Original Research

Nigerian pharmacists' self-perceived competence and confidence to plan and conduct pharmacy practice research

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Abstract

Background: Recent studies have revealed that pharmacists have interest in conducting research. However, lack of confidence is a major barrier.
Objective: This study evaluated pharmacists' self-perceived competence and confidence to plan and conduct health-related research.
Method: This cross sectional study was conducted during the 89th Annual National Conference of the Pharmaceutical Society of Nigeria in November 2016. An adapted questionnaire was validated and administered to 200 pharmacist delegates during the conference.
Result: Overall, 127 questionnaires were included in the analysis. At least 80% of the pharmacists had previous health-related research experience. Pharmacist's competence and confidence scores were lowest for research skills such as: using software for statistical analysis, choosing and applying appropriate inferential statistical test and method, and outlining detailed statistical plan to be used in data analysis. Highest competence and confidence scores were observed for conception of research idea, literature search and critical appraisal of literature. Pharmacists with previous research experience had higher competence and confidence scores than those with no previous research experience (p<0.05). The only predictor of moderate-to-extreme self-competence and confidence was having at least one journal article publication during the last 5 years.
Conclusion: Nigerian pharmacists indicated interest to participate in health-related research. However, self-competence and confidence to plan and conduct research were low. This was particularly so for skills related to statistical analysis. Training programs and building of Pharmacy Practice Research Network are recommended to enhance pharmacist's research capacity.

Keywords

Pharmacists; Clinical Competence; Pharmacy Research; Pharmaceutical Services; Attitude of Health Personnel; Cross-Sectional Studies; Nigeria

INTRODUCTION

In the last century, pharmacy profession has undergone transformation from the traditional system of compounding and dispensing medicine through drug information services to patient care oriented services that focus on achieving maximum therapeutic benefit with minimal or no harmful effect(s).[1-4] As a result, the concept of "Seven-star pharmacist" was introduced two decades ago to recommend the minimum skills required by pharmacist to meet the expanding and dynamic role of pharmaceutical services in the healthcare system. The 'Seven-star pharmacist' was described as a care giver, a decision maker, a communicator, a leader, a manager, a life-long learner, and an educator.[5] The concept of 'Seven-star pharmacist' was revised and expanded to accommodate two additional roles (researcher and entrepreneur). This led to the introduction of the concept of 'Nine-star pharmacist'.[6] As a researcher, pharmacists are

expected to undertake research to improve patient care. In addition, pharmacist must be able to appraise evidence in literature to provide relevant health information to patients and other healthcare providers.

Pharmacy practice research was critical to the advancement of pharmacy profession in the last few decades.[7,8] Research has shown the impact of pharmacists in improving medication adherence and therapeutic outcomes.[1,8] Regardless of area of specialization, pharmacists need to conduct research to synthesize new knowledge and integrate research outcomes into patient care.[2,9,10] Thus, pharmacist participation in high-quality, practice-based research is strongly encouraged. Undergraduate training provides the basic skills for research. This is further enhanced through postgraduate and continuing education programs.[10] Sound knowledge of research design and biostatistics are needed to facilitate pharmacist participation and implementation of research outcomes into patient care. However, there is lack of curricular and standard in both undergraduate and postgraduate training to emphasize the development of such skills.[10]

Training pharmacy students and pharmacists regarding various components of research and undertaking research projects will enhance research skills. Research experience during training provokes critical thinking and stimulates interest in future research. In addition, it increase time and research project management skills, and promotes

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collaboration and team work.[10] Recent studies have shown that pharmacists recognize the importance of practice-based research. There is growing interest to participate in practice-based research among pharmacists.[11-13] However, interest to participate in research is not enough and does not necessarily translates into ability to design and conduct research. This theory is supported by studies that demonstrated inadequate knowledge of research design[8,9,14] and low publication rate among practicing pharmacists.[9,13,15]

There are several barriers to Pharmacist's participation in research and scientific publication. These include: lack of time and job support[2,7-9,12,14], lack of research experience[2,12], lack of adequate training/inadequate knowledge[9,13], financial constraints[9,13], lack of curricular and postgraduate training standard, and lack of mentorship.[10] Addressing these challenges will improve pharmacist's participation in research and ultimately increase the synthesis and dissemination of new knowledge.[10] However, it is important to understand the nature and the magnitude of the problem in different settings. This will guide the design and implementation of suitable interventions. A recent study found that pharmacists in Nigeria are willing to participate in pharmacy practice research. The authors revealed that inadequate knowledge was a major barrier and the respondents indicated the need for additional training in research design and biostatistics.[13] This study explores pharmacists' self-competence and confidence to design and conduct pharmacy practice research. The objectives of this study are (1) to explore the research background and publication rate of pharmacists in Nigeria; (2) to determine and rank the self-reported competence and confidence scores of pharmacists; (3) to compare the competence and confidence scores between pharmacists with previous research experience and those with no research experience; (4) to examine pharmacist's preferences for postgraduate training programs to build their research capacities.

METHODS

Study design

This was a cross sectional study conducted among Nigerian pharmacists. The study was conducted during the 89th Annual National Conference of the Pharmaceutical Society of Nigeria in November 2016.

Study population

Pharmaceutical Society of Nigeria (PSN) is the umbrella association of all registered pharmacists in Nigeria. PSN organizes annual national conference to gather pharmacists from all fields of practice (hospital, community, academia, administration and industry) across the country to discuss issues related to the profession. The 89th Annual National Conference was held between 7th and 12th November 2016. The conference was attended by about 1,000 delegates. All pharmacist delegates attending the conference were considered for inclusion. Pharmacists who decline to participate were excluded from the study. A convenient sampling method was used. A total of two

hundred (200) questionnaires were distributed to delegates during the conference.

Instrument for data collection

The questionnaire used for the study was developed by Awaisu et al.[9] Permission to use the survey was obtained from the corresponding author. The demographic information section was adjusted to suit Nigerian setting. The adapted questionnaire was validated by five Pharmacists. In the end, the questionnaire consists of 64-item and six sections (demographic, research background and interest, barriers to participation, self-assessment of competence and confidence to conduct research, and postgraduate training interest and preference).

Data collection

Two hundred questionnaires were distributed to pharmacists during the conference. The Principal investigator approached the pharmacists and explained the objectives of the study. The survey was administered to pharmacists who gave consent for participation. Respondents were informed that their participation was voluntary and their response will remain confidential and anonymous. Participants were given the choice to fill the questionnaire at the time they were administered or return later by hand. Completed questionnaire were retrieved from the participants before the end of the conference.

Data analysis

The data were analyzed using IBM SPSS version 24. Categorical variables were presented as frequency and percentage. Continuous variables were presented as mean and standard deviation. A 5-point semantic-differential scale was used to determine self-perceived competence and confidence of pharmacists to plan and conduct research. The responses were transformed into scores as follow: 5, 4, 3, 2 and 1 point was assigned to participants who indicated "extremely competent", "very competent",

Table 1. Demographic characteristics of the pharmacists		
Variable	**Frequency**	**Percentage**
Gender[c]		
Male	90	70.9
Female	34	26.8
Age[b]		
21 – 30	35	27.6
31 – 40	28	22.0
41 – 50	34	26.8
> 50	28	22.0
Highest degree[a]		
Bachelor of Pharmacy	79	62.2
Doctor of Pharmacy	7	5.5
Masters	34	26.8
PhD	6	4.7
Area of practice		
Hospital	64	46.7
Community	28	20.4
Academic	16	11.7
Administration	19	13.9
Industry	10	7.3
Years of experience		
1 - 5 years	52	40.9
6 - 10 years	20	15.7
11 - 15 years	16	12.6
> 15 years	39	30.7
a = 1 missing data, b = 2 missing data, c = 3 missing data		

Table 2. Research background and interest of Nigerian pharmacist in conducting health-related research		
Variable	**Frequency**	**Percentage**
Previous research experience [c]		
Yes	101	79.5
No	23	18.1
Previous research related training		
No training	32	24.4
Workshop	28	21.4
Seminar	42	32.1
Short course	18	13.7
Undergraduate training	6	4.6
Postgraduate training	5	3.8
Interest in conducting health-related research[a]		
Not interested at all	1	0.8
Not very interested	3	2.4
Somewhat interested	19	15.0
Very interested	81	63.8
Extremely interested	22	17.3
Interest in learning about conducting health-related research		
Somewhat interested	13	10.2
Very interested	82	64.6
Extremely interested	32	25.2
Overall ability to design and conduct health-related research[a]		
Poor	8	6.3
Fair	31	24.4
Good	61	48.0
Very good	18	14.2
Excellent	8	6.3
Involvement in research as a subject or a respondent[a]		
Never	14	11.0
Sometimes	52	40.9
Often	29	22.8
Usually	20	15.7
Always	11	8.7
Involvement in research as a principal investigator or co-investigator[f]		
Never	34	26.8
Sometimes	45	35.4
Often	18	14.2
Usually	11	8.7
Always	10	7.9
Number of peer-reviewed journal articles published within the last 5 years[e]		
0	77	60.6
1 − 3	34	26.8
>4	11	8.7
Number of peer-reviewed posters and/or abstracts in local/regional conference since last 5 years[c]		
0	84	66.1
1 − 3	32	25.2
>4	8	6.3
Number of peer-reviewed posters and/or abstracts in international conference since last 5 years[d]		
0	101	79.5
1 − 3	16	12.6
> 4	6	4.7
a = 1 missing datum, c = 3 missing data, d = 4 missing data, e = 5 missing data, f = 9 missing data		

"moderately competent", "not very competent" and "not competent at all" respectively. The same scoring system was used to transform responses in the confidence domain.

The scores were used to compute the mean score for each item in the competence and confidence domain. The overall competence and confidence scores were calculated as the average of the scores of the items in each domain. Student t-test was used to compare the mean scores between pharmacists with and those without previous research experience. Normality of the continuous data was tested using Kolmogorov-Smirnov test. The mean score of items in the research competence and confidence domains were ranked to determine the lowest and the highest scores. This was used to identify specific research skills

participants were most and least competent or confident to undertake, respectively. P-values lower than 0.05 were considered statistically significant.

Logistic regression analysis was used to determine factors that predict moderate-to-extreme self-competence and confidence scores. First the overall competence and confidence scores were categorized into two groups: 3 − 5 points were labelled as moderate-to-extreme self-competence and confidence while scores below 3 were defined as not competent and confident. The independent variables were transformed into dichotomous variables as follows; 1 and 0 for presence and absence of characteristics of interest respectively.

Table 3. Barriers to pharmacist participation in health-related research

Barrier	Frequency	Percentage
Lack of funds	82	36.4
Lack of job support	53	23.6
Lack of time	48	21.3
Inadequate knowledge	25	11.1
Lack of interest	6	2.7
No barrier	5	2.2
Others	6	2.7

RESULTS

A total of 144 pharmacists returned the survey (72% response rate). However, 17 questionnaires were excluded from analysis because respondents did not answer more than 30% of the questions [8]. In the end 127 questionnaires were included in the analysis and the majority was male (70.9%) respondents. Only 40 pharmacists (31.5%) had a postgraduate degree (Masters and Doctor of Philosophy). Table 1 illustrates the demographic characteristics of the participants.

Table 2 shows that 79.5% of the pharmacists had previous research experience. In addition, 96.1% indicated interest to design and conduct health-related research. All the participants indicated interest to learn about health-related research. About 68.5% of the pharmacists rated their ability to design and conduct research as good to excellent. The publication rate of pharmacist was low; 60.6% had no article published in a peer review journal in the last 5 years. Table 2 shows the research background and interest of Nigerian pharmacists in conducting health-related research.

Several barriers to pharmacist participation in health-related research were identified. Lack of fund was the most common barrier (36.4%). This was followed by lack of job support (23.6%), lack of time (21.3%) and inadequate knowledge (11.1%). Table 3 shows the barriers to pharmacist participation in health-related research.

At least 70% of the pharmacists rated themselves as moderately to extremely competent and confident to plan and conduct health-related research (i.e. from conception of idea to writing a manuscript for publication in a journal). It is important to note that less than 10% of the pharmacists rated themselves as extremely competent and confident to undertake research. Overall, high competence scores were observed for ability to search literature efficiently (3.5; SD=0.9); prepare poster or oral presentation (3.4; SD=1.0); and conceive research idea (3.3; SD=0.8). In contrast, pharmacist's competence scores in the following skills were low: perform statistical analysis using software (2.6; SD=1.0); choose and apply appropriate inferential statistical test and method (2.6; SD=0.9); and outline detailed statistical plan for data analysis (2.8; SD=0.8). (Online supplementary material).

Pharmacists with Previous Research Experience (PRE) had significantly higher competence score in the following skills: conception of research idea, literature search and review, formulate research hypothesis and research question, compared to pharmacists with No Previous Research Experience (NPRE) (p<0.05). In addition, pharmacists in the PRE group had significantly higher overall competence score than those in the NPRE group (3.2; SD=0.7 versus 2.6; SD=0.7; p=0.001). Table 4 illustrates the competence scores for all the pharmacists, and comparison of competence score between PRE and NPRE groups. Multiple logistic regression analysis showed that publication of article in peer review journal during the last five years was the only predictor of moderate-to-extreme self-competence (OR: 6.8; 95%CI: 1.977 – 23.537; p=0.002). Gender, years of experience, previous research experience, previous research related training, having an abstract in local/regional or international conference were not significant predictors of moderate-to-extreme self-competence score (online supplementary material).

Table 4. Competence scores of Pharmacists for components of research	Mean competence score (SD)			p-value
Competence domain	**All participants**	**PRE group**	**NPRE group**	
Conception of research idea	3.3 (0.8)	3.5 (0.7)	2.6 (1.0)	0.001
Searching the literature efficiently	3.5 (0.9)	3.7 (0.6)	2.7 (1.3)	0.002
Critically reviewing research literature	3.1 (1.0)	3.3 (0.8)	2.6 (1.2)	0.002
Formulating research hypotheses and research questions	2.9 (1.0)	3.1 (0.9)	2.3 (0.9)	0.002
Proposing appropriate study designs/methods	3.0 (0.8)	3.0 (0.8)	2.5 (0.7)	0.008
Writing research proposal or developing a protocol	2.9 (1.0)	3.0 (1.0)	2.5 (1.2)	0.049
Defining target population, sample and eligibility criteria	3.2 (0.8)	3.4 (0.7)	2.6 (1.0)	<0.0001
Determine appropriate sample size	3.2 (0.8)	3.3 (0.8)	2.6 (0.8)	0.001
Choosing an appropriate sampling technique (e.g. random sampling)	3.1 (0.9)	3.2 (0.8)	2.8 (0.9)	0.070
Determining outcome measures (variables to measure)	3.0 (0.9)	3.1 (0.9)	2.6 (1.1)	0.046
Ethical considerations	3.0 (0.9)	3.1 (1.0)	2.7 (1.1)	0.144
Outlining detailed statistical plans to be used in data analyses	2.8 (0.8)	2.9 (1.0)	2.7 (0.7)	0.523
Designing a data collection form	3.0 (1.0)	3.2 (0.9)	2.5 (1.0)	0.002
Developing and validating a study instrument (e.g. questionnaire)	3.1 (0.9)	3.2 (0.9)	2.6 (0.9)	0.011
Collecting relevant data using pre-planned data collection forms	3.1 (0.9)	3.2 (0.9)	2.6 (0.8)	0.009
Managing and storing data including data entry into a database	3.1 (1.0)	3.2 (1.0)	2.8 (0.9)	0.072
Statistical analyses using software (e.g. STATA, SPSS, Epi Info)	2.6 (1.0)	2.7 (1.0)	2.3 (1.1)	0.159
Choosing and applying appropriate inferential statistical tests and methods	2.6 (0.9)	2.7 (0.9)	2.6 (0.9)	0.754
Summarizing data in tables or charts	3.2 (1.1)	3.4 (1.1)	2.9 (0.9)	0.045
Interpretation of the findings and determining the significance of obtained results	3.2 (0.9)	3.3 (0.9)	2.9 (0.8)	0.063
Preparing a presentation (oral or poster)	3.4 (1.0)	3.6 (0.9)	2.6 (1.1)	<0.0001
Writing a manuscript for publication in a scientific journal	2.9 (1.0)	3.0 (0.8)	2.6 (0.8)	0.096
Overall competence score	**3.1 (0.7)**	**3.2 (0.7)**	**2.6 (0.7)**	**0.001**

Table 5. Confidence scores of pharmacists for components of research	Mean score (SD)			p-value
Confidence domain	All participants	PRE group	NPRE group	
Conception of research idea	3.5 (0.8)	3.6 (0.7)	2.9 (0.9)	<0.0001
Searching the literature efficiently	3.6 (0.9)	3.7(0.7)	3.1 (1.3)	0.063
Critically reviewing research literature	3.4 (0.8)	3.5 (0.9)	3.2 (0.8)	0.166
Formulating research hypotheses and research questions	3.2 (0.9)	3.3 (0.9)	2.8 (1.0)	0.027
Proposing appropriate study designs/methods	3.1 (1.0)	3.1 (1.0)	2.8 (0.9)	0.186
Writing research proposal or developing a protocol	3.2 (0.9)	3.2 (0.9)	3.0 (0.7)	0.186
Defining target population, sample and eligibility criteria	3.3 (0.9)	3.4 (0.8)	2.8 (1.0)	0.008
Determine appropriate sample size	3.2 (0.9)	3.3 (0.9)	2.8 (0.9)	0.031
Choosing an appropriate sampling technique (e.g. random sampling)	3.2 (0.9)	3.2 (0.9)	2.8 (1.0)	0.062
Determining outcome measures (variables to measure)	3.1 (0.9)	3.2 (1.0)	2.9 (0.8)	0.145
Ethical considerations	3.2 (1.0)	3.3 (1.0)	3.0 (1.1)	0.193
Outlining detailed statistical plans to be used in data analyses	2.9 (1.1)	3.0 (1.1)	2.7 (1.0)	0.347
Designing a data collection form	3.2 (1.0)	3.3 (0.9)	2.6 (1.0)	0.004
Developing and validating a study instrument (e.g. questionnaire)	3.2 (1.0)	3.2 (1.0)	2.9 (0.8)	0.153
Collecting relevant data using pre-planned data collection forms	3.3 (0.9)	3.5 (0.8)	2.7 (1.0)	0.001
Managing and storing data including data entry into a database	3.2 (1.0)	3.3 (1.0)	2.7 (0.9)	0.022
Statistical analyses using software (e.g. STATA, SPSS, Epi Info)	2.8 (1.0)	2.9 (1.0)	2.6 (1.0)	0.190
Choosing and applying appropriate inferential statistical tests and methods	2.9 (1.0)	3.0 (1.0)	2.5 (1.0)	0.073
Summarizing data in tables or charts	3.4 (0.9)	3.5 (0.9)	3.0 (0.7)	0.060
Interpretation of the finding and determining the significance of obtained results	3.3 (1.1)	3.4 (1.1)	3.0 (0.8)	0.105
Preparing a presentation (oral or poster)	3.4 (1.0)	3.5 (1.1)	3.0 (0.9)	0.031
Writing a manuscript for publication in a scientific journal	3.0 (1.1)	3.1 (1.0)	2.7 (0.9)	0.225
Overall confidence score	3.2 (0.7)	3.3 (0.7)	2.8 (0.8)	0.012

The confidence scores were observed to mirror the results in the competence domain. Confidence score for the following skills were high: ability to search literature efficiently (3.6; SD=0.9); conceive research idea (3.5; SD=0.8); critical review of literature (3.4; SD=0.8); summarize data in tables or charts (3.4; SD=0.9); and prepare a presentation (oral or poster) (3.4; SD=1.0). Ability to perform statistical analysis using software (2.8; SD=1.0); choose and apply appropriate inferential statistical test and method (2.9; SD=1.0); and outline detailed statistical plan to be used in data analysis (2.9; SD=1.1) were observed to have low confidence score (online supplementary material).

Pharmacists in the PRE group had significantly higher confidence scores for conception of research idea (3.6; SD=0.7 versus 2.9; SD=0.9, p<0.0001); formulation of research hypothesis and research question (3.3; SD=0.9 versus 2.8; SD=1.0, p=0.027); and definition of target population, sample and eligibility criteria (3.4; SD=0.8 versus 2.8; SD=1.0, p=0.008), than those in NPRE group. The PRE group had higher overall confidence score (3.3; SD=0.7) than those in the NPRE group (2.8; SD=0.8). Table 5 shows the confidence scores for all the pharmacists and the comparison of the scores between the PRE and NPRE groups. Logistic regression analysis revealed that the only predictor of moderate-to-extreme self-confidence score was publication of at least one article in peer review journal during the last five years (OR:5.0; 95%CI: 1.336 – 18.811; p=0.017) Gender, years of experience, previous research experience, previous research related training, having an abstract in local/regional or international conference were not significant predictors of moderate-to-extreme self-confidence score (online supplementary material).

Most of the pharmacists indicated interest in postgraduate training. About 40% of the pharmacists was interested in pursuing Doctor of Philosophy (PhD). In addition, 33.8% and 21.1% of the pharmacists wish to enroll in fellowship/residency and Masters respectively. Within the discipline of clinical pharmacy and practice, interest was high for pharmacotherapeutic (35.7%), and pharmacoepidemiology and drug safety (15.9%) research. Table 6 shows pharmacist's area of interest in postgraduate training.

DISCUSSION

The proportion of Nigerian pharmacists with self-reported previous research experience (79.5%) was higher than those reported in previous studies (33 - 59%).[9,12,14] This could be explained by the mandatory research project conducted by inal year pharmacy undergraduate students in most schools in Nigeria. Despite previous research

Table 6. Pharmacist's area of interest in post graduate training		
Variable	N	%
Interest in postgraduate studies[a]		
Not interested	7	5.3
Masters	28	21.1
Residency/fellowship	45	33.8
PhD	53	39.8
Area of interest in clinical pharmacy and practice		
Pharmacoepidemiology and drug safety	25	15.9
Pharmacotherapeutics research	56	35.7
Pharmacoeconomics	18	11.5
Social and behavioural aspects of life	19	12.1
Clinical outcome research	21	13.4
Direct patient care	18	11.5
Area of interest		
Clinical pharmacy	73	55.3
Pharmaceutics	16	12.1
Pharmacology	16	12.1
Pharmacognosy	7	5.3
Pharmacokinetics	7	5.3
Pharmaceutical chemistry	5	3.8
Public health	4	3.0
Pharmacogenomics	3	2.3
Pharmaceutical microbiology	1	0.8
a = 2 missing data		

experience, publication rate was low. This is consistent with publication rate reported in Qatar.[9] Low publication rate is attributed to lack of time, lack of novelty, poor mentoring, and low self-esteem i.e. approaching research with the thought that it is not publishable.[16]

The high level of interest to participate in research demonstrated by Nigerian pharmacist is consistent with previous studies.[8,9,14] However, interest does not translate into increase in research productivity. There are several barriers to pharmacist's participation in research. In our study, lack of funds was the most common challenge. This was followed by lack of job support, lack of time, and inadequate knowledge. This is not in conformity with previous studies. Lack of time is the major barrier to pharmacist's participation in practice based research.[7-9,12] Other barriers include: lack of training/inadequate knowledge, lack of job support, financial restrictions, and lack of awareness regarding opportunities in research.[7-9,12-14]

Nigerian pharmacists have inadequate skills to plan and conduct pharmacy practice research. This was reflected in the low percentage of pharmacists with extreme self-competence and confidence to design and conduct research. In addition, only 20.5% of the pharmacists rated themselves to have either very good or excellent ability to plan and conduct research. Previous studies have shown that pharmacists lack confidence to undertake research.[7,9,12] Lack of confidence is linked to inadequate knowledge of research methodology and statistics.[8,13] Pharmacy Practice Research Network (PPRN) and intensive training of pharmacists are effective strategies used to address low confidence among pharmacists.[3,17] While intensive training courses improve research related knowledge and skills, PPRN empower and educate pharmacists to participate in research. This promotes the implementation of research outcomes in patient care.[3] In addition, research training course for pharmacy students increases confidence to undertake research-related task and publication rate.[18]

Pharmacists with PRE had higher competence and confidence scores than those with NPRE. This is consistent with a previous study, which concluded that pharmacists with PRE were more confident in their research skills, and ability to read and evaluate research papers.[13] In addition, pharmacists with PRE are more likely to participate in research with minimal supervision and are more influential in convincing colleagues to change practice based on sound research evidence.[12,14] This underlines the need to train and expose undergraduate and postgraduate pharmacy students to research. Such action would stimulate interest in research, and prepare students to become independent researchers and evidence based practitioners. Moreover, research participation provokes critical thinking, improve problem-solving skills and decision making during pharmacotherapy.[4]

Pharmacists had low competence and confidence scores for ability to undertake statistical analysis using software packages such as STATA, SPSS and Epi Info; and choosing appropriate statistical test and method. High competence and confidence scores were observed for research skills related to design such as conception of idea, literature review and critical appraisal. This is in consonant with Perreault *et al.*, which found that pharmacists had better knowledge of research methodology than biostatistics.[8] All the pharmacists in our study indicated interest in learning about health-related research. This coupled with the low competence and confidence in research related capabilities highlight the need for training programs. To buttress this point, a recent study conducted in Nigeria found that 87% of the pharmacists believed they need research oriented training to effectively conduct pharmacy practice research.[13] Training programs should focus on biostatistics, data analysis and interpretation.

Limitations

The major limitations of this study are the lack of sample size calculation and use of convenient sampling technique. Although, pharmacists were recruited during the annual national conference that attracts delegates from all states of the federation, our findings are not generalizable because of the small sample size and convenient sampling method. In addition, subjective assessment of competence and confidence is liable to self-reporting bias. Furthermore, many surveys were not retrieved and some were returned with incomplete response. Therefore, there is attrition bias in the study. Another limitation of the study is recall bias. Some questions required the pharmacists to recall historical data which they may not recall correctly. Despite these limitations, there are some positives in this study. To the best of our knowledge, this is the first study to evaluate the self-competence and confidence to plan and conduct research among pharmacists in Nigeria. In addition, this study has representative pharmacists from different area of practice and states of the federation. Again, this is the first study to rank and determine the research skills pharmacists are most and least self-competent or confident to perform.

CONCLUSIONS

The proportion of Nigerian pharmacists with self-reported previous research experience was high. However, publication rate among the pharmacists was low. Pharmacist's self-reported competence and confidence to perform statistical analysis and write manuscript for publication were low. Over 90% of the pharmacists are interested in pursuing postgraduate studies. Research training with hands-on session in the short term and building of a pharmacy practice research network in the long term are recommended.

ACKNOWLEDGMENTS

CONFLICT OF INTEREST

The authors declare that they have no competing interests to disclose.

FUNDING

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