Currents in Pharmacy Teaching and Learning xxx (xxxx) xxx

Contents lists available at ScienceDirect

Currents in Pharmacy Teaching and Learning

journal homepage: www.sciencedirect.com/journal/currents-in-pharmacy-teaching-and-learning

Research Paper

Interprofessional education and collaborative practice in Nigeria – Pharmacists' and pharmacy students' attitudes and perceptions of the obstacles and recommendations

Segun J. Showande *, Tolulope P. Ibirongbe

University of Ibadan, Faculty of Pharmacy, Department of Clinical Pharmacy and Pharmacy Administration, Ibadan, Oyo State, Nigeria

ARTICLE INFO

Keywords:
Interprofessional education
Interprofessional collaborative practice
Interprofessional attitude scale (IPAS)
Pharmacist
Pharmacy students
Nigeria

ABSTRACT

Introduction: Many countries have implemented interprofessional education (IPE) and interprofessional collaborative practice (IPCP), but there is a dearth of information on the state of IPE in Nigeria. We evaluated the attitude of Nigerian pharmacy students and pharmacists towards IPE and IPCP and the perceived barriers to and recommendations for the implementation of IPE and IPCP.

Methods: A cross-sectional survey of 238 community and hospital pharmacists and 765 pharmacy students in Nigeria was conducted with an online questionnaire using the Interprofessional Attitude Scale. Information on the perceived barriers to and recommendations for implementing IPE was also collected.

Results: Two hundred and seven pharmacists (87%) and 629 (82.2%) pharmacy students agreed that it is necessary for health profession students to learn together. Perceived barriers to the implementation of IPE and IPCP included professional pride [pharmacists = 51 (21.42%), pharmacy students = 55 (7.19%)], prejudice against other health professions [pharmacists = 35 (14.7%), pharmacy students = 74 (9.67%)], uni-professional training [pharmacists = 5 (2.1%), pharmacy students = 7 (0.92%)], and government policies that discourage IPE and IPCP [pharmacists = 10 (4.2%), pharmacy students = 20 (2.61%)]. Recommendations proposed were the integration of IPE in undergraduate pharmacy curricula, cooperation among health professionals to curb professional rivalry, and the provision of necessary facilities and resources by the government.

Conclusions: Nigerian pharmacists and pharmacy students had positive attitudes towards IPE and IPCP. The perceived barriers to implementing IPE in Nigeria include discouraging government policies. Deliberate and implementable government policies on IPE are needed.

Introduction

Globally, there has been increasing emphasis on interprofessional education (IPE) and interprofessional collaborative practice (IPCP) in the health care sector. Several factors may be responsible for this, including the increase in chronic diseases, advances in health care technology, and increased complexity in the delivery of health care services.[1] Health care has evolved from a group of individual professionals to IPCP,[2] and this model of care is now considered the standard of practice in hospital settings.[2–5] Traditional

* Corresponding author.
E-mail address: sj.showande@ui.edu.ng (S.J. Showande).

https://doi.org/10.1016/j.cptl.2023.07.013

training of health care students is usually uni-professional, with the traditional and outdated curricula engendering "professional tribalism and hierarchical relationship."[6,7] In professional silos training, health profession students hardly interact.[8] IPE which promotes mutual learning by health profession students, has been advocated as the gateway to curb professional silos training and practice.[9,10]

IPE is not a new concept. As early as 1973, the World Health Organization (WHO)[11,12] provided worldwide support for IPE through various initiatives such as the "Learning Together to Work Together for Health" to promote IPE and IPCP. In this document, the WHO stated that IPE occurs when two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes. It also mentioned that collaborative practice in health care occurs when multiple health workers from different professional backgrounds provide comprehensive services by working with patients, their families, carers, and communities to deliver the highest quality of care across settings. In 2010, WHO[13] also strongly recommended the establishment and inclusion of IPE in health profession curriculum. Several studies have described the implementation of IPE in various health institutions and among health profession students, especially in developed countries.[14,15] In some climes, students' IPE geared towards developing IPCP is mandatory as part of the training of health professionals. However, IPE implementation is suboptimal or may be non-existent in sub-Saharan African countries such as Nigeria, where IPE is underdeveloped.[16,17]

Health care professionals must communicate and collaborate effectively to optimize patient care across settings.[18] There are misconceptions about pharmacists' function in the interprofessional collaborative team, possibly due to pharmacists needing to understand the role of other health care team members, the unassertiveness of pharmacists, and the lack of interprofessional training or learning.[19] Studies on pharmacist perception of IPE mainly focused on interprofessional collaboration.[20,21] These studies evaluated the pharmacist-general practitioner collaboration. However, the information relating to the attitude of pharmacists towards IPE and IPCP is sparse.[6]

Few studies were conducted in Nigeria on health profession students and health professionals attitudes towards IPE and IPCP.[16,22,23] Yet, IPE is scarce in many pharmacy schools in Nigeria because of the old bachelor of pharmacy (BPharm) curriculum, which did not consider IPE. Though, pharmacy students showed positive attitude to IPE in two studies conducted at one university in Nigeria,[23,24] it is possible that this does not reflect the views of all Nigerian pharmacy students. The opinion of Nigerian pharmacists (who were once pharmacy students and are now involved in collaborative practices with other health professionals) on IPE and IPCP were not included in any known study on IPE in Nigeria.

But IPE is now more pertinent with onboarding the doctor of pharmacy (PharmD) curriculum in many schools of pharmacy in Nigeria. As of December 2021, the National Universities Commission[25] endorsed 20 universities for pharmacy programs in Nigeria and 11 have been approved to offer a PharmD program.[26] This is yet to commence in many of these universities. The PharmD program is hoped to improve pharmacy students' professional skills and knowledge and prepare them as pharmacists for future IPCPs by involving them in IPE and learning. In Nigeria, pharmacists have five main areas of practice: community, academia, industry, regulatory, administration and hospital. A description of the pharmacy workforce from 2011 to 2016 showed that 42% of licensed pharmacists were in community practice, 11% in hospitals, 2.6% in administrative and regulatory, 1.8% in the industry, and 0.8% in academia.[27] Only pharmacists practising in hospitals and community settings have the opportunity to regularly work in collaboration with other health professionals in the care of patients.

However, the question is, what is the attitude of present Nigerian pharmacy students and past ones who are now pharmacists towards IPE and IPCP? This study, therefore, evaluated Nigerian pharmacy students' and pharmacists' attitudes towards IPE and IPCP and the perceived obstacles to its implementation and recommendations to overcome these obstacles. The study also compared the attitude of pharmacists and pharmacist students towards IPE and IPCP and the association of their demographic variables with these attitudes.

Methods

Ethical approval

The study protocol was approved by the joint ethics committee of the University of Ibadan and University College Hospital with approval number UI/EC/21/0192. All participants voluntarily gave their informed consent online (pharmacists and pharmacy students) by checking a box in the online questionnaire after reading a brief study introduction. The participants may continue with the questionnaire or opt out of the study based on whether informed consent was given. The research was conducted in line with the principle of the Declaration of Helsinki.[28]

Study design

The cross-sectional study was conducted among Nigerian community and hospital pharmacists and pharmacy students in accredited pharmacy schools in Nigeria from June to October 2021. The projected population of Nigerians by 2022 was 216.7 million. The country is the seventh largest nation in the world population-wise and has 36 states, including Abuja, the Federal Capital Territory. All the states have 774 Local Governments Areas. The states are divided into six geopolitical zones: Northwest, Northeast, Southwest, North-Central, South-South, and Southeast.[29]

Two hundred and seventeen state, private, and federal universities with over 2.1 million students are scattered nationwide.[30] Twenty of the universities are accredited pharmacy schools.[25] According to the National Universities Commission, the estimated number of pharmacy students from the second year to the fifth or sixth year, as the case may be, was 20,000. The BPharm degree

program lasts five years, while the PharmD program lasts six years. As of 2016, 6801 hospital and community pharmacists were registered with the Pharmacists Council of Nigeria (PCN). The sample size was calculated online using the Raosoft calculator[31] from the sample frame for pharmacy students (20000) and pharmacists (6801) with a 95% CI, 5 % margin of error, 50% response distribution, and 10% allowance for non-response. The eventual sample size for pharmacy students and pharmacists was 435 and 400, respectively.

Study instrument and distribution

An online questionnaire was developed using Google Form (Alphabet, Inc), a free online survey builder on the Google Workspace suite tool. The questionnaire contained the validated Interprofessional Attitude Scale (IPAS) used with permission from the authors. Many instruments have been developed to assess attitudes towards IPE and IPCP and the impact of interventions on IPE and IPCP.[32,33] The available IPE attitude measures are fraught with different degrees of validity issues.[33] They were developed before the Interprofessional Education Collaborative report[34] and did not cover all four competency domains. The IPAS improved on these deficiencies[35] and has been used in the United States (US),[36] Mexico,[19] Qatar,[8,37] and Germany.[38] The instrument has been validated among medicine, nursing, and pharmacy students.[35]

The IPAS comprises 27 items with five graded responses from strongly disagree = 1 to strongly agree = 5. There are five subdomains in the scale: teamwork, roles, and responsibilities (TRR), patient centeredness (PC), interprofessional biases (IB), diversity and ethics (DE), and community centeredness (CC).[35] The subscales contain nine, five, three, four, and six items, respectively. Higher mean values in the subdomain scores suggest a positive attitude, and lower values indicate a negative attitude.[35] Other questionnaire items were respondent characteristics, including age, sex, ethnicity, and marital status. Questions on courses received with other health profession students at the undergraduate level, preferred health professionals to collaborate with, if participants had received lectures with other health profession students, and preferred interprofessional activities were included in the questionnaire for pharmacists and pharmacy students. The pharmacists were further asked about their practice setting, years of experience, position held at work, previous practice setting, pharmacy school attended based on geopolitical zone, whether they had worked with other health profession students during clerkship posting at undergraduate, and whether they had the opportunity to work on a task in a health care team. For the pharmacy students, information on the year of study, the type of pharmacy program undertaken, and the pharmacy school attended based on the geopolitical zones were also obtained. Both the pharmacists and the pharmacy students were further requested to highlight perceived barriers to and suggestions for implementing IPE and IPCP in Nigeria.

All hospital and community pharmacists in Nigeria, including pharmacists undergoing the compulsory one-year National Youth Service Corp (NYSC) program for graduates, post-intern, and post-NYSC pharmacists were included in the study. Intern pharmacists and others practising in different settings aside from community and hospitals were excluded from the study. Also, pharmacy students from the second to the fifth or sixth year of the pharmacy undergraduate program from all the accredited pharmacy schools in the six geopolitical zones in Nigeria were included. Pharmacy students in the first year were excluded.

The online questionnaire was pretested in Oyo state, Ibadan, among pharmacy students at the University of Ibadan from the second to the fifth year. Students undertaking the BPharm program were in Year 3 to Year 5, while students undergoing the PharmD program were in Year 2. There were no students in the sixth year yet. Ten students from each year of study participated in the pretest. Five pharmacists from the community and hospital settings in Ibadan were also part of the pretest. Prior to the pretest, the questionnaire was reviewed by four clinical pharmacy researchers who were conversant with questionnaire design and use. Based on the comments of the researchers and the outcome of the pretest, the questions on perceived barriers to and suggestions for implementing IPE and IPCP were converted to open-ended questions. Pretest results were excluded from the final analysis.

Convenient and snowball sampling techniques were employed to distribute the questionnaire among pharmacists. First, the link to the online questionnaire was shared on the WhatsApp (WhatsApp LLC) platform of members of the Pharmaceutical Society of Nigeria (PSN), Oyo state, with the instruction that only hospital and community pharmacists should complete it. Subsequently, the link to the online questionnaire was shared on the Facebook (Meta Platforms, Inc) page of the Young Pharmacists of Nigeria. The link to the questionnaire was also shared on the PSN state platforms through contacts. For the pharmacy students, convenient sampling was used. The contacts of the presidents of the Pharmacy Association of Nigerian Students (PANS) from each accredited pharmacy school were obtained from the National PANS president. The online questionnaire link was distributed to all PANS presidents, who circulated it on each school's pharmacy students WhatsApp platform. Only pharmacy students from the second to the sixth year were asked to complete the questionnaire. Through the pharmacists and PANS presidents' contacts, the link to the online questionnaire was reposted every two weeks until the end of October 2021. Participants were only allowed to fill out the questionnaire once.

Data analysis

The results generated from the online quantitative survey were imported into SPSS, version 26 (IBM, Corp). Frequencies, percentage, mean (M), and SD were utilized to summarize the participants' socio-demographics and attitudes to IPE. Item 8 (It is not necessary for health profession students to learn together) in the TRR IPAS subdomain was reverse scored. Subsequently, the M attitude score for each of the IPAS subdomains was calculated. Cronbach alpha coefficient was computed to determine the internal consistency of the IPAS and subdomains. The association between pharmacist and pharmacy student respondent characteristics and the M attitude scores of the five subdomains in the IPAS were evaluated with either student's *t*-test or one-way analysis of variance (ANOVA) with Bonferroni or Games Howell *post-hoc* test. Statistically significant differences were considered at $P < .05$. The influence of the variables: whether participants received lectures with other health profession students, if the pharmacists worked with other

health profession students during clerkship posting at the undergraduate level, if the pharmacists had the opportunity to work in an interprofessional team, on the attitude of pharmacists and pharmacy students towards IPE was determined with student's *t*-test.

Results

Demographic characteristics of participants

The age of the pharmacists was M = 30.32, SD = 8.99 years, and there were more male 136 (57.1%) and community pharmacists

Table 1
Demographic characteristics of pharmacists.

Variables	Category	Frequency (%)
Sex	Male	102 (42.9)
	Female	136 (57.1)
Age[a] (years), (n = 237), Mean (SD)		30.32 (8.99)
Age group	≤ 25 years	77 (32.4)
	26–27 years	51 (21)
	28–30 years	52 (21.8)
	31+ years	57 (24.8)
Ethnicity	Yoruba	108 (45.4)
	Igbo	60 (25.2)
	Hausa	11 (4.6)
	Others	59 (24.8)
Marital status	Single	158 (66.4)
	Married	80 (33.6)
Practice setting	Community pharmacy	137 (57.6)
	Hospital	101 (42.4)
Years of experience, (n = 237), Mean (SD)		6.73 (7.73)
Group	≤ 2 years	73 (30.8)
	3–4 years	77 (32.5)
	5–7 years	31 (13.1)
	8+ years	56 (23.6)
Position held at work	Assistant director of pharmaceutical services	6 (2.5)
	Chief pharmacist	10 (4.2)
	Deputy director of pharmaceutical services	10 (4.2)
	Director of pharmaceutical services	2 (0.8)
	Grade 1 pharmacist	14 (5.9)
	NYSC pharmacist	39 (16.4)
	Pharmacy manager	12 (5)
	Post-intern locum pharmacist	43 (18.1)
	Principal pharmacist	7 (2.9)
	Staff pharmacist	46 (19.3)
	Superintendent pharmacist	49 (20.6)
Previous practice settings[b]	Research/academia	24 (10)
	Hospital	140 (58.4)
	Community	163 (68)
	Government & NGOs	30 (11.7)
	Pharmaceutical industry	16 (5.1)
	Medical representatives	11 (4.6)
	Importation	2 (0.8)
	Distribution	3 (1.2)
	Mental health	9 (3.3)
	Public health	22 (6.3)
Pharmacy school attended based on geopolitical zone (n = 227)	Northeast	4 (1.7)
	Northwest	21 (8.7)
	North-Central	22 (9.2)
	Southeast	25 (10.5)
	Southeast	98 (41)
	South-South	57 (23.9)
Received lectures with other health profession students at undergraduate level.	Yes	215 (90.3)
	No	23 (9.7)
Worked together with other health professionals during clerkship posting at undergraduate level.	Yes	138 (58)
	No	100 (42)
Have had the opportunity to work in a team with other health professionals in my practice setting.	Yes	186 (78.2)
	No	52 (21.8)

NGOs = Non-governmental organizations; NYSC = National Youth Service Scheme.
[a] Variable binned based on equal percentile of scanned cases.
[b] Participant may chose more than one option.

137 (57.6%). Most of the pharmacists, 215 (90.3%) and 138 (58%), claimed to have received lectures and worked with other health profession students while undergoing clerkship training, respectively, during the undergraduate pharmacy program (Table 1). There was an almost equal distribution of sex, male 379 (49.5%) and female 386 (50.5%), among the pharmacy students with an average age of M = 22.18, SD = 2.77 years. Most pharmacy students, 625 (81.7%), were undergoing the BPharm program. Also, most of the pharmacy students, 719 (94%) and 402 (52.5%), claimed to have had lectures and the occasion to be engaged in a task, respectively, with other health profession students (Table 2).

Table 3 shows the courses pharmacy students and pharmacists had with other health profession students. The two most preferred health professions to have interprofessional collaboration with were medicine [pharmacists = 226 (94.2%), pharmacy students = 701 (91.4%)] and nursing [pharmacists = 204 (85%), pharmacy students = 546 (71.1%)]. The IPE activities that the pharmacy students and pharmacists preferred to have together with other health profession students and professionals are listed in Table 3.

The Cronbach alpha coefficient for the internal consistency of the IPAS and its subdomains for pharmacy students and pharmacists were 0.578 to 0.875 and 0.601 to 0.830, respectively. Statistically significant differences were found between the pharmacists' and the pharmacy students' M scores in most items in the IPAS TRR subdomain, as shown in Table 4. Two hundred and seven pharmacists (87%) and 629 (82.2%) pharmacy students agreed that it is essential for health profession students to learn or be educated together. The mean score of the attitude of pharmacy students (M = 40.41, SD = 3.69) towards TRR was statistically significantly higher than the pharmacists (M = 36.58, SD = 4.02), $P < .001$. Regarding the PC, IB, and DE IPAS subdomains, no significant differences in the pharmacy students' and pharmacists' M attitudinal scores were found. The M attitude score of the pharmacists (M = 27.25, SD = 2.62) towards the IPAS CC subdomain was statistically significantly higher than the pharmacy students' (M = 26.83, SD = 2.72), $P = .04$ (Table 4).

Table 5 shows that there was a statistically significant difference in the M attitude score of the IPAS TRR subdomain based on the years of experience of pharmacists by one-way ANOVA [F (3,233) = 3.837, $P = .01$)]. Post-hoc comparison with Bonferroni indicated that the M attitude score for pharmacists with eight plus years of experience (M = 37.93, SD = 3.51) was significantly higher than pharmacists with three to four years (M = 35.95, SD = 4.1) and five to seven years (M = 35.36, SD = 3.54) of experience. The average scores of pharmacists' attitudes towards the IPAS subdomain of TRR were also higher for those who had participated in a task as part of a health care team (M = 36.99, SD = 3.83} compared to those who did not (M = 35.16, SD = 4.38), [t(236) = 3.021, $P = .003$].

Table 2
Demographic characteristics of pharmacy students.

Variables	Category	Frequency (%)
Sex	Male	379 (49.5)
	Female	386 (50.5)
Age (years)[a] ($n = 763$), Mean (SD)		22.18 (2.77)
Age group	≤ 20 years	213 (27.9)
	21–25 years	414 (54.3)
	26–29 years	126 (16.5)
	30+ years	10 (1.3)
Ethnicity	Yoruba	352 (46)
	Igbo	110 (14.4)
	Hausa	101 (13.2)
	Other	202 (26.4)
Marital status	Single	745 (97.4)
	Married	18 (2.4)
	Separated	2 (0.3)
Year of study	Second	227 (29.7)
	Third	147 (19.2)
	Fourth	168 (22)
	Fifth	213 (27.8)
	Sixth	10 (1.3)
Program being undertaken	Bachelor of pharmacy degree	625 (81.7)
	Doctor of pharmacy degree	140 (18.3)
Pharmacy school attended based on geopolitical zone	Southwest	313 (40.9)
	Northwest	187 (24.4)
	South-South	107 (14)
	North-Central	96 (12.5)
	Southeast	54 (7.1)
	Northeast	8 (1)
Previous educational qualifications for example BSc, MBA, diploma	Yes	78 (10.2)
	No	687 (89.8)
Had lectures with other health profession students.	Yes	719 (94)
	No	46 (6)
Had the opportunity to work as a team with other health profession students on a task.	Yes	402 (52.5)
	No	363 (47.5)
Students engaged in interprofessional activity should be assessed/evaluated.	Yes	678 (88.6)
	No	87 (11.4)

BSc = Bachelor of science; MBA = Master of business administration.
[a] Variable binned based on equal percentile of scanned cases.

Table 3
Pharmacists' and pharmacy students' preferred interprofessional educational activities and collaborators.

Item	Variables	Pharmacist frequency (%)	Pharmacy student frequency (%)
Courses received together with other health profession students at undergraduate level	Basic science courses	179 (77.2)	619 (50.7)
	Biochemistry	150 (64.6)	270 (34.9)
	Physiology	147 (61.3)	397 (51.7)
	Anatomy	129 (53.8)	346 (45.1)
	Pharmacology	89 (37.1)	226 (29.4)
	Biostatistics	56 (23.4)	125 (16.3)
Preferred health profession students or health professionals to have interprofessional collaboration with	Physicians/medical student	226 (94.2)	701 (91.4)
	Nurses/student nurses	204 (85)	546 (71.1)
	Dieticians	140 (58.2)	NA
	Physiotherapists/students	132 (55.5)	349 (45.7)
	Dentists	129 (54.2)	287 (37.5)
	Psychologists	128 (53.3)	309 (40.3)
	Social workers/students	109 (45.5)	179 (23.4)
	Optician/optometry students	106 (44.2)	170 (22.1)
	Biomedical science students	NA	276 (35.9)
	Medical laboratory scientists	5 (2)	NA
	Occupational therapist	1 (0.4)	NA
	Epidemiologist	1 (0.4)	NA
	Paramedics students	NA	257 (33.6)
	Others	NA	11 (1.4)
Preferred interprofessional educational activities to have with other health profession students or health care professionals	Community outreach program	160 (66.7)	502 (65.5)
	Seminars on collaborative activities	151 (62.9)	455 (59.3)
	Case-based studies with real patients	136 (56.8)	354 (46.2)
	Interprofessional communication	135 (56.4)	404 (52.6)
	Workshops on interprofessional collaboration	124 (51.7)	393 (51.2)
	Professional development program	101 (42.1)	328 (42.8)
	Clinical placement for collaborative activities	97 (40.4)	327 (42.7)
	Health informatics	90 (37.6)	351 (45.9)
	Integrated care plan	84 (34.9)	193 (25.2)
	Forum to share experiences	75 (31.3)	317 (41.6)
	Journal club (studying published papers together)	42 (17.5)	153 (20)
	Competitions	20 (4.1)	209 (27.3)
	Lectures with other health profession students	NA	391 (51)
	Simulations	NA	142 (18.5)

NA = not applicable.

Similarly, students who had the opportunity to collaborate with other health profession students during their undergraduate clerkship program had higher IPAS TRR subdomain M attitude scores (M = 37.21, SD = 3.58) compared to those who had not (M = 35.71, SD = 4.43), [t(236) = 2.884, $P = .006$], as shown in Table 5. For pharmacy students, significant differences existed in the M attitude scores for IB subdomain based on the year of study, the geopolitical zone where the university is situated, and the type of pharmacy program undertaken by the student (BPharm or PharmD), see Table 6.

The pharmacists and pharmacy students highlighted some impediments to implementing IPE and IPCP in the country. These included professional pride [pharmacists $n = 51$ (21.42%), pharmacy students $n = 55$ (7.19%)], encouragement of professional silos training [pharmacists $n = 5$ (2.1%), pharmacy students $n = 7$ (0.92%)], prejudice against other health professions [pharmacists $n = 35$ (14.7%), pharmacy students $n = 74$ (9.67%)], and government policies that disfavour IPE and IPCP [pharmacists $n = 10$ (4.2%), pharmacy students $n = 20$ (2.61%)]. Other barriers are listed in Table 7.

Some of the recommendations proposed for the implementation of IPE and IPCP in Nigeria included integration of IPE in undergraduate pharmacy programs [pharmacists $n = 50$ (21.01%), pharmacy students $n = 117$ (49.16%)], cooperation among health professionals to curb professional rivalry [pharmacists n = 5 (2.1%), pharmacy students $n = 6$ (2.52%)], and the provision of necessary facilities and resources by the government [pharmacists n = 3 (1.26%), pharmacy students $n = 80$ (33.61%)]. Other recommendations for implementing IPE and IPCP are highlighted in Table 8.

Discussion

Most studies and reviews on IPE in developed countries focused on students of medicine, nursing, occupational therapy, social work, and physiotherapy,[39–48] and no study, as far as we know, has concurrently examined the attitude of pharmacists and pharmacy students towards IPE and IPCP. Also, in Nigeria there is a dearth of studies on IPE among pharmacists or pharmacy students. Since IPE has primarily been studied mainly in the context of medicine and nursing and few in allied health professions until now, there is a need

Table 4
Pharmacists' and pharmacy students' attitudes towards interprofessional education and interprofessional collaborative practice.

Q	Interprofessional attitude scale items and subdomains	Pharmacy students $N = 765$ Mean (SD)	Pharmacists $N = 238$ Mean (SD)	P value
	Teamwork, roles, and responsibilities	40.41 (3.69)	36.58 (4.02)	< .001
	Total mean score (Min = 9; Max = 45)			
1	Shared learning before graduation helped me become a better team worker.	4.67 (0.54)	4.28 (0.73)	< .001
2	Shared learning helped me think positively about other professionals.	4.61 (0.58)	4.25 (0.69)	< .001
3	Learning with other students helped me become a more effective member of a health care team.	4.54 (0.62)	4.13 (0.8)	< .001
4	Shared learning with other health profession students increased my ability to understand clinical problems.	4.51 (0.64)	4.02 (0.87)	< .001
5	Patients would ultimately benefit if health profession students worked together to solve patient problems.	4.76 (0.47)	4.71 (0.51)	.27
6	Shared learning with other health profession students helped me communicate better with patients and other professionals.	4.52 (0.61)	4.13 (0.78)	< .001
7	I would have welcomed the opportunity to work on small-group projects with other health profession students during my undergraduate pharmacy program.	4.51 (0.57)	4.39 (0.63)	.01
8	It is not necessary for health profession students to learn together.	4.08 (0.94)	2.59 (1.43)	< .001
9	Shared learning helped me understand my limitations.	4.22 (0.75)	4.06 (0.74)	< .001
	Patient centeredness	23.27 (1.88)	23.31 (1.85)	.77
	Total mean score (Min = 5; Max = 25)			
10	Establishing trust with my patients is important to me.	4.81 (0.4)	4.79 (0.42)	.47
11	It is important for me to communicate compassion to my patients.	4.55 (0.59)	4.51 (0.6)	.36
12	Thinking about the patient as a person is important in getting treatment right.	4.54 (0.62)	4.61 (0.56)	.15
13	In my profession, one needs skills in interacting and cooperating with patients.	4.71 (0.5)	4.73 (0.47)	.59
14	It is important for me to understand the patient's side of the problem.	4.65 (0.5)	4.67 (0.47)	.56
	Interprofessional biases	11.2 (2)	11.48 (1.99)	.06
	Total mean score (Min = 3; Max = 15)			
15	Health professionals/students from other disciplines have prejudices or made assumptions about me because of my profession.	3.69 (0.89)	3.80 (0.83)	.08
16	I have prejudices or make assumptions about health professionals/students from other disciplines.	3.4 (0.1)	3.45 (0.94)	.49
17	Prejudices and assumptions about health professionals from other disciplines get in the way of delivery of health care.	4.11 (0.86)	4.22 (0.86)	.08
	Diversity and ethics	18.8 (1.58)	18.99 (1.54)	.10
	Total mean score (Min = 4; Max = 20)			
18	It is important for health professionals to respect the unique cultures, values, roles/responsibilities, and expertise of other health professions.	4.71 (0.48)	4.76 (0.44)	.14
19	It is important for health professionals to understand what it takes to effectively communicate across cultures.	4.56 (0.56)	4.63 (0.55)	.10
20	It is important for health professionals to respect the dignity and privacy of patients while maintaining confidentiality in the delivery of team-based care.	4.71 (0.53)	4.79 (0.44)	.04
21	It is important for health professionals to provide excellent treatment to patients regardless of their background (e.g., race, ethnicity, gender, sexual orientation, religion, class, national origin, immigration status, or ability).	4.82 (0.45)	4.82 (0.53)	.94
	Community centeredness	26.83 (2.72)	27.25 (2.62)	.04
	Total mean score (Min = 6; Max = 30)			
22	It is important for health professionals to work with public health administrators and policymakers to improve delivery of health care.	4.61 (0.55)	4.64 (0.52)	.48
23	It is important for health professionals to work on projects to promote community and public health.	4.65 (0.5)	4.63 (0.54)	.54
24	It is important for health professionals to work with legislators to develop laws, regulations, and policies that improve health care.	4.54 (0.62)	4.66 (0.52)	.002
25	It is important for health professionals to work with non-clinicians to deliver more effective health care.	4.07 (0.88)	4.26 (0.8)	.001
26	It is important for health professionals to focus on populations and communities, in addition to individual patients, to deliver effective health care.	4.33 (0.72)	4.45 (0.67)	.03
27	It is important for health professionals to be advocates for the health of patients and communities.	4.62 (0.53)	4.6 (0.54)	.57

Max = maximum; Min = minimum; Q = question.

for a better understanding of IPE in other health profession university curricula. It may be incorrect to assume that IPE models used in medical and nursing university curricula can be applied to allied health curricula like pharmacy because allied health professions like pharmacy refer to various health professions with distinctive service delivery methods and educational strategies. On a global level, the scope of practice for many allied health professions also varies greatly. Therefore, it is essential to consider the institutional and geographical context of IPE.[40,49,50] Thus, understanding pharmacists and pharmacy students views on IPE and IPCP, especially in resource-constrained nations like Nigeria in sub-Saharan Africa, becomes pertinent.

The findings in this study showed that pharmacists and pharmacist students have positive attitudes towards TRR, PC, IB, DE, and CC but pharmacists' attitude scores were higher than the students. Several studies also reported similar findings, with students of health

Table 5
Association between pharmacists' demographics and the IPAS subdomain mean scores.

Variables	N	Teamwork, roles, and responsibilities M (SD) (Min = 9; Max = 45)	Patient-centeredness M (SD) (Min = 5; Max = 25)	Inter-professional biases M (SD) (Min = 3; Max = 15)	Diversity and ethics M (SD) (Min = 4; Max = 20)	Community-centeredness M (SD) (Min = 6; Max = 30)
Age[a] (years)						
≤ 25	77	35.81 (4.61)	23.14 (1.94)	11.51 (1.83)	18.84 (1.84)	26.94 (2.73)
26–27	50	36.66 (3.56)	23.22 (1.62)	11.64 (1.77)	18.94 (1.38)	27.18 (2.46)
28–30	52	36.62 (3.84)	23.4 (1.83)	11.35 (2.19)	18.98 (1.43)	27.37 (2.86)
31+	59	37.49 (3.59)	23.51 (1.95)	11.42 (2.23)	19.24 (1.32)	27.61 (2.36)
P value		.12	.67	.89	.52	.50
Sex						
Male	102	37.11 (3.54)	23.17 (1.94)	11.38 (2.03)	18.99 (1.32)	27.38 (2.52)
Female	136	36.18 (4.32)	23.41 (1.78)	11.55 (1.97)	18.99 (1.69)	27.15 (2.68)
P value		.08	.32	.52	.99	.49
Practice setting						
Hospital	101	37.03 (3.85)	23.31 (1.89)	11.51 (2.16)	19.09 (1.32)	27.29 (2.41)
Community pharmacy	137	36.23 (4.13)	23.31 (1.83)	11.46 (1.87)	18.92 (1.69)	27.22 (2.76)
P value		.14	1.00	.86	.40	.84
Years of experience[a]						
≤ 2	73	36.7 (4.28)	22.99 (1.97)	11.21 (2)	18.69 (1.92)	26.93 (2.81)
3–4	77	35.95 (4.1)	23.18 (1.78)	11.68 (1.74)	19.04 (1.34)	27.22 (2.53)
5–7	31	35.36 (3.54)	23.77 (1.52)	12.16 (1.99)	19.16 (1.42)	27.26 (2.73)
8+	56	37.93 (3.51)	23.68 (1.88)	11.23 (2.23)	19.23 (1.27)	27.68 (2.43)
P value		.01	.08	.08	.20	.46
Received lectures with other health profession students						
Yes	214	36.63 (3.93)	23.37 (1.83)	11.52 (1.99)	19.09 (1.36)	27.29 (2.59)
No	24	36.17 (4.87)	22.79 (2)	11.13 (2.01)	18.13 (2.56)	26.88 (2.88)
P value		.60	.15	.36	.08	.46
Worked with other health profession students during clerkship at undergraduate						
Yes	138	37.21 (3.58)	23.22 (1.91)	11.28 (2.14)	18.95 (1.56)	27.19 (2.55)
No	100	35.71 (4.43)	23.43 (1.77)	11.76 (1.75)	19.05 (1.51)	27.33 (2.75)
P value		.006	.38	.06	.62	.68
Had the opportunity to work on a task in a healthcare team						
Yes	186	36.99 (3.83)	23.37 (1.86)	11.44 (2.1)	19.04 (1.5)	27.42 (2.47)
No	52	35.16 (4.38)	23.08 (1.8)	11.64 (1.56)	18.81 (1.67)	26.64 (3.03)
P value		.003	.31	.46	.33	.06

IPAS = Interprofessional Attitude Scale; M = mean; Max = maximum; Min = minimum.
[a] Variable binned based on equal percentile of scanned cases.

professions displaying positive attitudes towards IPE and IPCP.[8,19,37,41,43,51–54] These studies were conducted in different countries (Qatar,[8,37,43] Mexico,[19] New Zealand,[51] Switzerland,[52] US,[53] Singapore,[54] and Nigeria[22,23]) using various instruments such as the Readiness for interprofessional learning scale (RIPLS),[55,56] Jefferson Scale of Attitudes towards Physician-Nurse Collaboration,[55,56] and IPAS.[8,37] Though different tools were used and, in some cases, IPE in various forms was evaluated, the same report of pharmacy students or other health profession students displaying positive attitudes towards IPE was found. These positive attitudes to IPE showed the willingness of pharmacy students to be educated and learn with other health profession students to foster IPCP in the future. As suggested by Berger-Estillita et al[52] and Violato and Kings,[57] this positive attitude to IPE might have resulted from previous exposure to IPE interventions. As reported in this study, pharmacists during their undergraduate studies and pharmacy students had had lectures in some courses with other health profession students and worked with other health profession students during clerkship posting. Also, the years of pharmacists' work experience and participation in health care teams during clerkship as undergraduates and in practice as professionals were associated with the attitude of pharmacists towards IPE. This is comparable with the report of the study carried out in Qatar, where 21% of the pharmacists had had previous IPE experience and displayed positive attitude towards IPE.[37] Although IPE in Nigeria is still nascent, exposure to didactic lectures and clerkship rotations with other health profession students may have imparted the students' positive attitude towards IPE and IPCP. Lack of participation in IPE during undergraduate studies may predispose health profession students to an unwillingness to participate in IPCP after graduation.[6]

In this study, pharmacists and pharmacy students suggested various means of engaging in IPE with students from other health professions. These included seminars, case-based studies, workshops, integrated care plans, journal clubs, and clinical placement for collaborative activities. Graduates of medicine, nursing, and pharmacy recognized the scarcity of IPE learning activities in two related studies conducted in Australia.[58,59] The available IPE learning activities mainly involved didactic and unorganized teaching. This was insufficient to prepare the students for future IPCP.[58,59] This resonates with what is currently obtainable in Nigerian pharmacy schools, as reported by pharmacists and pharmacy students. Rather than limit the IPE experiences of pharmacy students to didactic lectures and a few weeks of contact with other health profession students, especially medical and nursing students, pharmacy educators and the regulators of pharmacy education in Nigeria, the PCN, should formulate curriculum and policies to cater to the suggestions of the

Table 6
Association between students' demographics and the IPAS subdomain scores.

Variables	N	Teamwork, roles, and responsibilities M (SD) (Min = 9; Max = 45)	Patient centeredness M (SD) (Min = 5; Max = 25)	Inter-professional biases M (SD) (Min = 3; Max = 15)	Diversity and ethics M (SD) (Min = 4; Max = 20)	Community centeredness M (SD) (Min = 6; Max = 30)
Year of study						
2nd		38.33 (2.96)	23.16 (1.98)	10.81 (2.01)	18.86 (1.47)	26.56 (2.73)
3rd		38.13 (3.22)	23.05 (2)	10.94 (2.01)	18.61 (1.66)	26.82 (2.85)
4th		38.01 (3.12)	23.39 (1.78)	11.59 (2.04)	18.74 (1.63)	26.83 (2.62)
5th		38.38 (3.14)	23.44 (1.74)	11.52 (1.87)	18.92 (1.6)	27.13 (2.69)
6th		38.2 (2.53)	23.24 (1.87)	10.8 (1.69)	18.8 (1.58)	26.4 (2.46)
P value		.87	.28	< .001	.41	.27
Sex						
Male	379	40.49 (3.73)	23.26 (1.94)	11.16 (2.1)	18.77 (1.64)	26.87 (2.65)
Female	386	40.37 (3.65)	23.27 (1.82)	11.25 (1.9)	18.83 (1.52)	26.78 (2.79)
P value		.56	.91	.51	.61	.63
Age (in years)[a]						
≤ 20	213	37.91 (3.11)	23.03 (1.99)	11 (2.03)	18.79 (1.52)	26.76 (2.72)
21–25	414	38.29 (3.09)	23.4 (1.81)	11.29 (2.02)	18.76 (1.59)	26.86 (2.71)
26–29	126	38.59 (3.13)	23.21 (1.88)	11.31 (1.86)	18.88 (1.64)	26.85 (2.7)
30+	10	39.6 (2.59)	24 (1.41)	10.8 (2.49)	19.8 (0.42)	27 (3.16)
P value		.06	.07	.28	.21	.97
Pharmacy school attended based on geopolitical zone						
Southwest	313	40.41 (3.5)	23.18 (1.87)	10.89 (1.99)	18.74 (1.53)	26.91 (2.66)
Southeast	54	41.59 (2.85)	23.56 (1.76)	11.43 (2.07)	19.30 (1.54)	27.44 (2.72)
South-South	107	39.71 (4.02)	23.06 (1.98)	11.29 (2.07)	18.61 (1.52)	26.51 (2.82)
Northwest	187	40.56 (3.75)	23.4 (1.89)	12.88 (1.96)	18.87 (1.68)	26.49 (2.81)
Northeast	8	41.38 (3.54)	23.63 (1.77)	11.45 (1.81)	18.25 (1.67)	26.75 (2.66)
North-Central	96	40.19 (4.09)	23.33 91.86)	11.20 (2)	18.84 (1.56)	27.21 (2.55)
P value		.06	.46	.002	.12	.10
Program of study						
BPharm	625	40.41 (3.75)	23.3 (1.87)	11.32 (2.01)	18.81 (1.6)	26.92 (2.72)
PharmD	140	40.44 (3.44)	23.11 (1.94)	10.69 (1.89)	18.74 (1.49)	26.41 (2.68)
P value		.94	.27	.001	.64	.04
Received lectures with other health profession students						
Yes	719	40.39 (3.66)	23.25 (1.85)	11.24 (1.96)	18.81 (1.54)	26.81 (2.69)
No	46	40.83 (4.13)	23.61 (2.26)	10.7 (2.62)	18.72 (2.15)	27.04 (3.2)
P value		.43	.20	.18	.79	.58

BPharm = Bachelor of pharmacy; IPAS = Interprofessional Attitude Scale; M = mean; Max = maximum; Min = minimum; PharmD = Doctor of pharmacy.

[a] Variable binned based on equal percentile of scanned cases.

students. However, this has to be done in collaboration with other professional bodies to harmonize IPE activities in the various curricula.

According to similar studies, practicing pharmacists showed positive attitudes towards participating in IPE and IPCP from survey results in Qatar[37] and Canada.[21] Pharmacists may view IPCP as an occasion to lobby for improved working conditions,[60] achieve professional fulfilment, and enhance professional image.[20,61,62] However, when there are role conflicts, ambiguities, and hierarchical inequalities between health care personnel, teamwork suffers.[63] For pharmacists to effectively and efficiently participate in IPCP, there is the need for competence, commitment, confidence, and responsibility, when engaged in IPCP.[64]

More than 80% of the pharmacists and pharmacy students agreed that it was necessary for health professionals and health profession students to learn together. This is not usually the case in practice. In a study in Spain, pharmacists did not show a tendency to collaborate with general practice physicians because of the perceived physicians' lack of understanding of the need for collaboration.[20] The perception of the pharmacists on learning with others may be premised on possible unsavoury experiences during practice, which is sometimes due to the age-old rivalry and hierarchical structure in the health sector and the difficulties encountered in working with physicians. Graduates from Australia mentioned discordance between the theory and practice of IPCP.[58] This reflects the existence of limited IPCP in actual practice.[59] Worthy of note is that some pharmacists in this study might not have been exposed to other forms of IPE activities, unlike the students, and this may explain why few pharmacists did not believe that pharmacy students should learn together with other health profession students. This attitude may be corrected with the deliberate involvement of relevant health care professionals in patient care through team-based practice at primary, secondary, and tertiary health facilities.

The type of program undertaken by pharmacy students (BPharm or PharmD) and the year of study influenced the students' attitudes towards interprofessional biases such that those in the BPharm program and students in the fourth year had higher attitude scores. There was no sex difference in the attitude towards IPE. In comparison with other studies, there seems to be no clear-cut direction on the influence of sex on attitude towards IPE; while some reported sex differences,[65,66] others did not.[8,54] Likewise, a study by

Table 7
Pharmacists' and pharmacy students' perceived barriers to the implementation of interprofessional education and interprofessional collaborative practice in Nigeria.

Barriers to the implementation of IPE and IPCP	Pharmacists (N = 238) Frequency (%)	Pharmacy students (N = 765) Frequency (%)
Professional- and profession-related barriers		
Professional pride	51 (21.42)	55 (7.19)
The unwillingness of health professionals to work as a team	9 (3.78)	15 (1.96)
Professional superiority complex	28 (11.76)	77 (10.07)
Professional stereotyping	1 (0.42)	8 (1.05)
Professional insecurity or low self-esteem	2 (0.84)	17 (2.22)
Ingrained prejudice against other health professionals	35 (14.7)	74 (9.67)
Lack of trust in other health professionals	3 (1.26)	3 (0.39)
Lack of patient-centeredness among health care professionals	6 (2.52)	3 (0.39)
Lack of effective interprofessional communication	21 (8.82)	20 (2.61)
Historical interprofessional rivalry	23 (9.67)	37 (4.84)
Unawareness of the unique roles of the different health professionals	5 (2.1)	16 (2.09)
Professionals not understanding their limitations	5 (2.1)	7 (0.92)
Lack of awareness, understanding, and respect for other health care professionals	8 (3.36)	31 (4.05)
Lack of education and training of health professionals together	7 (2.94)	15 (1.96)
Strife/conflict among health care professionals	8 (3.36)	20 (2.61)
Lack of cooperation between the different professions and professional bodies	NA	39 (5.1)
Discrimination against other professions	NA	10 (1.3)
Professional silo mentality	11 (4.62)	NA
Education and learning barriers		
Undergraduate training encouraging professional silo	5 (2.1)	7 (0.92)
Rigid curriculum/educational system which does not facilitate IPE	9 (3.78)	71 (9.28)
Lack of facilities and resources and resource person	5 (2.1)	104 (13.59)
Lack of centralized study centres	7 (2.94)	88 (11.5)
Late introduction of clinical experience into pharmacy education	NA	6 (0.78)
Varying school calendar and schedule	NA	25 (3.27)
The unwillingness of students to participate in IPE	NA	20 (2.61)
The population size of students	NA	18 (2.35)
The excess workload of faculties	3 (1.26)	24 (3.14)
Faculty resistance to change	2 (0.84)	10 (1.3)
Time constraints	3 (1.26)	69 (9.02)
Health sector organization barriers		
Hierarchical system present in the health sector	1 (0.42)	2 (0.26)
Limited research regarding IPE and collaborative practice	1 (0.42)	6 (0.78)
Inadequate knowledge of the benefits of IPE and collaborative practice	15 (6.3)	34 (4.44)
Government and education regulator-related barriers		
Lack of government policy that favours the implementation of IPE and collaborative practice	10 (4.2)	20 (2.61)
Bureaucracy	1 (0.42)	1 (0.13)
Non-representation of all health professionals in the legislative system	NA	4 (0.52)

IPCP = Interprofessional collaborative practice; IPE = Interprofessional education; NA = not applicable.

Khan et al[66] reported that fourth-year pharmacy students had higher attitude scores towards IPE which agrees with our finding; while in another study in Qatar which employed RIPLS, junior pharmacy students had higher attitude scores towards IPE. These divergent results could have emanated from the level of development of IPE in these countries, the forms of IPE available, the period of introduction of IPE in the undergraduate program, and the type of pharmacy program or curriculum. Early introduction of IPE in the undergraduate pharmacy program may foster interprofessional relationships among health profession students that may transcend to IPCP which may in turn improve patient care.

The pharmacists and pharmacy students mentioned several impediments to implementing IPE in pharmacy schools, including professional pride, encouraging professional silos training, prejudice against other health professions students and professionals, and unfavourable government policies on IPE. However, barriers to IPE are not limited to countries like Nigeria, where IPE is at the teething stage. In Switzerland, medical students opined that resistance to IPE by students or faculty, lack of an established framework, and challenges coordinating coursework are significant barriers to IPE.[67] Pharmacists in Qatar claimed that lack of technical and administrative support limited their participation in IPE training.[37] The pharmacy graduates in Australia reported the existence of professional silo mentality and limited social interactions between health care professionals,[58,59] a report similar to our findings. Australian pharmacy graduates also mentioned the presence of hierarchy in the health sector, with the physician being considered superior.[59] As suggested by several authors, barriers to collaborative practice could be reduced through interprofessional training at both undergraduate and postgraduate levels.[68] Because of the peculiarity of the developmental stage of IPE in Nigeria, the pharmacists and pharmacy students recommended the integration of current global best practices of IPE in undergraduate pharmacy curriculum and programs, cooperation among health professionals to curb professional rivalry, good communication skills for pharmacists, and provision of facilities and resource persons. And according to Lawlis et al.,[67] faculty development programs that promote faculty engagement and buy-in that assist or ease changes to professional and institutional culture are another strategy to overcome these

Table 8
Pharmacists' and pharmacy students' recommendations for the implementation of interprofessional education and interprofessional collaborative practice in Nigeria.

Recommendations	Pharmacists Frequency (%)	Pharmacy students Frequency (%)
Interprofessional centredness		
Having training that can foster collaborative practice among health professionals	53 (22.27)	NA
Re-orientation of health professionals on patient-centred care	21 (8.82)	18 (7.56)
Encourage mutual respect for all professionals	12 (5.04)	30 (12.61)
Cooperation between the different professional bodies to deal with professional rivalry.	5 (2.1)	6 (2.52)
Establish a method for resolving conflicts between team members	1 (0.42)	2 (0.84)
Orientation on the need for IPE and interprofessional teamwork	36 (15.13)	90 (37.82)
Changing the status quo of making prejudiced assumptions based on discipline	5 (2.1)	8 (3.36)
Provision of enabling environment to foster IPE and for health care workers to work in harmony	4 (1.68)	15 (6.3)
Interprofessional education and learning		
Educating students that all professions are important and discouraging superiority complex	13 (5.46)	11 (4.62)
Integration of IPE in undergraduate studies	50 (21.01)	117 (49.16)
Online platforms should be utilized for collaborative training	4 (1.68)	3 (1.26)
Education on the roles of each health professional and their limitation	13 (5.46)	40 (16.81)
Training to develop effective communication skills in health profession students and health professionals	14 (5.88)	18 (7.56)
School curriculum review	10 (4.2)	62 (26.05)
Confidence in one's profession	3 (1.26)	NA
Encouraging the development of a good interprofessional relationship	2 (0.84)	22 (9.24)
Projects involving teamwork should be encouraged	NA	34 (14.29)
Lecturers should stop transmitting negative perceptions of other professions	NA	6 (2.52)
Non-formal IPE (e.g., health outreach) should be implemented	NA	137 (57.56)
Centralized study centre	1 (0.42)	30 (12.61)
Synchronization of academic calendar and schedules of health profession students	NA	23 (9.66)
Health professionals in academia should collaborate to effect IPE implementation	NA	14 (5.88)
Creating awareness of the benefits of IPE and collaborative practice	1 (0.42)	90 (37.82)
Government policies		
Advocacy among stakeholders to promote IPE	5 (2.1)	5 (2.1)
Favourable policies/laws that foster the implementation of IPE and collaborative practice	19 (7.98)	15 (6.3)
Full representation of all categories of health care professionals in administration and national legislative policymaking	3 (1.26)	NA
Provision of necessary facilities and/or resources by government	3 (1.26)	80 (33.61)

IPCP = Interprofessional collaborative practice; IPE = interprofessional education; NA = not applicable.

barriers.

IPE was designed to ensure and encourage health profession educators to facilitate patient-centred teamwork among students and enhance their professional skills and knowledge.[69,70] It would be helpful to investigate outcomes such as skill mastery at levels three and four of the Kirkpatrick hierarchy[71] in future research since attitudes and beliefs cannot be reliably predicted.

Strengths and limitations of the study

The strength of this study lies in the fact that it is a nationwide survey involving pharmacists and pharmacy students in the country's six geopolitical zones. To the best of our knowledge, it is also the first time that the views and attitudes of pharmacists and pharmacy students towards IPE and IPCP were evaluated concurrently in a study. The study is, however, not without limitations. One of the limitations is the use of online questionnaires where only those who had access to the internet and were interested completed it. The required sample size for pharmacists was therefore not achieved. Hence the results of the pharmacist's attitude to IPE and IPCP may not be generalizable to all community and hospital pharmacists in Nigeria. Another limitation is that the self-report used in the survey is known for common method variance and social desirability bias. A profession was evaluated, which may limit the results' external validity. Also, the uncertainty of whether attitude will ultimately affect or transform into particular future behaviours is an acknowledged flaw in attitude research. The reader is therefore encouraged to reflect on the findings of this study vis-à-vis the significant cautions raised.

Conclusions

Nigerian pharmacy students and practicing hospital and community pharmacists showed positive attitudes towards IPE and IPCP. Previous exposure to IPE and a willingness to learn with other health professionals and students influenced the pharmacists' and pharmacy students' attitudes towards IPE. The pharmacists and pharmacy students highlighted the lack of government policies on IPE, interprofessional rivalry, and professional silos training as barriers to IPE. Integration of IPE in the undergraduate pharmacy curriculum, cooperation among health professional bodies to curb rivalry, and the provision of enabling laws, policies, and facilities for the development of IPE were recommended. Through the PCN (the body regulating pharmacy education and training), the government should ensure the inclusion and implementation of IPE in the pharmacy curriculum in all pharmacy schools in Nigeria. Further study should be conducted to support these findings on the pharmacists' opinion on IPE and IPCP.

Disclosure(s)

None.

CRediT authorship contribution statement

Segun J. Showande: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Tolulope P. Ibirongbe:** Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing – review & editing.

Declaration of Competing Interest

None.

Acknowledgements

We thank all the pharmacy students and pharmacists who participated in the study and the Pharmacy Association of Nigerian Students for assisting in disseminating the questionnaire to all the pharmacy students. We also thank the Pharmaceutical Society of Nigeria, the Association of Community Pharmacists of Nigeria, and the Association of Hospital and Administrative Pharmacists of Nigeria for distributing the questionnaire among their members.

References

1 American College of Clinical Pharmacy, Page II RL, Hume AL, et al. Interprofessional education: principles and application. A framework for clinical pharmacy. *Pharmacotherapy*. 2009;29(3):145e–164e. https://doi.org/10.1592/phco.29.7.879.
2 Young N, Tokumaru S, Goo R. Training future pharmacists to optimize the healthcare workforce. *Hawaii J Health Soc Welf*. 2022;81(4 Suppl 2):28–30.
3 Alvarez G, Coiera E. Interdisciplinary communication: an uncharted source of medical error? *J Crit Care*. 2006;21(3). https://doi.org/10.1016/j.jcrc.2006.02.004, 336–242; discussion 242.
4 Kerfoot KM, Rapala K, Ebright P, Rogers SM. The power of collaborations with patient safety programs: building safe passage for patients, nurses, and clinical staff. *J Nurs Adm*. 2006;36(12):582–588. https://doi.org/10.1097/00005110-200612000-00008.
5 Lee H, Ryu K, Sohn Y, Kim J, Suh GY, Kim E. Impact on patient outcomes of pharmacist participation in multidisciplinary critical care teams: a systematic review and meta-analysis. *Crit Care Med*. 2019;47(9):1243–1250. https://doi.org/10.1097/ccm.0000000000003830.
6 El-Awaisi A, Joseph S, El-Hajj MS, Diack L. A comprehensive systematic review of pharmacy perspectives on interprofessional education and collaborative practice. *Res Social Adm Pharm*. 2018;14(10):863–882. https://doi.org/10.1016/j.sapharm.2017.11.001.
7 Frenk J, Chen L, Bhutta ZA, et al. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *Lancet*. 2010;376(9756):1923–1958. https://doi.org/10.1016/S0140-6736(10)61854-5.
8 El-Awaisi A, El Hajj MS, Joseph S, Diack L. Perspectives of pharmacy students in Qatar toward interprofessional education and collaborative practice: a mixed methods study. *J Interprof Care*. 2018;32(6):674–688. https://doi.org/10.1080/13561820.2018.1498466.
9 Barr H, Coyle J. Introducing interprofessional education. In: Loftus S, Gerzina T, Higgs J, Smith M, Duffy E, eds. *Educating Health Professionals. Practice, Education, Work and Society*. SensePublishers; 2013.
10 Paradis E, Whitehead CR. Beyond the lamppost: a proposal for a fourth wave of education for collaboration. *Acad Med*. 2018;93(10):1457–1463. https://doi.org/10.1097/ACM.0000000000002233.
11 Lapkin S, Levett-Jones T, Gilligan C. A systematic review of the effectiveness of interprofessional education in health professional programs. *Nurse Educ Today*. 2013;33(2):90–102. https://doi.org/10.1016/j.nedt.2011.11.006.
12 WHO Study Group on Multiprofessional Education of Health Personnel: the Team Approach. *Learning Together to Work Together for Health*. World Health Organization; 1988. Accessed 12 July 2023 https://apps.who.int/iris/handle/10665/37411.
13 Health Professions Network Nursing and Midwiferty Office. Framework for Action on Interprofessional Education & Collaborative Practice. Accessed 12 July 2023 https://www.who.int/publications/i/item/framework-for-action-on-interprofessional-education-collaborative-practice; 2010.
14 Aston SJ, Rheault W, Arenson C, et al. Interprofessional education: a review and analysis of programs from three academic health centers. *Acad Med*. 2012;87(7):949–955. https://doi.org/10.1097/ACM.0b013e3182583374.
15 Anderson ES, Lennox A. The Leicester model of interprofessional education: developing, delivering and learning from student voices for 10 years. *J Interprof Care*. 2009;23(6):557–573. https://doi.org/10.3109/13561820903051451.
16 Iyoke CA, Lawani LO, Ugwu GO, et al. Knowledge and attitude toward interdisciplinary team working among obstetricians and gynecologists in teaching hospitals in south East Nigeria. *J Multidiscip Healthc*. 2015;8:237–244. https://doi.org/10.2147/JMDH.S82969.
17 Osaro E, Charles AT. Harmony in health sector: a requirement for effective healthcare delivery in Nigeria. Asian Pac. *J Trop Med*. 2014;7S1:S1–S5. https://doi.org/10.1016/S1995-7645(14)60196-6.
18 Katoue MG, Awad AI, Dow AW, Schwinghammer TL. Interprofessional education and collaborative practice in Kuwait: attitudes and barriers from faculty. *J Interprof Care*. 2021;35(2):208–216. https://doi.org/10.1080/13561820.2020.1713062.
19 Boland D, White T, Adams E. Experiences of pharmacy trainees from an interprofessional immersion training. *Pharmacy (Basel)*. 2018;6(2):37. https://doi.org/10.3390/pharmacy6020037.
20 Jové AM, Fernández A, Hughes C, Guillén-Solà M, Rovira M, Rubio-Valera M. Perceptions of collaboration between general practitioners and community pharmacists: findings from a qualitative study based in Spain. *J Interprof Care*. 2014;28(4):352–357. https://doi.org/10.3109/13561820.2014.898621.
21 Kelly DV, Bishop L, Young S, Hawboldt J, Phillips L, Keough TM. Pharmacist and physician views on collaborative practice: findings from the community pharmaceutical care project. *Can Pharm J (Ott)*. 2013;146(4):218–226. https://doi.org/10.1177/1715163513492642.
22 Vincent-Onabajo G, Mustapha SA, Gujba FK. Attitudes toward interprofessional practice among healthcare students in a Nigerian university. *J Interprof Care*. 2019;33(3):336–342. https://doi.org/10.1080/13561820.2019.1605980.
23 Odole AC, Odunaiya NA, Ajadi OI. Interprofessional education among Nigerian clinical students: implications for interprofessional care. *J Interprof Care*. 2019;33(6):645–653. https://doi.org/10.1080/13561820.2018.1544545.
24 Showande S. Transition from professional silos to interprofessional collaboration, are pharmacy students interested? a cross-sectional attitudinal study in a Nigerian university. *Int J Pharm Pract*. 2015;23(suppl 2):23–106. Royal Pharmaceutical Society Annual Conference 2015 abstract.

25 *Accredited: universities for pharmacy programmes in Nigeria*. Pharmacy Council of Nigeria; 2023. Accessed 12 July 2023 https://www.pcn.gov.ng/universities-accredited-for-pharmacy-programmes-in-nigeria/.
26 Universities that offers PharmD program in Nigeria 2023/2024. In: *Drug Savant*; 7 January 2023. Accessed 12 July 2023 https://drugsavant.com/universities-that-offers-pharm-d-program-nigeria/. Accessed 12 July 2023.
27 Ekpenyong A, Udoh A, Kpokiri E, Bates I. An analysis of pharmacy workforce capacity in Nigeria. *J Pharm Policy Pract*. 2018;11:20. https://doi.org/10.1186/s40545-018-0147-9.
28 World Medical Association. World medical association declaration of Helsinki: ethical principles for medical research involving human subjects. *JAMA*. 2013;310(20):2191–2194. https://doi.org/10.1001/jama.2013.281053.
29 Eze TC, Okpala CS, Ogbodo JC. Patterns of inequality in human development across Nigeria's six geopolitical zones. *Dev Country Stud*. 2014;4(8):97–101.
30 Vision. National Universities Commision. Accessed 12 July 2023. https://www.nuc.edu.ng/; 2023.
31 *Sample size calculator*. Raosoft, Inc; 2004. Accessed 12 July 2023 http://www.raosoft.com/samplesize.html.
32 Gillan C, Lovrics E, Halpern E, Wiljer D, Harnett N. The evaluation of learner outcomes in interprofessional continuing education: a literature review and an analysis of survey instruments. *Med Teach*. 2011;33(9):461–470. https://doi.org/10.3109/0142159X.2011.587915.
33 Shrader S, Farland MZ, Danielson J, Sicat B, Umland EM. A systematic review of assessment tools measuring interprofessional education outcomes relevant to pharmacy education. *Am J Pharm Educ*. 2017;81(6):119. https://doi.org/10.5688/ajpe816119.
34 *Core competencies for interprofessional collaborative practice: 2016 update*. Interprofessional Education Collaborative; 2016. Accessed 12 July 2023 https://ipec.memberclicks.net/assets/2016-Update.pdf.
35 Norris J, Carpenter JG, Eaton J, et al. The development and validation of the Interprofessional attitudes scale: assessing the interprofessional attitudes of students in the health professions. *Acad Med*. 2015;90(10):1394–1400. https://doi.org/10.1097/ACM.0000000000000764.
36 Humphrey CE, Christopher K, Ginn CC. Interprofessional education: a team approach in the classroom. In: *Pedagogicon conference proceedings*; 2023. Accessed 12 July 2022 https://encompass.eku.edu/pedagogicon/2019/attract/3. Accessed 12 July 2022.
37 El-Awaisi A, El Hajj MS, Joseph S, Diack L. Perspectives of practising pharmacists towards interprofessional education and collaborative practice in Qatar. *Int J Clin Pharmacol*. 2018;40(5):1388–1401. https://doi.org/10.1007/s11096-018-0686-9.
38 Pedersen TH, Cignacco E, Meuli J, Habermann F, Berger-Estilita J, Greif R. The German interprofessional attitudes scale: translation, cultural adaptation, and validation. GMS. *J Med Educ*. 2020;37(3). https://doi.org/10.3205/zma001325. Doc32.
39 Hammick M, Freeth D, Koppel I, Reeves S, Barr H. A best evidence systematic review of interprofessional education: BEME guide no. 9. *Med Teach*. 2007;29(8):735–751. https://doi.org/10.1080/01421590701682576.
40 Davidson M, Smith RA, Dodd KJ, Smith JS, O'Laughlan MJ. Interprofessional pre-qualification clinical education: a systematic review. *Aust Health Rev*. 2008;32(1):111–120. https://doi.org/10.1071/AH080111.
41 Reeves S, Perrier L, Goldman J, Freeth D, Zwarenstein M. Interprofessional education: effects on professional practice and healthcare outcomes (update). *Cochrane Database Syst Rev*. 2013;2013(3). https://doi.org/10.1002/14651858.CD002213.pub3. CD002213.
42 Remington TL, Foulk MA, Williams BC. Evaluation of evidence for interprofessional education. *Am J Pharm Educ*. 2006;70(3):66. https://doi.org/10.5688/aj700366.
43 Wilbur K, Kelly I. Interprofessional impressions among nursing and pharmacy students: a qualitative study to inform interprofessional education initiatives. *BMC Med Educ*. 2015;15:53. https://doi.org/10.1186/s12909-015-0337-y.
44 Machado AC, Czock A, Boone J, Anderson C, Leite SN. How interprofessional education is offered to pharmacists and pharmacy students: a scoping review. *J Interprofessional Educ Pract*. 2022;29, 100563. https://doi.org/10.1016/j.xjep.2022.100563.
45 Nagge JJ, Lee-Poy MF, Richard CL. Evaluation of a unique interprofessional education program involving medical and pharmacy students. *Am J Pharm Educ*. 2017;81(10):6140. https://doi.org/10.5688/ajpe6140.
46 Thurston MM, Chesson MM, Harris EC, Ryan GJ. Professional stereotypes of interprofessional education naive pharmacy and nursing students. *Am J Pharm Educ*. 2017;81(5):84. https://doi.org/10.5688/ajpe81584.
47 Vogler C, Arnoldi J, Moose H, Hingle ST. Interprofessional education involving medical and pharmacy students during transitions of care. *J Interprof Care*. 2017;31(3):404–406. https://doi.org/10.1080/13561820.2016.1256871.
48 Jebara T, Power A, Boyter A, Jacob SA, Portlock J, Cunningham S. Student pharmacist practice-based interprofessional education in Scotland: a qualitative study of stakeholders' views and experiences. *J Interprof Care*. 2023;37(1):73–82. https://doi.org/10.1080/13561820.2021.2011843.
49 Olson R, Bialocerkowski A. Interprofessional education in allied health: a systematic review. *Med Educ*. 2014;48(3):236–246. https://doi.org/10.1111/medu.12290.
50 Wellmon R, Gilin B, Knauss L, Linn MI. Changes in student attitudes toward interprofessional learning and collaboration arising from a case-based educational experience. *J Allied Health*. 2012;41(1):26–34.
51 Horsburgh M, Lamdin R, Williamson E. Multiprofessional learning: the attitudes of medical, nursing and pharmacy students to shared learning. *Med Educ*. 2001;35(9):876–883. https://doi.org/10.1046/j.1365-2923.2001.00959.x.
52 Berger-Estilita J, Chiang H, Stricker D, Fuchs A, Greif R, McAleer S. Attitudes of medical students towards interprofessional education: a mixed-methods study. *PloS One*. 2020;15(10), e0240835. https://doi.org/10.1371/journal.pone.0240835.
53 Dennis V, Craft M, Bratzler D, et al. Evaluation of student perceptions with 2 interprofessional assessment tools-the collaborative healthcare interdisciplinary relationship planning instrument and the Interprofessional attitudes scale-following didactic and clinical learning experiences in the United States. *J Educ Eval Health Prof*. 2019;16:35. https://doi.org/10.3352/jeehp.2019.16.35.
54 Ahmad MI, Chan SW, Wong LL, Tan ML, Liaw SY. Are first-year healthcare undergraduates at an Asian university ready for interprofessional education? *J Interprof Care*. 2013;27(4):341–343. https://doi.org/10.3109/13561820.2013.769094.
55 Wilhelmsson M, Ponzer S, Dahlgren L, Timpka T, Faresjö T. Are female students in general and nursing students more ready for teamwork and interprofessional collaboration in healthcare? *BMC Med Educ*. 2011;11:15. https://doi.org/10.1186/1472-6920-11-15.
56 Hansson A, Foldevi M, Mattsson B. Medical students' attitudes toward collaboration between doctors and nurses - a comparison between two Swedish universities. *J Interprof Care*. 2010;24(3):242–250. https://doi.org/10.3109/13561820903163439.
57 King S, Violato E. Longitudinal evaluation of attitudes to interprofessional collaboration: time for a change? *J Interprof Care*. 2021;35(1):124–131. https://doi.org/10.1080/13561820.2020.1712334.
58 Gilligan C, Outram S, Levett-Jones T. Recommendations from recent graduates in medicine, nursing and pharmacy on improving interprofessional education in university programs: a qualitative study. *BMC Med Educ*. 2014;14:52. https://doi.org/10.1186/1472-6920-14-52.
59 Ebert L, Hoffman K, Levett-Jones T, Gilligan C. "They have no idea of what we do or what we know": Australian graduates' perceptions of working in a health care team. *Nurse Educ Pract*. 2014;14(5):544–550. https://doi.org/10.1016/j.nepr.2014.06.005.
60 Baker L, Egan-Lee E, Martimianakis MA, Reeves S. Relationships of power: implications for interprofessional education. *J Interprof Care*. 2011;25(2):98–104. https://doi.org/10.3109/13561820.2010.505350.
61 Dey RM, de Vries MJW, Bosnic-Anticevich S. Collaboration in chronic care: unpacking the relationship of pharmacists and general medical practitioners in primary care. *Int J Pharm Pract*. 2011;19(1):21–29. https://doi.org/10.1111/j.2042-7174.2010.00070.x.
62 Luetsch K, Rowett D. Interprofessional communication training: benefits to practicing pharmacists. *Int J Clin Pharmacol*. 2015;37:857–864. https://doi.org/10.1007/s11096-015-0130-3.
63 Sutcliffe KM, Lewton E, Rosenthal MM. Communication failures: an insidious contributor to medical mishaps. *Acad Med*. 2004;79(2):186–194. https://doi.org/10.1097/00001888-200402000-00019.
64 Wiedenmayer K, Summers RS, Mackie CA, AGS Gous, Everard M, Tromp D. Developing pharmacy practice: a focus on patient care: handbook – 2006 edition. Accessed 12 July 2023 https://www.fip.org/files/fip/publications/DevelopingPharmacyPractice/DevelopingPharmacyPracticeEN.pdf; 2006.

65 Curran VR, Sharpe D, Forristall J, Flynn K. Attitudes of health sciences students towards interprofessional teamwork and education. *Learn Health Soc Care*. 2008;7(3):146–156. https://doi.org/10.1111/j.1473-6861.2008.00184.x.
66 Khan TM, Emeka PM, Aljadhey H, Haseeb A. Study investigating pharmacy students' interprofessional perceptions toward the pharmacy profession in Saudi Arabia. *Curr Pharm Teach Learn*. 2015;7(1):62–69. https://doi.org/10.1016/j.cptl.2014.09.019.
67 Lawlis TR, Anson J, Greenfield D. Barriers and enablers that influence sustainable interprofessional education: a literature review. *J Interprof Care*. 2014;28(4):305–310. https://doi.org/10.3109/13561820.2014.895977.
68 Hughes CM, McCann S. Perceived interprofessional barriers between community pharmacists and general practitioners: a qualitative assessment. *Bri J Gen Pract*. 2003;53(493):600–606.
69 Gillette C, Dinkins MM, Bliss R, et al. Health professions students' attitudes and perceptions of interprofessional biases. *Int J Pharm Pract*. 2019;27(4):396–398. https://doi.org/10.1111/ijpp.12536.
70 Bunniran S, McCaffrey III DJ. Healthcare professionals and interdisciplinary care. In: Plake KS, Schafermeyer KW, McCarthy RL, eds. *McCarthy's introduction to health care delivery: A primer for pharmacists*. 6th ed. Jones & Bartlett Learning; 2016:43–80.
71 Kirkpatrick DL, Kirkpatrick JD. *Evaluating training programs: The four levels*. 3rd ed. Barrett-Koehler Publishers, Inc; 2006.