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DYSMENORRHEA AMONG UNDERGRADUATE STUDENTS: A CROSS-SECTIONAL STUDY AT KENYATTA UNIVERSITY, NAIROBI-KENYA

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DIAGNOSTIC ACCURACY OF TRANSCUTANEOUS BILIRUBIN MEASUREMENTS IN NEONATES ADMITTED AT A TERTIARY TEACHING AND REFERRAL HOSPITAL IN NAIROBI, KENYA

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ABSTRACT

Objectives: Dysmenorrhea is reported globally as a major public health concern among menstruating women. It remains a leading gynecological issue in students, however, it is underexplored in low-middle income countries. This study explored the prevalence of dysmenorrhea and associated factors on severity, academic activities, and the coping mechanisms applied including the reproductive health services accessed among undergraduate students at a public university in Kenya.

Methods: A mixed-method study was conducted among female undergraduate students at Kenyatta University between October 2024 and March 2025.

Participants completed a structured questionnaire and further exploration was conducted in focus group discussions. Quantitative data were analyzed in R (version 4.5.1) using descriptive statistics and chi-square tests at a 5% significance level, while qualitative data underwent thematic analysis using NVivo software (version 14) to explore experiences and coping strategies related to dysmenorrhea.

Results: One hundred and fifty-seven participants completed the qualitative questionnaire. Approximately 143/157 (91.1%) [95% CI: 85.59%–94.61%] of the participants reported that they experienced dysmenorrhea which also negatively affected their academic activities. 92/157(58.6%) of those experiencing dysmenorrhea reported to use over-the-counter (OTC) medication to manage their symptoms. Non-pharmacological coping methods reported by the participants to manage dysmenorrhea included relaxation included relaxation 32/65(33.5%), heat therapy 21/65(27.0%), and exercise 12/65(19.3%). 41/157(29.6%) attest to access reproductive health services with a few numbers of students (23/41-12.7%) relied on the university health-unit as the main access to reproductive health services to manage dysmenorrhea.

Conclusion: Dysmenorrhea is very common among university students with a significant impact on academic activities that potentially affects their quality of life. Therefore, improving menstrual health education and active on-campus support services will foster supportive learning environments among undergraduates experiencing dysmenorrhea in this population.

Key words: Dysmenorrhea, Undergraduates, Academic activities

Word count: Approximately 3,641

INTRODUCTION

Dysmenorrhea is painful menstrual bleeding in the reproductive-aged females ^{1,2}. It's characterized by lower abdominal cramps and discomfort, and may include other symptoms such as nausea, diarrhea, and fatigue occurring just before or during menses ³. Menstrual pain can range from mild to severe and is categorized as primary or secondary dysmenorrhea ². Primary dysmenorrhea has no identifiable cause while secondary dysmenorrhea may be due to underlying gynecological conditions ⁴. Other factors contributing to the severity of menstrual pain are fluctuations in hormonal levels and lifestyle or socio-cultural factors ⁵. Dysmenorrhea has an estimated global prevalence of 50%-95% among reproductive-

aged females ^{6,7}. In Africa, studies conducted in Zimbabwe, Ghana, Kenya, Nigeria and Ethiopia reported an estimated prevalence ranging from 52% to 82.4% ⁸⁻¹³. Even though most women experience mild to moderate pain, a particular population of females struggle with severe pain that significantly impacts their quality of life (QoL) ^{8,14}. It's reported that among students who experience dysmenorrhea, it may affect their academic performance resulting in missed classes, decreased concentration, and poor examination performance including social and work activities, that generally affects their QoL ^{6,15}.

Whereas the prevalence of dysmenorrhoea is widely published, there is a paucity of data on the impact of dysmenorrhoea and coping

strategies among university students in low-middle income countries^{8,16}. This limits the capacity to create tailored and effective interventions and support systems in this unique academic environment with diverse socio-cultural factors¹³. Therefore, this study aimed to determine the prevalence of dysmenorrhea among undergraduate students, assess its effects on academic activities, and explore the coping mechanisms used as well as their access to reproductive health services (RHS) at Kenyatta University.

METHODS

Study area, design and population

Kenyatta University is a public university located in Nairobi-Kenya, with a diverse student population drawn from various regions of Kenya and other countries. It offers a wide range of undergraduate and postgraduate programs across different schools and faculties. Students either reside on campus in university hostels or off campus in nearby urban, peri-urban, or rural neighborhoods. Some combine their studies with part-time jobs to meet living expenses, while others are supported by families, and scholarships. The university has a health center which provides a range of basic services including reproductive health care. This cross-sectional study was conducted between October 2024 to March 2025. A mixed-method approach was adopted, combining quantitative and qualitative data collection.

Sample size and sampling technique: A sample size was derived using the Cochran formula for descriptive studies¹⁷. Assuming 89.6% prevalence of dysmenorrhea with 5% margin of error and 95% confidence level a final sample size of 157 participants was derived^{15,18}. A list of all female undergraduates at KU were obtained in compliance with the university's data

protection guidelines. It contained their email addresses only, which were later anonymized to ensure strict adherence to institutional data governance requirements. Simple random sampling was digitally executed—the list was uploaded into a randomization function in Microsoft Excel (RAND) to generate random numbers and sorted in ascending order. Therefore, first 157 of the randomly ordered list were invited to participate via their email addresses.

Data collection: Quantitative data were collected through a structured online survey link (Google Form) to quantify dysmenorrhea prevalence and severity for statistical insights. The survey link was shared to the 157 students via school email address and requested to voluntarily participate to the study. Participants were informed that by filling and submitting the questionnaire, they were giving voluntary consent to take part in the study. In cases of delayed responses, follow-up emails were made as reminders to the entire sample population twice after the initial invitation. The research tool gathered data on: socio-demographics, menstrual history, dysmenorrhea severity, and coping strategies employed and reproductive health services accessed. Menstrual pain was assessed using the Numerical Rating Scale (NRS) (0=no pain, 1-3=mild, 4-6=moderate, and 7-10=severe).

Purposive sampling was applied to invite students to participate in focused group discussions (FGDs) using separate informed consents. The qualitative data was gathered using four in-depth FGD sessions lasting between 30-45 minutes and were facilitated by the researcher. Data saturation was confirmed at a point where the discussions didn't bring up any new themes and thus stopped. The meetings were recorded and handled with strict confidentiality, ensuring that students' identities were anonymized.

The integration of two datasets was operationalized through triangulation i.e., the qualitative insights were used to complement and interpret the patterns observed in quantitative data, leading to a holistic understanding of dysmenorrhea impact in this population.

Eligibility criteria: Eligibility was restricted to female undergraduates who voluntarily agreed to participate in the study.

Ethical approval: The study was reviewed and approved by the Kenyatta University Ethics Review Committee (KUERC) under approval number PKU/303O/I2054.

Data analysis: Quantitative data were securely managed in Excel worksheet populated directly from the online questionnaire responses. The google form populated an online excel sheet that formed the raw data. Data cleaning, management and analysis were carried out in R (version 4.5.1) because of its open-source nature. Since all the study variables were categorical, the analysis focused on examining possible associations between them using the Pearson Chi-square test of independence. Whenever the count in any cell was less than five, the Fisher's Exact Test was applied instead. For cases where the test results were significant, standardized residuals and odds ratios were examined to identify the main contributors to the observed association. The results were summarized as frequencies and percentages. Qualitative data from FGDs were analyzed thematically using NVivo software (version 14). Analysis involved transcription of audio

recordings, which were conducted in both English and Kiswahili. During transcription, participants' responses were categorized into themes to guide the analysis. Thematic analysis followed a systematic approach involving coding, where meaningful excerpts of information were assigned descriptive labels. For instance, statements or phrases related to dysmenorrhea such as "cramping," "lack of concentration in class," and "pain relief pills" were grouped into sub-themes. The identified themes were then reviewed and refined to ensure that the core insights aligned with the research objectives. Manuscript guidelines: The study adhered to STROBE reporting guidelines for cross-sectional studies (Supplementary Checklist A).

RESULTS

Response rate

All the 157 participants responded to the survey for the quantitative data. Additionally, 39 participants took part in four separate FGD sessions (13, 10, 9 and 7, respectively). We explored associations of dysmenorrhea with the demographic variables.

Socio-demographic variables

The mean age of participants was 21 years (range: 18–26 years) with most respondents being single (95%, $n = 149/157$), and reside in urban areas at 75% (117/157) (Table1).

Table 1: Distribution of dysmenorrhea by severity and the association with demographic variables ($n=157$).

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			Pain severity counts (%)				
Variable	Category	Total	No pain	Mild	Moderate	Severe	P_ value
Total		157 (100)	7 (4.5)	20 (12.7)	72 (45.9)	58 (36.9)	
Marital Status	Married	8 (5.1)	2 (25)	3 (37.5)	2 (25)	1 (12.5)	0.0075
	Single	149 (94.9)	5 (3.4)	17 (11.4)	70 (47)	57 (38.3)	
Residence	Peri-urban	9 (5.7)	0 (0)	1 (11.1)	3 (33.3)	5 (55.6)	
	Rural	31 (19.7)	2 (6.5)	5 (16.1)	18 (58.1)	6 (19.4)	0.31
	Urban	117 (74.5)	5 (4.3)	14 (12)	51 (43.6)	47 (40.2)	
Employment Status	No	138 (87.9)	6 (4.3)	18 (13)	63 (45.7)	51 (37)	1.0
	Yes	19 (12.1)	1 (5.3)	2 (10.5)	9 (47.4)	7 (36.8)	
Age Group	Below 20	30 (19.1)	1 (3.3)	3 (10)	15 (50)	11 (36.7)	0.49
	20-22	91 (58)	5 (5.5)	9 (9.9)	40 (44)	37 (40.7)	
	23-25	34 (21.7)	1 (2.9)	7 (20.6)	17 (50)	9 (26.5)	
	Above 25	2 (1.3)	0 (0)	1 (50)	0 (0)	1 (50)	
Academic Activities Impact	No	49 (31.2)	1 (2)	11 (22.4)	23 (46.9)	14 (28.6)	0.0001
	Yes	84 (53.5)	1 (1.2)	4 (4.8)	37 (44)	42 (50)	
	Not applicable	24 (15.3)	5 (20.8)	5 (20.8)	12 (50)	2 (8.3)	
Impact Frequency	Not applicable	34 (23.1)	2 (5.9)	12 (35.3)	18 (52.9)	2 (5.9)	0.0001
	Always	37 (25.2)	5 (13.5)	1 (2.7)	9 (24.3)	22 (59.5)	
	Sometimes	76 (51.7)	2 (2.6)	7 (9.2)	45 (59.2)	22 (28.9)	

Parentheses show row-wise percentages; numbers indicate category counts.

Respondents demographics with dysmenorrhea severity:

Association between dysmenorrhea severity and selected demographic factors was assessed using Fisher's exact test based on the hypergeometric distribution (Table1). This test was appropriate given that several cells had expected counts below five—for instance, only two married participants reported experiencing no pain. For each

variable, we tested whether its distribution differed across the four pain severity categories (no pain, mild, moderate, and severe). Marital status showed a significant overall association ($p=0.0076$). However, post-hoc pairwise comparisons with the severe group in TableS3 indicated that none of the contrasts remained significant after Holm correction, suggesting no independent association between marital status and pain severity.

Prevalence of dysmenorrhea

90.4% (142/157) of the participants were aware of dysmenorrhea. Most participants

obtained information about dysmenorrhea from digital media like Google chrome and ChatGPT (47.9%) (Figure1A).

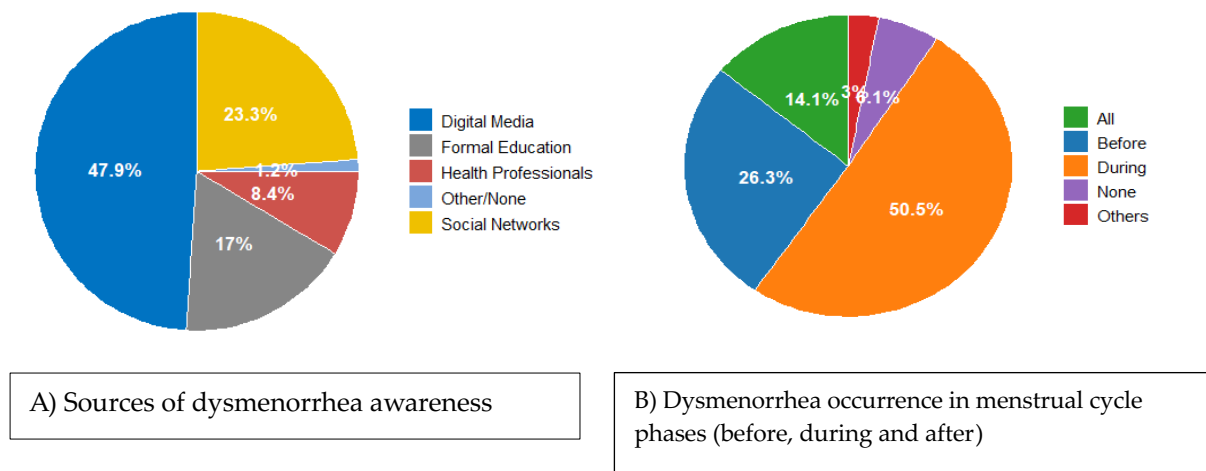


Figure 1: Dysmenorrhea awareness and mensural cycle phases

The data showed that 143/157 (91.1%) [95%CI:85.59%–94.61%] (Table1) of students reported experiencing dysmenorrhea, with severity levels on the NRS (mild, moderate, and severe) accounting for 20/143(12.74%), 72/143(45.9%), and 58/143(36.9%), respectively. Majority of them attest to experience pain during menstruation at 63/143(50%) (Figure1B).

Dysmenorrhea symptoms affecting academic activities

Disruptive symptoms: Dysmenorrhea-related symptoms assessed in the study included cephalgia, dorsalgia, dyschezia, dysuria and hypogastric pain (Figure2B). Figure2A presents precision estimates of other symptoms associated with menstrual pain—revealing diarrhea and nausea as the most frequently reported symptoms across all pain categories, as their prevalence increase steadily with pain severity. In Figure2B, dysuria exhibited the highest prevalence, followed by hypogastric pain.

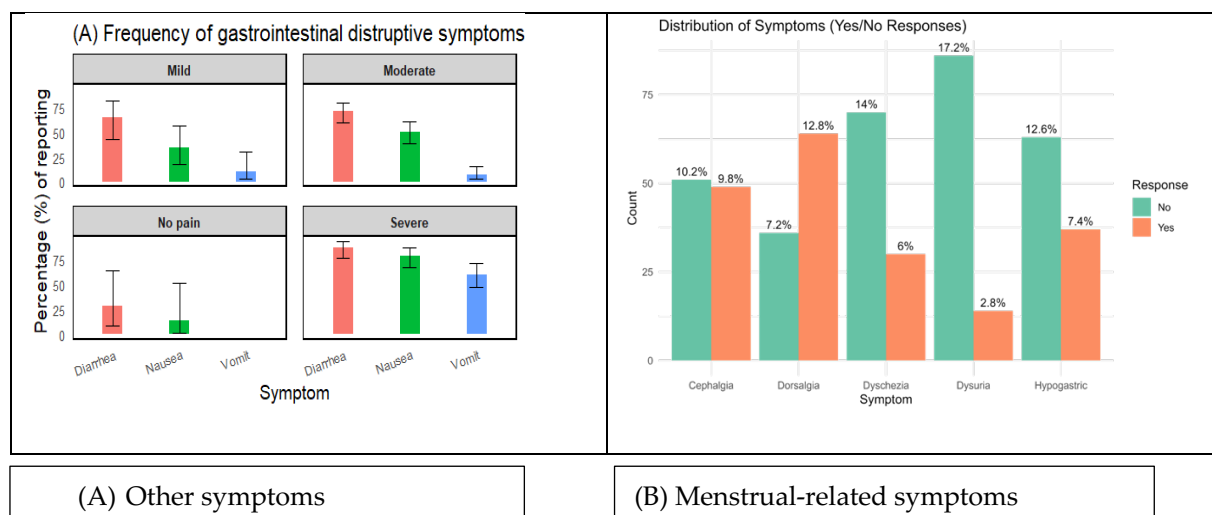


Figure 2: Dysmenorrhea disruptive symptoms

Effects of dysmenorrhea symptoms: The most affected activity was concentration during lectures, followed by decreased concentration during personal studies and group discussions, as well as missed lectures (Table2). This demonstrates that even though students attend lectures, menstrual pain limits their ability to participate effectively and also prefer not to miss their examinations. Moreover, the FGD sessions provided more insights on the effects of menstrual pain as quoted below (TableS4);

“Dysmenorrhea affects our social and academic responsibilities and should be a valid reason to be absent from school, social activities or work.” (FGD, 04)

“Female students should be heard when they raise issues with dysmenorrhea because it affects study performance. They should be allowed to miss tests and Exams when experiencing period pain, and not be shamed or punished for doing so.” (FGD, 02)

Table 2: Effects of dysmenorrhea on academic activities

Types of academic activities affected	Yes counts (%)	No counts (%)
Missed lectures	60(38.2)	8(5.1)
Missed examinations	12(7.6)	1(0.6)
Missed personal studies/group discussions or assignments	46(29.3)	4(2.5)
Limits concentration during lectures	62(39.5)	7(4.5)
Limits concentration during examinations	45(28.7)	4(2.5)
Limits concentration in personal studies/group discussions	59(37.6)	6(3.8)

Academic activities and dysmenorrhea severity: The overall Fisher’s tests were significant ($p < 0.001$). It’s post-hoc pairwise comparisons showed a significant ORs (95% CIs excluding 1) (TableS3). Participants whose academic activities were affected by dysmenorrhea had markedly higher odds of severe pain. For instance, those in the mild pain group who reported no impact on studies had an OR of 8.27 (95%CI:1.97–40.0; $p_{\text{adj}} = 0.01$) relative to the severe pain group. Conversely, for participants reporting “not applicable” compared with those affected, the no pain vs severe comparison yielded an OR of 0.03 (95%CI:0–

0.53; $p_{\text{adj}} = 0.026$). Similarly, among those whose studies were affected, all three contrasts (no pain vs severe, mild vs severe, and moderate vs severe) were significant, with small ORs (0.01–0.15), indicating that the likelihood of academic disruption increased sharply with pain severity.

Turning to impact frequency (Table1), among those for whom impact was not applicable, participants with mild pain (OR=132, 95%CI:8.74–5574.28; $p_{\text{adj}} < 0.001$) and moderate pain (OR=22, 95%CI:3.74–217.01; $p_{\text{adj}} < 0.001$) had significantly higher odds of reduced impact compared to those

with severe pain, whereas the no pain vs severe contrast was not significant ($p=0.424$). The very wide CIs indicate substantial uncertainty in these estimates, likely due to small subgroup counts. Among those affected sometimes, the mild vs severe comparison remained significant ($OR=18.86$, $95\%CI:2.88-195.61$; $p_{adj}=0.001$), but the moderate vs severe comparison ($OR=4.4$, $95\%CI:0.9-41.95$; $p_{adj}=0.252$) lost significance after adjustment. Again, the wide CIs reflect imprecision in the estimates.

Among participants always affected, the moderate vs severe contrast showed significantly lower odds ($OR=0.20$, $95\%CI:0.07-0.55$; $p_{adj}=0.003$), implying that those with moderate pain were less likely to report constant interference compared to those with severe pain. Both the impact and frequency of impact on academic activities were strongly associated with pain severity. Participants with severe dysmenorrhea were more likely to experience frequent and consistent disruptions, while the wide confidence intervals across several comparisons suggest uncertainty in the strength of these associations, possibly reflecting small subgroup sizes or heterogeneity in responses.

Dysmenorrhea coping strategies and RHS accessed

To ease the pain, the participants reported the use of over the counter (OTC) medications to manage their pain (Figure3A). Non-steroidal Anti-inflammatory Drugs (NSAIDs) such as Ibuprofen (Advil, Motrin, brufen etc), aspirin, and naproxen sodium, diclofenac (diclomol etc), mefenamic acid

(ponstan), hyoscine (buscopan) were the most used while paracetamol (Tylenol, panadol, efferalgan, cipladon, maramoja, ordinary paracetamol) were the least used. Non-medical management of pain (Figure4B) was also reported as well as combined therapy of both methods (TableS4). The interviews presented a combined therapy by application of non-medical strategies and topical pain relief. Midol (acetaminophen, caffeine and pyrilamine) and pamprin (acetaminophen, pamabrom and pyrilamine) were self-reported to relieve pain & reduce fatigue and to create a cooling or warming sensation to disrupt the pain, respectively (TableS4). The topical pain relief applied were Methanol-based (like Icy hot) and capsaicin cream to create a cooling sensation and to disrupt pain signalling respectively. The discussions suggest that participants in FGD1&3 (20 participants) largely preferred non-pharmacological methods, particularly rest and heat therapy, with fewer opting for medical interventions. This was reflected as quoted below;

"I think people should be made aware of the condition and not think that those suffering from it are pretending. I once called the ambulance to take me to the health unit, but the health worker in the facility really scolded me over it saying period pain is not a big deal while I was in a very bad state" (FGD, 01).

"Affordable treatment options be provided for university students as well as alternatives in the university clinics by health care provider who aren't judgmental" (FGD, 3).

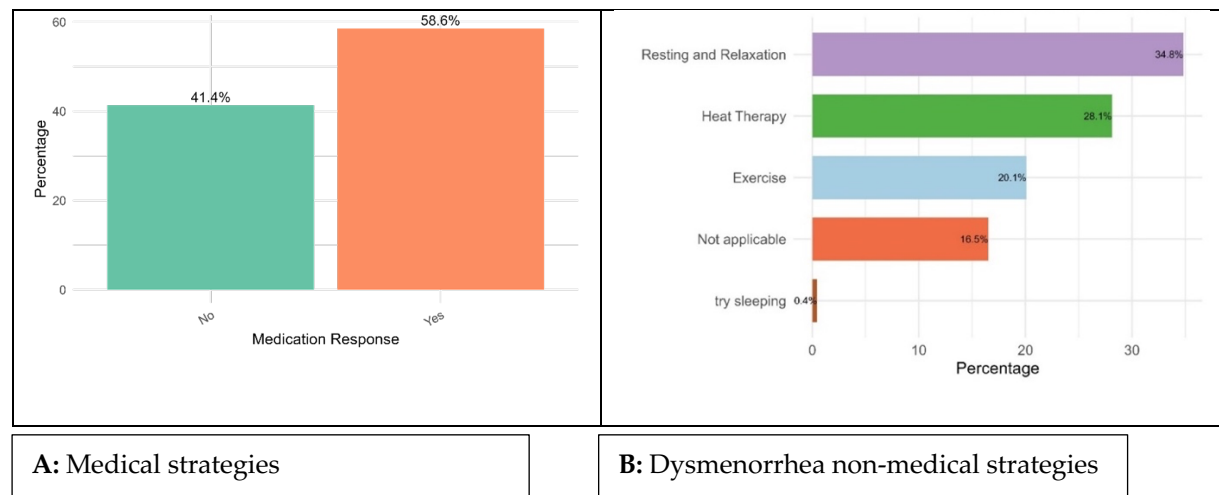


Figure 3: Dysmenorrhea coping strategies (medical/pharmacological and non-medical/pharmacological)

As part of dysmenorrhea coping strategies, the study also assessed the accessibility to RHS. In total, Figure4 revealed that only 41/157(29.6%) reported to have access. This was evident since a higher frequency of 107/157 (68%) reported to lack family support when seeking RHS on dysmenorrhea treatment options (FigureS1).

The university health unit i.e., on-campus health services had the highest point of access facility to treat menstrual pain at 23/41(13%) (Figure4). Collectively, the qualitative findings revealed that different sociocultural beliefs, stigma and unfriendly healthcare providers contributed to the reluctance to seek help (TablesS4, S1 and S2).

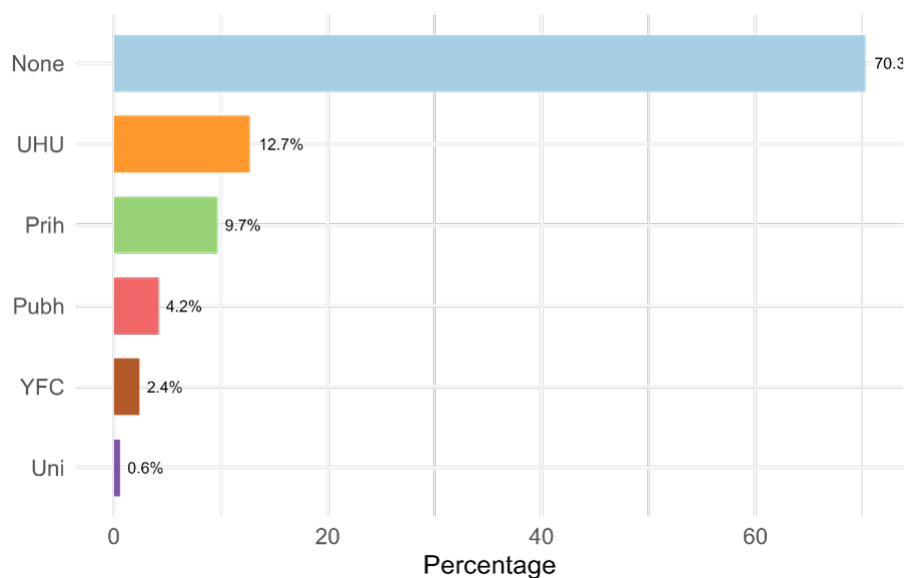


Figure 4: Facility used to access the RHS

Key: UHU and Uni= University Health Unit, Prih= Private hospital, Pubh= Public hospital, and YFC= Youth Friendly Clinics.

DISCUSSION

The relationship between participants' sociodemographic factors with severity of dysmenorrhea revealed the critical effects of dysmenorrhea in the population. The lack of association between respondents' age and dysmenorrhea is in contrast with some studies which suggests a decline in dysmenorrhea severity with increasing age due to hormonal stabilization and physiological changes ¹⁹. Besides, the homogeneity of our study population (young undergraduates) had a narrow age range which can be attributed to the lack of association. Hence, further research involving broader age ranges are needed to explore this relationship more extensively (in the Kenyan-context). Additionally, the significant association observed between marital status with severity of dysmenorrhea underscores the importance of considering socioeconomic and lifestyle factors to address dysmenorrhea in academic and work settings concurs with literature ⁸. Therefore, there is need for targeted interventions that incorporates; increased access to menstrual health education, stress management programs, and policies supporting menstrual health ²⁰.

In Kenya, the study's point prevalence 143/157 (91.1%) was higher compared with Kiprop et.al study's prevalence which was at 82.4% ⁸. In Eastern Africa, the occurrence varies compared to records in Ethiopia where substantial research has been conducted on dysmenorrhea showing a range from 51.3% to 80% ^{15 6}. Moreover, studies in Uganda reported a prevalence of 63.6% and 75.8% ^{19,21}. With a prevalence of 75.97%, the occurrence is comparable to other studies in Sub-Saharan Africa among university students in Zimbabwe (75.9%) amongst other countries as referenced by Nyirenda et.al., ^{13,22}. The worldwide prevalence of dysmenorrhea differs among

university/college students' population and also influenced by health-related, cultural and environmental factors ⁷. Despite the global differences in dysmenorrhea prevalence, it's considered that any occurrence above 65% is classified as high as observed in this study ^{6,18}.

The significant proportion of the participants reported dysmenorrhea affecting their academic activities aligns with existing literature on socio-economic and educational consequences of menstrual pain; notably in limited resource settings where access to menstrual health resources are limited ⁸. The strong association between academic activities and dysmenorrhea severity depicts the devastating nature of dysmenorrhea symptoms to hinder the students' ability to attend lectures, exams and other academic activities; ultimately affecting their overall academic success. Moreover, the high frequency of impact on dysmenorrhea severity that was found to always affect the students' academic activities suggests that menstrual pain severity is not merely a personal issue but also a vital educational challenge that merits institutional attention. The negative impacts of decreased productivity in their academic activities are also reported on literature ²⁰. This calls for institutional support such as flexible attendance policies and access to pain management resources to mitigate its effects on educational outcomes ^{8,16}.

Most students relied on self-medication (non-medical) and primarily using diverse OTC analgesics, while the rest did not seek any medical assistance ²³. This is in contrast with literature implying OTC medication are often first in line of treatment for dysmenorrhea management ²⁰. Additionally, this justifies the higher percentage of the students using digital media as their first option for seeking knowledge related to dysmenorrhea and its treatment strategies.

Nonetheless, it also underscores the gaps in healthcare access and awareness—including the potential stigma surrounding menstruation that discourage students from seeking medical care ^{24,25}.

The students' poor health-seeking behaviors unmasked the need for improved RHS for menstrual health management. Despite public hospitals being the least accessed at 20%, the students' frequency of seeking RHS was deemed important for public health concern to inform effective dysmenorrhea treatment approaches. Addressing these behaviors through policy and educational initiatives may improve access to RHS and treatment outcomes in this population. Additionally, the interpretation of RHS access may be confounded by unmeasured socioeconomic status and physical distance to healthcare facilities. However, despite 92/157(58.6%) reporting use of OTC medications, there was no qualitative analysis provided to establish a connection between pain severity and coping strategies chosen. This gap in data recommends further research to explore these relationships.

Furthermore, the study also assessed the potential barriers in accessing RHS both at a family and community level. The frequencies exposed the need for family support due to high representation of 107/157(68%) students who confirmed to lack family support and over 50/157 (32%) who had family support to manage dysmenorrhea. At the community level, TableS1 shows the greatest challenge in accessing RHS facilities among university students was financial at 24/52(63%). Among the barriers reported (stigma, lack of awareness, and financial constraints), the results echo other reports where >63.16% of the challenges was attributed to financial constraints in accessing RHS for dysmenorrhea treatment ^{8,24,26,27}.

As young adults, presence or absence of occupation does not directly affect the access to treatment. However, financial constraints are due to the cost of medications, diagnostic tests and also regulations that prohibit students access to RHS especially in low-resource settings. Furthermore, the lack of insurance coverage for RHS further exacerbates the barrier. Among the suggestions raised for better menstrual healthcare, the students proposed that gynecological care services should be included within the university health unit services for effective care, including employment of well-trained staff to address dysmenorrhea. Therefore, public health interventions should be tailored on increasing dysmenorrhea awareness, development of student friendly services, reduce stigma and improve access to affordable and effective treatment services ^{28–30}.

Study strengths and limitations

Due to limited research on dysmenorrhea in Kenya, the study addressed a significant gap in women reproductive health research. Thus, it provides timely evidence that potentially informs public health interventions and university health services. Secondly, the focus on a specific and diverse population of university students ensured a relevance and contextual depth with supervised data collection procedures for accuracy and ethical rigor. The study used a self-developed (by the researcher) tool that relied on referencing study tools used in the same area of research, since dysmenorrhea lacks a single universally accepted validated tool. The respondents were liable to self-reporting bias depending on the student personal experience on dysmenorrhea. The study area selection involved a single university within one capital only, which potentially limits the generalization of the results to the entire population in the

country. Therefore, while student enrolment at KU is from all over the country (which embodies students from different counties), findings from only one university is limited to indexing the entire body of females countrywide.

Conclusion

Dysmenorrhea was prevalent among KU undergraduates 143/157(91.1%), with 58/143(36.9%) experiencing severe pain that disrupts their academic activities. Many normalize the pain or lack healthcare access and support. However, targeted interventions—menstrual health education, active on-campus support services, and supportive policy advocacy; are essential to reduce stigma, enhance care and improve QoL, thus foster supportive learning environments.

Contributions: Conceptualization, Purity. O., Charles. M, Rosebella. K and Joseph. M.; methodology, Purity. O., Rosebella. K and Joseph. M; software, Purity. O, Patrick. M and Zayyad. A.; validation, Charles. M., Rosebella. K, Joseph. M., Stella. I, Jael. O, Ezekiel. M, and Petr. G.M.; formal analysis, Purity. O., Patrick. M, and Zayyad. A; investigation, Rosebella. K., Joseph. M and Jael. O; resources, Peter. G.M; data curation, Patrick. M., Noah. L.W and Zayyad. A; writing—original draft preparation, Purity. O., Rosebella. K, and Joseph. M; writing—review and editing, Purity. O., Rosebella. K., Joseph. M., Stella. I., Ezekiel. M, Noah. LW, Jael. O, Peter. G.M, and Charles. M.; visualization, Purity. O., James. W, Patrick. M, Noah. LW and Zayyad. A; supervision, Rosebella. K., Joseph. M, and Jael. O; project administration, Purity. O and Peter. G.M. All authors have read and agreed to the published version of the manuscript.

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Access to data: The data presented in this study are available on request from the corresponding author due to privacy considerations.

REFEENCES

1. Cetin A. Evaluation of Biological and Sociodemographic Factors Affecting Dysmenorrhea. *Cureus*. 2020 May 5; DOI: <https://doi.org/10.7759/cureus.7977>
2. Hassan Nagy,, Karen Carlson,, Moien AB Khan. Dysmenorrhea - StatPearls - NCBI Bookshelf [Internet]. 2023. DOI: <https://www.ncbi.nlm.nih.gov/books/NBK560834/>
3. Chen CX, Carpenter JS, Ofner S, Lapradd M, Fortenberry JD. Dysmenorrhea Symptom-Based Phenotypes: A Replication and Extension Study. *Nurs Res*. 2021;70(1):24–33. DOI: <https://doi.org/10.1097/NNR.0000000000000477>
4. Clemenza S, Vannuccini S, Capezzuoli T, Meleca CI, Pampaloni F, Petraglia F. Is primary dysmenorrhea a precursor of future

- endometriosis development? *Gynecol Endocrinol.* 2021; 37(4):287–93. DOI: <https://doi.org/10.1080/09513590.2021.1878134>
5. Bajalan Z, Alimoradi Z, Moafi F. Nutrition as a Potential Factor of Primary Dysmenorrhea: A Systematic Review of Observational Studies. *Gynecol Obstet Invest.* 2019 May 1; 84(3):209–24. DOI: <https://doi.org/10.1159/000495408>
6. Tadese M, Kassa A, Muluneh AA, Altaye G, et al. Prevalence of dysmenorrhoea, associated risk factors and its relationship with academic performance among graduating female university students in Ethiopia: A cross-sectional study. *BMJ Open.* 2021 Mar 19;11(3): e043814. DOI: <https://doi.org/10.1136/bmjopen-2020-043814>
7. Wang L, Yan Y, Qiu H, Xu D, Zhu J, Liu J, et al. Prevalence and Risk Factors of Primary Dysmenorrhea in Students: A Meta-Analysis. *Value Health [Internet].* 2022 Oct 1; 25(10):1678–84. DOI: <https://doi.org/10.1016/J.JVAL.2022.03.023>
8. Kiprop E, Wafula AT, Olpengs D, Ng'ang'andu CH, Kimondo JW, Mayoka GW. Dysmenorrhea curtails effective academic engagements by female students - insights from a cross-sectional study at a Kenyan University. *East Afr Med J [Internet].* 2024 Sep 30; 101(8):7267–77. DOI: <https://www.ajol.info/index.php/eamj/article/view/279359>
9. Mesele TT, Dheresa M, Oljira L, Wakwoya EB, Gemedo GM. Prevalence of Dysmenorrhea and Associated Factors Among Haramaya University Students, Eastern Ethiopia. *Int J Womens Health.* 2022;14:517–27. DOI: <https://doi.org/10.2147/IJWH.S333447>
10. Molla A, Duko B, Girma B, Madoro D, Nigussie J, Belayneh Z, et al. Prevalence of dysmenorrhea and associated factors among students in Ethiopia: A systematic review and meta-analysis. Vol. 18, *Women's Health.* SAGE Publications Ltd; 2022. DOI: <https://doi.org/10.1177/17455057221079443>
11. Ameade EPK, Amalba A, Mohammed BS. Prevalence of dysmenorrhea among University students in Northern Ghana; its impact and management strategies. *BMC Women's Health.* 2018 Feb 13;18(1):39. DOI: <https://doi.org/10.1186/s12905-018-0532-1>
12. Irozulike FC, Asiwe N, Ekokodje JW, Wedeh MS, Izibeya JD, Filima PL. Prevalence of Dysmenorrhea and its Management among Undergraduate Students of the University of Port Harcourt, Nigeria. *Asian Journal of Advanced Research and Reports.* 2023 Nov 6;17(12):19–28. DOI: <https://doi.org/10.9734/ajarr/2023/v17i12582>
13. Nyirenda T, Nyagumbo E, Murewanhema G, Mukonowenzou N, Kagodora SB, Mapfumo C, et al. Prevalence of dysmenorrhea and associated risk factors among university students in Zimbabwe. *Women's Health.* 2023 Jan 1;19. DOI: <https://doi.org/10.1177/17455057231189549>
14. Ayieko S, Nguku A, Kidula N. It's not just about pads! Adolescent reproductive health views in Kenya: A qualitative secondary analysis. *PLOS Global Public Health.* 2023 May 22;3(5): e0001285. DOI: <https://doi.org/10.1371/journal.pgph.0001285>
15. Belayneh W, Kassaye Z, Arusi T, Abera N, Hantalo A, Melkamu B, et al. Prevalence of dysmenorrhea and associated factors and its effect on daily academic activities among female undergraduate students of Hawassa University College of Medicine and Health Sciences, Hawassa, Ethiopia. *Frontiers in reproductive health.* 2023 Dec 15; 5:1244540.

DOI:

<https://doi.org/10.3389/FRPH.2023.1244540>

16. Kagia A, Kagia A, Gichuhi JW, Karanja J. PREVALENCE OF PAIN SYMPTOMS SUGGESTIVE OF ENDOMETRIOSIS AMONG ADOLESCENTS IN KENYA. *East African Medical Journal*. 2018;95(8):1818-1826. DOI: <https://doi.org/10.4314/eamj.v95i8>

17. Ahmed SK. How to choose a sampling technique and determine sample size for research: A simplified guide for researchers. *Oral Oncology Reports* [Internet]. 2024 Dec 1; 12:100662. DOI: <https://doi.org/10.1016/J.OOR.2024.100662>

18. Azagew AW, Kassie DG, Walle TA. Prevalence of primary dysmenorrhea, its intensity, impact and associated factors among female students' at Gondar town preparatory school, Northwest Ethiopia. *BMC Women's Health*. 2020 Jan 6;20(1):5. DOI: <https://doi.org/10.1186/s12905-019-0873-4>

19. Nakame RM, Kiwanuka F, Robert A. Dysmenorrhoea among students aged 18–45 years attending University in Uganda: A cross-sectional multicenter study of three Universities in Uganda. *Nurs Open*. 2019 Apr;6(2):268–75. DOI: <https://doi.org/10.1002/nop2.207>

20. Fernández-Martínez E, Pérez-Corrales J, Palacios-Ceña D, Abreu-Sánchez A, Iglesias-López MT, Carrasco-Garrido P, et al. Pain management and coping strategies for primary dysmenorrhea: A qualitative study among female nursing students. *Nurs Open*. 2022 Jan 1;9(1):637–45. DOI: <https://doi.org/10.1002/nop2.1111>

21. Odongo E, Byamugisha J, Ajeani J, Mukisa J. Prevalence and effects of menstrual disorders on quality of life of female undergraduate students in Makerere

University College of health sciences, a cross sectional survey. *BMC Women's Health*. 2023 Mar 30;23(1):152. DOI: <https://doi.org/10.1186/s12905-023-02290-7>

22. Esan DT, Ariyo SA, Akinlolu EF, Akingbade O, Olabisi OI, Olawade DB, et al. Prevalence of dysmenorrhea and its effect on the quality of life of female undergraduate students in Nigeria. *Journal of Endometriosis and Uterine Disorders*. 2024 Mar 1;5. DOI: <https://doi.org/10.1016/J.JEUD.2024.100059>

23. de Sanctis V, Soliman AT, Daar S, Di Maio S, Elalaily R, Fiscina B, et al. Prevalence, attitude and practice of self-medication among adolescents and the paradigm of dysmenorrhea self-care management in different countries. *Acta Biomed*. 2020; 91(1):182–92. DOI: <https://doi.org/10.1016/J.JEUD.2024.100059>

24. Sima RM, Sulea M, Radosa JC, Findekle S, Hamoud BH, Popescu M, et al. The Prevalence, Management and Impact of Dysmenorrhea on Medical Students' Lives-A Multicenter Study. *Healthcare*. 2022 Jan 1;10(1):157. DOI: <https://doi.org/10.3390/healthcare10010157>

25. Getahun SB, Berhe S, Mekonnen B, Melaku G. Reasons for Not Seeking Healthcare Among Students with Dysmenorrhea: A Qualitative Study. *Int J Women's Health*. 2023;15:1733–44. DOI: <https://doi.org/10.2147/IJWH.S437233>

26. Armour M, Parry K, Manohar N, Holmes K, Ferfolja T, Curry C, et al. The Prevalence and Academic Impact of Dysmenorrhea in 21,573 Young Women: A Systematic Review and Meta-Analysis. *J Women's Health (Larchmt)* [Internet]. 2019 Aug 1; 28(8):1161–71. DOI: <https://doi.org/10.1089/JWH.2018.7615>

27. Francavilla R, Petraroli M, Messina G, Stanyevic B, Bellani AM, Esposito SMR, et al. Dysmenorrhea: Epidemiology, Causes and Current State of the Art for Treatment. Vol. 50, Clinical and Experimental Obstetrics and Gynecology. IMR Press Limited; 2023. DOI: <https://doi.org/10.31083/j.ceog5012274>

28. Gupta J, Cardoso L, Kanselaar S, Scolese AM, Hamidaddin A, Pollack AZ, et al. Life Disruptions, Symptoms Suggestive of Endometriosis, and Anticipated Stigma Among College Students in the United States. *Women's Health Reports*. 2021 Dec 1;2(1):633–42. DOI: <https://doi.org/10.1089/whr.2021.0072>

29. Cherenack EM, Rubli J, Melara A, Ezaldein N, King A, Alcaide ML, et al. Adolescent girls' descriptions of dysmenorrhea and barriers to dysmenorrhea management in Moshi, Tanzania: A qualitative study. *PLOS Global Public Health*. 2023 Jul 6;3(7):e0001544. DOI: <https://doi.org/10.1371/journal.pgph.0001544>

30. Hennegan J, Caruso BA, Zulaika G, Torondel B, Haver J, Phillips-Howard PA, et al. Indicators for National and Global Monitoring of Girls' Menstrual Health and Hygiene: Development of a Priority Shortlist. *Journal of Adolescent Health*. 2023 Dec 1;73(6):992–1001. DOI: <https://doi.org/10.1016/j.jadohealth.2023.07.017>