p > 0.05$). Similarly, employment status, training received, level of education, and provision of vaccination services were significantly associated with perceived benefits of using community pharmacies as vaccination centres ($p < 0.05$). In addition, employment status, training received, and provision of vaccination services were significantly associated with perceived barriers to the provision of vaccination services in community pharmacies ($p < 0.05$).

Table 6: Factors associated with perception, perceived benefits, potential barriers and sociodemographic variables

Variable	Total respondents	Test	Perception (Mean ± SD / t or F)	p-value	Perceived Benefits (Mean ± SD / t or F	p-value	Potential Barriers (Mean ± SD / t or F)	p-value
Gender: Male	220	t-test	t= -0.426	0.670	t= -1.954	0.051	t= 0.579	0.563
Female	191							
State of practice:		t-test	t= -2.088	0.037*	t= -1.200	0.231	t= 1.657	0.098
Lagos	296							
Oyo	115							
Type of pharmacy:		t-test	t= 0.326	0.745	t= -0.427	0.670	t= 0.727	0.468
Chain	53							
Independent	358							
Employment status:		t-test	t= -3.129	0.002*	t= -2.536	0.012*	t= -2.333	0.020*
Employee pharmacist	195							
Pharmacist owner	216							
Highest level of education:		ANOVA	F= 2.976	0.019*	F= 2.548	0.039*	F= 0.289	0.885
B.Pharm/ B.Sc. Pharm								
Pharm. D	265							
Master's degrees	23							
Fellow WAPCP	90							
Ph. D	27							
	6							
Undergone vaccination training:		t-test	t= 4.191	<0.001*	t = —	0.003*	t = —	0.001*
Yes	165							
No	246							
Provide vaccination services:		t-test	t= 4.045	<0.001*	t = —	0.001*	t = —	0.000*
Yes	129							
No	282							

Footnote: * significant at <0.05 p-value; t-value (for t-test); F-value (for ANOVA)

DISCUSSION

This study assessed the perception of community pharmacists on vaccination services, the perceived benefits and potential barriers to provision of the services in community pharmacies. The study revealed that many community pharmacists agreed that vaccination services should be rendered in community pharmacies. The respondents also agreed on the perceived benefits of providing vaccination services in their pharmacies while they opined that some barriers still exist in the provision of the services in their pharmacies.

Most of the respondents were male. This is similar to previous studies in Nigeria[19,30]. The mean age of respondents is also similar to other previous studies[31,32]. B. Pharm has been the first degree in Nigeria for over forty (40) years in Nigerian universities and other parts of the world until recently when Pharm. D was introduced. Hence, most of the respondents have B.Pharm. as the highest level of education in compliance with other previous studies[19,34]. Most of the respondents also work at independent pharmacies as in previous studies[14,34]. There are statistically significant differences in the mean age and years of community pharmacy working experience between the two

States under study similar to the study in four Balkan countries where pharmacists from Albania were younger and less experienced than those from Bulgaria, Romania, or Serbia[29]. The differences in responses among the older and more experienced Oyo participants suggest that experience influences practice and perceptions. While less than half of the respondents had undergone vaccination training similar to Alnahar *et al.*[34] study, there was no significant difference between the two States.

Respondents' views that community pharmacies should be involved in vaccine administration and designated as vaccination centres, that such involvement would improve vaccination coverage in Nigeria, and that community pharmacists should be authorized to administer vaccines are consistent with findings from previous studies among community pharmacists[31,34].

This study showed that community pharmacists are ready to provide vaccination services beyond the COVID-19 vaccine in tandem with a review by Teo *et al.*[31]. During the COVID-19 pandemic, because of the need to increase COVID-19 vaccination coverage in Nigeria, community pharmacies and pharmacists were included in the delivery of COVID-19 vaccines in some States in Nigeria[25]. Respondents in this study perceived that their services and involvement in COVID-19 vaccination should be an influencing factor to their inclusion in the national database to offer vaccination services as vaccinators beyond just COVID-19 vaccination. This is evidence that community pharmacists are willing to expand their services as vaccinators and have positive attitude towards their inclusion among vaccination service providers.

Community pharmacies have been recognised as the most accessible location for patient care[13] while community pharmacists are considered well-trained healthcare professionals who can be involved in the administration of vaccines[14,35-36]. An earlier study conducted in Nigeria in 2008 among community pharmacists showed that 95.3% of community pharmacists expressed interest in the use of their pharmacies as routine immunisation centres[18]. In this study, an overall 96.5% of the respondents agreed and strongly agreed to the perceived benefits of using community pharmacies as vaccination centres with reasons that it will increase vaccination coverage rate, reduce the workload of the healthcare system and serve as additional service to the patient as well as more convenient to patient/consumers, increase pharmacist's knowledge and professional satisfaction and role advancement among pharmacists similar to previous studies[14,31,34,37].

Although most of the respondents agreed that community pharmacies should be involved in the administration of vaccine, only one-third of the respondents are currently providing vaccination services. This could be due to the potential barriers identified in this study.

In this study, the potential barriers to the provision of vaccination services in community pharmacies as vaccination centres agreed with other previous studies include lack of awareness among the patients, lack of collaboration with other healthcare professionals, lack of adequate training for the community pharmacists, time, workload and legislation and legal liability[14,22,29,31,35,38]. In this study, less than 50% of the respondents indicated that lack of time for the provision of services, lack of private area to provide vaccination service, lack of clients' demand, and increase in workload for pharmacists as major potential barriers to provision of vaccination services in community pharmacies as vaccination centres. This is an indication that the respondents have positive attitudes and showed readiness to provide the services in their pharmacies as shown in previous studies that facilities are suitable for provision of vaccination services and those that do not have suitable facilities were willing to have one[34]. Regardless, three-quarter of the respondents still recognise lack of reimbursement of pharmacists as a potential barrier to the service similar to some earlier studies where they showed interest in having additional fees for vaccination services provided[18,34].

Limitations

This study was conducted in two out of the 36 States in Nigeria which might limit the generalisability of the study even though the States were purposefully selected for the study. Their inclusion was informed by the notable involvement of community pharmacists in providing vaccination services during the COVID-19 pandemic. This context also positioned community pharmacies in these states to benefit from federal government support for COVID-19 vaccine administration. Though pretested, the questionnaire might not have captured all relevant variables on the perception, perceived benefits and barriers to provision of vaccination services in community pharmacists, thus, limiting the depth of data collected. Also, responses may be affected by acquiescence and social desirability biases, as participants may tend to agree with statements or provide answers they perceive as socially acceptable rather than their true views. The use of a multi-stage sampling technique may have introduced selection bias, as sampling at different stages could limit representativeness and affect the generalisability of the findings.

CONCLUSION

The study revealed that community pharmacists were in

agreement with the perception that vaccination services should be rendered in community pharmacies and that community pharmacists should be given the authority to administer vaccines. The respondents agreed that the delivery of vaccination services in community pharmacies can lead to increased accessibility to vaccines and improvement in vaccination coverage in Nigeria. The respondents further agreed that lack of authorization by the government together with an existing policy that is not in support of the service, lack of collaboration with other healthcare professionals, and lack of reimbursement of community pharmacists providing services as the most recognised perceived barriers to the provision of the services.

Inclusion of community pharmacies and pharmacists in the national database as vaccination centres and vaccinators to offer vaccination services beyond just COVID-19 vaccination and the government authorisation needs to be handled at the policy-making level.

Further study will describe the delivery of vaccination services in community pharmacies using the COVID-19 experience and how their involvement had impacted vaccination coverage in Nigeria.

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