

## Prevalence of Primary Dysmenorrhea and Its Associated Risk Factors among Adolescent Girls in Selected Schools of Lusaka District, Zambia

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### ABSTRACT

**Background:** Dysmenorrhea is a common gynecological issue among young females. However, no studies in Zambia have examined the prevalence and associated factors of primary dysmenorrhea among adolescent girls. This study aimed to determine the prevalence and associated factors of primary dysmenorrhea among adolescents in selected schools in the Lusaka District.

**Methods:** A cross-sectional study was conducted in eight randomly selected schools in Lusaka, including 400 post-menarche girls aged 10–19 years. Participants were selected via random sampling, and data were collected using a researcher-designed questionnaire informed by literature. The tool included closed-ended and Likert scale questions, piloted for reliability (Cronbach's alpha: 0.8–0.9). Analysis was performed using STATA version 14.2, with variables having  $p < 0.05$  in multivariate logistic regression considered statistically significant.

**Results:** All 400 participants responded (response rate: 100%). The prevalence of primary dysmenorrhea was 78% (312/400; 95% CI: 73.6%–82.0%). Major risk factors included a positive family history ( $p < 0.001$ ) and symptoms like breast tenderness ( $p = 0.008$ ), diarrhea ( $p < 0.001$ ), headache ( $p = 0.002$ ), and nausea ( $p = 0.015$ ). Menstrual cycles lasting 31–35 days ( $p = 0.034$ ) and moderate menstrual flow ( $p = 0.011$ ) were also significant.

**Conclusion:** Primary dysmenorrhea is highly prevalent among adolescents in Lusaka. Determinants included family history, long cycles, moderate flow intensity, and menstrual discomfort.

**Keywords:** Prevalence, Painful menstruation, Adolescent, Risk factors, Menstruation

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### Introduction

Over 80% of young women experience dysmenorrhea, making it the most prevalent gynecological disorder worldwide (1). This reality underscores the urgent need to address and understand dysmenorrhea's impact on adolescent's lives. According to Midilli et al (2) and Omidvar et al (3), it is important to understand this condition. Primary dysmenorrhea refers to the cramping pain experienced in the lower abdomen before or during menstruation, occurring without any underlying pelvic pathology (4). This condition often begins around or shortly after menarche (within 6 to 12 months), when ovulatory cycles are established (5) and the pain usually coincides with the onset of menstrual bleeding and lasts from 48 to 72 hours (6).

Primary dysmenorrhea can be severe enough to cause significant disruptions in daily life, particularly among adolescent girls, leading to considerable effects on their quality of life, school performance, and increased health care utilization (7). Although the exact cause of primary dysmenorrhea is not fully understood, common risk factors include a family history of dysmenorrhea, heavier menstrual bleeding, abnormal menstrual length, and menstrual cycle irregularity (8).

The condition can negatively impact daily activities, often leading to school absenteeism, social withdrawal, lower academic performance, and an increased healthcare cost (Akiyama et al, 9). Failure to address Primary Dysmenorrhea can result in significant social and financial burdens, affecting not only individuals and families but also communities and societies on a larger scale.

Globally, the prevalence of Primary Dysmenorrhea is estimated to be around 50% to 90% and this wide range reflects the diversity in reporting and methodology across studies conducted in different countries and regions (7). For instance, in a study conducted in Iran, the prevalence was around 82.9% among university students (10). In Sweden, the prevalence of Primary Dysmenorrhea among young women aged 15-2 was reported to be 61% (11). In Africa, the

prevalence of Primary Dysmenorrhea has been reported as high as 92.96% in Egypt (12).

Numerous factors have been identified as associated with Primary Dysmenorrhea and this sheds more light on the complex relationship of biological, psychological, and socio-environmental influences. A study by Azagew et al (13) revealed that factors such as stress and anxiety had been shown to exacerbate menstrual pain. In addition, low socioeconomic status, poor dietary habits, and inadequate access to healthcare have also been recorded to show an association with primary dysmenorrhea (14). Other influencers recorded are positive family history, menstrual cycle length, and intensity (Ibid).

A significant knowledge gap exists regarding the prevalence of Primary Dysmenorrhea and associated factors in Zambia. There has been a study by MK (15) on Dysmenorrhea's Initial management system by Indian and Zambian students at ITM University, the study focused on comparing the initial management systems of dysmenorrhea between Indian and Zambian students at ITM University. The study however does not provide comprehensive epidemiological data on the prevalence of Primary Dysmenorrhea among Zambian adolescents or explore the various factors associated with Primary Dysmenorrhea.

Therefore, understanding the full range of Primary Dysmenorrhea among adolescent girls is a crucial point in developing appropriate management and preventive strategies as this will help in informing healthcare policies, developing targeted interventions, and improving the quality of life of adolescents in Zambia. Hence, this study was aimed to determine the prevalence of Primary Dysmenorrhea and identify associated factors among adolescent girls in 8 selected schools of Lusaka District, Zambia.

### Methods

This was a cross-sectional study design was conducted among adolescent girls aged 10 to 19 years old. This study was conducted in 8 selected schools of Lusaka District in Lusaka District,

Zambia. The 8 schools comprised both private and public schools from the urban and peri-urban settlement areas of Lusaka. The study was conducted between June 2023 and August 2023.

To ensure a minimum power of 80%, the sample size was determined based on a 95% confidence level and a 5% absolute precision. Given the absence of data on the prevalence of dysmenorrhea in adolescent girls in Zambia, the prevalence rate of 42.9% among urban Zimbabwean adolescent girls in 2019 (UNICEF, 2019) was utilized. This calculation yielded a desired sample size of 376. However, the study enrolled 400 participants.

#### ***Inclusion Criteria***

- i. Adolescent girls who had reached menarche after 2018
- ii. Adolescent girls aged between 10 to 19 years
- iii. Adolescent girls who have agreed to participate.
- iv. Ability to speak and understand English

#### ***Exclusion Criteria***

- i. Adolescent girls who have not experienced menarche and/or experienced menarche before 2018
- ii. Adolescent girls who are not willing to participate
- iii Adolescent girls who do not speak and read English

#### ***Sample size determination and sampling procedure***

The study employed a combination of purposive and simple random sampling techniques to select both schools and respondents. Using a random number generator, a subset of schools (8) was randomly selected from the sampling frame. Within selected schools, all eligible adolescent girls had an equal chance of being included in the study through random selection from each grade which had adolescent girls meeting the eligibility criteria. To ensure a fair representation of the targeted population, a simple random sampling procedure was used to select the respondents who would constitute the sample. The schools were categorized into two; Primary and Secondary schools. Purposive sampling was utilized to

identify and select adolescent girls who met the study's eligibility criteria. Therefore, adolescent girls meeting the eligibility criteria were purposively samples, and within this group, all had an equal chance of being included in the study through random selection.

#### ***Data collection***

The data collection tool was a researcher-designed questionnaire developed through a review of relevant literature on primary dysmenorrhea. The questionnaire consisted of 30 questions across four sections: demographic characteristics, menstrual history, primary dysmenorrhea symptoms, and associated factors. A pre-test was conducted with a sample of adolescent girls (n = 10) from the Chibombo District to assess the clarity, relevance, and comprehensibility of the questions. Based on feedback, necessary adjustments were made to improve question-wording and overall clarity. To ensure reliability, internal consistency was assessed, resulting in a Cronbach's alpha of  $0.8 \leq \alpha < 0.9$  indicating good reliability. Content validity was confirmed through expert review to ensure that the questionnaire adequately captured the relevant aspects of primary dysmenorrhea and its associated factors.

Two trained research assistants with experience in fieldwork were responsible for data collection within the selected schools.

#### ***Dependent and independent variables***

The primary focus of this study centered on Primary Dysmenorrhea, categorized into two groups: yes (coded as "1"), and no (coded as "0"). Following an extensive literature review, we meticulously controlled for a wide array of variables such as Age (10 to 19 years), age at menarche (10 to 11 years "early menarche", 12 to 14 years "typical menarche" and 15 to 16 years "late menarche"), duration of period (1 to 5 days and 6 to 10 days), length of the menstrual cycle (16 to 20 days, 21 to 25 days, 26 to 30 days, 31 to 40 days and irregular), discomfort during menstruation (Breast tenderness, Diarrhea, Headache, anxiety, fatigue, nausea and skin problems and others"), family history (Yes and no)

among others.

### **Analysis**

Analysis of data was done using STATA version 18 SE (StataCorp, College Station, TX, USA). Descriptive statistics such as frequencies and percentages were used to summarize categorical variables.

The prevalence of Primary Dysmenorrhea was calculated by taking the number of adolescents who reported having Primary Dysmenorrhea and dividing it by the total number of participants. This prevalence was then presented as a percentage with its exact 95% confidence interval. Primary Dysmenorrhea was then compared across socio-demographic and menstrual characteristics of adolescents using the Chi-square and Fisher's exact tests based on the assumptions of each test.

Taking Primary Dysmenorrhea as the outcome variable ("Yes" coded = 1, "Otherwise" coded = 0) adjusted and unadjusted logistic regression models were performed to determine factors associated with dysmenorrhea. At the adjusted level, machine-lead stepwise and investigator-lead stepwise logistic regressions were performed of which the investigator-lead stepwise logistic regressions were settled for as the best-fit model based on the Bayesian Information Criteria (BIC). Standard errors were adjusted for the clustering of adolescents within Schools. All forms of analysis were performed at a 5% significance level.

### **Ethics statement**

This study was approved by the University of Zambia Biomedical Research Ethics Committee (UNZABREC) and the National Health Research Authority (NHRA). Consent was obtained from the participants before undertaking the study. 400 adolescent girls who gave assent and consent were included in the study. Utilizing special codes to

identify participants allowed for the preservation of anonymity and privacy. Participation was voluntary, and no incentives were provided to the respondents. For adolescent girls under the age of Consent (below 18 years old), assent was obtained from their legal guardians or parents. No incentives were offered to respondents, ensuring that their participation was solely by the desire to contribute to scientific knowledge.

## **Results**

### ***Descriptive characteristics of study participants***

Out of the 400 adolescent girls that took part in this study, the majority 68.3% (273/400) were aged 15 to 19 years old, while 31.8% (127/400) were aged 10 to 14 years old. Additionally, 15.8% (63/400) experienced early menarche (ages 10 to 11), 79.3% (317/400) experienced typical menarche (ages 12 to 14), and only 5% (20/400) had late menarche (ages 15 to 16). The majority of participants 82.5% (330/400) reported menstrual durations of 3 to 5 days, this was followed by 14.2% (57/400) who reported having a menstrual duration of 6 to 8 days. Only 2% (8/400) reported having a menstrual duration of 1 to 2 days and 1.5% (5/400) had a menstrual duration of more than 8 days. The majority of the adolescents 81.3% (325/400) had access to menstrual materials. Approximately a quarter 26% (104/400) reported menstrual cycle lengths of 26 to 30 days and were followed by 22.5% (90/400) who reported menstrual cycles of 31 to 35 days. More than half 57.5% (230/400) of the girls reported moderate menstrual intensity of menstrual flow. During menstruation, breast tenderness was prevalent among 30.8% (123/400) of participants, while anxiety was reported by a minority at 6.8% (27/400). Furthermore, 63.5% (254/400) had a history of primary dysmenorrhea (Table 1).

**Table 1.** Descriptive statistics of social-demographic and menstrual characteristics of study participants

| Characteristic                              | Frequency<br>N = 400 | Percentage<br>(%) |
|---|----------------------|-------------------|
| <b>Age group</b>                            |                      |                   |
| 10-14 years                                 | 127                  | 31.8              |
| 15-19 years                                 | 273                  | 68.3              |
| <b>Live with</b>                            |                      |                   |
| Father and Siblings                         | 8                    | 2                 |
| Mother and Siblings                         | 72                   | 18                |
| Parents and Siblings                        | 207                  | 51.7              |
| Parents, Siblings, and Extended Family      | 57                   | 14.2              |
| With other family                           | 56                   | 14                |
| <b>Age at menarche</b>                      |                      |                   |
| 10-11 (Early menarche)                      | 63                   | 15.8              |
| 12-14 (typical menarche)                    | 317                  | 79.3              |
| 15-16 years (late menarche)                 | 20                   | 5                 |
| <b>Duration of menses</b>                   |                      |                   |
| 1-2 days                                    | 8                    | 2                 |
| 3-5 days                                    | 330                  | 82.5              |
| 6-8 days                                    | 57                   | 14.2              |
| >8 days                                     | 5                    | 1.3               |
| <b>Menstrual Materials</b>                  |                      |                   |
| Cloths (Traditional Chitenge Material)      | 44                   | 11                |
| Cotton wool                                 | 3                    | 0.8               |
| Diapers                                     | 2                    | 0.5               |
| Pads  | 351                  | 87.8              |
| <b>Access to menstrual materials</b>        |                      |                   |
| No  | 75                   | 18.8              |
| Yes   | 325                  | 81.3              |
| <b>Affordability of Menstrual Materials</b> |                      |                   |
| No  | 213                  | 53.3              |
| Yes   | 187                  | 46.8              |
| <b>Menstrual cycle length</b>               |                      |                   |
| 16-20 Days                                  | 76                   | 19                |
| 21-25 Days                                  | 79                   | 19.8              |
| 26-30 Days                                  | 104                  | 26                |
| 31-35 Days                                  | 90                   | 22.5              |
| 36-40 Days                                  | 5                    | 1.3               |
| Irregular                                   | 46                   | 11.5              |
| <b>Menstrual flow intensity</b>             |                      |                   |
| Light                                       | 81                   | 20.3              |
| Moderate                                    | 230                  | 57.5              |
| Heavy                                       | 89                   | 22.3              |
| <b>Product change frequency</b>             |                      |                   |
| 1-3 times                                   | 329                  | 82.3              |
| 4-6 times                                   | 70                   | 17.5              |
| 7-9 times                                   | 1                    | 0.3               |
| <b>Education about menstruation</b>         |                      |                   |
| No  | 44                   | 11                |
| Yes   | 356                  | 89                |
| <b>A person who gave the information</b>    |                      |                   |
| Aunty                                       | 33                   | 8.5               |
| Grandmother                                 | 83                   | 20.8              |
| Mother                                      | 165                  | 41.5              |
| Sister                                      | 30                   | 7.5               |
| Teacher                                     | 49                   | 12.5              |
| Missing                                     | 40                   | 10                |

| Characteristic  | Frequency<br>N = 400 | Percentage<br>(%) |
|---|----------------------|-------------------|
| <b>The most prominent Discomforts during menstruation</b> |                      |                   |
| Anxiety   | 27                   | 6.8               |
| Breast Tenderness   | 123                  | 30.8              |
| Diarrhea  | 67                   | 16.8              |
| Fatigue   | 30                   | 7.5               |
| Headache  | 66                   | 16.5              |
| Nausea  | 39                   | 9.8               |
| Skin Problems   | 37                   | 9.3               |
| Other   | 11                   | 2.8               |
| <b>Family history of Dysmenorrhea</b>                     |                      |                   |
| No  | 65                   | 16.3              |
| Yes   | 254                  | 63.5              |
| Missing   | 81                   | 20.5              |

*n* Sample, % Percentage

**Prevalence of primary dysmenorrhea**

The prevalence of Primary Dysmenorrhea among adolescent girls aged 10 to 19 years old was 78% (312/400) with a 95% CI of 73.6%, 82.0%.

**Primary dysmenorrhea against socio-demographic and menstrual characteristics among adolescents**

Bivariate analysis reviewed that, a significant majority 82.1% (224/273) of adolescents reporting Primary Dysmenorrhea fell within the 15 to 19 age group (P = 0.004). Notably, all adolescents experiencing late menarche also reported Primary Dysmenorrhea 100% (20/20), and this was statistically significant (P = 0.001). Additionally, the majority of participants with moderate menstrual flow intensity had Primary Dysmenorrhea 82.2% (189/230) while 78.7% (70/89) of those with heavy menstrual flow had

Primary Dysmenorrhea. These findings were also statistically significant (P = 0.007). Moreover, 74.0% (77/104) of adolescents with Primary Dysmenorrhea had menstrual cycles lasting 26 to 30 days, while 84.4% (76/90) of those with cycles lasting 31 to 35 days also reported Primary Dysmenorrhea, a statistically significant association (P = 0.055). Breast tenderness was prevalent among 85.4% (105/100) of adolescents with Primary Dysmenorrhea with a significant correlation between discomforts during menstruation and Primary Dysmenorrhea status (P < 0.001). Lastly, a family history of Primary Dysmenorrhea was significantly associated with experiencing Primary Dysmenorrhea, at 87% (221/254). These findings were statistically significant (P < 0.001). (Table 2)

**Table 2.** Bivariate analysis of Primary Dysmenorrhea against social-demographic and menstrual characteristics of study participants

| Characteristics           | Total<br>N (%) | Dysmenorrhea |              | P value             |
|---------------------------|----------------|--------------|--------------|---------------------|
|                           |                | No<br>N (%)  | Yes<br>N (%) |                     |
| <b>Overall prevalence</b> | 400            | 88 (12.0%)   | 312 (78.0%)  |                     |
| <b>Age group</b>          |                |              |              |                     |
| 10-14 years               | 127 (100)      | 39 (30.7)    | 88 (69.3)    | 0.004 <sup>C*</sup> |
| 15-19 years               | 273 (100)      | 49 (17.9)    | 224 (82.1)   |                     |
| <b>Live with</b>          |                |              |              |                     |
| Father and Siblings       | 8 (100)        | 3 (37.5)     | 5 (62.5)     | 0.779 <sup>E</sup>  |
| Mother and Siblings       | 72 (100)       | 17 (23.6)    | 55 (76.4)    |                     |
| Parents and Siblings      | 207 (100)      | 46 (22.2)    | 161 (77.8)   |                     |

| Characteristics                             | Total<br>N (%) | Dysmenorrhea |              | P value             |
|---|----------------|--------------|--------------|---------------------|
|   |                | No<br>N (%)  | Yes<br>N (%) |                     |
| Parents, Siblings, and Extended Family      | 57 (100)       | 11 (19.3)    | 46 (80.7)    |                     |
| With other family                           | 56 (100)       | 11 (19.6)    | 45 (80.4)    |                     |
| <b>Age at menarche</b>                      |                |              |              |                     |
| 10-11 (Early menarche)                      | 63 (100)       | 20 (31.7)    | 43 (68.3)    | 0.005 <sup>E*</sup> |
| 12-14 (typical menarche)                    | 317 (100)      | 68 (21.5)    | 249 (78.5)   |                     |
| 15-16 years (late menarche)                 | 20 (100)       | 0 (0.0)      | 20 (100.0)   |                     |
| <b>Duration of menses</b>                   |                |              |              |                     |
| 1-2 days                                    | 8 (100)        | 2 (25.0)     | 6 (75.0)     | 0.224 <sup>E</sup>  |
| 3-5 days                                    | 330 (100)      | 71 (21.5)    | 259 (78.5)   |                     |
| 6-8 days                                    | 57 (100)       | 12 (21.1)    | 45 (78.9)    |                     |
| > 8 days                                    | 5 (100)        | 3 (60.0)     | 2 (40.0)     |                     |
| <b>Menstrual Materials</b>                  |                |              |              |                     |
| Cloths (Traditional Chitenge Material)      | 44 (100)       | 7 (15.9)     | 37 (84.1)    | 0.673 <sup>E</sup>  |
| Cotton wool                                 | 3 (100)        | 0 (0.0)      | 3 (100.0)    |                     |
| Diapers                                     | 2 (100)        | 0 (0.0)      | 2 (100.0)    |                     |
| Pads  | 351 (100)      | 81 (23.1)    | 270 (76.9)   |                     |
| <b>Access to menstrual materials</b>        |                |              |              |                     |
| No  | 75 (100)       | 14 (18.7)    | 61 (81.3)    | 0.439 <sup>C</sup>  |
| Yes   | 325 (100)      | 76 (22.8)    | 251 (77.2)   |                     |
| <b>Affordability of Menstrual Materials</b> |                |              |              |                     |
| No  | 213 (100)      | 46 (21.6)    | 167 (78.4)   | 0.835 <sup>C</sup>  |
| Yes   | 187 (100)      | 42 (22.5)    | 145 (77.5)   |                     |
| <b>Menstrual cycle length</b>               |                |              |              |                     |
| 16-20 Days                                  | 76 (100)       | 24 (31.6)    | 52 (68.4)    | 0.055 <sup>E*</sup> |
| 21-25 Days                                  | 79 (100)       | 12 (15.2)    | 67 (84.8)    |                     |
| 26-30 Days                                  | 104 (100)      | 27 (26.0)    | 77 (74.0)    |                     |
| 31-35 Days                                  | 90 (100)       | 14 (15.6)    | 76 (84.4)    |                     |
| 36-40 Days                                  | 5 (100)        | 0 (0.0)      | 5 (100.0)    |                     |
| Irregular                                   | 46 (100)       | 11 (23.9)    | 35 (76.1)    |                     |
| <b>Menstrual flow intensity</b>             |                |              |              |                     |
| Light                                       | 81 (100)       | 28 (34.6)    | 53 (65.4)    | 0.007 <sup>C*</sup> |
| Moderate                                    | 230 (100)      | 41 (17.8)    | 189 (82.2)   |                     |
| Heavy                                       | 89 (100)       | 19 (21.3)    | 70 (78.7)    |                     |
| <b>Product change frequency</b>             |                |              |              |                     |
| 1-3 times                                   | 329 (100)      | 69 (21.0)    | 260 (79.0)   | 0.429 <sup>E</sup>  |
| 4-6 times                                   | 70 (100)       | 19 (27.1)    | 51 (72.9)    |                     |
| 7-9 times                                   | 1 (100)        | 0 (0.0)      | 1 (100.0)    |                     |
| <b>Education about menstruation</b>         |                |              |              |                     |
| No  | 44 (100)       | 9 (20.5)     | 35 (79.5)    | 0.793 <sup>C</sup>  |
| Yes   | 356 (100)      | 79 (22.2)    | 277 (77.8)   |                     |
| <b>A person who gave the information</b>    |                |              |              |                     |
| Aunty                                       | 33 (100)       | 6 (18.2)     | 27 (81.8)    | 0.840 <sup>C</sup>  |
| Grandmother                                 | 83 (100)       | 19 (22.9)    | 64 (77.1)    |                     |
| Mother                                      | 165 (100)      | 36 (21.8)    | 129 (78.2)   |                     |
| Sister                                      | 30 (100)       | 7 (23.3)     | 23 (76.7)    |                     |
| Teacher                                     | 49 (100)       | 14 (28.6)    | 35 (71.4)    |                     |
| Missing                                     | 40 (100)       | 6 (15)       | 34 (95)      |                     |
| <b>Discomforts during menstruation</b>      |                |              |              |                     |
| Anxiety                                     | 27 (100)       | 10 (37.0)    | 17 (63.0)    | <0.001 <sup>C</sup> |
| Breast Tenderness                           | 123 (100)      | 18 (14.6)    | 105 (85.4)   |                     |
| Diarrhea                                    | 67 (100)       | 10 (14.9)    | 57 (85.1)    |                     |
| Fatigue                                     | 30 (100)       | 4 (13.3)     | 26 (86.7)    |                     |
| Headache                                    | 66 (100)       | 16 (24.2)    | 50 (75.8)    |                     |
| Nausea                                      | 39 (100)       | 2 (5.1)      | 37 (94.9)    |                     |
| Skin Problems                               | 37 (100)       | 19 (51.4)    | 18 (48.6)    |                     |

| Characteristics                       | Total<br>N (%) | Dysmenorrhea |              | P value  |
|---------------------------------------|----------------|--------------|--------------|----------|
|                                       |                | No<br>N (%)  | Yes<br>N (%) |          |
| Other                                 | 11 (100)       | 9 (81.8)     | 2 (18.2)     |          |
| <b>Family history of dysmenorrhea</b> |                |              |              |          |
| No                                    | 65 (100)       | 26 (40.0)    | 39 (60.0)    | < 0.001C |
| Yes                                   | 254 (100)      | 33 (13.0)    | 221 (87.0)   |          |
| Missing                               | 81 (100)       | 29 (35.8)    | 52 (64.2)    |          |

C = Chi-square; E = Fishers' exact; n Sample; % Percentage, \* Statistically significant at 5% significance level

### **Factors associated with primary dysmenorrhea among adolescent aged 10 to 19 years old**

The study utilized Investigator stepwise logistic regression to examine predictors of Primary Dysmenorrhea among adolescents aged 10 to 19 in 8 selected schools of the Lusaka district. Univariate analysis identified significant associations between Primary Dysmenorrhea and factors such as age, length of menstrual cycle, menstrual flow intensity, discomforts during menstruation, and family history of dysmenorrhea ( $P < 0.05$ ). In multivariable logistic regression, significant associations between various factors and Primary Dysmenorrhea occurrence were found. Adolescent girls with menstrual cycles lasting 31 to 35 days had a significantly increased likelihood of experiencing Primary Dysmenorrhea (AOR, 3.45; 95% CI, 1.10, 10.96;  $P = 0.034$ ). In addition, Adolescent girls with a moderate flow intensity during their

menstruation showed high odds of experiencing Primary Dysmenorrhea (AOR, 3.64; 95% CI, 1.35, 9.80;  $P = 0.011$ ). Furthermore, other discomforts during menstruation, such as Breast tenderness (AOR, 4.73; 95% CI, 1.50, 14.90;  $P = < 0.008$ ), Diarrhea (AOR, 11.26; 95% CI, 3.0, 42.38;  $P = < 0.001$ ), Headache (AOR, 12.41; 95% CI, 2.44, 63.23;  $P = < 0.002$ ) and Nausea (AOR, 9.33; 95% CI, 1.55, 56.04;  $P = < 0.015$ ) showed an increase of likelihood of girls experiencing Primary Dysmenorrhea. Family history of Primary Dysmenorrhea emerged as a significant predictor, with adolescents having such a history exhibiting increased odds of Primary Dysmenorrhea (AOR, 9.94; 95% CI, 4.18, 23.78;  $P = < 0.001$ ). Notably, factors like age, age at menarche, and duration of menses did not predict Primary Dysmenorrhea in the adjusted model. (Table 3).

**Table 3.** Factors associated with Primary Dysmenorrhea in adolescent girls aged 10 to 19 years of age

| Characteristics                        | Unadjusted         |         | Adjusted          |         |
|--|--------------------|---------|-------------------|---------|
|  | OR (95% CI)        | P value | OR (95% CI)       | P value |
| <b>Age group</b>                       |                    |         |                   |         |
| 10-14 years                            | Ref                | -       | Ref               | -       |
| 15-19 years                            | 2.03 (1.24, 3.30)  | 0.005*  | 0.47 (0.20, 1.10) | 0.081   |
| <b>Live with</b>                       |                    |         |                   |         |
| Father and Siblings                    | Ref                | -       | Ref               | -       |
| Mother and Siblings                    | 1.94 (0.42, 8.98)  | 0.396   |                   |         |
| Parents and Siblings                   | 2.10 (0.48, 9.12)  | 0.322   |                   |         |
| Parents, Siblings, and Extended Family | 2.51 (0.52, 12.12) | 0.252   |                   |         |
| With other family                      | 2.45 (0.51, 11.87) | 0.264   |                   |         |
| <b>Age at menarche</b>                 |                    |         |                   |         |
| 10-11 (Early menarche)                 | Ref                | -       | Ref               | -       |
| 12-14 (typical menarche)               | 1.70 (0.94, 3.09)  | 0.079   | 0.71 (0.25, 2.02) | 0.517   |
| 15-16 years (late menarche)            | -                  | -       |                   |         |
| <b>Duration of menses</b>              |                    |         |                   |         |
| 1-2 days                               | Ref                | -       |                   |         |
| 3-5 days                               | 1.22 (0.24, 6.15)  | 0.813   |                   |         |



| Characteristics                        | Unadjusted          |          | Adjusted            |          |
|--|---------------------|----------|---------------------|----------|
|  | OR (95% CI)         | P value  | OR (95% CI)         | P value  |
| 6-8 days                               | 1.25 (0.22, 6.99)   | 0.800    |                     |          |
| >8 days                                | 0.22 (0.02, 2.45)   | 0.219    |                     |          |
| <b>Menstrual cycle length</b>          |                     |          |                     |          |
| 16-20 Days                             | Ref                 | -        | Ref                 | -        |
| 21-25 Days                             | 2.58 (1.18, 5.63)   | 0.018*   | 3.14 (0.90, 11.0)   | 0.073    |
| 26-30 Days                             | 1.32 (0.69, 2.53)   | 0.409    | 1.36 (0.53, 3.49)   | 0.526    |
| 31-35 days                             | 2.50 (1.19, 5.29)   | 0.016*   | 3.47 (1.10, 10.96)  | 0.034*   |
| 36-40 Days                             |                     |          |                     |          |
| Irregular                              | 1.47 (0.64, 3.38)   | 0.366    | 1.42 (0.25, 8.16)   | 0.693    |
| <b>Menstrual flow intensity</b>        |                     |          |                     |          |
| Light                                  | Ref                 | -        | Ref                 | -        |
| Moderate                               | 2.44 (1.38, 4.30)   | 0.002*   | 3.64 (1.35, 9.80)   | 0.011*   |
| Heavy                                  | 1.95 (0.98, 3.85)   | 0.056*   | 1.57 (0.54, 4.59)   | 0.406    |
| <b>Education about menstruation</b>    |                     |          |                     |          |
| No                                     | Ref                 | -        |                     |          |
| Yes                                    | 0.90 (0.42, 1.96)   | 0.260    |                     |          |
| <b>Discomforts during menstruation</b> |                     |          |                     |          |
| Anxiety                                | Ref                 | -        | Ref                 | -        |
| Breast Tenderness                      | 3.43 (1.35, 8.67)   | 0.009*   | 4.73 (1.50, 14.90)  | 0.008*   |
| Diarrhea                               | 3.35 (1.19, 9.39)   | 0.021    | 11.26 (3.0, 42.38)  | <0.001*  |
| Fatigue                                | 3.82 (1.03, 14.18)  | 0.045*   | 2.51 (0.45, 14.03)  | 0.295    |
| Headache                               | 1.84 (0.70, 4.81)   | 0.215    | 12.41 (2.44, 63.23) | 0.002*   |
| Nausea                                 | 10.88 (2.15, 55.16) | 0.004*   | 9.33 (1.55, 56.04)  | 0.015*   |
| Skin Problems                          | 0.56 (0.20, 1.53)   | 0.258    | 0.47 (0.13, 1.74)   | 0.263    |
| Others                                 | 0.13 (0.02, 0.73)   | 0.020*   | 0.45 (0.10, 2.09)   | 0.305    |
| <b>Family history of Dysmenorrhea</b>  |                     |          |                     |          |
| No                                     | Ref                 | -        | Ref                 | -        |
| Yes                                    | 4.46 (2.41, 8.27)   | < 0.001* | 9.97 (4.18, 23.78)  | < 0.001* |

CI confidence interval, OR Odds ratio, % Percentage, Ref Reference, \* Statistically significant at 5% significance level

**Discussion**

This study aimed to explore the prevalence of Primary Dysmenorrhea among adolescent girls in Lusaka District Zambia and examine factors associated with its occurrence.

The prevalence of Primary Dysmenorrhea was found to be 78.0%, aligning with rates reported in similar studies conducted in Morocco with 77.94% (17) and 77.86% in Nigeria (18). It was also comparable with 74.34 in Ghana (19) among adolescent girls in Secondary school in Accra. The substantial prevalence underscored in this study is indicative of a significant public health concern that mirrors the global burden of dysmenorrhea among adolescents (20). The similarities in the prevalence rates of this study compared to those of other studies conducted suggest commonalities in the experiences of adolescent girls regarding menstrual pain. However, the variation in reported rates may stem from differences in the definitions

and criteria used to identify primary dysmenorrhea, as well as individual perceptions and cultural contexts surrounding menstrual pain.

For instance, differences in survey methodologies, such as the inclusion of various severity levels or symptom assessments, can lead to discrepancies in prevalence reporting. Some studies may classify primary dysmenorrhea based on self-reported pain levels, while others might rely on clinical definitions or diagnostic criteria. Additionally, factors such as regional healthcare access, cultural attitudes toward menstruation, and educational background may influence how participants perceive and report their menstrual experiences. Understanding these nuances is essential for interpreting prevalence data accurately and highlights the need for standardized definitions and measurement tools in future research.

The findings of the study reveal intriguing

insights into the relationship between menstrual cycle length and Primary Dysmenorrhea. Notably, it was observed that there were significant associations between specific cycle lengths and Primary Dysmenorrhea. Menstrual cycles lasting 31-35 days exhibited a significantly higher risk of primary dysmenorrhea, with AOR 3.45, 95% CI: 1.10, 10.96  $p = 0.034$ . These findings suggest that longer menstrual cycles may be associated with an increased likelihood of experiencing Primary Dysmenorrhea. This is in line with studies by Omidvar (3) and Hikma (21) both reported a positive association between menstrual cycle length and Primary Dysmenorrhea, with longer cycles being a risk factor. Research has consistently found a link between menstrual cycle length and Primary Dysmenorrhea. However, Kotagasti (22) found that earlier age at menarche and higher parity were the primary factors influencing primary dysmenorrhea, indicating that the relationship between menstrual cycle length and primary dysmenorrhea may be more complex than initially perceived.

The conflicting findings suggest that while menstrual cycle length may be a contributing factor, it interacts with other variables such as age at menarche and individual physiological differences. Moreover, the cross-sectional nature of many studies, including this one, limits the ability to establish causal relationships between menstrual cycle length and primary dysmenorrhea. Future research employing longitudinal designs could provide deeper insights into how changes in menstrual cycle length over time relate to the onset and severity of primary dysmenorrhea.

The results also showed that the relationship between moderate flow intensity of menstruation and Primary Dysmenorrhea is significant (AOR, 3.64; 95% CI, 1.35, 9.80;  $P = 0.011$ ). This is in contrast to a study by Ylikorkala et al (28) which reported that long and heavy menstrual flow is associated with increased severity of primary dysmenorrhea. The discrepancy arises from differences in the populations studied and the methodologies employed. For instance, their study focused on a broader demographic, which includes

varying factors influencing dysmenorrhea severity, such as age, lifestyle, and underlying health conditions. Understanding these differences is crucial, as they highlight the need for further research to clarify the complexities surrounding menstrual flow patterns and their impact on dysmenorrhea severity in different populations.

Among the discomforts examined, Breast tenderness (AOR, 4.73; 95% CI, 1.50, 14.90;  $P = < 0.008$ ), Diarrhea (AOR, 11.26; 95% CI, 3.0, 42.38;  $P = < 0.001$ ), Headache (AOR, 12.41; 95% CI, 2.44, 63.23;  $P = < 0.002$ ) and Nausea (AOR, 9.33; 95% CI, 1.55, 56.04;  $P = < 0.015$ ), emerged as a significant predictor of primary Dysmenorrhea. These results are in line with studies that have reported Primary Dysmenorrhea being accompanied by symptoms such as headache, nausea, diarrhea, and breast tenderness (23, 24). This indicates a significant impact on the quality of life for affected adolescents, leading to absenteeism from school (23). In addition, the substantial increase in risk underscores the importance of recognizing gastrointestinal symptoms as potential indicators of Primary Dysmenorrhea severity. However, while these studies all established associations between various discomforts and Primary Dysmenorrhea, they may not have taken into account any causal relationships. Thus, future research could explore longitudinal designs to investigate the temporal sequence of symptoms and Primary Dysmenorrhea onset.

In this particular study, a positive family history of Primary Dysmenorrhea was a determinant factor of Primary Dysmenorrhea. The study revealed that the adolescents who had a positive family history of Primary Dysmenorrhea were more likely to develop Primary Dysmenorrhea (AOR, 9.94; 95% CI, 4.18, 23.78;  $P = < 0.001$ ). This is supported by several studies that have found a similar significant association between a positive family history and the occurrence of Primary Dysmenorrhea. Shalini (25) and Parveen (26) both found a strong correlation between the two, with Parveen also noting a higher prevalence of dysmenorrhea in those with a positive family history. Omidvar (3)

and Septiyani (27) further support this, with Omidvar identifying family history as a key determining factor and Septiyani finding a significant relationship between the two. These findings suggest that a positive family history is a strong predictor for the occurrence of Primary Dysmenorrhea. However, the studies may not have accounted for all potential confounding variables that could influence the association between family history and Primary Dysmenorrhea. These factors could be genetic predisposition, lifestyle factors and socioeconomic status could confound the relationships observed.

Some of the limitations of this study are that data was collected through self-reporting of Primary Dysmenorrhea symptoms and associated factors and this may be subject to recall bias or social desirability bias. Participants could have over-reported or under-reported their symptoms leading to inaccuracies in prevalence estimates. In addition, the cross-sectional design of the study limited the ability to establish causality. A longitudinal study would provide a better understating of the relationship between Primary Dysmenorrhea and associated factors.

### Conclusion

The high prevalence of primary dysmenorrhea in the Lusaka District underscores the significance of this public health issue, particularly among adolescent girls. Key determinants identified include positive family history, long cycle length, moderate menstrual flow intensity, and discomfort during menstruation. However, this study's findings are limited to only eight schools in the district, and other potential factors influencing primary dysmenorrhea may not have been considered.

Additionally, untreated primary dysmenorrhea can lead to negative outcomes such as social withdrawal, school absenteeism, poor concentration, and decreased academic performance. This study did not explore the

specific impacts of primary dysmenorrhea on academic and psychosocial well-being, indicating a need for further research to better understand these relationships.

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### Conflict of interest

The authors have no conflict of interest to declare.

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### Ethical considerations

Ethical considerations were carefully addressed and implemented in the research study, including obtaining informed consent and assent from participants, ensuring their privacy and confidentiality, and conducting the study according to relevant ethical guidelines and regulations.

### Code of ethics

No. 3601-2023

### Author's contribution

N. E. N, contribution to study conception and design as well as data collection; N. E. N, D. M. N, and S. S. had an equal contribution and were involved in all aspects of data analysis and interpretation; N. E. N, J. M. Z, M. N. M, and C. J, equally contributed to the drafting of the manuscript. All the authors have read and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

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