

Quality of life of pharmacy students in Northern Nigeria

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Keywords

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Abstract

Objectives To assess the quality of life (QoL) of Nigerian pharmacy students and to investigate its predictors.

Methods This cross-sectional descriptive study randomly sampled one pharmacy school from each of the three geopolitical zones of northern Nigeria. We collected data with the WHOQOL-BREF questionnaire. Independent-samples t-test and one-way analysis of variance were used to compare groups. The predictors of QoL were identified using multiple linear regression analysis. $P < 0.05$ was considered statistically significant.

Key findings The overall response rate was 81.2%. The overall QoL mean score of pharmacy students in the region was 76.94 ± 17.65 . There was a lower environment domain mean score (56.06 ± 14.60) compared to other domains. Multivariate analyses revealed that being a Christian, in the 5th year of study, and having a current illness/problem negatively affected overall QoL ($P < 0.05$). Having a current illness/problem negatively affected physical health ($P < 0.05$). Being in the 5th year of study and having a current illness/problem negatively affected psychological health, whereas schooling in the state of residence, active involvement with student organizations/clubs and having a current illness/problem negatively affected the environment domain ($P < 0.05$).

Conclusion This study showed that pharmacy students had a fair overall QoL and poor well-being in all four domains. Religion, state of residence, year of study, organizations/clubs and current illness/problem were the significant predictors of QoL. Therefore, these findings will be useful in reviewing the training of pharmacy students with a view to improving their well-being and quality of pharmacy education.

Introduction

The duration of pharmaceutical undergraduate training in Nigeria is long and demanding. The training for the Bachelor of Pharmacy degree lasts five years comprising one year of pre-pharmacy course work and four years of pharmaceutical sciences (professional pharmacy). The programme consists of a series of semesters of 17–18 weeks of lectures, practical, and clinical clerkship; students who gained admission into the university from high school require a minimum of 10 semesters to graduate.^[1] Those that have previously obtained a diploma or first degree qualify for direct entry into second year of the programme with a minimum of 8 semesters to graduate. A benchmark of 50% in all courses (except dispensing

and pharmacy jurisprudence courses which are benchmarked at 60%) and a cumulative performance equivalent to a lower second class degree is the minimum requirement for graduation.^[2] The intensity of the undergraduate pharmacy curricula in Nigeria demands full dedication and diligence by the students. These high academic demands could lead to impairments in the quality of life (QoL) of these students.^[3] The World Health Organization defines QoL as ‘an individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns.’^[4] Continuous investigation of variables that negatively affect QoL could

serve as opportunities to engage Pharmacy students effectively and help them gain the knowledge, skills and competencies required for practice after graduation.

The gradual change from basic science, similar to high school studies, to the more challenging professional pharmacy curriculum, might lead to student stress.^[5] Stress has been implicated as a cause of adverse consequences which could impact on overall well-being and QoL of college students.^[6,7] In addition to academic stress, Nigerian students encounter other difficulties such as financial constraints^[8,9] since there are no student loans and emotional problems.^[9] Therefore, there is a need for pharmacy educators to take the QoL of their students into account while preparing them for professional practice. It is also the responsibility of the academic institution to create a conducive environment that enhances students' well-being. Encouraging well-being in the tertiary institutions means stimulating effective learning^[10] and human development.^[11]

The QoL of pharmacy students has been explored in other countries. Two US-based studies have reported reduced mental well-being across the first three years of a PharmD curriculum.^[12,13] and another reported higher overall QoL among students of private pharmacy schools compared to their counterparts in public pharmacy schools.^[14] A Malaysian study reported relatively lower mental QoL among Master of Pharmacy students than non-pharmacy students.^[15] In Africa, a Ghana-based study reported the highest mean QoL score among third-year pharmacy students with no significant difference at two-point times.^[16] No studies assessing Nigerian pharmacy students' QoL have been identified.

Northern Nigeria is a densely populated region with about 90 million people in an area of about 20 131 km².^[17] Hausa and Islam are the dominant ethnic group and religion of the people of this region. Malaria is endemic, with an estimated annual incidence of 56% with 0.2% mortality,^[18] and a prevalence in northern Nigeria ranging from 35.7% to 60.3%.^[19–21] Malaria can have negative impacts on the QoL of people, including pharmacy students. Another factor that could impact on QoL of students is the urban location of most tertiary institutions.

The aim of this study was to assess the QoL of Nigerian pharmacy students and investigate its predictors.

Methods

Setting and participants

This was a descriptive, cross-sectional study of pharmacy students in northern Nigeria, conducted between June and August 2018. There are 8 accredited pharmacy schools in northern Nigeria spread across three geopolitical zones (North-East, North-West and North-Central).

The names of the various pharmacy schools in each zone were written on pieces of paper, folded and shuffled by an independent person. Three non-pharmacy students were called to pick a ballot from each zone. At the end of this exercise, the three pharmacy schools selected were University of Maiduguri (UNIMAID) from the North-East, Usmanu Danfodiyo University (UDU) from the North-West and University of Ilorin (UNIILORIN) from the North-Central.

The Faculty of Pharmacy of the UNIMAID is in Borno state, in the capital Maiduguri (population 1 112 449),^[22] and was established in 2002. The faculty had 606 registered students during the 2017/2018 academic session. The Faculty of Pharmaceutical Sciences of the UDU is in Sokoto state in the capital Sokoto (population of about 563 861)^[22] and was established in 2007. The faculty had 465 registered students during the 2017/2018 academic session. The Faculty of Pharmaceutical Sciences at UNIILORIN in Kwara state is in the capital Ilorin (population 814 192)^[22] and was established in 2013. The faculty had 276 registered students during the 2017/2018 academic session.

Survey instrument

The survey instrument included the WHOQOL-BREF, a generic QoL instrument developed by the WHO (see Supplemental material),^[23] with the addition of demographic questions relevant to the student population. The WHOQOL-BREF was selected as it is a multi-attribute utility instruments for cross-cultural comparison and is available in diverse languages.^[24] The WHOQOL-BREF contains 26 items with a five-point Likert scale. The first two items ask for overall QoL and general health perceptions. Items 3–9 comprise the physical health domain and cover: activities of daily living; dependence on medicinal substances and medical aids; energy and fatigue; mobility; pain and discomfort; sleep and rest; and work capacity. Psychological health, items 10–15, comprises items about bodily image and appearance; negative feeling; positive feeling; self-esteem; spirituality/religion/personal beliefs; and thinking, learning, memory and concentration. Social relationships, items 16–18, comprise items about personal relationships; social support; and sexual activity. Finally, environment domain comprises 8 items (19–26) about financial resources, freedom, physical safety and security; health and social care: accessibility and quality; home environment; opportunities for acquiring new information and skills; participation in and opportunities for recreation/leisure activities; physical environment (pollution/noise/traffic/climate); and transport. Socio-demographic data included sex, age, tribe, marital status, year of study, the total number of years spent on the

programme, schooling in the state of residence, prior higher degree, active involvement with student organizations/clubs, current illness/problems, University and frequency of assignments/assessments.

Ethics approval

The Faculty of Pharmacy Research Review Board of the UNIMAID granted ethical approval for this study.

Data collection

The authors of this paper approached students from all years of study in each university while they waited for their lectures in the lecture halls. The students were briefed about the study and its objectives, and those who agreed to participate in the study provided signed consent forms before receiving the paper-based questionnaires. A trained research assistant distributed the questionnaires to the participants who completed them while seated in the lecture halls; completed questionnaires were returned to the research assistant. Participation was voluntary, and no incentives were offered to the participants. Data were collected one month before the end-of-year examination of the 2017/2018 session of the study pharmacy schools. The questionnaire was administered to 900 students across the 3 pharmacy schools.

Data management and analyses

Retrieved questionnaires with more than 4 of the 26 QoL items missing were excluded from the study in line with WHO guideline.^[25] Transformation of the raw scores in each domain as prescribed by the guideline yielded a score of 4–20.^[25] To achieve this, 3 negatively phrased items (Q3, Q4 and Q26) were reversed to transform these negatively framed questions to positively framed ones (1 = 5), (2 = 4), (3 = 3), (4 = 2), (5 = 1). Thereafter, the domain scores were calculated using the WHO prescribed formula:^[25] DOM 1 = MEAN.6(Q3, Q4, Q10, Q15, Q16, Q17, Q18)*4, DOM 2 = MEAN.5(Q5, Q6, Q7, Q11, Q19, Q26)*4, DOM 3 = MEAN.2(Q20, Q21, Q22)*4, DOM 4 = MEAN.6(Q8, Q9, Q12, Q13, Q14, Q23, Q24, Q25)*4. Calculated domain scores ranged from 4 to 20. These scores were transformed to percentage following WHO guidance.^[26] This scale was subsequently categorized into four: <70 (poor), 70–79 (fair), 80–89 (good) and 90–100 (excellent).^[27]

Descriptive statistics were used to summarize the social and demographic data of the participants. Comparisons between groups were done with independent-samples *t*-test and one-way analysis of variance. Multiple comparisons were performed using the Bonferroni post hoc test.

Missing data were not included in the analysis. The predictors of QoL were investigated using correlation and multiple linear regression analyses. The variables included in the regression analysis model were gender, religion, state of residence, students' organization/club involvement and current illness/problem. $P < 0.05$ was statistically significant. Data analysis was done with the Statistical Package for Social Sciences (SPSS) version 21.0 (SPSS Inc., Chicago, IL, USA) for Windows.

Results

Out of 900 questionnaires distributed across the 3 pharmacy schools, 731 were retrieved while 711 of them were valid. The response rate for each University was 92.0% (368/400) UNIMAID, 60.8% (152/250) UDU and 84.4% (211/250) UNIILORIN, respectively. The overall response rate was 81.2% (731/900). The overall mean age of the participants was 23.5 ± 3.4 years. The study population ($N = 711$) consisted of 58.2% male and 33.6% female students. The proportions of the missing data were <4.0%, 19.4% missing data occurred only on item 21 (sexual activity). The detailed respondents' social and demographic results are shown in Table 1.

Table 2 shows that compared to Christian students, Muslim students had a significantly higher mean score for social relationships (69.35 ± 17.46 versus 66.58 ± 18.30) and environment (57.00 ± 14.31 versus 54.48 ± 15.00) ($P < 0.05$). Participants that had no current illness/problem, compared to those with a problem, had a significantly higher score for overall QoL (78.23 ± 17.21 versus 74.91 ± 18.32), physical health (62.25 ± 14.32 versus 56.00 ± 14.93), psychological health (70.40 ± 12.91 versus 67.04 ± 13.74) and environment (57.34 ± 14.50 versus 50.19 ± 14.67) ($P < 0.05$).

Table 3 reveals that pharmacy schools differed significantly only in the physical health domain ($F_{(704)} = 9.913$, $P < 0.001$). Post hoc tests revealed that UNIILORIN students had a significantly higher score for physical health (63.48 ± 13.96) than UNIMAID students (57.75 ± 15.64) and UDU students (59.66 ± 13.06 ; $P < 0.05$). The mean score for overall QoL and psychological health differed significantly between study years ($F_{(704)} = 2.699$, $P = 0.030$, and $F_{(697)} = 4.559$, $P = 0.001$, respectively). Fourth-year students significantly higher overall QoL scores (78.08 ± 16.82) than those in the fifth (final) year of study (71.93 ± 19.73 , $P < 0.05$). The fifth-year students had significantly lower scores for psychological health (64.83 ± 13.65) than those in the first year (71.67 ± 13.65) and third year (71.08 ± 12.89), respectively ($P < 0.05$). Students who had spent six years or more in the five-year pharmacy programme had the lowest scores in the physical health domain (50.50 ± 18.30) and in the psychological

Table 1 Respondents' Socio-demographic Characteristics (*N* = 711)

Variables	<i>n</i> (%) [†]
University	
UNIMAID	358 (50.4)
UDU	149 (21.0)
UNIILORIN	204 (28.7)
Age (years)	
15–32	667 (93.8)
33–50	15 (2.1)
Gender	
Female	239 (33.6)
Male	414 (58.2)
Year of study	
First	88 (12.4)
Second	159 (22.4)
Third	170 (23.9)
Fourth	187 (26.3)
Fifth	107 (15.0)
Prior degree	
No	579 (81.4)
Yes	132 (18.8)
Religion	
Islam	451 (63.4)
Christianity	254 (35.7)
Marital status	
Single	662 (93.1)
Married	38 (5.3)
Assignment/Assessment frequency	
More frequently	597 (84.0)
Less frequently	107 (15.0)
Residence	
On-campus	440 (61.9)
Off-campus	265 (37.3)
Student's organizations/clubs active involvement	
No	272 (38.3)
Yes	425 (59.8)
Current illness/problem	
No	433 (60.9)
Yes	273 (38.4)

[†]Totals do not equal 711 due to missing responses.

health domain (62.50 ± 15.46) compared to those who had spent 1–5 years ($P < 0.05$). Table 3 shows the detailed account of mean scores for each domain according to study years and the number of years spent in the programme. Students schooling in their states of residence had a significantly higher score for the environment domain (58.84 ± 14.18) than those attending a pharmacy school outside their state of residence (53.96 ± 14.86 , $P < 0.05$). Similarly, students actively involved in student organizations/clubs had a significantly lower score for the environment domain (54.59 ± 14.62) than those not actively involved (58.13 ± 14.51 , $P < 0.05$; Table 3).

Of the 273 respondents that had a current illness/problem, 30.0% ($n = 82$) reported stress followed by malaria (26.4%, $n = 72$) as the current illness/problem they had.

Fig. 1 shows other illnesses/problems reported by the participants.

The results of the correlation analysis showed significant positive relationships between gender and physical health, and schooling in the state of residence and environment, respectively. In contrast, there was a significant negative relationship between religion and social relationships; the environment domain; being in the fifth year of the pharmacy programme; and overall health and psychological health. Similarly, a significant negative relationship existed between active involvement in students' organization/club and environment, current illness/problem and overall health, physical health, psychological health and environment, respectively (see Table 4).

Results of multiple linear regression analysis revealed Christianity, being in fifth year of study, and having a current illness/problem were significant predictors of impaired overall QoL. A current illness/problem was the only significant predictor of poorer physical health. Being in the fifth year of study and having a current illness/problem were the significant predictors of impaired psychological health. Finally, schooling out of the state of residence, students' organization/club active involvement and having a current illness/problem were the significant predictors of poorer environment (Table 5).

Discussion

This study revealed that the participating pharmacy students had a fair overall QoL yet poor physical, psychological health and environment and social relationships. The study was robust because sampling was done from all study years in each University studied. The main limitation was that this was a cross-sectional study rather than a longitudinal cohort study which could have shown more clearly at the individual level how student's QoL changes with time in the programme. Other limitations were the use of only three out of eight pharmacy schools in northern Nigeria, and the errors of recall, common to all studies asking for retrospective information.

Lack of opportunity for leisure activities could be responsible for the deterioration of the environment of these students. A similar study done in Brazil among nursing students provided evidence that absence of leisure time to unwind was one of the common problems affecting the QoL of students.^[28] Spare moments are usually consumed by extensive academic demands in pharmacy schools. Therefore, this finding points to the need to satisfy the recreational needs of pharmacy students to improve their environment domain. In contrast, an earlier study performed among educational science students in Iran reported higher environment domain score compared to other domains.^[29] Reasons for this difference

Table 2 Impact of personal socio-demographic characteristics on the QoL

Variables	Overall QoL Mean (SD)	QoL domains			
		PH Mean (SD)	PSH Mean (SD)	SR Mean (SD)	EN Mean (SD)
Total	76.94 (17.65)	59.80 (14.85)	69.08 (13.31)	68.36 (17.75)	56.06 (14.60)
Gender					
Female	77.93 (17.51)	58.85 (15.68)	69.76 (13.68)	69.66 (18.85)	56.56 (14.82)
Male	76.33 (17.91)	61.01 (14.26)	69.09 (13.04)	67.96 (17.25)	56.06 (14.17)
<i>P</i> value	0.270	0.075	0.538	0.243	0.671
Age (years)					
15–32	76.92 (17.44)	60.02 (14.81)	69.22 (13.36)	68.56 (17.75)	56.26 (14.53)
33–50	76.67 (19.97)	63.57 (13.61)	71.11 (9.38)	71.67 (16.90)	56.39 (12.75)
<i>P</i> value	0.956	0.359	0.586	0.502	0.974
Religion					
Islam	77.89 (17.50)	59.54 (14.07)	68.99 (12.67)	69.35 (17.46)	57.00 (14.31)
Christianity	75.30 (17.85)	60.27 (16.26)	69.21 (14.41)	66.58 (18.30)	54.48 (15.00)
<i>P</i> value	0.061	0.534	0.831	0.048*	0.028*
Current illness/problem					
No	78.23 (17.21)	62.25 (14.32)	70.40 (12.91)	69.22 (16.96)	57.34 (14.50)
Yes	74.91 (18.32)	56.04 (14.93)	67.04 (13.74)	67.18 (18.91)	54.19 (14.67)
<i>P</i> value	0.015*	<0.001*	0.001*	0.141	0.005*

EN, environment; PH, physical health; PSH, psychological health; SR, social relationships.

**t*-Test significant at $P < 0.05$.

could be variations in disciplines, student's populations, schools and geographic areas.

Christian students had much lower social relationships and environment domain scores compared to their Muslim counterparts. These findings suggest that Christian students were worse than the Muslims at tackling various social relationships and environment issues. A plausible reason for this is that the minority Christian students in a Muslim-dominated region may suffer some social exclusion. A similar study performed among medical students in New Zealand reported that more devout students could manage stress better via open expression of their belief.^[30] It is possible that Muslim students in this Muslims dominated region had greater religiosity. After controlling for confounders, Christianity was a significant predictor of impaired overall QoL. This finding substantiates that Christian pharmacy students may not show deep commitment to their religious faith. A similar study among medical students elsewhere showed that devout students had less likelihood of reporting exhaustion and psychological problems.^[31]

This study revealed that as students moved from one study year to another, QoL did not change much in the first three years, slightly increased in fourth year and then dropped in fifth year. As student progress through the course, there are more academic demands such as clinical clerkship, completing a research project, grade point expectations for graduation, the feeling of incompetence and insecurity about the future, and dealing with job pursuit. Other studies have reported a similar trend among nursing and medical students.^[32,33] QoL was

better among students in the first year of their study compared to those in other study years. This result is comparable to that of earlier studies that reported higher QoL among nursing, and medical students in the first year compared to other years of study.^[32–34] The academic workload in the first year is much lower than that of higher levels, and much of the first year curriculum is a repetition of the high school curriculum. The National Universities Commission (NUC) approved a minimum benchmark for the Bachelor of Pharmacy programme requiring each student to carry an academic load of not less than 40 credit units in the first year, not less than 41 credit units in the second year, not less than 49 credit units in the third year, not less than 48 credit units in the fourth year, and finally, not less than 32 credit units in the fifth year.^[35]

Being in the fifth year of the pharmacy programme predicted deterioration of overall QoL and psychological health consistent with the findings of similar studies conducted among medical students elsewhere.^[33,36,37] Coupled with the pressure to pass all courses in the fifth year, these students must adapt to the 8–10 weeks hospital-based experiential training; academic work undertaken out of the classroom may be associated with a higher level of academic pressure.^[38] In contrast, a similar study done in the United States reported that students in the experiential year had somewhat higher QoL than those involved in classroom learning.^[14] Fifth-year students' higher academic demands (not <32 credit units including 90 h of clinical pharmacy clerkship in the hospital and

Table 3 Scores of pharmacy students according to school demographic impact factors of QoL

Variables	Overall QoL Mean (SD)	QoL domains			
		PH Mean (SD)	PSH Mean (SD)	SR Mean (SD)	EN Mean (SD)
Study University					
UNIMAID	76.69 (18.97)	57.75 (15.64)	69.34 (14.05)	68.30 (18.43)	54.89 (15.47)
UDU	78.19 (17.51)	59.66 (13.06)	68.29 (12.34)	67.81 (17.01)	57.39 (13.97)
UNIILORIN	76.47 (15.23)	63.48 (13.96)	69.18 (12.68)	68.83 (17.14)	57.15 (13.34)
<i>P</i> value	0.618	<0.001**	0.722	0.866	0.099
Year of study					
First	78.98 (20.02)	62.16 (15.33)	71.67 (13.50)	70.02 (17.90)	56.50 (14.45)
Second	77.53 (15.76)	59.59 (14.39)	68.86 (12.87)	67.80 (17.00)	57.03 (14.17)
Third	77.21 (17.17)	59.48 (13.43)	71.08 (12.88)	69.94 (17.43)	56.47 (14.41)
Fourth	78.07 (16.82)	59.48 (15.70)	68.64 (13.28)	66.96 (18.91)	55.23 (15.08)
Fifth	71.93 (19.73)	59.27 (15.81)	64.83 (13.65)	67.74 (17.11)	55.05 (14.96)
<i>P</i> value	0.030**	0.639	0.001**	0.473	0.735
Number of years spent in University					
1	80.14 (19.04)	63.02 (15.18)	71.08 (13.42)	69.85 (17.57)	57.21 (14.33)
2	76.57 (15.58)	58.68 (13.65)	69.52 (12.53)	68.74 (16.49)	56.22 (14.06)
3	76.87 (17.08)	59.78 (13.65)	70.28 (13.27)	68.99 (18.10)	57.10 (15.24)
4	76.76 (17.11)	60.20 (15.26)	69.03 (13.01)	67.83 (16.59)	55.13 (14.16)
5	75.32 (18.99)	60.89 (14.55)	65.47 (13.23)	67.93 (19.92)	55.95 (14.76)
≥6	71.79 (22.35)	50.50 (18.30)	62.50 (15.46)	65.24 (22.10)	52.85 (17.90)
<i>P</i> value	0.183	0.001**	0.002**	0.799	0.570
Residence					
Off-Campus	78.41 (18.44)	60.35 (14.85)	69.28 (13.54)	69.76 (17.27)	57.29 (13.25)
On-Campus	76.14 (17.11)	59.54 (14.84)	68.96 (13.20)	67.51 (18.07)	55.42 (15.28)
<i>P</i> value	0.099	0.487	0.760	0.106	0.101
Schooling in the state of residence					
No	76.27 (18.23)	59.48 (14.59)	68.85 (13.26)	67.59 (18.06)	53.96 (14.66)
Yes	77.92 (17.15)	60.43 (14.98)	69.61 (13.41)	69.25 (17.45)	58.84 (14.18)
<i>P</i> value	0.216	0.400	0.456	0.220	<0.001*
Organizations/clubs active involvement					
No	77.39 (16.32)	59.56 (13.97)	69.03 (12.89)	69.38 (17.59)	58.13 (14.51)
Yes	76.71 (18.48)	59.90 (15.49)	69.08 (13.63)	67.61 (17.88)	54.59 (14.62)
<i>P</i> value	0.621	0.774	0.965	0.202	0.002*
Prior degree					
No	76.99 (17.50)	59.92 (14.63)	69.07 (13.49)	68.54 (17.54)	55.86 (14.52)
Yes	76.71 (18.33)	59.31 (15.80)	69.09 (12.55)	67.55 (18.73)	56.93 (14.98)
<i>P</i> value	0.866	0.674	0.989	0.569	0.451
Assessments/assessments frequency					
More frequently	76.89 (17.74)	59.73 (14.87)	68.93 (13.29)	68.62 (17.83)	56.06 (14.60)
Less frequently	76.87 (17.07)	59.66 (14.66)	69.78 (13.39)	66.86 (17.71)	55.50 (14.68)
<i>P</i> value	0.992	0.964	0.545	0.351	0.720

EN, environment; PH, physical health; PSH, psychological health; SR, social relationships.

**t*-Test significant at $P < 0.05$; **one-way ANOVA significant at $P < 0.05$.

180 h in a research project coupled with accumulated carry-over courses from the lower study years) than those in other study years may have contributed to low QoL among them. The findings in this study imply that pharmacy schools in northern Nigeria need to adopt supportive strategies to adequately equip students in the lower study years for the fifth-year coursework and experiences.

In this study, students who attended a pharmacy school in their state of residence had significantly higher score

for their environment than those schooling outside their state of residence. The short distance to school and proximity to family which may translate to better financial and moral support for students could partly explain this observation. Students who attended a school outside their home state may face a culture shock that could limit their leisure, making their living situation more difficult. This finding is comparable to that of an earlier study done among medical students elsewhere.^[32] An earlier study conducted in the United States reported that experiencing

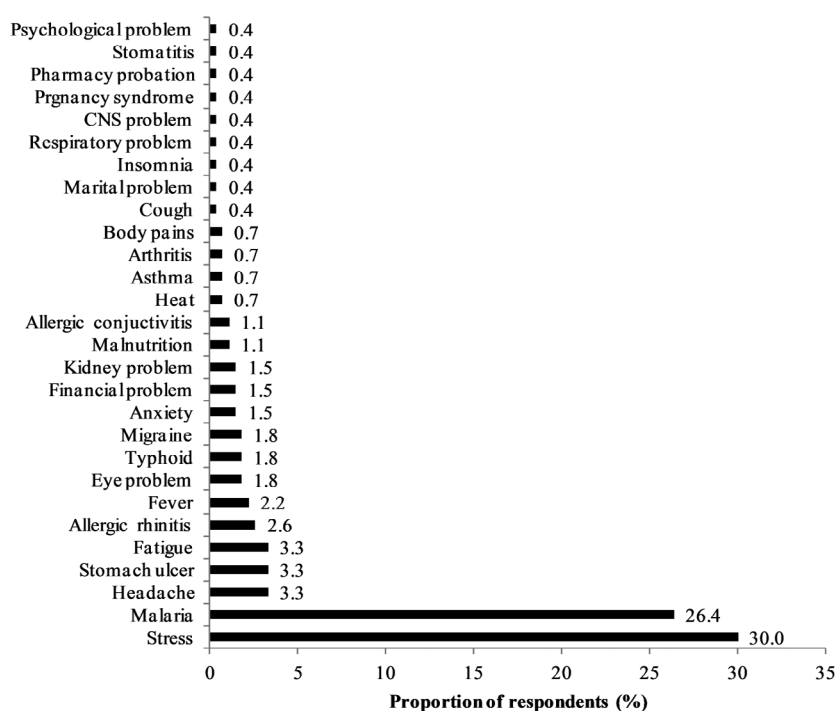


Figure 1 Figure Proportion of respondents that had current illness/problem*. *Totals do not equal 100% due to missing responses; CNS, Central Nervous System

an independent life, stress and being far from family has positive association with lower QoL.^[39] Therefore, schools of pharmacy should be sensitive to students' environment issues and offer them the much-desired help.

Active involvement with students' organizations/clubs was a significant predictor of impaired environment domain. No data were collected that could explain this, but possible reasons to explore could be the time spent in

this involvement reduced the time available for their academic studies resulting in stress.

This study also revealed that having a current illness/problem such as malaria or stress negatively affected the overall QoL, physical health, psychological health and environment. Illness/problems can cause limitations in physical activities and dependence on medical treatment, negative feelings and financial constraints may diminish

Table 4 Correlation analysis results of QoL variables

Variables		Overall	PH	PSH	SR	EN
Gender	Correlation	−0.043	0.070**	−0.024	−0.046	−0.017
	P value	0.135	0.037	0.269	0.122	0.335
Religion	Correlation	−0.071	0.023	0.008	−0.075*	−0.083*
	P value	0.061	0.534	0.831	0.048	0.028
Schooling in the state of residence	Correlation	0.047	0.032	0.028	0.047	0.166**
	P value	0.216	0.400	0.456	0.220	<0.001
5th year of study	Correlation	−0.119**	−0.015	−0.133**	−0.015	−0.029
	P value	0.002	0.690	<0.001	0.700	0.442
Students' organizations/clubs active involvement	Correlation	−0.019	0.011	0.002	−0.049	−0.118**
	P value	0.621	0.774	0.965	0.202	0.002
Current illness/problem	Correlation	−0.091*	−0.204**	−0.123**	−0.056	−0.105**
	P value	0.015	<0.001	0.001	0.141	0.005

PH, physical health; PSH, psychological health; SR, social relationships; EN environment Values of categorical variables: 1 = Male, 0 = Female; 1 = Christianity, 0 = Islam; 1 = Yes, 0 = No; 1 = Less, 0 = More.

*significant at $P < 0.05$; **significant at $P < 0.01$.

Table 5 Multiple linear regression analysis results of significant predictors of QoL of undergraduate pharmacy students ($N = 711$)

QoL domains	Dependent variables	Unstandardized coefficients		Standardized coefficients		T	Sig.	R^2
		B	Std. Error	Beta				
Overall	Religion	−3.354	1.563	−0.091		−2.146	0.032*	0.039
	Fifth year of study	−6.765	2.054	−0.133		−3.293	0.001*	
	Current illness/problem	−4.281	1.487	−0.116		−2.879	0.004*	
PH	Current illness/problem	−5.927	1.221	−0.195		−4.855	<0.001*	0.047
PSH	5th year of study	−5.339	1.539	−0.140		−3.470	0.001*	0.036
	Current illness/problem	−3.340	1.109	−0.122		−3.011	0.003*	
SR	—	—	—	—		—	—	—
EN	Schooling in the state of residence	5.037	1.188	0.173		4.240	<0.001*	0.060
	Students' organizations/clubs active involvement	−2.622	1.221	−0.088		−2.148	0.032*	
	Current illness/problem	−3.943	1.189	−0.132		−3.317	0.001*	

Values of categorical variables: Christianity, 0 = Islam; 1 = Yes, 0 = No; 1 = Less, 0 = More.

The blank cells correspond to domain with no significant predictors in the model.

EN, environment; PH, physical health; PSH, psychological health; SR, social relationships.

*Indicates statistical significance at $P < 0.05$.

the QoL. Other researchers have established a link between dissatisfaction with life and poor health outcomes, personal, social and psychological problems.^[40]

Finally, the most common problem reported among those who had a current illness/problem was stress. The findings in this study highlight stress as the main reason for the impairment of QoL of the study population. Hence, further research to better characterize this stress among students is recommended. Besides their healthcare training, students also face other situations that generate stress^[41] which can cause physical and psychological problems^[41] that may manifest as learning disabilities, poor academic performance and illness. This research is, therefore, a call to introduce personal and institutional positive stress management strategies for students.

Conclusion

This study showed that pharmacy students in northern Nigeria had a fair overall QoL, and poor physical health, psychological health and environment, and social relationships. Student's religion, state of residence, year of study, involvement with organizations/clubs and current illness/problem were the significant predictors of QoL.

Being in the fifth year of the pharmacy programme negatively affected the overall QoL and psychological health of students. Therefore, schools of pharmacy in Nigeria as a matter of urgency should undertake a review of undergraduate pharmaceutical training to cut academic workload during the final year. The provision of recreational facilities, counselling and necessary support services to improve well-being are critical for this category

of students to help them achieve academic success, practice skills and competency.

Declarations

Conflict of interest

The authors declare that they have no conflicts of interest to disclose.

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Authors' contributions

RNO conceived and designed the study, performed data acquisition, analysis and interpretation, and drafted the manuscript. JOM and AAB performed data acquisition and interpretation. All authors approved final manuscript. All Authors state that they had complete access to the study data that support the publication.

IRB ethics

Faculty of Pharmacy Research Review Board, University of Maiduguri, Nigeria reviewed the study protocols and thereafter, granted an ethical approval.

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