

RESEARCH ARTICLE

The brain drain potential of skilled health workers from sub-Saharan Africa: A case study of pharmacy students in Nigeria

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Abstract

Background: The increasing migration of health workers from low- and middle-income countries is an ongoing public health concern. This study evaluated the brain drain potential of pharmacy students in Nigeria. **Methods:** This was a cross-sectional survey of final year pharmacy students from three Nigerian universities. Data collection was done via a 46-item self-administered questionnaire. **Results:** There were 377 respondents. Reasons for potential emigration included better standard of living (n=334, 88.6%), access to advanced technology (n=330, 87.5%) and opportunity for professional development (n=341, 90.5%) in the destination countries. Respondents younger than 25 years were more likely to have a high emigration potential compared to those older (98.6% vs 84.6%, $\chi^2=10.816$, $p=0.029$). **Conclusion:** This study showed high emigration potential for the surveyed final year pharmacy students. This highlights the need for interventions that will promote retention and limit brain drain.

Introduction

The increasing migration or brain drain of health workers from low- and middle-income countries is an ongoing public health concern due to its adverse impact on health security and access to essential services in the source countries (Bredtmann *et al.*, 2019). Estimates indicate that health workforce migration is most severe in sub-Saharan Africa, South-East Asia and Latin America, with common destination countries including Australia, Canada, the United States of America, United Kingdom and other high-income European nations (Ahmad, 2004; Bhargava *et al.*, 2011; Bredtmann *et al.*, 2019). International health workforce mobility is facilitated by commonalities in the education and training curriculum of health professions (Ghani *et al.*, 2010). For example, foreign pharmacists make up about 30% of the pharmacy workforce in Canada (Canadian Institute of Health Information, 2021), 20% in United States (Patel *et al.*,

2018), 10% in Australia (Jackson *et al.*, 2021), and 6% in United Kingdom (General Pharmaceutical Council, 2020). While health workforce migration adds to the human capital in the high-income destination countries, the resulting brain drain not only depletes the health human resources available in the low- and middle income source countries but also widens inequalities (Pang *et al.*, 2002).

In some instances, there is “brain waste” as some of the emigrating health workers may end up working outside the health sector or as unskilled labour in the destination countries (Pang *et al.*, 2002). There are difficulties in objectively assessing brain drain of health workers, including pharmacists. While the number of foreign-trained pharmacists registering in key destination countries may provide reliable data, it does not fully capture the extent of migration (International Pharmaceutical Federation, 2006). This is because emigrating practitioners who may be unsuccessful in registering as pharmacists or who

work outside the health sector in the destination countries are not documented (International Pharmaceutical Federation, 2006). In addition, many regulatory and professional bodies are unable to provide accurate yearly figures for the number of pharmacists either emigrating or registering from abroad (International Pharmaceutical Federation, 2006). Pharmacists may also emigrate without requesting for a letter of good standing or confirmation of registration from the regulatory body in their home country, thereby making it difficult to assess the extent and pattern of migration (International Pharmaceutical Federation, 2006).

The novel coronavirus disease (COVID-19) pandemic revealed the readiness of countries to handle public health crises, especially in relation to shortages in frontline health workers (Lal *et al.*, 2021). To cope with the COVID-19 pandemic, many high-income countries advertised key incentives such as relaxed immigration policies, joining bonuses and housing in order to attract foreign health workers (Dzinamarira and Musuka, 2021). These so called “pull factors” promoted emigration and further burdened the availability of essential health services in the migrants’ home countries. It also increased the severity of health workforce shortages and hindered health system performance in the source countries (Dzinamarira and Musuka, 2021).

Factors that cause an individual to emigrate are called ‘push factors’ and some of these include unemployment, poor economic conditions, lack of career development opportunities, low remuneration, political uncertainty, limited access to funding in the source countries (Kasper and Bajunirwe, 2012). Other factors also influence migration, and these include those that keep people in their country of origin (stick factors) in spite of compelling pull and push factors and others that prevent a person from returning to their country after they have migrated (stay factors) (Padarath *et al.*, 2003). Stick factors include incentives and rewards, strong social and cultural ties, patriotism and cost of migration, while stay factors include the development of new social and cultural bonds, the risk of disruption to the education of children, or a reluctance to disrupt new lifestyle patterns in the destination countries (Padarath *et al.*, 2003).

Countries invest in the education and training of their health professionals and run at a loss when there is excessive emigration (Dodani and LaPorte, 2005). As custodians of medicines and medicinal products, pharmacists are critical for ensuring the rational use of medicines and access to essential health services (Chukwu *et al.*, 2017). A continuous decline in the number of pharmacists in countries with high emigration rates, such as Nigeria, further heightens

the severity of the existing workforce shortages and is detrimental to attaining the goal of universal health coverage (Ekpenyong *et al.*, 2018).

Even though pharmacists are the most accessible healthcare professionals in the world, published literature on the brain drain of health workers has mainly focused on the emigration of physicians and nurses, with limited studies published on pharmacists. Studies on the brain drain potential of pre-service pharmacists are also lacking. Exploring the factors that encourage pharmacists to leave their country and move to other countries can provide the insights needed for workforce planning and policy formation. This study aims to evaluate the brain drain potential of pharmacy students in Nigeria. The findings of this research will help inform evidence-based policy development and implementation in Nigeria.

Methods

Design and setting

This cross-sectional study was conducted between January 2021 to March 2021. The study recruited final year pharmacy students from three universities in Nigeria, namely: the University of Nigeria, Nsukka, Enugu State (UNN), University of Uyo, Akwa Ibom State (UNIUYO), and University of Jos, Jos, Plateau State (UNIJOS).

Eligibility criteria

The total number of final year pharmacy students registered at UNN, UNIUYO and UNIJOS, during the study period was 336, 110 and 84, respectively and were eligible to participate in the study. The three universities were chosen based on access to contact persons and willingness to participate in the study.

Sample size

The sample size (n) for this study was estimated using the formula: $(Z^2 P(1-P))/d^2$, where Z is statistic for a specified level of confidence, P is the proportion, and d means precision (Daniel and Cross, 2013). Based on a 95% confidence interval (Z=1.96), precision level of 0.05, and an assumed proportion of at least 50% responding to the survey, a minimum sample size of 142 students was estimated for this study.

Data collection

The survey was conducted using a structured self-administered questionnaire presented in three sections. The first section of the survey tool collected

respondents' demography while sections two and three, focused on the emigration potential of pharmacy students and explored the push/pull factors that promote brain drain, respectively.

Face and content validity of the research questionnaire was assessed in a pilot study that included ten pharmacy students. Feedback obtained from the pilot was incorporated with further iteration resulting in a questionnaire comprising 46 question items, a combination of multiple choice and a five-point Likert response scale. The data obtained from the pilot study were excluded from the final analysis. The completed questionnaires were stored in locked filing cabinets at the Department of Clinical Pharmacy and Pharmacy Management, University of Nsukka, Nigeria. Research data were only accessible to the researchers directly involved in the study. Ethics review and approval were obtained on 4 December, 2020 from the Health Research and Ethics Committee (HREC) of University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla (Ref. No: NHREC/05/01/2008B-FWA00002458-1RB00002323).

Data analysis

Data analysis was conducted using IBM SPSS version 25.0 (IBM Corp, version 25.0, Armonk, NY, USA). Descriptive statistics (frequencies, mean and percentages) were used to summarise the data, while the Pearson's Chi-Square test was used to assess the association between variables. Statistical significance was set at $p < 0.05$. Respondents' emigration potential was assessed via the total emigration score and total expectation to emigrate score. The total emigration score was obtained by the summation of the scores from the participants' responses to the items in section two of the questionnaire. It was a five-point Likert scale with 18 items. The maximum possible score was '90'. Thus, a higher score indicated greater intentions to migrate. The total emigration score was dichotomised, with scores above 54 indicating high emigration score while scores less than or equal to 54 were low emigration scores.

Using a five-point Likert scale in section three of the questionnaire, respondents provided answers to 12 questions on their future expectations about Nigeria. These questions were pointers to emigration within the next five years. The total expectation to emigrate score was obtained by the summation of the scores from the participants' responses with a maximum possible score of 60. The total expectation to emigrate score was further dichotomised, with scores less than 36 indicating an overall low emigration potential and greater than or equal to 36 indicating a high emigration potential.

Results

There was a total of 377 respondents who completed the survey from the three universities included in this study (UNN = 336, UNIUYO = 110, UNIJOS = 84). This represented an overall participation rate of 71.1% (377/530). The survey participation rate for the individual universities was as follows: UNN (213/336 = 63.4%), UNIUYO (94/110 = 85.5%) and UNIJOS (70/84 = 83.3%).

Socio-demographic characteristics of respondents

The majority of the respondents were aged between 21 to 26 years old ($n=304$, 80.6%), a little above half were females ($n=202$, 53.6%), and a large proportion had not travelled abroad as of when the study was conducted ($n=327$, 86.7%) (see Table I).

Table I: Demographic details, N=377

Variables	n (%)
Age (in years)	
18-20	27 (7.2)
21 – 23	141 (37.4)
24 – 26	163 (43.2)
27 – 29	33 (8.8)
>29	13 (3.4)
Gender	
Male	175 (46.4)
Female	202 (53.6)
University	
UNN	213 (56.5)
UNIJOS	70 (18.6)
UNIUYO	94 (24.9)
Place of upbringing	
Urban	299 (79.3)
Rural	78 (20.7)
Previously travelled abroad	
Yes	50 (13.3)
No	327 (86.7)
Previously applied for any scholarship abroad	
Yes	124 (32.9)
No	253 (67.1)
Written or intend to write IELTS/TOEFL/GRE within 5 years	
Yes	268 (71.1)
No	109 (28.9)

UNN- University of Nigeria Nsukka; UNIJOS - University of Jos; UNIUYO - University of Uyo

IELTS - International English Language Testing System; TOEFL - Test of English as a Foreign Language; GRE - Graduate Record Examination

Emigration potential and destination countries

Majority of the survey respondents (n=342, 90.8%) had considered emigrating from Nigeria. The majority (n=318, 84.4%) indicated they had been advised by a friend or family member to consider emigrating. The key destination countries reported included Canada (n=178, 47.2%), United States (n=77, 20.4%) and United Kingdom (n = 62, 16.4%), Table II.

Table II: Emigration potential, N=377

Variables	n (%)
Consideration given to migrating abroad	
None at all	35 (9.3)
Some	122 (32.4)
A great deal	220 (58.4)
Family members/friends have told me to consider migrating abroad	
Yes	318 (84.4)
No	59 (15.6)
Intention to migrate abroad	
No intentions	43 (11.4)
< 2 years	88 (23.3)
2 – 5 years	182 (48.3)
> 5 years	64 (17.0)
Likely destination if I migrate abroad	
United States	77 (20.4)
Canada	178 (47.2)
United Kingdom	62 (16.4)
Australia	24 (6.4)
Others†	36 (9.5)

† "Others" included: Other European Countries (25), Asia (7), Middle East (1), New Zealand (1), Ghana (1), Did not specify (1).

Reasons for emigration

The main reasons for considering emigration were for better remuneration and salaries (n=312, 82.8%), better standard of living (n=334, 88.6%), access to advanced technology (n=330, 87.5%), better opportunities for their family members (n=313, 83.0%) and opportunity for professional development (n=341, 90.5%) in the destination countries. After categorisation, majority of the respondents had a high emigration score (n=352; 93.4%), Tables IIIa and IIIb.

Expectations about the future

For most of the items, a larger proportion of the respondents were undecided. Close to three-fifths of the respondents (n=208, 55.1%) disagreed that they would remain in Nigeria even if the cost of emigration is affordable. About a fifth of the respondents (n=77,

20.4%) believed there would be increased budgetary allocation to the health sector and Nigerians would be better perceived by foreigners (n=90, 23.8%), within five years. About half of the respondents had high expectations to emigrate score (n=199; 52.8%), as seen in Table IV.

Association between the demographic variables and emigration intentions/future expectations

Emigration potential was associated with age, specific university attended, place of upbringing, and whether the respondents had previously considered emigrating or had been told to consider emigrating by friends or family ($p < 0.05$).

Respondents in the younger age bracket were more likely to have a high emigration potential compared to those older (98.6% vs 84.6%, $\chi^2=10.816$, $p=0.029$). High emigration potential was more likely for respondents from UNIUYO compared to those from UNN and UNIJOS (96.8% vs 95.8% vs 81.4%, $\chi^2=19.906$, $p < 0.001$). Emigration potential was also more likely to be high for respondents who grew up in urban settings compared to those who grew up in rural areas (95.0% vs 87.2%, $\chi^2=6.085$, $p=0.014$).

Respondents who had given a great deal of consideration to emigrating were also more likely to have a high emigration potential compared to those who had only given some or no consideration at all (97.3% vs 88.5% vs 85.7%, $\chi^2=13.351$, $p=0.001$). The same was true for respondents whose family members or friends had previously encouraged them to emigrate compared to those who had never been told this (95.3% vs 83.1, $\chi^2=12.027$, $p=0.001$). In addition, a larger proportion of the students who had intentions of migrating abroad within two years of graduation had a high emigration potential compared to those who had no intentions (96.6% vs 83.7%, $\chi^2=9.554$, $p=0.023$), as seen in Tables Va and Vb.

Discussion

Published reports demonstrate rising health workforce mobility in sub-Saharan African countries, Nigeria inclusive (World Health Organization, 2017; Abang, 2019). A 2017 report showed that Nigerian-born students account for about a third of the African students studying in the United States (U.S. Embassy & Consulate in Nigeria, 2017). While studies on the emigration potential of medical and pharmacy students in several African countries have been published (Muula, 2005; Mattes and Mniki, 2007; Burch *et al.*, 2011), similar research for pharmacy students in Nigeria is limited.

Table IIIa: Emigration reasons, N=377

Variables	n (%)				
	SD	D	N	A	SA
1. I would emigrate from Nigeria for better remuneration/salaries	20 (5.3)	13 (3.4)	32 (8.5)	127 (33.7)	185 (49.1)
2. I would emigrate from Nigeria for better standards of living and quality of life	17 (4.5)	10 (2.7)	16 (4.2)	100 (26.5)	234 (62.1)
3. I would emigrate from Nigeria for better opportunities for my family	21 (5.6)	13 (3.4)	30 (8.0)	95 (25.2)	218 (57.8)
4. I am OK with the working conditions in Nigeria†	167 (44.3)	121 (32.1)	52 (13.8)	21 (5.6)	16 (4.2)
5. I would emigrate from Nigeria for better access to advanced technology	19 (5.0)	10 (2.7)	18 (4.8)	101 (26.8)	229 (60.7)
6. I would emigrate from Nigeria for better opportunities for professional development	12 (3.2)	6 (1.6)	18 (4.8)	90 (23.9)	251 (66.6)
7. I would emigrate from Nigeria due to security issues	17 (4.5)	34 (9.0)	76 (20.2)	94 (24.9)	156 (41.4)
8. There are better personal development opportunities in Nigeria than elsewhere†	183 (48.5)	88 (23.3)	62 (16.4)	20 (5.3)	24 (6.4)
9. I am satisfied with current personal/family finances†	190 (50.4)	110 (29.2)	57 (15.1)	12 (3.2)	8 (2.1)
10. I am satisfied with the general economic conditions in Nigeria†	260 (69.0)	86 (22.8)	18 (4.8)	5 (1.3)	8 (2.1)

SD – Strongly Disagree (coded as '1'); D – Disagree (coded as '2'); N- Neutral (coded as '3'); A – Agree (coded as '4'); SA – Strongly agree (coded as '5')

† The code for this item was transformed to: SD = 5; D = 4; N = 3; A = 2; SA = 1

Table IIIb: Emigration reasons, N=377

Variables	n (%)				
	SD	D	N	A	SA
11. I would rather take an online international course in Nigeria than travel abroad†	185 (49.1)	90 (23.9)	65 (17.2)	19 (5.0)	18 (4.8)
12. I would rather go for a short-term consultancy visit abroad than reside abroad†	137 (36.3)	94 (24.9)	80 (21.2)	39 (10.3)	27 (7.2)
13. I would remain in Nigeria even if the cost of emigration is affordable†	215 (57.0)	84 (22.3)	45 (11.9)	15 (4.0)	18 (4.8)
14. As an employer, I would prefer an internationally-trained pharmacist to one that schooled in Nigeria†	70 (18.6)	75 (19.9)	131 (34.7)	54 (14.3)	47 (12.5)
15. I would remain in Nigeria if the governance improves in the next five years†	78 (20.7)	66 (17.5)	137 (36.3)	67 (17.8)	29 (7.7)
16. I would remain in Nigeria if there is increased budgetary allocation to the health sector†	75 (19.9)	56 (14.9)	137 (36.3)	69 (18.3)	40 (10.6)
17. Even if offered foreign citizenship, I would return to Nigeria for residence and practice†	158 (41.9)	77 (20.4)	86 (22.8)	37 (9.8)	19 (5.0)
18. I would not want to practice abroad due to issues on discrimination/racism†	98 (26.0)	91 (24.1)	128 (34.0)	40 (10.6)	20 (5.3)

SD – Strongly Disagree (coded as '1'); D – Disagree (coded as '2'); N- Neutral (coded as '3'); A – Agree (coded as '4'); SA – Strongly agree (coded as '5')

† The code for this item was transformed to: SD = 5; D = 4; N = 3; A = 2; SA = 1

Table IV: Expectations about the future, N=377

Variables	n (%)				
	SD	D	N	A	SA
Within five years in Nigeria:					
1. Remuneration and salaries for pharmacists would have improved	38 (10.1)	82 (21.8)	143 (37.9)	82 (21.8)	32 (8.5)
2. The standard of living and quality of life would have improved	42 (11.1)	90 (23.9)	145 (38.5)	74 (19.6)	26 (6.9)
3. There would be better opportunities for my family	37 (9.8)	73 (19.4)	150 (39.8)	82 (21.8)	35 (9.3)
4. There would be better working conditions for pharmacists	39 (10.3)	69 (18.3)	153 (40.6)	87 (23.1)	29 (7.7)
5. There would be improved access to advanced technology	42 (11.1)	80 (21.2)	139 (36.9)	93 (24.7)	23 (6.1)
6. There would be improved opportunities for professional development	38 (10.1)	87 (23.1)	132 (35.0)	92 (24.4)	28 (7.4)
7. There would be improved personal development opportunities	39 (10.3)	87 (23.1)	117 (31.0)	107 (28.4)	27 (7.2)
8. Most pharmacists would remain in Nigeria even if the cost of emigration is affordable	94 (24.9)	114 (30.2)	90 (23.9)	61 (16.2)	18 (4.8)
9. There would be increased budgetary allocation to the health sector	51 (13.5)	78 (20.7)	171 (45.4)	58 (15.4)	19 (5.0)
10. It would be easier for pharmacy graduates to gain internship placements	49 (13.0)	73 (19.4)	151 (40.1)	83 (22.0)	21 (5.6)
11. The security issues would have significantly improved	63 (16.7)	89 (23.6)	148 (39.3)	60 (15.9)	17 (4.5)
12. Nigerians would be better perceived abroad	43 (11.4)	81 (21.5)	163 (43.2)	68 (18.0)	22 (5.8)

SD – Strongly Disagree (coded as ‘5’); D – Disagree (coded as ‘4’); N – Neutral (coded as ‘3’); A – Agree (coded as ‘2’); SA – Strongly agree (coded as ‘1’)

Table Va: Association between the demographic variables and emigration score/expectation score, N=377

Variables	Emigration score		χ^2	p	Expectation score		χ^2	p
	Low	High			Low	High		
Age (in years)			10.816	0.029*			5.298	0.258
18 – 20	2 (7.4)	25 (92.6)			12 (44.4)	15 (55.6)		
21 – 23	2 (1.4)	139 (98.6)			64 (45.4)	77 (54.6)		
24 – 26	16 (9.8)	147 (90.2)			73 (44.8)	90 (55.2)		
27 – 29	3 (9.1)	30 (90.9)			21 (63.6)	12 (36.4)		
>29	2 (15.4)	11 (84.6)			8 (61.5)	5 (38.5)		
Gender			0.335	0.563			2.489	0.115
Male	13 (7.4)	162 (92.6)			75 (42.9)	100 (57.1)		
Female	12 (5.9)	190 (94.1)			103 (51.0)	99 (49.0)		
University			19.906	<0.001**			0.990	0.609
UNN	9 (4.2)	204 (95.8)			101 (47.4)	112 (52.6)		
UNIJOS	13 (18.6)	57 (81.4)			36 (51.4)	34 (48.6)		
UNIUYO	3 (3.2)	91 (96.8)			41 (43.6)	53 (56.4)		
Marital status			0.120	0.942			1.371	0.504
Single	23(6.6)	327 (93.4)			164 (46.9)	186 (53.1)		
Married	2 (7.7)	24 (92.3)			14 (53.8)	12 (46.2)		
Divorced	0 (0.0)	1 (100.0)			0 (0.0)	1 (100.0)		
Place of upbringing			6.085	0.014*			0.306	0.580
Urban	15 (5.0)	284 (95.0)			139 (46.5)	160 (53.5)		
Rural	10 (12.8)	68 (87.2)			39 (50.0)	39 (50.0)		

*p < 0.05; **p < 0.001; UNN - University of Nigeria Nsukka; UNIJOS - University of Jos; UNIUYO - University of Uyo

Table Vb: Association between the demographic variables and emigration intentions/expectations about the future, N=377

Variables	Emigration score		χ^2	p	Expectation score		χ^2	p
	Low	High			Low	High		
Consideration given to migrating abroad			13.351	0.001*			3.320	0.190
None at all	5 (14.3)	30 (85.7)			12 (34.3)	23 (65.7)		
Some	14 (11.5)	108 (88.5)			63 (51.6)	59 (48.4)		
A great deal	6 (2.7)	214 (97.3)			103 (46.8)	117 (53.2)		
Family members/friends have told me to consider migrating abroad			12.027	0.001*			0.797	0.372
Yes	15 (4.7)	303 (95.3)			147 (46.2)	171 (53.8)		
No	10 (16.9)	49 (83.1)			31 (52.5)	28 (47.5)		
Intention to migrate abroad			9.554	0.023*			7.008	0.072
No intentions	7 (16.3)	36 (83.7)			17 (39.5)	26 (60.5)		
< 2 years	3 (3.4)	85 (96.6)			43 (48.9)	45 (51.1)		
2 – 5 years	9 (4.9)	173 (95.1)			79 (43.4)	103 (56.6)		
>5years	6 (9.4)	58 (90.6)			39 (60.9)	25 (39.1)		

*p < 0.05; **p < 0.001

This study showed that at least a third of the pharmacy students in the three universities surveyed have considered emigrating after graduation, with more than two-thirds having written or intending to write the required English language and graduate qualifying examinations. This is in line with a previous study which showed that upwards of 40% of medical students surveyed in six sub-Saharan African countries intend to migrate after graduation (Burch *et al.*, 2011). The findings of this study also suggest that the reported trend of the rise in out-migration of pharmacists in Nigeria is linked to considerations and decisions made by these practitioners in their pre-service years (Ekpenyong *et al.*, 2018). The key destination countries reported by the respondents that including Canada, United States, United Kingdom and Australia are in line with research that showed that these four countries together employ about 69% of foreign-born physicians and 72% of nurses (Cometto *et al.*, 2013).

Around 23,000 health workers emigrate annually from sub-Saharan Africa, including Nigeria (Nwagwu, 2015). In Canada for example, the number of Nigerian pharmacists practicing in the country has more than doubled in absolute terms from 110 reported in 2011 to 240 in 2020, indicating rising migration (Canadian Institute of Health Information, 2021). The cost implications of high emigration are significant, as estimates indicate that the African region loses an upward of \$2.17 billion annually from health workers' migration (Mills *et al.*, 2011). Health workforce migration affects the human capital available in source countries with a negative impact on the economy and the availability of essential health services (Mills *et al.*,

2011). Brain drain also worsens the already-depleted human resources for health in low-income countries in Africa and widens the gap in health inequalities (Nwagwu, 2015). Reports indicate that the emigration of highly-skilled workers from sub-Saharan African countries contributes to the widening gap in science and technology between the continent and other parts of the world (Chirdan *et al.*, 2009).

Although research on the relationship between demographic variables and the factors that facilitate brain drain is limited (Owusu-Daaku *et al.*, 2008); this study demonstrates that the emigration potential of pharmacy students in Nigeria is associated with age, area of upbringing (i.e., rural vs urban), personal considerations, and influence of family and friends. This is in line with existing research works, which show that migrant friends and/or relatives in destination countries, including the knowledge of a pharmacist who has migrated abroad, are strong pull factors (Hassell *et al.*, 2008; Wuliji *et al.*, 2009). Friends and family facilitate migration by reducing the associated costs and risks and increasing the potential gains (Hagopian *et al.*, 2005).

A 2013 report estimates that migrants aged 15 to 24 accounted for about one-eighth (28.2 million) of the 232 million international migrants worldwide (United Nations, 2017). This study revealed that high emigration potential was more likely for respondents younger than 25 years. Expectations about the future also influence migration and promote brain drain (Crush and Pendleton, 2012). This study showed overall low future expectation score is in line with an existing study of students in health and non-health sectors in southern African countries (Crush and

Pendleton, 2012). Evidence indicates that negative perception towards the future, by students in the health professions, including pharmacy, is associated with the intention to migrate, for the long term (Crush and Pendleton, 2012), while a positive future expectation is linked to short term emigration and intention to remain or return to the country of origin (Owusu-Daaku *et al.*, 2008; Wuliji *et al.*, 2009). The overall low future expectation reported in this study is also in tandem with an existing study of pharmacy students in Ghana in which only a few respondents expressed optimism regarding possible future opportunities while others perceived pharmacy as being routine and lacking in challenges and prospects of making a real contribution to patient care (Owusu-Daaku *et al.*, 2008). Although high emigration potential was more likely for respondents from UNIUYO compared to the other two universities, the exact reason for this was not clear from this study.

Limitations

This study has some limitations. Due to limited resources available to conduct the study, only three universities were included. As such, the findings of this study cannot be generalised to the overall population of interest. However, the findings do provide insights into the brain drain potential of pharmacy students in Nigeria. It provides evidence, previously lacking in the literature, about this phenomenon. It highlights the need for interventions and policies that will limit the potential for the brain drain of future pharmacists in the country.

This study has shown a high emigration potential for final-year pharmacy students in the three Nigerian universities surveyed. While these findings cannot be generalised nationally or internationally, the emerging trend suggests the need for policy interventions that will promote retention and limit brain drain potential in low- and middle-income countries. This study suggests that these issues will require addressing factors such as pharmacists' remuneration, the standard of living, professional opportunities, and access to advanced technologies.

For young pharmacists to be encouraged to remain in their home countries, they would need to be paid what they consider commensurate to the rigours of pharmacy school. This starts from their first salaries after graduation. In Nigeria, it is usually during the one-year internship. Irrespective of the practice setting, there should be a benchmark on the minimum salary pharmacists can earn based on their level or years of experience. If there is an improvement in the economy and general state of the country, it is likely

that more pharmacists will be willing to practice in their home countries.

There are complaints about the difficulties in securing internship placements in accredited institutions, mainly due to the limited number of spaces available. This information trickle down to pharmacy students, who are also concerned about the lack of professional opportunities and poor standard of living in a dwindling economy, as indicated by the findings of our study. More internship sites would need to be accredited by the Pharmacists Council of Nigeria (PCN) to cater for the increasing number of pharmacy graduates. More opportunities for professional development and career advancement are also needed to encourage retention, promote job satisfaction and potentially limit brain drain.

Conclusion

This study showed high emigration potential for the surveyed final year pharmacy students. This highlights the need for interventions that will promote retention and limit brain drain.

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Conflict of interest

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