Perceptions of the roles and impact of clinical pharmacists by students in health-related disciplines in a Nigerian university

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ABSTRACT

Background: The expanded responsibilities of pharmacists have created friction with other health professionals. This study sought to assess the perceptions of the roles and impact of clinical pharmacists by students in health-related disciplines in a Nigerian university.

Methods: This was a cross-sectional survey of final year students in eight health-related disciplines in the University of Nigeria Nsukka. Data were collected with a 37-item structured self-administered questionnaire and analyzed using the IBM SPSS Version 25. Pearson's Chi-Square tested the association between variables while multiple linear regression determined the predictors. Statistical significance was set as $P < 0.05$.

Results: Of the 790 eligible students, 463 participated. Three-fifths of the respondents had previously done Students Industrial Work Experience Scheme (SIWES)/Industrial Training (IT) in a hospital (n = 283, 61.1%). More than half of the respondents agreed that clinical pharmacists should participate in ward rounds (n = 326, 70.4%). Less than half of them (n = 184, 39.7%) agreed that clinical pharmacists should manage patients with chronic diseases. Majority of the students (n = 451, 97.4%) agreed that clinical pharmacists are necessary to the healthcare system. Overall, less than half of the respondents had a positive perception of the roles (n = 200, 43.2%) and impact (n = 195, 42.1%) of clinical pharmacists. Being in a department other than pharmacy significantly predicted a decrease in the positive perception of the roles (B = -4.187, P < 0.001) and impact (B = -0.826, P < 0.001) of clinical pharmacists. Having a pharmacist as an immediate family member increased the positive perception of the roles of clinical pharmacists (B = 0.889, P = 0.005). Undergoing SIWES/IT in a hospital (B = 0.598, P < 0.001) significantly predicted an increase in the positive perception of the impact of clinical pharmacists.

Conclusion: Less than half of the respondents had a positive perception of the roles/impact of clinical pharmacists. Interprofessional education should be encouraged.

1.   Introduction

The expanded responsibilities of pharmacists have provided platforms for interprofessional collaborations.[1,2] Since rendering pharmaceutical care services requires collaborative efforts, the acceptance of the roles of pharmacists by other members of the healthcare team is necessary for success.[1] The practice model of clinical pharmacy stemmed from the United States but is now entrenched in different countries.[3] As of 2019, the University of Nigeria Nsukka (UNN) was one of the few universities in Nigeria to kickstart the Doctor of Pharmacy (Pharm.D) degree programme with her 2019/2020 Session freshmen.

It has been revealed that clinical pharmacists make great impact when they spend quality time on clinical services and are a highly valuable resource for primary health care.[4,5] Conversely, some healthcare professionals and members

of the public, view pharmacists solely as dispensers of medicines. [6] Advancements in professional practice have led to role overlap and the crossing of boundaries.

Students in health-related disciplines lack a developed understanding of pharmacists' roles, responsibilities and practice settings. [7] Understanding how future health professionals view the roles of pharmacists who work in patient-oriented settings gives insight to the interprofessional relationships that could occur in future practice. The ever-evolving practice of pharmacy entails that students in health-related disciplines might eventually perceive encroachment during their future careers. This study sought to assess the perceptions of the roles and impact of clinical pharmacists by final year students of health-related disciplines in a Nigerian university.

2. Methods

2.1 Study design/site
This was a cross-sectional survey conducted in UNN between 3 May 2019 and 21 August 2019. Students from eight health-related disciplines were sampled: Pharmacy, Medicine and Surgery, Dentistry, Medical Laboratory Science, Medical Rehabilitation, Nursing, Medical Radiography and Veterinary Medicine. Of the eight disciplines, only Pharmacy and Veterinary Medicine are located in the Nsukka Campus of the University. The others are located in Enugu Campus and closer to the University of Nigeria Teaching Hospital (UNTH).

2.2 Eligibility criteria
All final year students of the eight aforementioned departments who were willing to participate were eligible. Eligible students who were willing to fill the questionnaires were recruited for the study.

2.3 Sample size and selection
Using the Raosoft sample size calculator, the minimum recommended sample size for the total population of 790 students was 259, assuming 5% margin of error, 50% response distribution, at 95% confidence interval. The students were recruited from their classrooms by convenience sampling.

2.4 Data collection
The study instrument was a 37-item structured self-administered questionnaire in four domains. The first domain requested for personal details. The second and third domains requested for the students' opinions on the roles and impact of clinical pharmacists in healthcare, respectively. The fourth domain comprised open-ended questions to explore the opinions of students on the Pharm.D programme and consultancy status of pharmacists.

The questionnaire was both face and content-validated to eliminate ambiguities and irrelevances. For face validity, the questionnaire was piloted among 24 conveniently-sampled students (three from each discipline) to determine the reliability of the instrument among the study population. Content validation was by eight Clinical Pharmacists in the Department of Clinical Pharmacy and Pharmacy Management, UNN. The internal consistency was calculated as 0.71 using Cronbach's alpha technique. The data obtained from the pre-test were excluded from the study. Confidentiality was maintained throughout the study. The participants dropped their filled questionnaires in a general envelope.

2.5 Data analysis
Data were analyzed using the IBM SPSS Version 25.0. Descriptive statistics were used to summarize data. Inferential statistics such as Pearson's Chi-Square test and multiple linear regression were utilized, with statistical significance set as $P < 0.05$.

For the second and third domains, categorization into positive and negative perception was achieved after obtaining the total perception score. Statements which were in agreement with the positive roles/impact of clinical pharmacists were given a score of '1' while those in disagreement, '0'. The total perception score was the sum of these scores. Categorization as positive perception of the roles/impact of clinical pharmacists was set as scores above the median score.

The open-ended questions utilized the thematic analysis. Two independent researchers closely examined the data to identify common themes, using the inductive approach such that there were no preconceived themes. The approach was also semantic as the explicit content of the data were analyzed with interests in the students' opinions.

The Health Research and Ethics Committee (HREC) of the University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu State approved the study protocol (NHREC/05/01/2008B-FWA00002458-1RB00002323) on 20 June, 2019. Students who agreed to participate, provided oral and written informed consent.

3. Results

A total of 463 questionnaires were completed, representing an overall participation rate of 58.6% (463/790). Individually, the participation rate was: Pharmacy - 66.8% (142/211); Medicine and Surgery - 51.9% (70/135); Dentistry - 51.9% (7/12); Medical Radiography - 70.0% (70/100); Medical Rehabilitation - 62.5% (50/80); Veterinary Medicine - 78.7% (37/47), Medical Laboratory Science - 55.7% (64/115); Nursing Sciences - 24.4% (22/90).

Most of the students were 21 to 26 years old (n = 387, 83.6%), single (n = 450, 97.2%), had previously done Students Industrial Work Experience Scheme (SIWES) / Industrial Training (IT) in a hospital (n = 283, 61.1%) (Table 1).

More than half of the students agreed that clinical pharmacists should participate in ward rounds (n = 326, 70.4%). Less than half of them (n = 184, 39.7%) agreed that clinical pharmacists should manage patients with chronic diseases, Table 2a and Table 2b.

Majority of the students (n = 451, 97.4%) agreed that clinical pharmacists are necessary to the healthcare system. About two-fifths of them (n = 171, 36.9%) agreed that clinical pharmacy services increase cost to patients (Table 3).

After categorization into positive and negative perception of the roles/impact of clinical pharmacists, less than half of the respondents had a positive perception of the roles of clinical pharmacists (n = 200, 43.2%) and the impact of clinical pharmacists (n = 195, 42.1%).

About three-fifth of the 306 respondents (n = 183, 59.8%) agreed that Pharm.D graduates should earn higher than B.Pharm graduates (Table 4).

Close to half of the 239 respondents (n = 115, 48.1%) believed that the 6-year Pharm.D programme improves the clinical knowledge of pharmacists (Figure 1). Some of the 212 respondents opined that Pharm.D graduates should be paid higher than B.Pharm graduates due to the longer duration of training (n = 47, 22.2%) (Figure 2).

About half of the 210 respondents felt consultant clinical pharmacists should earn the same as consultant human or veterinary doctors (n = 115, 54.8%), Figure 3.

A larger proportion of pharmacy students (n = 125, 88.0%) had a positive perception of the roles of clinical pharmacists compared to students of the other disciplines (x^2 = 175.339, df = 7, P < 0.001). More pharmacy (n = 83, 58.5%) and nursing students (n = 16, 72.7%) had a positive perception of the impact of clinical pharmacists compared to students of the other disciplines (x^2 = 64.997, df = 7, P < 0.001). See Table 5a for more details.

More students who had immediate family members as pharmacists (n = 61, 58.7%) had positive perception of the roles of clinical pharmacists compared to those who had none (n = 139, 38.7%) (x^2 = 13.061, df = 1, P < 0.001). More students who underwent SIWES/IT in a hospital (n = 136, 48.1%) had a positive perception of the impact of clinical pharmacists compared to those who did not (n = 59, 32.8%) (x^2 = 10.535, df = 1, P = 0.001). See Table 5b for more details.

Being in a department other than pharmacy significantly predicted a decrease in the positive perception of the roles of clinical pharmacists (B = -4.187, P < 0.001). Having a pharmacist as an immediate family member increased the positive perception of the roles of clinical pharmacists (B = 0.889, P = 0.005), Table 6.

Being in a department other than pharmacy (B = -0.826, P < 0.001) and having a pharmacist as an immediate family member (B = -0.331, P = 0.025) significantly predicted a decrease in the positive perception of the impact of clinical pharmacists. Furthermore, undergoing SIWES/IT in a hospital (B = 0.598, P < 0.001) significantly predicted an increase in the perception of the impact of clinical pharmacists, Table 7.

Table 1: Demographic information, N = 463

Variables	n (%)
Age (in years)	
<18	0 (0)
18 – 20	20 (4.3)
21 – 23	229 (49.5)
24 – 26	158 (34.1)
27 – 29	42 (9.1)
>29	14 (3.0)
Gender	
Male	236 (51.0)
Female	227 (49.0)
Marital Status	
Single	450 (97.2)
Married	11 (2.4)
Separated	1 (0.2)
Divorced	1 (0.2)
Department	
Pharmacy	142 (30.7)
Medicine & Surgery	70 (15.1)
Nursing	22 (4.8)
Medical Radiography	71 (15.3)
Medical Laboratory Science	64 (13.8)
Medical Rehabilitation	50 (10.8)
Dentistry	7 (1.5)
Veterinary Science	37 (8.0)
I have an immediate family member (e.g., parents/siblings) who is a pharmacist	104 (22.5)
This is my first degree	403 (87.0)
I have previously done SIWES / IT in a hospital setting	283 (61.1)
Place of upbringing	
Urban	358 (77.3)
Rural	105 (22.7)

SIWES – Students Industrial Work Experience Scheme; IT – Industrial Training

Table 2a: Roles of clinical pharmacists I, N = 463

Variables	SD n (%)	D n (%)	A n (%)	SA n (%)	Mean (SDV)
1. Clinical Pharmacists should participate in ward rounds	20 (4.3)	117 (25.3)	184 (39.7)	142 (30.7)	2.97 (0.86)
2. Clinical pharmacists can play important roles in patient education and counselling	9 (1.9)	12 (2.6)	255 (55.1)	187 (40.4)	3.34 (0.63)
3. Clinical pharmacists can monitor patients' response to drug therapy to avoid/ reduce toxicity or side effects	8 (1.7)	16 (3.5)	246 (53.1)	193 (41.7)	3.35 (0.63)
4. Clinical pharmacists can monitor patients' response to drug therapy to ensure effectiveness	7 (1.5)	20 (4.3)	239 (51.6)	197 (42.5)	3.35 (0.64)
5. Clinical pharmacists can provide drug information to healthcare professionals such as compatibility, stability, storage, availability	6 (1.3)	15 (3.2)	230 (49.7)	212 (45.8)	3.40 (0.62)
6. Clinical pharmacists should take patients' medication history on admission	18 (3.9)	75 (16.2)	216 (46.7)	154 (33.3)	3.09 (0.80)
7. Clinical pharmacists should have access to patients' charts and have a place to document their services	10 (2.2)	66 (14.3)	231 (49.9)	156 (33.7)	3.15 (0.74)
8. Clinical pharmacists should analyze patient treatment and suggest changes of therapy when necessary	16 (3.5)	64 (13.8)	225 (48.6)	158 (34.1)	3.13 (0.78)

SD - Strongly Disagree (coded as 1)**; D** – Disagree (coded as 2)**; A** – Agree (coded as 3)**; SA** – Strongly agree (coded as 4); **SDV** – Standard Deviation

Table 2b: Roles of clinical pharmacists II, N = 463

Variables	SD n (%)	D n (%)	A n (%)	SA n (%)	Mean (SDV)
9. * Clinical pharmacists should care about drug products and leave patient care to doctors, health officers and nurses	78 (16.8)	96 (20.7)	214 (46.2)	75 (16.2)	2.62 (0.95)
10. The current setup in Nigerian hospitals (infrastructure and environment) is appropriate for the provision of clinical pharmacy services	94 (20.3)	244 (52.7)	77 (16.6)	48 (10.4)	2.17 (0.87)
11. Clinical pharmacists should provide point-of-care testing	46 (9.9)	146 (31.5)	187 (40.4)	84 (18.1)	2.67 (0.87)
12. There are situations in which a pharmacist can change a patient's medication regimen	39 (8.4)	124 (26.8)	219 (47.3)	81 (17.5)	2.74 (0.89)
13. Clinical pharmacists should recommend dietary or lifestyle changes	56 (12.1)	136 (29.4)	181 (39.1)	90 (19.4)	2.66 (0.93)
14. Clinical pharmacists should perform health screenings	56 (12.1)	206 (44.5)	139 (30.0)	62 (13.4)	2.45 (0.87)
15. Clinical pharmacists should manage patients with chronic diseases	75 (16.2)	204 (44.1)	120 (25.9)	64 (13.8)	2.37 (0.91)
16. Clinical pharmacists should conduct physical examinations	52 (11.2)	177 (38.2)	166 (35.9)	68 (14.7)	2.54 (0.88)
17. Clinical pharmacists should conduct research	10 (2.2)	19 (4.1)	262 (56.6)	172 (37.1)	3.29 (0.65)
18. Clinical pharmacists should recommend over-the-counter (OTC) products	21 (4.5)	63 (13.6)	249 (53.8)	130 (28.1)	3.05 (0.77)
19. Clinical pharmacists	18 (3.9)	28 (6.0)	251 (54.2)	166 (35.9)	3.22 (0.73)

SD - Strongly Disagree (coded as 1); **D** – Disagree (coded as 2); **A** – Agree (coded as 3); **SA** – Strongly agree (coded as 4); **SDV** – Standard Deviation
* The code responses were reversed in a positive direction such that higher mean scores indicated more positive perception of the roles of clinical pharmacists

Table 3: Impact of clinical pharmacists in healthcare, N = 463

Variables	SD n (%)	D n (%)	A n (%)	SA n (%)	Mean (SDV)
1. Clinical pharmacists are necessary to the healthcare system	5 (1.1)	7 (1.5)	196 (42.3)	255 (55.1)	3.51 (0.59)
2. Clinical pharmacists improve patients' overall health	8 (1.7)	23 (5.0)	221 (47.7)	211 (45.6)	3.37 (0.66)
3. Clinical Pharmacists improve patients' adherence to therapy	12 (2.6)	45 (9.7)	224 (48.4)	182 (39.3)	3.24 (0.73)
4. * Clinical pharmacy services increase cost to patients	46 (9.9)	125 (27.0)	232 (50.1)	60 (13.0)	2.66 (0.83)
5. * Clinical pharmacists do not reduce cost to the health care system	52 (11.2)	131 (28.3)	211 (45.6)	69 (14.9)	2.64 (0.87)
6. Clinical pharmacists prevent drug related problems	8 (1.7)	42 (9.1)	257 (55.5)	156 (33.7)	3.21 (0.67)
7. * Clinical pharmacy services do not enhance patients' satisfaction	30 (6.5)	53 (11.4)	218 (47.1)	162 (35.0)	3.11 (0.84)

SD - Strongly Disagree (coded as 1); **D** – Disagree (coded as 2); **A** – Agree (coded as 3); **SA** – Strongly agree (coded as 4); **SDV** – Standard Deviation
* The code responses were reversed in a positive direction such that higher mean scores indicated more positive perception of the impact of clinical pharmacists

Table 4: Opinions on Pharm.D and consultancy status of clinical pharmacists

Variables	n (%)
1. The 6-year Pharm.D programme for pharmacy students is relevant	253 (81.6)
2. Pharm.D graduates should earn higher than B.Pharm graduates	183 (59.8)
3. Clinical pharmacists who are consultants (Fellows of the West African Post Graduate College of Pharmacists, FPCPharm) should earn the same as consultants in other fields (such as Medicine & Surgery or Veterinary Medicine)	195 (62.1)

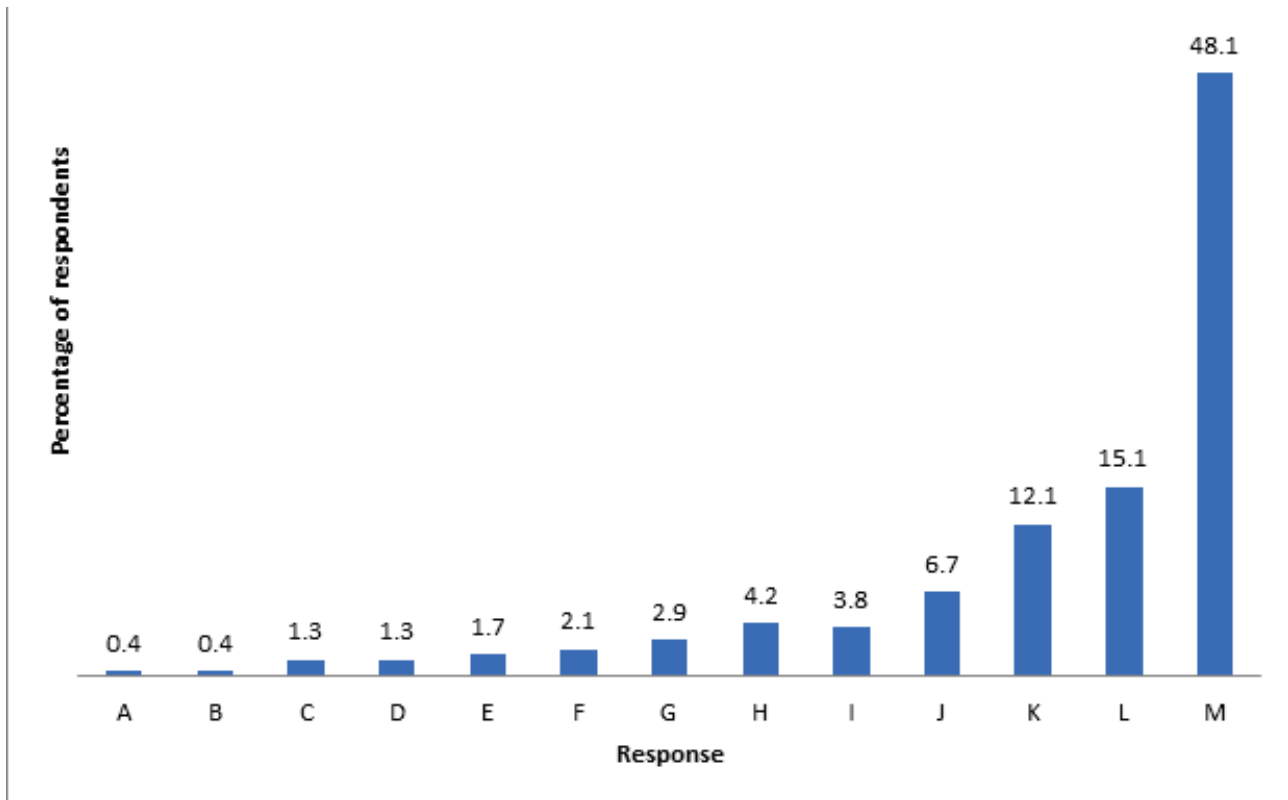Note: Percentages are based on the responses to the question

Figure 1: Relevance of the Pharm.D programme, N = 239

Keys: **A** - Yes, It would soon become the minimum requirement for pharmacy practice; **B** - No, It is not recognized on graduation; **C** - Yes, It is a faster option to obtain Pharm.D straight than after obtaining B.Pharm; **D** - No, It has no positive impact in the health sector; **E** - Yes, Clinical pharmacy is the current trend; **F** - Yes, It expands a tight school curriculum; **G** - Yes, It would earn a certification of Pharm.D on graduation; **H** - No, It encroaches into other disciplines like medicine; **I** - Yes, To meet the current health needs; **J** - No, It is a waste of years; **K** - Yes, Improves relevance of pharmacists; **L** - Yes, Increases level of exposure/experience in preparation for practice; **M** - Yes, Improves the clinical knowledge of pharmacists
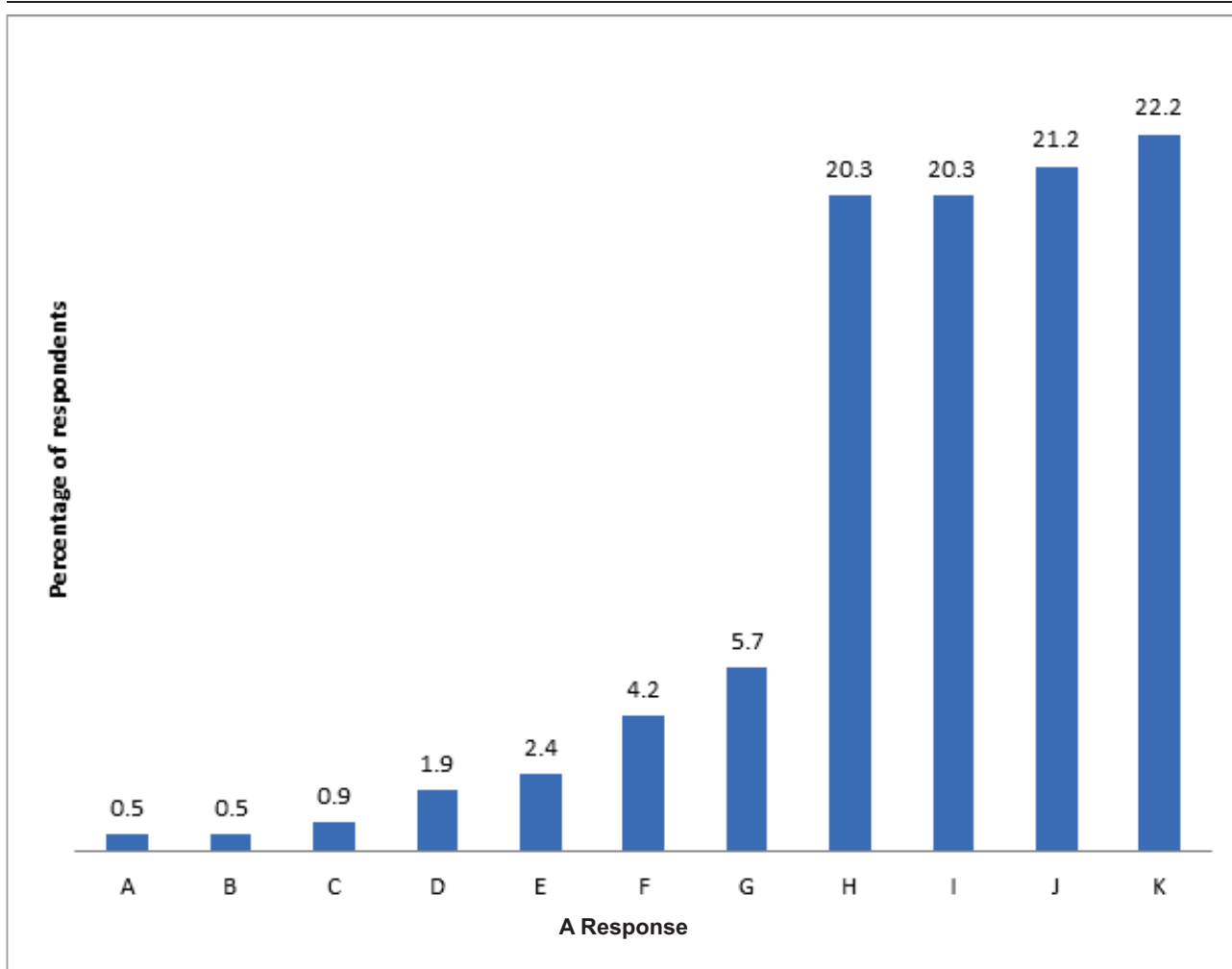
Figure 2: Remuneration of Pharm.D graduates, N = 212

Keys: **A** - Yes, It would make B.Pharm holders to aspire to become Pharm.D holders; **B** - No, Pharm.D programme is not necessary; **C** - No, It would reduce the usefulness of B.Pharm; **D** - No, It would lead to unhealthy segregation among pharmacists; **E** - No, Not every pharmacist wants to work in a clinical setting ; **F** - No, B.Pharm has been a progenitor of Pharm.D; **G** - Yes, Their jobs as clinical pharmacists would require more efforts and working hours; **H** - Yes, Additional knowledge/competence; **I** - No, No one is superior to the other; **J** - Yes, Better qualification; **K** - Yes, Longer duration of training
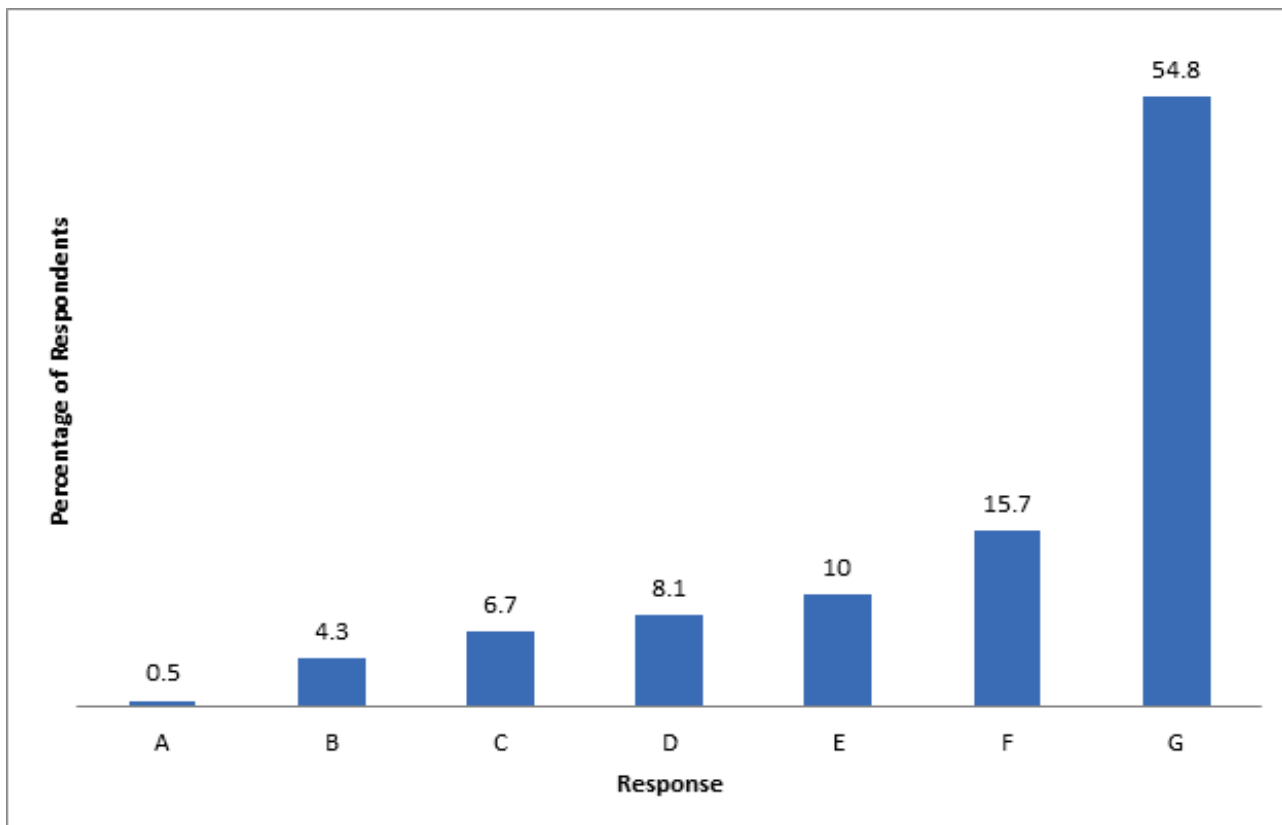
Figure 3: Remuneration of clinical pharmacy consultants in comparison to consultants in other disciplines like Medicine/Surgery and Veterinary Medicine, N = 210

Keys: **A** - No, It will distort the hierarchy in the health sector; **B** - Yes, They spend more years in training like their counterparts in Medicine/Surgery and Veterinary Medicine; **C** - No, The requirements for attainment are not the same; **D** - No, There are difference in years of training to consultancy status; **E** - Yes, They play vital roles and render similar services like their counterparts in Medicine/Surgery and Veterinary Medicine; **F** - No, There are differences in function and roles; **G** - Yes, They are all consultants with similar training and competences

Table 5a: Association between the demographics/experiential factors and the perceptions of the roles/impact of clinical pharmacists I, N = 463

Variables	Roles		Total	χ^2	Impact		Total	χ^2
	Positive	Negative			Positive	Negative		
Age (in years)				1.269				2.329
< 18	-	-	-		-	-	-	
18 – 20	11 (55.0)	9 (45.0)	20		6 (30.0)	14 (70.0)	20	
21 – 23	99 (43.2)	130 (56.8)	229		94 (41.0)	135 (59.0)	229	
24 – 26	66 (41.8)	92 (58.2)	158		72 (45.6)	86 (54.4)	158	
27 – 29	18 (42.9)	24 (57.1)	42		18 (42.9)	24 (57.1)	42	
> 29	6 (42.9)	8 (57.1)	14		5 (35.7)	9 (64.3)	14	
Gender				0.329				1.450
Male	105 (44.5)	131 (55.5)	236		93 (39.4)	143 (60.6)	236	
Female	95 (41.9)	132 (58.1)	227		102 (44.9)	125 (55.1)	227	
Marital Status				175.339 **				
Single	193 (42.9)	257 (57.1)	450		190 (42.2)	260 (57.8)	450	
Married	7 (63.6)	4 (36.4)	11		5 (45.5)	6 (54.5)	11	
Separated	0 (0.0)	1 (100.0)	1		0 (0.0)	1 (100.0)	1	
Divorced	0 (0.0)	1 (100.0)	1		0 (0.0)	1 (100.0)	1	
Department								64.997 **
Pharmacy	125 (88.0)	17 (12.0)	142		83 (58.5)	59 (41.5)	142	
Medicine/Surgery	12 (17.1)	58 (82.9)	70		28 (40.0)	42 (60.0)	70	
Nursing	4 (18.2)	18 (81.6)	22		16 (72.7)	6 (27.3)	22	
Medical Radiography	23 (32.4)	48 (67.6)	71		10 (14.1)	61 (85.9)	71	
Medical Laboratory Science	12 (18.8)	52 (81.3)	64		33 (51.6)	31 (48.4)	12	
Medical Rehabilitation	17 (34.0)	33 (66.0)	50		18 (36.0)	32 (64.0)	50	
Dentistry	1 (14.3)	6 (85.7)	7		3 (42.9)	4 (57.1)	7	
Veterinary Medicine	6 (16.2)	31 (83.8)	37		4 (10.8)	33 (89.2)	37	

* P < 0.05; ** P < 0.001

Table 5b: Association between the demographics/experiential factors and the perceptions of the roles/impact of clinical pharmacists II, N = 463

Variables	Roles Positive	Negative	Total	χ^2	Impact Positive	Negative	Total	χ^2
A5				13.061 **				1.173
Yes	61 (58.7)	43 (41.3)	104		39 (37.5)	65 (62.5)	104	
No	139 (38.7)	220 (61.3)	359		156 (43.5)	203 (56.5)	359	
A6				0.287				0.840
Yes	176 (43.7)	227 (56.3)	403		173 (42.9)	230 (57.1)	403	
No	24 (40.0)	36 (60.0)	60		22 (36.7)	38 (63.3)	60	
A7				6.500 *				10.535 *
Yes	109 (38.5)	174 (61.5)	283		136 (48.1)	147 (51.9)	283	
No	91 (50.6)	89 (49.4)	180		59 (32.8)	121 (67.2)	180	
A8				1.082				0.160
Urban	150 (41.9)	208 (58.1)	358		149 (41.6)	209 (58.4)	358	
Rural	50 (47.6)	55 (52.4)	105		46 (43.8)	59 (56.2)	105	

A5 – Immediate family member (e.g., parents/siblings) is a pharmacist; A6 – First degree; A7 – Previously done SIWES/IT in a hospital setting; A8 – Place of upbringing; * P < 0.05; ** P < 0.001

Table 6: Multiple linear regression analysis summary for the independent variables predicting the perception of the roles of clinical pharmacists, N = 463

Variables	Unstandardized Coefficient (B)	Unstandardized Coefficient (Standard Error)	Standardized Coefficient (Beta)	t	P-value
Constant	16.047	0.553		29.005	< 0.001
Gender	-0.090	0.295	-0.013	-0.303	0.762
Age (Transformed)	-0.311	0.297	-0.045	-1.045	0.297
Gender	-0.090	0.295	-0.013	-0.303	0.762
Marital Status (Transformed)	-0.044	0.809	-0.002	-0.054	0.957
Department (Transformed)	-4.187	0.287	-0.564	-14.583	<0.001*
A5	0.889	0.314	0.108	2.835	0.005*
A6	0.504	0.400	0.053	1.349	0.178
A7	-0.090	0.275	-0.013	-0.326	0.745
A8	0.131	0.330	0.016	0.398	0.691

Note: R = 0.583; R^2 = 0.340; Adjusted R^2 = 0.328; $F_{(8, 454)}$ = 29.201, P < 0.001

*P < 0.05

A5 – Immediate family member (e.g., parents/siblings) is a pharmacist: coded as No = 0, Yes = 1; **A6** – First degree: coded as No = 0, Yes = 1; **A7** – Previously done SIWES/IT in a hospital setting: coded as No = 0, Yes = 1; **A8** – Place of upbringing: coded as Rural = 0, Urban = 1

Age (Transformed): ≤ 23 years coded as 0, > 23 years coded as 1; **Marital Status (Transformed)**: Single coded as 0, Not single coded as 1; **Department (Transformed)**: Pharmacy coded as 0, Not Pharmacy coded as 1

Table 7: Multiple linear regression analysis summary for the independent variables predicting the perception of the impact of clinical pharmacists, N = 463

Variables	Unstandardized Coefficient (B)	Unstandardized Coefficient (Standard Error)	Standardized Coefficient (Beta)	t	P-value
Constant	5.704	0.259		21.993	< 0.001
Age (Transformed)	0.109	0.139	0.039	0.782	0.434
Gender	0.094	0.138	0.034	0.681	0.496
Marital Status (Transformed)	-0.077	0.379	-0.009	-0.203	0.839
Department (Transformed)	-0.826	0.135	-0.274	-6.138	<0.001*
A5	-0.331	0.147	-0.099	-2.253	0.025*
A6	0.252	0.188	0.061	1.344	0.180
A7	0.598	0.129	0.210	4.642	< 0.001*
A8	-0.005	0.155	-0.001	-0.032	0.975

Note: $R = 0.347$; $R^2 = 0.121$; Adjusted $R^2 = 0.105$; $F_{(8, 454)} = 7.780$, $P < 0.001$
*$P < 0.05$

A5 – Immediate family member (e.g., parents/siblings) is a pharmacist: coded as No = 0, Yes = 1; **A6** – First degree: coded as No = 0, Yes = 1; **A7** – Previously done SIWES/IT in a hospital setting: coded as No = 0, Yes = 1; **A8** – Place of upbringing: coded as Rural = 0, Urban = 1

Age (Transformed): ≤ 23 years coded as 0, > 23 years coded as 1; **Marital Status (Transformed)**: Single coded as 0, Not single coded as 1; **Department (Transformed)**: Pharmacy coded as 0, Not Pharmacy coded as 1

4. Discussion

Overall, less than half of the students had a positive perception of the roles and impact of clinical pharmacists. The most common reason provided for the relevance of the Pharm.D programme was that it improves the clinical knowledge of pharmacists. Being a pharmacy student was a significant predictor of a positive perception of both the roles and impact of clinical pharmacists. Having family members as pharmacists was a significant predictor of a positive perception of the roles of clinical pharmacists. SIWES/IT experience in a hospital was a significant predictor of a positive perception of the impact of clinical pharmacists.

Most of the students had previously done SIWES/IT in a hospital. During SIWES/IT, these students are mentored by senior colleagues and are expected to identify possible gaps in practice. A comprehensive analysis of Nigerian pharmacy students' area of practice preference for SIWES is unknown as no such study has been conducted. However, pharmacy students probably opt for patient-oriented settings such as community pharmacies or hospitals based on availability or ease of placements. The other health-related disciplines majorly run their SIWES in hospitals. Interestingly, it is in the hospital that pharmacy students are more likely to have face-to-face contact with students and health professionals of other disciplines. Stereotypes on the roles of the different health-related disciplines could affect students' future collaborations. [8, 9] Students' perceptions of health care professionals could change after interactions with those in other disciplines. [10]

More than half of the students were open to clinical pharmacists participating in ward rounds. The participation of clinical pharmacists in medical rounds is not strange. [3] In a different study, medical students recognized pharmacists as medication experts but still placed them in a subordinate role to physicians. [11] On the contrary, nursing students in Qatar expressed displeasure with pharmacists who just dispensed medicines without the necessary information. [12] Many of the practicing pharmacists in UNTH possess postgraduate degrees, attend workshops, seminars and conferences, actively participate in ward rounds and serve as preceptor to pharmacy students from UNN. It is possible that these students are familiar with the practice of pharmacists in this hospital, since it is their Teaching Hospital.

Majority of the students agreed that clinical pharmacists are necessary to the healthcare system. Interprofessional education has the potential to positively influence the acceptance of team-based care delivery and enables the different disciplines to appreciate their roles in achieving the desired outcomes for patients. [10] In Philadelphia, first year medical and pharmacy students were thrilled to know that they offered similar courses like physiology and pharmacology. [13] Similarly, healthcare providers in Saudi Arabia had positive attitude towards the roles of clinical pharmacists. [14] However, there needs to be role clarity if these health professionals are to function efficiently in the healthcare team. [15]

About two-fifths of the students agreed that clinical pharmacy services increase cost to patients. This contradicts the findings from other studies. The contributions of Pharmacists to substantial healthcare savings have been documented. [16] There is evidence that interventions from pharmacists

lead to cost savings. [17] Clinical pharmacy services have shown significant positive impact in the management of chronic diseases. [18]

Less than half of the students in this study felt clinical pharmacists should manage patients with chronic diseases. In the Midwestern medical school in US, the medical students opined that pharmacists were not qualified to manage patients with chronic diseases, perform health screenings or perform physical examinations. [1] Possibly, the question might have been misinterpreted to mean that pharmacists would solely manage patients with chronic diseases. [1] Pharmacists are trained to be collaborators in the management of chronic diseases. In hospitals, pharmacists are rarely involved in screening services. However, community pharmacists are actively involved with measuring blood pressure, rapid testing of blood sugar and cholesterol, rapid diagnostic tests for malaria. In the US, clinical pharmacists have received the Board of Pharmacy Specialties certification in different specialties to allow for independent or collaborative practice. [3]

The duration of undergraduate training is considered when health professionals are placed on entry grade level. [19] It is for this reason that fresh graduates of six-year disciplines like Medicine/Surgery and Veterinary Medicine earn higher than their Pharmacy counterparts (Bachelor of Pharmacy, B.Pharm) in Nigeria. Thus, one would expect that the six-year Pharm.D degree should reflect on the salary scale, besides the 'Dr.' title.

Being in a department other than pharmacy significantly predicted a decrease in the positive perception of the roles of clinical pharmacists. Pharmacy students are trained to understand the responsibilities of pharmacists and this might be responsible for their positive perception. Due to

the close contact with family members who are pharmacists, the students might have had a first-hand experience of the roles of pharmacists, thus influencing their positive perception. In addition, their impression of the roles of pharmacists might have been influenced by interactions with pharmacy students or practicing pharmacists during SIWES/IT. Positive or negative interactions would have influenced perceptions. [1] In UNN, pharmacy students do not offer inter-disciplinary courses with any of the health-related disciplines beyond first year. Thus, most likely, their opinions were not solely dependent on classroom lectures. Differing perceptions of the roles and impact of pharmacists reflect individual, educational and environmental differences, as well as professional socializations. [20]

As expected, Pharmacy students had a better perception of the impact of clinical pharmacists. Furthermore, undergoing SIWES/IT in a hospital significantly predicted an increase in the positive perception of the impact of clinical pharmacists. Contrarily, in a Midwestern medical school in the US, having frequent interactions with a pharmacist or pharmacy student did not influence students' views on pharmacists' ability to manage patients with chronic diseases or increase their likelihood for referring patients to pharmacist-led medication therapy management services in their future careers. [1]

A study that explored clinical pharmacists' perception of their impact on healthcare in Khartoum State, Sudan revealed that majority believed they made a positive impact in healthcare though not to the aspired level. [4] Contrarily, in a study in Saudi Arabia, pharmacists were significantly less appreciative of the role of clinical pharmacists in direct patient care with a pessimistic view that might have stemmed from the presumption that physicians disapprove the active involvement of pharmacists in the healthcare team. [14] Clinical pharmacists are hindered by acceptance by pharmacists, other health professionals, work overload, lack of knowledge and training, poor documentation, lack of billing for services rendered. [6,21]

This study had some limitations. It was conducted in one university. Although UNN is one of the biggest universities in Nigeria and the National Universities Commission (NUC) as well as Councils of the different specialties strive to ensure uniformity in learning experiences, the individual differences might not be completely ruled out. In addition, assessments were made using self-reported data. Stratified sampling was not employed to achieve an even ratio of distribution. Furthermore, the cross-sectional design of the study made it impossible to analyze the change in perceptions of the students over a period of time. Nevertheless, this study has been able to highlight, in a Nigerian setting, the perceptions of the roles and impact of clinical pharmacists by students in health-related disciplines.

Enhanced interprofessional education among the health-related disciplines in universities through inter-disciplinary workshops, seminars and conferences is recommended. Educators should train students to efficiently work with a team-based approach. Regulatory bodies should clearly define the roles of the different health disciplines to curtail unnecessary rivalry. More pharmacy schools in Nigeria should commence the Pharm.D programme. Remuneration of health professionals in Nigeria should be in line with international best practices.

5. Conclusion

Overall, less than half of the students had a positive perception of the roles and impact of clinical pharmacists. Being in pharmacy, having family members as pharmacists and running SIWES/IT in a hospital were significant predictors for positive perceptions. This survey highlights the need for interprofessional education among students of health-related disciplines.

CONFLICTS OF INTEREST

As of the time the study was conducted, KCA was a lecturer in the Department of Clinical Pharmacy and Pharmacy Management, UNN while CMO was a final year student of the Faculty of Pharmaceutical Sciences, UNN. The authors declare no other conflict of interest.

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