

## ORIGINAL RESEARCH



# Impact of Dysmenorrhea on Participation in Academic Activities by Female Undergraduate Pharmacy Students in Nigerian Universities: A Nationwide Cross-Sectional Assessment

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## Abstract

### Background

Dysmenorrhea is a gynecological condition with symptoms ranging from mild pain to severe pain. In students especially those enrolled in rigorous academic programs like pharmacy, the condition may disrupt their academic participation and performance. However, there have been limited evidence on how it impedes this population's academic activities.

### Objectives

To assess the impact of dysmenorrhea on participation in academic activities among pharmacy students in Nigerian universities.

### Methods

This study was conducted using a cross-sectional self-administered questionnaire-based design among pharmacy students in Nigeria universities. Cluster random sampling technique (one school of pharmacy per each of the six geopolitical zones) was employed in selecting the participating pharmacy schools. Descriptive analysis was done to summarize the data. Chi-square test was performed to identify the relationships between various study variables across the universities. Binary logistic regression was used to determine predictors of the impact of dysmenorrhea on the respondents' participation in academic activities.

### Results

Out of 1387 respondents, the majority [972(70.08%)] were aged 20-25 years. Almost all respondents [1311(90.52%)] were single. Most of them [975 (70.30%)] saw their menses for the first time at ages 12-15 years. Among the respondents, 1220(87.96%) reported experiencing dysmenorrhea ( $p=0.017$ ). Of these, 669(54.84%) had their onset of pain on the first day of their menses ( $p=0.017$ ). Moderate [587(48.11%)] and severe [432(35.41%)] pain were reported. The reported impacts of dysmenorrhea included decrease in physical activities [1151(94.34%)], decreased concentration during lectures [1079(88.44%)], decrease in studying time [1011(82.87%)], absence from classes [643(52.70%)], and poor examination performance [299(24.51%)]. Predictors of the impact of dysmenorrhea were age, institution, level of study and pain intensity.

### Conclusion

The study revealed a high prevalence of primary dysmenorrhea, characterized by predominantly moderate pain lasting 1-2 days. The impacts included decreased physical activities, reduced concentration in lectures, decreased study time, class absenteeism, and poor examination performance.

**Keywords:** Dysmenorrhea, Impact, Female pharmacy students

## Introduction

Dysmenorrhea, is a prevalent gynecological condition that affects many women of reproductive age globally<sup>1</sup>. Characterized by lower abdominal pain, discomfort, and associated symptoms such as nausea, headaches, and exhaustion<sup>2</sup>, dysmenorrhea extends beyond its physical manifestations. It significantly impacts various aspects of a woman's life, including her academic performance<sup>3</sup>. The pain associated with dysmenorrhea varies in intensity, duration, and character, often leading to discomfort, reduced quality of life, and academic implications<sup>4</sup>. During menstruation, the uterine lining naturally shed as part of the reproductive

cycle. This process is facilitated by uterine contractions triggered by the release of prostaglandins, a hormone-like substances that promote these contractions<sup>5</sup>. Excessive levels of prostaglandins can lead to painful and uncomfortable uterine contractions<sup>6-8</sup>.

Universities serve as hubs of higher education, shaping the academic and career paths of numerous students. The academic success of students in Nigeria universities holds great importance as it reflects the quality of the educational system and has far-reaching implications for the nation's development. The relationship between dysmenorrhea and academic performance is a critical area of concern.

Dysmenorrhea can significantly interfere with a student's academic progress by causing reduced concentration, absenteeism, limited engagement in class activities, and an overall decline in academic performance<sup>1</sup>. Students with dysmenorrhea often miss classes, have a reduced performance in examinations, and struggle to concentration in lectures during menstrual periods<sup>2</sup>. These findings suggest a direct association between dysmenorrhea and academic challenges. Aside from the physical discomfort, dysmenorrhea also brings about psychosocial and emotional consequences, as students with dysmenorrhea frequently experience anxiety, depression, and social isolation<sup>9</sup>.

Numerous studies have investigated the prevalence of dysmenorrhea among students in countries such as Ethiopia (297; 64.7%), Ireland (864; 96.9%), Saudi Arabia (446; 79.4%), Ghana (245; 83.6%), Lebanon (445; 80.9%), and Iran (277; 89.1%)<sup>10-15</sup>. Similar studies have also been conducted among secondary school students in Enugu, Nigeria (760; 51.1%)<sup>16</sup> and Kwara state, Nigeria (287; 71.8%)<sup>17</sup>. Among undergraduates, class absenteeism (181; 42.7%) has been highlighted as a significant consequence of dysmenorrhea<sup>18</sup>. While the prevalence of dysmenorrhea and its association with academic challenges is acknowledged in the various studies, the studies do not adequately address the specific experiences of pharmacy students – a population subject to particularly rigorous academic and clinical training. Pharmacy students face a rigorous curriculum that combines theoretical knowledge with practical applications in laboratory and clinical settings. The academic demands are not only time-consuming but also mentally and physically challenging, making them uniquely vulnerable to the adverse effects of dysmenorrhea on academic performance. Few studies have been conducted in Nigeria among undergraduates of other disciplines. However, there have been no comprehensive study made on the various impacts of dysmenorrhea among undergraduates of pharmacy schools in Nigeria.

Given this gap, the aim of this study was to determine the prevalence of dysmenorrhea and its impact on academic activities among pharmacy undergraduates in Nigeria universities.

## Methods

### *Study Design, period and settings*

This study utilized a cross-sectional design conducted from 25th June to 25th August, 2023. Nigeria is a country in West Africa that lies between latitudes 4°N and 14°N and longitudes 3°E and 15°E. She shares border with Niger to the north, Benin to the west, Chad to the northeast, Cameroon to the east and to the south, it is bounded by the Gulf of Guinea. Nigeria is with an estimated population of 227,882,945. Nigeria has a landmass of over 923,768 square meters. The population is ethnically diverse with over 250 ethnic groups, with Igbo, Hausa and Yoruba being the largest. The country has a highly diverse geography ranging from mangrove swamps and the tropical forest in the south to savannahs in the central region and semi-arid Sahelian conditions in the north. She is covered by three types of vegetation: the forest, the savannahs and the montane land. South-west (SW), south-south (SS), southeast (SE), north-east (NE), north-central (NC), and north-west (NW) are the six geographical zones that make up Nigeria. There are 20 public pharmacy school in Nigeria with 2 in the north-central, 4 in the north-west, 5 in the south-south, 3 in the

south-east, 4 in the south and 2 in the north-east. The study was conducted among undergraduate pharmacy students in six public Nigeria universities having an estimated number of 2,760 female students. One university from each zone was chosen, to ensure a nationwide spread. University of Nigeria Nsukka (UNN) in the south-east, University of Port-Harcourt (UNIPORT) in the south-south, University of Lagos (UNILAG) in the south-west, University of Maiduguri (UNIMAD) in the north-east, University of Ilorin (UNILORIN) in the north-central, and Ahmadu Bello University, Zaria (ABU) in the north-west were the universities chosen. The selection was based on convenience in terms of accessibility and highest population of students per zone.

### *Study Population and Sample Size*

The study population comprised of pharmacy undergraduate students in first year to fifth year of the participating public Nigerian universities. The selected universities were those offering the B. Pharm programme which is a five-year degree programme. The Doctor of Pharmacy (Pharm. D) programme is a six-year degree programme which have been approved in only a few universities with fewer presently running the programme. Therefore, only universities offering the B. Pharm programme were considered for this study to ensure a uniform experience in academic programme by the participating students.

With the total number of students known in each level of the participating universities, the minimum sample size required for this study was determined for each university using the Raosoft online sample size calculator, with an assumed 50% proportion at 95% confidence level and 5% margin of error. The separate values were summed to give the study's sample size of 2170 after adding 10% for possible non-response rate.

### *Eligibility criteria*

The study included only pharmacy students of the selected universities from each geopolitical zone in Nigeria. Public universities were considered as they have higher population of students and offer a better representation of the students in the country. Students who didn't consent to participate in the study were excluded.

### *Study Instrument*

Using available literatures (1,2,19), a questionnaire was developed and its validity (face and content) and reliability (using test-retest) was determined among a small sample (20 undergraduates) of the study population who were later exempted from the final study. With a Cronbach's Alpha score of 0.782, the questionnaire was accepted with the minute change of adding the option "none" to some questions where need be. The data collection tool consisted of three sections, with five, nine, and eight items respectively. The first section was the sociodemographic characteristics which requested information regarding age, marital status, institution, current academic level and place of residence. The second section of the questionnaire was on reproductive characteristics and menstrual pattern with questions like "when did you first see your menses?, how long does your menses last?, how consistent is your menstrual cycle?, when does the pain start?, how would you describe the pain you experience during menstruation?, what are the location(s) of the pain?..." The third section – impact of dysmenorrhea contained questions like: "has menstrual pain caused your

absence from classes?”, “has menstrual pain reduced your concentration during lectures?”, “has menstrual pain caused a reduction in your physical activities?”. etc. The questions were transformed into a Google form and data was collected through electronic means.

### Study procedure

The relevant authorities were consulted before reaching out to the eligible students. Following an explanation of the study's purpose to the intended participants, informed consent was obtained from each participant after they were reassured of their anonymity, confidentiality, and voluntary involvement in the study. The students were contacted through WhatsApp after obtaining their contacts from their class representatives. The Google form was pre-set to receive only a single response from each respondent. Approval to conduct this study was obtained from the Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka (CPPM/HREC/23/UG/0007). Since neither the participants' names nor their email addresses were sought, confidentiality was upheld.

### Data management and analysis

Following the completion of the data collection process, the responses were downloaded into Microsoft Excel (2019). The data was filtered and cleaned to determine which responses were eligible for data analysis; the individuals had to have answered the questions on the socio-demographic section. The cleaned data was then exported to the Statistical Product and Service Solutions software (SPSS, version-27). The data were coded before being analyzed. Descriptive statistics like frequency distribution and percentage were used to present all of the study's primary findings. Chi-square test was used to compare the findings from the descriptive statistics across schools. Using the first choice in each category of the independent variable as the reference, logistic regression was utilized to identify the variables that might predict the presence of the impact of dysmenorrhea on involvement in academic activities. A p-value of less than 0.05 was considered statistically significant in all analyses.

### Results

A total of 1,387 female students responded to the questionnaire, producing an overall response rate (RR) of 63.92%. There were 383, 191, 186, 228, 172 and 227 responses from UNN (RR = 69.06%), UNIPORT (RR = 56.85%), UNILAG (RR = 52.54%), ABU (RR = 67.06%), UNIMAID (RR = 60.14%) and UNILORIN (RR = 75.67%), respectively. The majority (972, 70.07%) of the students fell within the ages of 20 – 25 years. In terms of marital status, 363 (94.53%) from UNN, 183 (95.81%) from UNIPORT, 185 (99.46%) from UNILAG, 207 (90.79%) from ABU, 152 (88.37%) from UNIMAID, and 221 (97.36%) from UNILORIN identified as being single and unmarried ( $p < 0.001$ ). As regards accommodation, majority of the students from UNN (233, 58.07%), UNILAG (164, 88.17%), ABU (164, 71.93%), UNIMAID (92, 53.49%) and UNILORIN (180, 79.30) reported residing on-campus. However, most students from UNIPORT (126, 65.97%) lived off-campus ( $p < 0.001$ ). (Table 1)

For table 2, “menstrual characteristics of the respondents”, students in UNN (281, 73.18%), UNIPORT (121, 63.35%), UNILAG (122, 65.59%), ABU (177, 77.23%), UNIMAID (158, 67.44%) and UNILORIN (158, 69.60%) reported to have experienced menarche at ages 12 -15 years ( $p < 0.001$ ).

Self-reported duration of menses varied among the students of the universities surveyed. Students at UNN (320, 83.33%), UNIPORT (162, 84.81%), UNILAG (151, 81.81%), ABU (183, 80.26%), UNIMAID (131, 76.16%) and UNILORIN (189, 83.26%) reported seeing their menses for a duration of 4 -7 days;  $p = 0.001$ . Students from UNN (301, 78.39%), UNIPORT (134, 70.16%), UNILAG (150, 80.65%), ABU (192, 84.21%) UNIMAID (143, 83.14%) and UNILORIN (193, 83.14%) reported having a regular menstruation cycle ( $p = 0.001$ ). Overall, 1215 (87.60%) students reported having dysmenorrhea. For the onset of pain, 210 (54.69%) students from UNN, 97 (50.79%) from UNIPORT, 96 (51.61%) from UNILAG, 102 (44.74%) from ABU, 62 (36.05%) from UNIMAID and 102 (44.93%) from UNILORIN reported experiencing the pain on the first day of their menstrual flow;  $p = 0.017$ .

For table 3, “distribution of pain locations and other symptoms among participants”, 163 (42.45%), 85 (44.50%), 48 (25.81%), 71 (31.14%), 42 (24.42%) and 63 (27.75%) students from UNN, UNIPORT, UNILAG, ABU, UNIMAID and UNILORIN, respectively, reported having pain located at the lower abdomen ( $p < 0.001$ ). In UNN (88, 22.91%), UNIPORT (48, 25.13%), ABU (54, 23.68%) and UNIMAID (35, 20.34%) respondents reported experiencing fatigue and weakness; UNILORIN (43, 18.94%) reported experiencing headache, fatigue and weakness. Conversely, 48 (25.81%) from UNILAG reported having no other symptom ( $p = 0.002$ ).

For table 4, “impact of menstrual pain on the academic and personal lives of participants”, 568 (46.56%) students reported that they fall asleep during lectures as a result of dysmenorrhea ( $p = 0.031$ ). In the same line, 299 (24.51%) students attested to have had poor performance in exams as a result of menstrual pain ( $p < 0.017$ ). More so, 314 (94.06%), 165 (98.80%), 156 (92.86%), 189 (91.75%) 132 (92.31%) and 195 (97.5%) respondents from UNN, UNIPORT, UNILAG, ABU, UNIMAID and UNILORIN, respectively, who experienced dysmenorrhea reported that it reduced their overall participation in physical activities. Likewise, the respondents [194 (57.57%)] from UNN, [86 (51.50%)] UNIPORT, [73 (43.45%)] UNILAG, [101 (49.03%)] ABU, [86 (60.14%)] and [103 (51.50%)] UNILORIN reported that dysmenorrhea had caused their absence from classes. Also, reduced concentration during lectures was reported by 1079 (88.81%) of the respondents ( $p = 0.515$ ).

For table 5, it shows the predictors of the impacts of dysmenorrhea on academic activities. Participants above 30 years showed the least likelihood of experiencing a decreased level of concentration during lectures ( $\text{Exp}(B) = 0.214$ ; 95% CI: 0.068–0.678;  $p = 0.009$ ). Institution-specific differences were also observed in the impact of dysmenorrhea. Students from UNILAG were significantly less likely to be absent from school due to dysmenorrhea compared to students in other institutions ( $\text{Exp}(B) = 0.643$ ; 95% CI: 0.443–0.935;  $p = 0.021$ ). Intensity of the pain was the strongest predictor of the impact of dysmenorrhea on the participation in academic activities. Severe pain had the most profound effect. It had the highest likelihood of absence from school ( $\text{Exp}(B) = 0.191$ ,  $p < 0.001$ ), failure to submit assignments ( $\text{Exp}(B) = 8.480$ ,  $p < 0.001$ ), and poor performance in exams ( $\text{Exp}(B) = 14.743$ ,  $p < 0.001$ ). (Table 5)



**Table 1 Sociodemographic Characteristics of the Students across the Pharmacy Schools**

	UNN (N = 383)	UNIPOINT (N = 191)	UNILAG (N = 186)	ABU (N = 228)	UNIMAID (N = 172)	UNILORIN (N = 227)			
Characteristics	n(%)						Total	$\chi^2(df)$	p-value
Age (years)									
<20	47 (15.0)	70 (22.4)	52 (16.6)	38 (12.1)	44 (14.1)	62 (19.8)	313 (100.0)	79.54 (15)	<0.001
20-25	293 (30.1)	108 (11.1)	127 (13.1)	172 (17.7)	111 (11.4)	161 (16.6)	972 (100.0)		
26-30	38 (43.7)	11 (12.6)	4 (4.6)	17 (19.5)	13 (14.9)	4 (4.6)	87 (100.0)		
>30	6 (40.0)	2 (13.3)	3 (20.0)	1 (6.7)	3 (20.0)	0 (0.0)	15 (100.0)		
Marital status									
Single	363 (27.7)	183 (14.0)	185 (14.1)	207 (15.8)	152 (11.6)	221 (16.9)	1311 (100.0)	39.27 (10)	<0.001
Married	21 (28.8)	6 (8.2)	1 (1.4)	21 (28.8)	18 (24.7)	6 (8.2)	73 (100.0)		
Divorced	0 (0.0)	2 (66.7)	0 (0.0)	0 (0.0)	1 (33.3)	0 (0.0)	3 (100.0)		
Year of study									
First	44 (20.5)	28 (13.0)	7 (3.3)	54 (25.1)	46 (21.4)	36 (16.7)	215 (100.0)	182.26 (20)	<0.001
Second	40 (14.7)	76 (27.9)	58 (21.3)	22 (8.1)	19 (7.0)	57 (21.0)	272 (100.0)		
Third	78 (31.2)	21 (8.4)	33 (13.2)	50 (20.0)	30 (12.0)	38 (15.2)	250 (100.0)		
Fourth	104 (32.9)	35 (11.1)	28 (8.9)	53 (16.8)	51 (16.1)	45 (14.2)	316 (100.0)		
Fifth	118 (35.3)	31 (9.3)	60 (18.0)	49 (14.7)	25 (7.5)	51 (15.3)	334 (100.0)		
Residence									
Off campus	151 (30.9)	126 (25.8)	22 (4.5)	64 (13.1)	79 (16.2)	47 (9.6)	489 (100.0)	161.62 (5)	<0.001
On campus	233 (25.9)	65 (7.2)	164 (18.3)	164 (18.3)	92 (10.2)	180 (20.0)	898 (100.0)		

UNN = University of Nigeria, Nsukka; UNIPOINT = University of PortHarcourt; UNILAG = University of Lagos; ABU = Ahmadu Bello University, Zaria; UNIMAID = University of Maiduguri; UNILORIN = University of Ilorin N = Total number of participants; n = frequency

**Table 2a: Menstruation Characteristics of Students across the Pharmacy schools**

	UNN (N = 383)	UNIPOINT (N = 191)	UNILAG (N = 186)	ABU (N = 228)	UNI=MAID (N = 172)	UNILORIN (N = 227)			
Characteristic	n(%)						Total	$\chi^2(df)$	p-value
See first menses (years)									
<12	81 (25.5)	57 (17.9)	57 (17.9)	35 (11.0)	28 (8.8)	60 (18.9)	318 (100.0)	52.12 (15)	<0.001
12-15	281 (28.8)	121 (12.4)	122 (12.5)	177 (18.2)	116 (11.9)	158 (16.2)	975 (100.0)		
16-19	21 (23.6)	13 (14.6)	6 (6.7)	15 (16.9)	26 (29.2)	8 (9.0)	89 (100.0)		
>19	1 (20.0)	0 (0.0)	1 (20.0)	1 (20.0)	1 (20.0)	1 (20.0)	5 (100.0)		
Duration of menses (days)									
≤3	55 (30.9)	23 (12.9)	30 (16.9)	25 (14.0)	23 (12.9)	22 (12.4)	178 (100.0)	29.78 (10)	0.001
4-7	320 (28.2)	162 (14.3)	151 (13.3)	183 (16.1)	131 (11.5)	189 (16.6)	1136 (100.0)		
>7	9 (12.3)	6 (8.2)	5 (6.8)	20 (27.4)	17 (23.30)	16 (21.9)	73 (100.0)		
Pads used per day									
≤ 3 pads	286 (27.6)	150 (14.5)	131 (12.6)	161 (15.5)	120 (11.6)	188 (18.1)	1036 (100.0)	22.64 (10)	0.012
4-6 pads	73 (27.4)	31 (11.7)	38 (14.3)	57 (21.4)	35 (13.2)	32 (12.0)	266 (100.0)		
>6 pads	25 (29.4)	10 (11.8)	17 (20.0)	10 (11.8)	16 (18.8)	7 (8.2)	85 (100.0)		
Consistency of menstrual cycle									
Regular	301 (27.0)	134 (12.0)	150 (13.5)	192 (17.3)	143 (12.8)	193 (17.3)	1113 (100.0)	19.88 (5)	0.001
Irregular	83 (30.3)	57 (20.8)	36 (13.1)	36 (13.1)	28 (10.2)	34 (12.4)	274 (100.0)		

UNN = University of Nigeria, Nsukka; UNIPOINT = University of PortHarcourt; UNILAG = University of Lagos; ABU = Ahmadu Bello University, Zaria; UNIMAID = University of Maiduguri; UNILORIN = University of Ilorin N = Total number of participants; n = frequency

**Table 2b: Menstruation Characteristics of Students across the Pharmacy schools**

	UNN (N = 383)	UNIPORT (N = 191)	UNILAG (N = 186)	ABU (N = 228)	UNI==MAID (N = 172)	UNILORIN (N = 227)			
Characteristic	n(%)						Total	$\chi^2(df)$	p - value
Onset of pain									
No pain	47 (28.1)	24 (14.4)	18 (10.8)	22 (13.2)	29 (17.4)	27 (16.2)	167 (100.0)	35.590 (20)	0.017
Days before the menses start	96 (21.8)	57 (13.0)	63 (14.3)	81 (18.4)	60 (13.6)	83 (18.9)	440 (100.0)		
On day one of the menses	210 (31.4)	97 (14.5)	96 (14.3)	102 (15.2)	62 (9.3)	102 (15.2)	669 (100.0)		
On day two of the menses	24 (30.8)	9 (11.5)	7 (9.0)	15 (19.2)	12 (15.4)	11 (14.1)	78 (100.0)		
Other days of the menses	6 (21.4)	4 (14.3)	1 (3.6)	7 (25.0)	7 (25.0)	3 (10.7)	28 (100.0)		
Duration of pain									
No pain	47 (28.1)	24 (14.4)	18 (10.8)	22 (13.2)	29 (17.4)	27 (16.2)	167 (100.0)	32.624 (25)	0.141
<1 day	75 (32.1)	35 (15.0)	29 (12.4)	38 (16.2)	26 (11.1)	31 (13.2)	234 (100.0)		
1-2 days	188 (30.1)	80 (12.8)	83 (13.3)	102 (16.3)	63 (10.1)	108 (17.3)	624 (100.0)		
3-4 days	35 (20.0)	26 (14.9)	34 (19.4)	29 (16.6)	21 (12.0)	30 (17.1)	175 (100.0)		
>4 days	9 (26.5)	5 (14.7)	4 (14.7)	4 (11.8)	8 (23.5)	3 (8.8)	34 (100.0)		
Unspecific	35 (22.2)	21 (13.3)	17 (10.8)	33 (20.9)	24 (15.2)	28 (17.7)	157 (100.0)		
Pain intensity									
No pain	47 (28.1)	24 (14.4)	18 (10.8)	22 (13.2)	29 (17.4)	27 (16.2)	167 (100.0)	15.737 (15)	0.400
Mild	61 (30.3)	25 (12.4)	31 (15.4)	27 (13.4)	31 (15.4)	26 (12.7)	201 (100.0)		
Moderate	161 (27.4)	75 (12.8)	85 (14.5)	104 (17.7)	57 (9.7)	105 (17.9)	587 (100.0)		
Severe	116 (26.9)	66 (15.3)	52 (12.0)	70 (16.2)	56 (13.0)	72 (16.7)	432 (100.0)		

UNN = University of Nigeria, Nsukka; UNIPORT = University of PortHarcourt; UNILAG = University of Lagos; ABU = Ahmadu Bello University, Zaria; UNIMAID = University of Maiduguri; UNILORIN = University of Ilorin N = Total number of participants; n = frequency

**Table 3: Distribution of Dysmenorrhea Pain Locations among Participants across the Pharmacy Schools**

	UNN (N = 383)	UNIPORT (N = 191)	UNILAG (N = 186)	ABU (N = 228)	UNIMAID (N = 172)	UNILORIN (N = 227)			
Characteristic	n(%)						Total	$\chi^2(df)$	P - value
Location of pain									
No pain	47 (28.1)	24 (14.4)	18 (10.8)	22 (13.2)	29 (17.4)	27 (16.2)	167 (100.0)	206.82 (90)	<0.001
Back	8 (28.6)	1 (3.6)	5 (17.9)	2 (7.1)	8 (28.6)	4 (14.3)	28 (100.0)		
Breast	0 (0.0)	0 (0.0)	3 (42.9)	2 (28.6)	2 (28.6)	0 (0.0)	7 (100.0)		
Lower abdomen	163 (34.5)	85 (18.0)	48 (10.2)	71 (15.0)	42 (8.9)	63 (13.3)	472 (100.0)		
Thigh and feet	1 (9.1)	1 (9.1)	3 (27.3)	4 (36.4)	0 (0.0)	2 (18.2)	11 (100.0)		
Lower abdomen, Back	56 (27.3)	25 (12.2)	26 (12.7)	33 (16.1)	24 (11.7)	41 (20.0)	205 (100.0)		
Lower abdomen, Back, Breast	23 (21.1)	11 (10.1)	25 (22.9)	17 (15.6)	9 (8.3)	24 (22.0)	109 (100.0)		
Lower abdomen, Back, Thigh and feet	15 (16.3)	7 (7.6)	9 (9.8)	28 (30.4)	18 (19.6)	15 (16.3)	92 (100.0)		
Lower abdomen, Back, Thigh and feet, Breast	7 (8.8)	7 (8.8)	12 (15.0)	19 (23.8)	14 (17.5)	21 (26.3)	80 (100.0)		
Lower abdomen, Breast	33 (37.9)	17 (19.5)	9 (10.3)	11 (12.6)	8 (9.2)	9 (10.3)	87 (100.0)		
Lower abdomen, Thigh and feet	18 (25.4)	4 (5.6)	17 (23.9)	6 (8.5)	9 (12.7)	17 (23.9)	71 (100.0)		
Lower abdomen, Thigh and feet, Breast	3 (12.0)	2 (8.0)	5 (20.0)	7 (28.0)	4 (16.0)	4 (16.0)	25 (100.0)		
Other combinations	11 (30.6)	6 (16.7)	5 (13.9)	5 (13.9)	6 (16.7)	3 (8.3)	36 (100.0)		
Other symptoms during menstruation									

UNN=University of Nigeria, Nsukka; UNIPORT= University of PortHarcourt; UNILAG=University of Lagos; ABU=Ahmadu Bello University, Zaria; UNIMAID=University of Maiduguri; UNILORIN= University of Ilorin; N=Total number of participants; n=frequency

**Table 4: Impact of Menstrual Pain on Participation in Academic Activities across the Different Pharmacy Schools**

Characteristic		UNN (N = 383)	UNIPOINT (N = 191)	UNILAG (N = 186)	ABU (N = 228)	UNIMAID (N = 172)	UNILORIN (N = 227)			
		n(%)						Total	$\chi^2(df)$	p-value
Has menstrual pain caused your absence from classes?	No	190 (25.5)	105 (14.1)	113 (15.2)	127 (17.1)	85 (11.4)	124 (16.7)	744 (100.0)	8.14(5)	0.149
	Yes	194 (30.2)	86 (13.4)	73 (11.4)	101 (15.7)	86 (13.4)	103 (16.0)	643 (100.0)		
Has menstrual pain reduced your concentration during lectures?	No	76 (24.7)	47 (15.3)	45 (14.6)	54 (17.5)	42 (13.6)	44 (14.3)	308 (100.0)	4.24 (5)	0.515
	Yes	308 (28.5)	144 (13.3)	141 (13.1)	174 (16.1)	129 (12.0)	183 (17.0)	1079 (100.0)		
Has menstrual pain caused you to fall asleep during lectures?	No	228 (27.8)	101 (12.35)	98 (12.0)	149 (18.2)	98 (12.0)	145 (17.7)	819 (100.0)	12.28(5)	0.031
	Yes	156 (27.5)	90 (15.8)	88 (15.5)	79 (13.9)	73 (12.9)	82 (14.4)	568 (100.0)		
Has menstrual pain caused your failure in meeting up with a deadline for the submission of an assignment?	No	268 (26.1)	134 (13.1)	140 (13.6)	180 (17.5)	135 (13.2)	169 (16.5)	1026 (100.0)	10.25 (5)	0.068
	Yes	116 (32.1)	57 (15.8)	46 (12.7)	48 (13.3)	36 (10.0)	58 (16.1)	361 (100.0)		
Has menstrual pain prevented you from studying?	No	95 (25.3)	46 (12.2)	55 (14.6)	66 (17.6)	54 (14.4)	60 (16.0)	376 (100.0)	4.72 (5)	0.451
	Yes	289 (28.6)	145 (14.3)	131 (13.0)	162 (16.0)	117 (11.6)	167 (16.5)	1011 (100.0)		
Has menstrual pain caused your poor performance in an exam?	No	291 (26.7)	150 (13.8)	162 (14.9)	173 (15.9)	127 (11.7)	185 (17.0)	1088 (100.0)	13.75 (5)	0.017
	Yes	93 (31.1)	41 (13.7)	24 (8.0)	55 (18.4)	44 (14.7)	42 (14.0)	299 (100.0)		
Has menstrual pain caused a reduction in physical activities?	No	70 (29.7)	26 (11.0)	30 (12.7)	39 (16.5)	39 (16.5)	32 (13.6)	236 (100.0)	7.50(5)	0.186
	Yes	314 (27.3)	165 (14.3)	156 (13.6)	189 (16.4)	132 (11.5)	195 (16.9)	1151 (100.0)		
Has menstrual pain impaired your relationship with friends and family members?	No	262 (26.9)	145 (14.9)	136 (13.9)	159 (16.3)	95 (9.7)	178 (18.3)	975 (100.0)	29.38 (5)	<0.001
	Yes	122 (29.6)	46 (11.2)	50 (12.1)	69 (16.7)	76 (18.4)	49 (11.9)	412 (100.0)		

UNN=University of Nigeria, Nsukka; UNIPOINT= University of PortHarcourt; UNILAG=University of Lagos; ABU=Ahmadu Bello University, Zaria;

UNIMAID=University of Maiduguri; UNILORIN= University of Ilorin; N=Total number of participants; n=frequency

**Table 5a: Predictors of the Impact of Dysmenorrhea on participation in Academic activities by the Students across the Pharmacy Schools in Nigeria**

Characteristics	Absence from school				Reduced concentration				Failure to submit assignment				Prevent studying				Poor Performance in exams			
	Exp (B)	95% C.I.for EXP(B)		p- value	Exp (B)	95% C.I.for EXP(B)		p-value	Exp (B)	95% C.I.for EXP(B)		p-value	Exp (B)	95% C.I.for EXP(B)		p-value	Exp (B)	95% C.I.for EXP(B)		p-value
		Lower	Upper			Lower	Upper			Lower	Upper			Lower	Upper			Lower	Upper	
Age of participants																				
<20																				
20-25	1.030	0.729	1.455	0.867	0.931	0.617	1.403	0.731	1.169	0.773	1.768	0.459	0.904	0.616	1.326	0.606	1.094	0.696	1.720	0.696
26-30	1.083	0.612	1.914	0.785	0.558	0.290	1.073	0.080	0.860	0.443	1.671	0.656	0.691	0.372	1.284	0.243	0.928	0.461	1.869	0.835
>30	0.622	0.202	1.915	0.408	0.214	0.068	0.678	0.009	0.139	0.017	1.157	0.068	0.310	0.101	0.945	0.039	0.780	0.196	3.109	0.725
Marital status																				
Single																				
Married	1.224	0.743	2.016	0.427	1.577	0.816	3.046	0.175	1.626	0.945	2.798	0.079	0.907	0.530	1.553	0.723	1.127	0.642	1.977	0.678
Divorced	0.000	0.000		0.999	0.749	0.066	8.472	0.815	0.000	0.000		0.999	0.787	0.068	9.147	0.848	0.000	0.000		0.999
Institution																				
UNN																				
UNIPOINT	0.847	0.585	1.226	0.378	0.732	0.471	1.137	0.164	1.149	0.766	1.724	0.503	1.098	0.715	1.688	0.669	0.959	0.615	1.497	0.855
UNILAG	0.643	0.443	0.935	0.021	0.752	0.483	1.170	0.206	0.808	0.531	1.229	0.319	0.737	0.488	1.114	0.148	0.460	0.277	0.765	0.003
ABU	0.805	0.576	1.126	0.206	0.793	0.529	1.188	0.260	0.620	0.417	0.920	0.018	0.784	0.538	1.143	0.206	1.070	0.723	1.583	0.736
UNIMAID	1.049	0.724	1.518	0.802	0.767	0.493	1.192	0.238	0.644	0.414	1.001	0.050	0.730	0.485	1.097	0.130	1.214	0.792	1.862	0.374

UNN = University of Nigeria, Nsukka; UNIPOINT = University of PortHarcourt; UNILAG = University of Lagos; ABU = Ahmadu Bello University, Zaria;

UNIMAID = University of Maiduguri; UNILORIN = University of Ilorin N = Total number of participants; n = frequency

**Table 5b: Predictors of the Impact of Dysmenorrhea on participation in Academic activities by the Students across the Pharmacy Schools in Nigeria**

Characteristics	Absence from school				Reduced concentration				Failure to submit assignment				Prevent studying				Poor Performance in exams			
	Exp (B)	95% C.I.for EXP(B)		P- value	Exp (B)	95% C.I.for EXP(B)		P- value	Exp (B)	95% C.I.for EXP(B)		P- value	Exp (B)	95% C.I.for EXP(B)		P- value	Exp (B)	95% C.I.for EXP(B)		P- value
		Lower	Upper			Lower	Upper			Lower	Upper			Lower	Upper			Lower	Upper	
Current level																				
First																				
Second	1.225	0.821	1.827	0.319	1.205	0.755	1.923	0.433	1.141	0.704	1.850	0.592	1.096	0.707	1.701	0.681	1.783	1.041	3.052	0.035
Third	1.291	0.836	1.994	0.249	1.426	0.849	2.395	0.179	1.251	0.740	2.117	0.403	1.428	0.880	2.319	0.149	1.937	1.092	3.436	0.024
Fourth	1.161	0.745	1.810	0.508	1.024	0.613	1.712	0.927	1.620	0.956	2.746	0.073	1.399	0.857	2.284	0.180	2.063	1.156	3.684	0.014
Fifth	1.326	0.842	2.090	0.224	1.406	0.820	2.411	0.215	1.532	0.893	2.626	0.121	1.214	0.738	1.999	0.445	2.096	1.156	3.798	0.015
Place of residence (Hostel)	0.964	0.755	1.232	0.772	0.890	0.661	1.200	0.445	1.017	0.770	1.344	0.904	1.175	0.893	1.546	0.248	1.034	0.771	1.386	0.823
Pain intensity																				
No pain																				
Mild	0.020	0.011	0.038	<.001	0.011	0.006	0.020	<.001	1.750	0.872	3.512	0.115	0.013	0.007	0.023	<.001	3.237	1.367	7.663	0.008
Moderate	0.054	0.035	0.084	<.001	0.050	0.028	0.089	<.001	3.546	1.950	6.448	<.001	0.066	0.040	0.110	<.001	4.249	1.931	9.351	<.001
Severe	0.191	0.144	0.254	<.001	0.225	0.128	0.396	<.001	8.480	4.664	15.420	<.001	0.204	0.128	0.324	<.001	14.743	6.749	32.205	<.001
Constant	0.752			0.178	3.853			0.000	0.253			0.000	2.649			0.000	0.144			0.000

UNN=University of Nigeria, Nsukka; UNIPORT= University of PortHarcourt; UNILAG=University of Lagos;ABU=Ahmadu Bello University, Zaria; UNIMAID=University of Maiduguri; UNILORIN= University of Ilorin; N=Total number of participants; n=frequency

## Discussion

The present study accessed the impact of dysmenorrhea on participation in academic activities among pharmacy undergraduates in Nigeria universities. This study reported that majority of the respondents experienced menarche within the ages of 12-15 years. This is consistent with the study among undergraduates of Gondar university which showed that 59.1% experienced menarche at 12-14 years<sup>20</sup>. In this study, 4-7 days duration of menstrual flow was mostly reported. This study conducted by Dahlawi et al. had 86.8% response for 3-7 days duration of menstrual flow<sup>2</sup>. Regarding the consistency of menstruation cycle, the findings of this studies shows that a regular cycle was most reported. This is in line with Dahlawi et al. study<sup>2</sup> where 70.4% of respondents reported having a regular menstruation cycle. The prevalence of dysmenorrhea in this study was 87.6%. This is consistent with findings from studies conducted in other countries such as in Iran (89.1%), Australia (88.0%), Palestine (85.1%) and Lebanon (80.9%)<sup>14,15,21,22</sup>. In Ghana, Ameada et al. conducted a study on dysmenorrhea among university students and got similar high prevalence level (83.6%)<sup>13</sup>. A higher prevalence (96.9%) was reported in the study carried out by Durand et al. among university students in Ireland<sup>11</sup>. However, some studies have reported a lower prevalence of dysmenorrhea. Among these studies are: the study conducted by Gebeyehu et al. among undergraduates of Gondar in Northwestern Ethiopia (76.6%), and the study conducted among nurses in Spain (63.3%)<sup>20,23</sup>. A recent meta-analysis of 20,813 women from various nations showed that the pooled prevalence was 71.1% globally<sup>2</sup>. The variation of the prevalence rate may be as a result of variation in culture, perception to pain and lifestyle.

In this study, majority of the respondents reported that their menstrual pain began on the first day of their menstrual cycle. Similarly, another study on dysmenorrhea found that a greater number of respondents reported experiencing menstrual pain on the first day of their menstrual flow, while a smaller fraction reported that the pain began a few days before the onset<sup>14</sup>. In contrast, the study conducted at

Princess Nourah Bint Abdulrahman University in Riyadh showed that most (59.8%) of their respondents experienced menstrual pain prior to the onset of their menstrual flow<sup>2</sup>. The results are as expected as the increase in the surge of prostaglandin production begin just prior to the menstrual flow. Also, results from the studies show the similarity and a minute variation in the onset of dysmenorrhea. Differences in physiological, cultural, or lifestyle may account for the variation.

This present study showed that the lower abdomen is the primary location of pain. This can be seen to be true as the contractions of the uterine wall causes the pain and the uterus is located just below the abdominal cavity. The back was also notably reported to be a significant location of pain. Many also reported feeling pain on the breast. Pain on the breast typically occurs due to hormonal change<sup>24</sup>. Some respondents experienced pain in a combination of these parts of the body. Similar findings (lower abdomen; 74.7%, back; 81.2%, pelvic: 61.8%) were observed in the study conducted among Haramaya university undergraduate regular students in eastern Ethiopia<sup>1</sup>.

Aside the pain experienced during menstruation, other symptom were present. Fatigue and weakness were most reported in this study. The findings in this report are in line with those observed in the study conducted at Princess Nourah Bint Abdulrahman University in Riyadh<sup>2</sup>. The study reported fatigue and weakness in 63.7% of the respondents. Fatigue and weakness (63.5%) was also reported among undergraduates of the university of Gondar, Ethiopia<sup>20</sup>. These studies noted that nausea and headache were also significantly prevalent. It is not surprising that such were the results. A woman's energy levels might be impacted by the hormonal changes that take place during the menstrual cycle, particularly variations in estrogen and progesterone levels. More so, some f may experience disrupted sleep patterns or insomnia during their menstrual cycle due to hormonal changes or discomfort. Poor sleep quality can result in fatigue and weakness during that period.

There is a similarity in the intensity of pain between this present study and the study conducted among undergraduates at Chukwuemeka Odumegwu Ojukwu University, Anambra<sup>18</sup>. The intensity of dysmenorrhea reported by respondents ranged from moderate (49.1%) to severe (38.2%). Mild (29.0%), moderate (60.8%), and severe (10.2%) menstrual pain were reported<sup>18</sup>. This highlights the varying levels of discomfort among participants in these studies. The variation was expected as pain is a subjective experience influenced by factors, including individual pain thresholds. Among the impacts of dysmenorrhea, the most frequently reported effects in this study were hindrance from participation in daily activities, reduced concentration during lectures, prevent one from studying, and absenteeism from classes. Slight variations existed in the order of these impacts across the universities. Similar findings were observed in the study conducted among Haramaya university undergraduates in Eastern Ethiopia. Difficulty to study (92.1%), and difficulty in concentrating in class (86.1%), were most reported<sup>1</sup>. In a systematic review by Munro et al<sup>3</sup> on the impact of dysmenorrhea, it was highlighted that dysmenorrhea posed a greater barrier to students' concentration in class and academic performance than to class attendance. This contrasts the findings of this present study, which showed that greater barrier was observed in students' concentration during lectures and class attendance, compared to exam performance. Performing poorly in the school of pharmacy could lead to students having to repeat a year, hence, the increase grit for academic success. In this present study, minority of the respondents had absence from classes as an impact of dysmenorrhea. In contrast, the findings of a study conducted in Gondar, Ethiopia, among preparatory school students revealed a significantly higher prevalence of absenteeism (65.0%)<sup>10</sup>. Reduced physical activities was the most reported impact of dysmenorrhea in the present study. Pain intensity, age at menarche and premenstrual syndrome, were found to be independent determining factors for the occurrence of the impact of dysmenorrhea on academic performance<sup>1</sup>. However, this present study reported age, university, year of study and pain intensity as the predictors of the various impacts of dysmenorrhea. This study highlighted that students who experienced severe pain had the highest likelihood of experiencing the various impacts of dysmenorrhea. This finding agrees with the studies that reported significant greater rates of absenteeism and decrease physical engagements among students with severe pain intensity compared to those with mild or moderate pain<sup>8,25</sup>.

### Strength and Limitation of study

This study was conducted across six pharmacy schools, each representing a distinct geopolitical zone of the country. This ensured an even representation of the country and a broad coverage of perspectives, hence, reducing the potential for regional bias. Also, the study design of this work allowed for valuable insights into the prevalence and characteristics of dysmenorrhea. The work also serves as a source of valuable insights for further research. However, this study's respondents were from a single profession, limiting the generalization of the findings to other populations.

### Conclusion

This study concludes that there is a significant prevalence of dysmenorrhea among pharmacy students in Nigeria, and

it unequivocally exerts adverse effects on their participation in academic activities. These impacts encompass reduced concentration and instances of class absences, which impede the students' academic progress.

While factors such as age, educational institution, academic level and pain intensity influenced the extent of dysmenorrhea's impact on academic performance, the students exhibited commendable determination toward their studies.

The findings from this study and others showed that the prevalence of dysmenorrhea is high.. Easy access to healthcare services on campus, including gynecological consultations and counseling for students experiencing dysmenorrhea should be promoted.

Addressing dysmenorrhea-related challenges among undergraduate students is not only a matter of academic performance but also a fundamental aspect of their overall well-being. The policy proposal should aim at raising awareness, providing support, and facilitating an environment conducive for academic success, regardless of the challenges posed by dysmenorrhea.

### Declarations

### Conflict of interests

Author(s) declare(s) that they have no conflicts of interest to disclose.

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### Data availability

The data associated with this study are available upon request to the corresponding author.

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