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Menstrual Hygiene Management and Its Association With School Absenteeism Among Adolescent Girls in Ethiopia: A Cross-Sectional Study

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ABSTRACT

Menstrual hygiene management (MHM) is an essential public health and human rights priority that directly influences adolescent girls' educational attainment, psychosocial well-being, and reproductive health trajectory. In low-resource settings, inadequate school water, sanitation, and hygiene (WASH) infrastructure, persistent cultural taboos, and unaffordable absorbent materials frequently force adolescent girls to miss school during their menses. This institution-based cross-sectional study investigated menstrual hygiene management knowledge, practices, and their independent association with school absenteeism among 638 post-menarche adolescent secondary school girls in the Amhara Region, Northwest Ethiopia. Utilizing a stratified two-stage cluster sampling design, data were collected using pre-tested, self-administered structured questionnaires. The results revealed that only 47.3% of the participants demonstrated good menstrual hygiene practices, and 51.6% possessed adequate comprehensive knowledge regarding menstruation. Approximately 41.5% of the students reported missing school for at least one day per menstrual cycle, with an average absence of 1.8 ± 0.9 days per cycle. Key self-reported drivers of school absenteeism included severe dysmenorrheic pain without analgesic access (68.4%), absence of clean, functional, and lockable school gender-segregated latrines (61.8%), lack of running water and soap (54.2%), and intense fear of accidental menstrual leakage and peer teasing (51.7%). Multivariable logistic regression revealed that adolescent girls with poor MHM practices had nearly four times higher odds of experiencing menstruation-related school absenteeism compared to those with good practices (AOR = 3.92, 95% CI: 2.64–5.82, p < 0.001).

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Furthermore, lack of private, lockable school latrines (AOR = 2.48, 95% CI: 1.62–3.81, p < 0.001), lack of parental discussion regarding menstruation prior to menarche (AOR = 1.94, 95% CI: 1.31–2.87, p = 0.001), and unmanaged dysmenorrhea (AOR = 3.15, 95% CI: 2.11–4.70, p < 0.001) were significant independent determinants of school absenteeism. Ensuring gender-sensitive school WASH facilities, integrating age-appropriate MHM curricula, and providing subsidized sanitary absorbents and pain relief protocols are imperative to reduce educational disparities and support female adolescent development in Ethiopia.

KEYWORDS: *Menstrual Hygiene Management, School Absenteeism, Adolescent Girls, Water Sanitation and Hygiene (WASH), Dysmenorrhea, Menstrual Stigma, Gender Equity, Ethiopia*

INTRODUCTION

Menstruation is a normal biological phenomenon and a vital indicator of female adolescent reproductive maturation [1]. Despite its universality, menstrual hygiene management (MHM) remains one of the most neglected public health, gender equity, and educational challenges across low- and middle-income countries (LMICs), particularly in sub-Saharan Africa [2].

The World Health Organization (WHO) and UNICEF Joint Monitoring Programme define comprehensive MHM as the condition wherein women and adolescent girls use clean menstrual management materials to absorb or collect menstrual blood, which can be changed in privacy as often as necessary for the duration of a menstrual period, using soap and water for washing the body as required, and having access to safe, convenient facilities to dispose of used menstrual management materials [3]. When these foundational requirements are unmet, menstruation transitions from a natural physiological process into a source of severe psychosocial distress, physical discomfort, and educational exclusion [4].

In Ethiopia, adolescent girls constitute a substantial demographic proportion of the school-going population. However, transitioning into puberty is frequently marked by fear, shame, and isolation due to entrenched socio-cultural taboos, pervasive misconceptions, and restrictive gender norms that frame menstruation as dirty, shameful, or polluting [5]. Many

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young girls reach menarche without prior anatomical or physiological knowledge, encountering their first menstrual bleed in absolute panic and distress [6]. This lack of preparatory guidance is exacerbated by poverty and structural deprivations, leaving families unable to afford commercially manufactured disposable sanitary pads [7]. As a result, girls are compelled to rely on unhygienic alternatives such as old rags, pieces of mattress foam, dried leaves, or unsterilized cloth strips, which carry risks of urogenital infections and severe leakage [8].

Within educational institutions, the physical and administrative environment often fails to accommodate the biological needs of menstruating girls. The vast majority of primary and secondary schools in rural and peri-urban Ethiopia lack basic Water, Sanitation, and Hygiene (WASH) infrastructure [9]. Latrines are frequently non-functional, shared between male and female students, devoid of internal door locks, lacking continuous running water, soap, and safe disposal receptacles or incinerators [10]. Confronted with the constant fear of visible blood staining, noxious odors, and peer mockery, millions of adolescent girls choose to remain at home during their menstrual periods [11]. Cumulative school absenteeism not only diminishes academic performance and self-esteem but also dramatically escalates female dropout rates, perpetuating gender disparities in socioeconomic mobility [12]. This cross-sectional study was undertaken to evaluate the status of MHM knowledge and practices and quantify their direct association with school absenteeism among adolescent secondary school girls in the Amhara Region of Ethiopia.

LITERATURE REVIEW

A growing body of international literature underscores the multi-dimensional impact of inadequate MHM on female adolescent health, dignity, and school attendance [13]. Systematic reviews across low-resource settings by Sommer et al. [14] and Hennegan and Montgomery [15] have established that unsupportive school environments are universally linked to negative educational outcomes, including recurrent class absenteeism, reduced classroom concentration, and premature school withdrawal. In a multi-country synthesis across sub-Saharan Africa, an estimated 1 in 10 adolescent girls misses school during her monthly period, amounting to an average loss of 10% to 20% of total academic curriculum time [16].

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In the East African context, several localized studies have illuminated the socio-ecological barriers governing menstrual management. In Kenya and Uganda, studies by Mason et al. [17] and Boosey et al. [18] highlighted that while access to commercial pads provides essential leakage protection, the physical absence of gender-segregated, lockable school latrines with washing facilities remains the primary structural bottleneck to consistent attendance. In Tanzania, qualitative inquiries demonstrated that girls who experience menstrual leaks face severe peer harassment and bullying from male classmates, triggering chronic school avoidance behaviors [19].

Within Ethiopia, empirical investigations have revealed substantial regional variability in MHM practices and absenteeism rates. Studies conducted in Southern Ethiopia by Gultie et al. [20] and in Eastern Ethiopia by Tegegne and Sisay [21] reported that between 45% and 62% of adolescent girls practice poor menstrual hygiene, with school absenteeism rates ranging from 25% to 55%. In Northwest Ethiopia, Belay et al. [22] observed that cultural silence surrounding reproductive health prevents open dialogue between mothers and daughters, leaving girls dependent on uninformed peers for menstrual advice. Furthermore, biomedical symptoms associated with menstruation—most notably primary dysmenorrhea (pelvic cramping), nausea, and headache—are frequently unmanaged in school settings due to the absence of school clinics, emergency analgesic medications, or rest spaces [23, 24]. Despite these foundational findings, comprehensive data that concurrently capture MHM practice metrics, school-level WASH parameters, dysmenorrheic pain severity, and multivariable regression determinants of absenteeism in secondary schools of the Amhara Region remain limited.

RESEARCH GAP

While previous studies in Ethiopia have examined MHM in either purely urban or strictly rural populations, there is a pronounced research gap concerning comparative multi-level analyses that integrate individual knowledge scores, behavioral practices, physical school WASH parameters, and clinical dysmenorrhea management within combined urban and peri-urban secondary school settings. Furthermore, few studies have mathematically quantified the relative contribution of individual MHM practice deficits (e.g., inadequate changing frequency, unhygienic material drying) versus structural school-level deficits (e.g., absence of latrine locks, soap availability) in predicting monthly school absenteeism using rigorous multivariable modeling.

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OBJECTIVES

The primary objective of this cross-sectional study was to assess menstrual hygiene management knowledge and practices and determine their association with school absenteeism among adolescent girls in secondary schools of the Amhara Region, Northwest Ethiopia. The specific objectives were:

- To evaluate the level of comprehensive knowledge regarding the physiology, causes, and management of menstruation among adolescent secondary school girls.
- To determine the proportion of adolescent girls adhering to safe and hygienic menstrual management practices.
- To quantify the prevalence and duration of menstruation-related school absenteeism over the preceding school semester.
- To assess the status of institutional Water, Sanitation, and Hygiene (WASH) infrastructure across the surveyed schools.
- To identify the independent socio-demographic, physical, and behavioral determinants of school absenteeism using multivariable logistic regression analysis.

METHODOLOGY

Study Design and Setting

An institution-based cross-sectional study was conducted from February to June 2025 across selected government secondary schools (Grades 7–12) located in the South Gondar and West Gojjam zones of the Amhara Region, Northwest Ethiopia. The region encompasses both urban centers and peri-urban agricultural settlements, providing a representative socio-economic and demographic cross-section of northern Ethiopian high school environments.

Source Population and Eligibility Criteria

The source population comprised all adolescent female students (aged 12–19 years) enrolled in regular academic programs in the selected secondary schools. The study population consisted of randomly selected adolescent girls who had reached menarche at least six months prior to the date of data collection. Students who had not yet attained menarche, those critically ill during the data collection period, or those who declined to provide assent/consent were excluded.

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Sample Size Determination and Sampling Technique

The sample size was determined using the single population proportion formula:

$$n = (Z^2 \cdot p \cdot q) / d^2$$

Assuming a 50% prevalence (p = 0.50) of safe MHM practices to achieve maximum sample size, a 95% confidence interval (Z = 1.96), and a 5% margin of error (d = 0.05), the initial sample size was calculated as 384. Accounting for a design effect of 1.5 to adjust for multi-stage cluster sampling and adding a 10% contingency for non-response or incomplete questionnaires, the final calculated sample size was 638 adolescent girls.

A stratified two-stage cluster sampling technique was employed. In the first stage, secondary schools were stratified into urban (n = 4) and peri-urban (n = 4) strata, from which six schools were selected via simple random lottery. In the second stage, sections (classrooms) within grades 7 through 12 were randomly selected proportional to the female student enrollment size. In each selected classroom, female students meeting the eligibility criteria were invited to participate following a private screening process facilitated by trained female public health enumerators.

Data Collection Instrument and Measurement

Data were collected using a pre-tested, structured, self-administered questionnaire adapted from WHO, UNICEF, and validated international MHM survey tools [3, 14]. The questionnaire was prepared in English, translated into Amharic, and back-translated to English to verify semantic integrity. The tool captured five domains: (1) socio-demographic and economic characteristics; (2) knowledge of menstruation (10 items); (3) menstrual hygiene practices (10 items); (4) school WASH environmental audit and personal experiences; and (5) menstrual pain (dysmenorrhea), fear of staining, and specific days of school absenteeism during menses over the previous three academic months.

Knowledge was classified as 'Adequate' if a participant scored ≥60% on 10 standardized knowledge questions regarding the biological origin of blood, menstrual cycle regularity, and hygienic requirements. Menstrual hygiene practice was scored across 10 behavioral indicators (use of clean commercial pads/washed reusable pads, changing absorbent ≥3 times daily during peak flow, washing genitals with clean water and soap, and safe disposal methods); scores at or above the mean were categorized as 'Good Practice,' whereas scores

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below the mean were classified as 'Poor Practice.' School absenteeism was defined as missing at least one full school day during the menstrual cycle within the preceding three months due directly to menstrual discomfort, lack of supplies, or embarrassment.

Ethical Clearance and Quality Assurance

Ethical clearance was obtained from the Institutional Review Board (IRB) of Debre Tabor Health Science College (Ref: DTHSC/IRB/2025/112). Administrative permission was secured from the Amhara Regional Health Bureau and Zonal Education Offices. Written informed assent was obtained from participants under 18 years along with parental/guardian consent, while participants aged 18 and 19 provided direct written informed consent. Strict privacy was maintained during data collection by conducting sessions in separate, quiet classrooms without male peers or teachers present.

Data Analysis

Data were checked for completeness, coded, and entered into EpiData Version 4.6 and exported to SPSS Version 28.0 for statistical analysis. Descriptive statistics (frequencies, percentages, means, and standard deviations) were calculated. Bivariate logistic regression was conducted to examine associations between individual independent variables and school absenteeism. Variables with $p < 0.25$ in bivariate analysis were entered into a multivariable logistic regression model. Adjusted Odds Ratios (AOR) with 95% Confidence Intervals (CI) were calculated, and statistical significance was declared at $p < 0.05$.

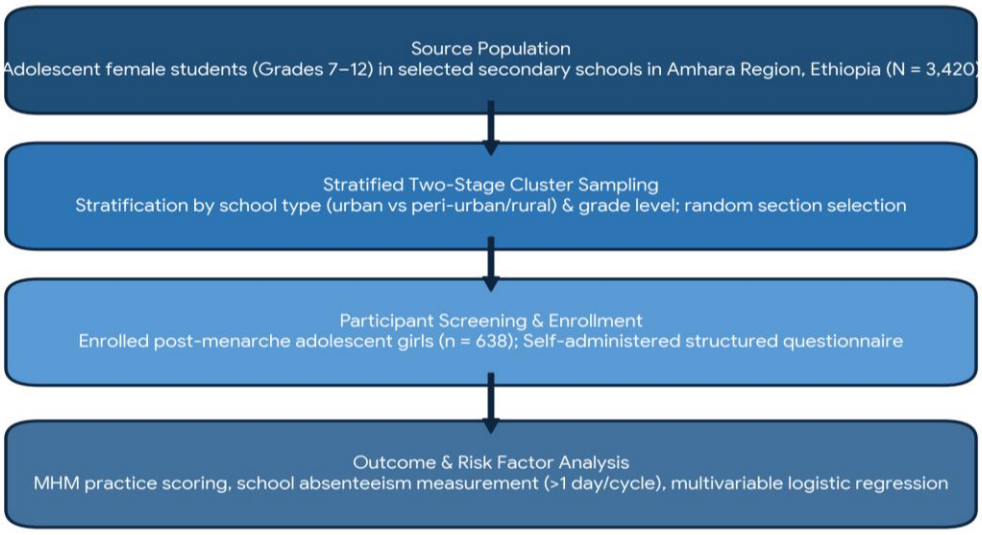

Figure 1: Methodological and Sampling Workflow of the Adolescent MHM Study

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RESULTS AND FINDINGS

Socio-Demographic Characteristics of the Participants

A total of 638 adolescent girls completed the study questionnaire, providing a response rate of 100%. The mean age of the participants was 16.2 ± 1.4 years (range: 13–19 years). The mean age at menarche was 14.1 ± 1.2 years. More than half of the students (54.5%, n = 348) attended urban secondary schools, while 45.5% (n = 290) were enrolled in peri-urban schools. Regarding maternal education, 31.8% (n = 203) of mothers had no formal education, 41.5% (n = 265) completed primary school, and 26.7% (n = 170) achieved secondary education or above.

Table 1 presents the socio-demographic and basic menarche-related characteristics of the respondents.

Table 1: Socio-Demographic Characteristics of Adolescent School Girls (N = 638)

Variable	Frequency (n)	Percentage (%)
Age Category (13–15 years / 16–17 years / 18–19 years)	218 / 294 / 126	34.2% / 46.1% / 19.7%
School Location (Urban / Peri-Urban)	348 / 290	54.5% / 45.5%
Grade Level (Grades 7–8 / Grades 9–10 / Grades 11–12)	184 / 282 / 172	28.8% / 44.2% / 27.0%
Maternal Education (No Formal / Primary / Secondary+)	203 / 265 / 170	31.8% / 41.5% / 26.7%
Living Arrangement (With Both Parents / Single Parent / Relatives/Alone)	398 / 152 / 88	62.4% / 23.8% / 13.8%
Received Information Prior to Menarche (Yes / No)	278 / 360	43.6% / 56.4%
Primary Source of Prior Information (Mother / Sister/Peer / Teacher / Media)	142 / 98 / 24 / 14	22.3% / 15.4% / 3.8% / 2.2%

Knowledge and Practices Regarding Menstrual Hygiene

Overall, 51.6% (n = 329) of the respondents demonstrated adequate comprehensive knowledge regarding menstruation. However, substantial misconceptions persisted: 38.6% believed that menstrual blood was impure or toxic waste, and 29.5% thought that physical exercise during menstruation was dangerous to health. Only 43.6% (n = 278) had received any form of reproductive education before experiencing their first menstrual period.

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In terms of hygiene practices, only 47.3% (n = 302) were classified as having good MHM practices. While 56.4% (n = 360) utilized commercially manufactured disposable sanitary pads, 35.7% (n = 228) relied on reusable cloth rags, and 7.9% (n = 50) used improvised pieces of foam mattress or toilet paper. Among girls using reusable cloths, only 38.2% washed them with clean water and soap and dried them in direct sunlight; the majority dried them indoors in hidden, dark, damp spaces due to shame and fear of being seen by male relatives. Only 39.8% (n = 254) changed their absorbent materials three or more times a day during heavy flow days.

Table 2 outlines the specific menstrual hygiene practices and the observed school WASH environmental conditions.

Table 2: Menstrual Hygiene Practices and School WASH Environment (N = 638)

Practice / Environmental Parameter	Frequency (n)	Percentage (%)
Type of Absorbent Used (Commercial Disposable Pads)	360	56.4%
Type of Absorbent Used (Reusable Cloth / Rags)	228	35.7%
Type of Absorbent Used (Mattress Foam / Paper)	50	7.9%
Frequency of Pad Change (≥3 times/day during peak flow)	254	39.8%
Wash Genitalia with Soap and Water Daily During Menses	312	48.9%
School Has Separate, Lockable Latrines for Girls	244	38.2%
Consistent Water and Soap Available at School Latrine	186	29.2%

Prevalence and Reported Causes of School Absenteeism

Out of 638 participants, 265 adolescent girls (41.5%, 95% CI: 37.7%–45.4%) reported missing school for at least one day per menstrual cycle during the previous three months. The average duration of school absence was 1.8 ± 0.9 days per cycle (range: 1–4 days). Figure 2 displays the primary self-reported barriers contributing to absenteeism among the affected girls.

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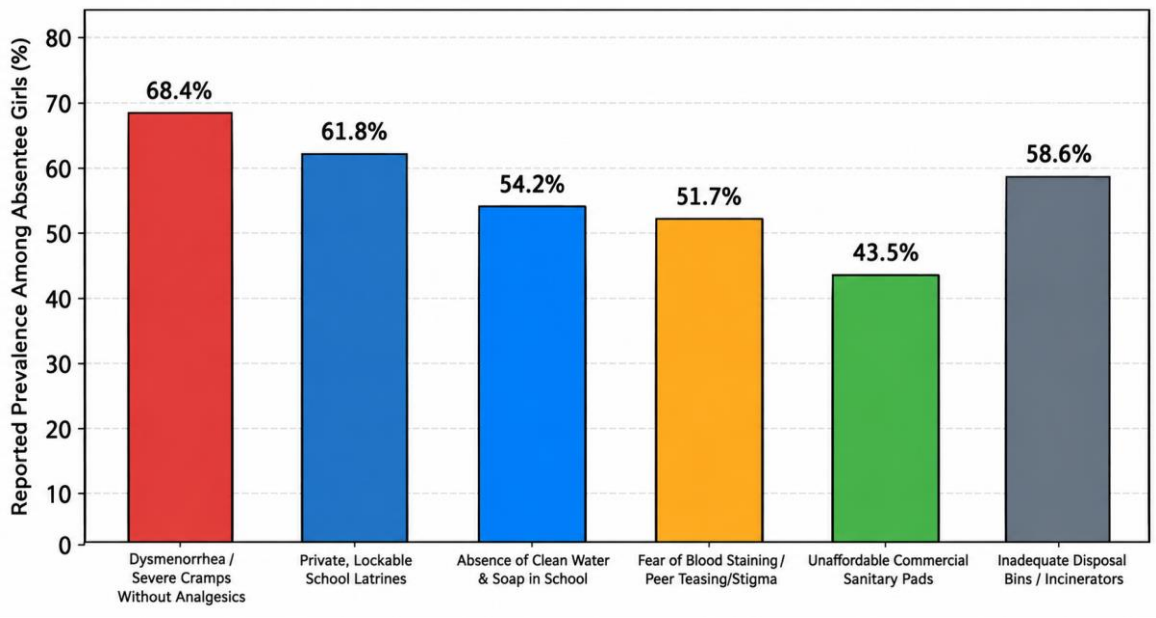

Figure 2: Primary Menstrual Barriers and Complaints Contributing to School Absenteeism

As illustrated in Figure 3, school absenteeism was dramatically higher among adolescent girls demonstrating poor MHM practices (64.2%, n = 216/336) compared to those adhering to good MHM practices (21.8%, n = 66/302).

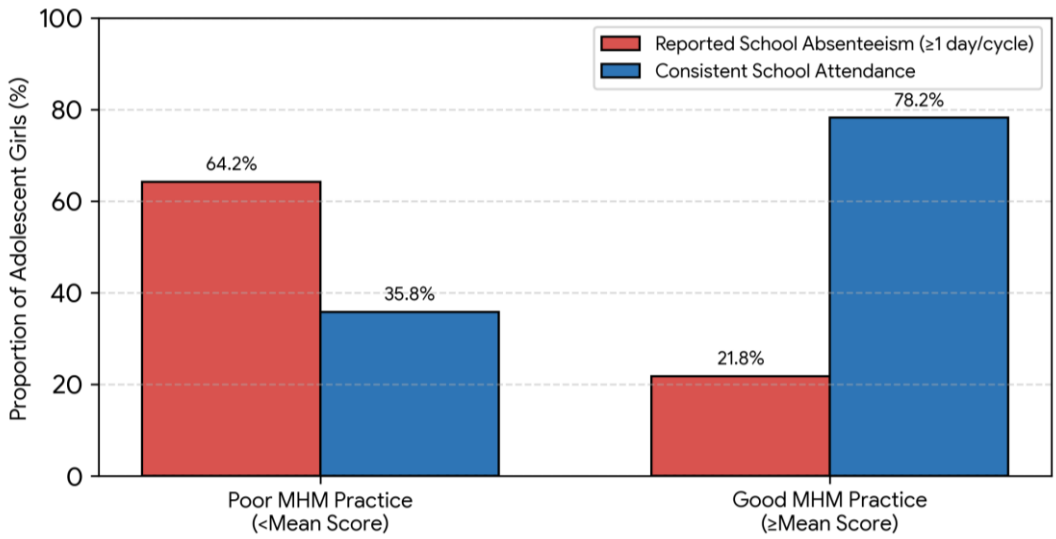

Figure 3: Comparison of School Absenteeism Rates by MHM Practice Competence

Multivariable logistic regression analysis was performed to identify independent predictors of menstruation-related school absenteeism (Table 3).

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Table 3: Multivariable Logistic Regression Analysis of Factors Associated with School Absenteeism (N = 638)

Independent Variable	Crude OR (95% CI)	Adjusted OR (AOR)	95% CI	p-value
MHM Practice Level (Poor vs Good)	4.82 (3.41–6.82)	3.92	2.64–5.82	<0.001*
Severe Dysmenorrhea (Yes vs No)	3.84 (2.71–5.44)	3.15	2.11–4.70	<0.001*
Lockable School Female Latrine (No vs Yes)	3.10 (2.21–4.36)	2.48	1.62–3.81	<0.001*
Pre-menarche Awareness (No vs Yes)	2.45 (1.75–3.42)	1.94	1.31–2.87	0.001*
Absorbent Type (Cloth/Rags vs Commercial Pads)	2.62 (1.88–3.66)	1.82	1.20–2.76	0.005*
School Location (Peri-Urban vs Urban)	1.74 (1.25–2.41)	1.38	0.92–2.06	0.118
Maternal Education (No Formal vs Secondary+)	1.86 (1.22–2.84)	1.26	0.78–2.04	0.342

DISCUSSION

The findings of this cross-sectional study demonstrate that menstrual hygiene management remains a substantial structural, physical, and psychological barrier to female secondary school attendance in Northwest Ethiopia. Over four in ten adolescent girls (41.5%) reported missing an average of nearly two school days every month due directly to menstruation. Cumulatively, this corresponds to losing approximately 18 to 22 academic days per school year, creating severe learning disruptions that place female students at an acute disadvantage relative to their male peers [25].

MHM Practice Deficits and Material Vulnerability

Our multivariable regression revealed that girls with poor MHM practices were nearly four times more likely to miss school compared to their peers with good practices (AOR = 3.92, 95% CI: 2.64–5.82). The use of unhygienic reusable cloths and improvised rags (43.6%) remains widespread due to economic hardship and rising inflation, which render commercial disposable pads unaffordable for low-income households [26]. Furthermore, the restrictive sociocultural climate forces girls to wash and dry reusable materials in secretive, poorly

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ventilated indoor areas without sunlight exposure, leading to damp, microbial-contaminated rags that cause perineal chafing, pruritus, and ascending reproductive tract infections [27]. Inadequate changing frequency (<3 times/day) during heavy flow days further increases the probability of visible blood leaks, directly triggering intense embarrassment and school absenteeism.

Structural School WASH Deficits and Social Stigma

The physical environment in educational institutions plays a decisive role in menstrual management. Over 60% of surveyed schools lacked separate, private, lockable latrines for female students, and over 70% had no reliable water supply or soap. Our findings demonstrated that the absence of lockable latrines increased the odds of absenteeism by 2.48 times (AOR = 2.48, 95% CI: 1.62–3.81). When girls cannot change absorbents in complete privacy or wash blood from their hands and uniforms, staying at home becomes the only viable protective strategy against pervasive social stigma and fear of peer teasing [28]. Studies across sub-Saharan Africa confirm that fear of humiliation following accidental staining is one of the most potent psychological drivers of adolescent female school withdrawal [29, 30].

The Burden of Unmanaged Dysmenorrhea

Crucially, this study identified severe dysmenorrhea as the single most frequently cited personal complaint (68.4%) and an independent predictor of school absenteeism (AOR = 3.15, 95% CI: 2.11–4.70). In many Ethiopian secondary schools, there are no first-aid facilities, rest rooms, or access to basic non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen or paracetamol [31]. Consequently, adolescent girls experiencing incapacitating pelvic cramping and systemic symptoms are physically incapable of participating in classroom activities. Integrating pain management protocols and female rest spaces within secondary schools represents a low-cost, high-impact intervention that remains largely overlooked in conventional school health policies [32].

LIMITATIONS

This study is subject to several methodological limitations:

- Self-Report Bias: Data regarding MHM practices and absenteeism were based on self-reports over the preceding three months, introducing potential recall inaccuracies and social desirability bias.

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- Cross-Sectional Design: The cross-sectional methodology enables identification of epidemiological associations but precludes establishing definitive longitudinal causality between MHM practices and academic progression.
- Unmeasured Quantitative Academic Metrics: The study evaluated days of school absence but did not capture standardized test scores or dropout tracking across consecutive academic semesters.
- Institutional Focus: Only adolescent girls currently enrolled in regular secondary schools were sampled; out-of-school adolescent girls who may have dropped out permanently due to menstrual or pubertal taboos were not captured.

FUTURE SCOPE

Future research and intervention frameworks should expand upon these findings through:

- School-Based WASH Interventional Trials: Evaluating the cost-effectiveness of installing gender-specific, solar-powered water points, lockable latrines, and on-site menstrual waste incinerators on long-term female attendance rates.
- Local Reusable Pad Production & Subsidies: Assessing the uptake and hygienic sustainability of locally manufactured, subsidized, high-absorbency reusable menstrual kits distributed through school reproductive health clubs.
- Comprehensive Puberty Education & Peer Mentorship: Implementing standardized, age-appropriate MHM curricula and male-inclusive sensitization workshops to dismantle menstrual taboos and eliminate classroom bullying.
- Integrated School Health & Pain Management: Establishing formal school-based dysmenorrhea screening, emergency pain relief dispensing protocols, and quiet recovery spaces for menstruating students.

CONCLUSION

Menstrual hygiene management remains a major public health and educational challenge among adolescent secondary school girls in the Amhara Region, Ethiopia. Poor MHM practices, unaddressed dysmenorrhea, lack of preparatory pre-menarche guidance, and severely deficient school WASH infrastructure are powerful, independent drivers of recurrent school absenteeism. Overcoming these barriers requires multi-sectoral collaboration between the Ministry of Health, Ministry of Education, and community stakeholders. Immediate policy actions must prioritize equipping secondary schools with private, lockable, water-

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supplied sanitation facilities, providing free or subsidized menstrual supplies, institutionalizing pain management protocols, and promoting open, stigma-free reproductive health education across Ethiopia.

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