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Determinants of Menstrual Hygiene Management Practices Among Adolescents: A Cross-Sectional Study

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Abstract

Background: Menstrual hygiene management (MHM) is critical for adolescents' health and well-being; however, challenges such as limited water, sanitation, and hygiene (WASH) facilities, stigma, and lack of education persist in low- and middle-income countries. In Indonesia, most studies have focused on knowledge and attitudes rather than the determinants of practices, leaving this area underexplored.
Purpose: This study aimed to identify the determinants of menstrual hygiene management practices among adolescents.
Methods: This cross-sectional study was conducted online with 365 female adolescents recruited through purposive sampling. Data collection tools included the Menstrual Hygiene Management (MHM) questionnaire, the Depression Anxiety Stress Scale (DASS-21), the Multidimensional Scale of Perceived Social Support (MSPSS), and demographic questionnaires. Associations were analyzed using independent t-tests, Pearson correlations, and linear regression.
Results: Bivariate analysis showed that higher MHM scores were significantly associated with age (r=0.290; p=0.000), age at menarche (r=0.173; p=0.001), education level (r=0.288; p=0.000), menstrual cycles (r=0.122; p=0.020), employment (r=0.277; p=0.000), family income (r=0.130; p=0.013), and place of residence (r=0.132; p=0.012). In contrast, a history of dysmenorrhea was negatively associated with MHM practices (r=-0.159; p=0.002). Linear regression analysis revealed that menstrual cycle (B=0.408; p=0.028) was a significant positive predictor of MHM, while a history of dysmenorrhea (B=-0.160; p=0.020) was a significant negative predictor.
Conclusion: Menstrual hygiene management was generally good among adolescents. Significant determinants included menstrual cycle length and history of dysmenorrhea. The findings underscore the importance of addressing biological and physiological factors in menstrual health education. Public health programs should also integrate menstrual cycle education and dysmenorrhea management strategies to improve hygiene practices.

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1. Introduction

Adequate menstrual hygiene management is critical to women's well-being, yet it remains a neglected issue in most parts of the world (Ene et al., 2024). Teen women are often affected by inadequate menstrual hygiene management, causing significant physical and psychological health risks (Betsu et al., 2024). One of the most important menstrual practices is personal hygiene, which affects physical and mental health (Alenizy et al., 2024a). Poor hygiene practices during menstruation can lead to the risk of reproductive tract infections (Majeed et al., 2022; Mehta et al., 2023). The stigma and shame experienced by adolescent girls make it uncomfortable to discuss menstruation (Austrian et al., 2021; Medina-Perucha et al., 2020). Limited water, sanitation, and hygiene (WASH) infrastructure and access to menstrual products hinder effective and convenient menstrual blood management, causing social embarrassment and anxiety

(Hennegan et al., 2024; Suleman et al., 2024). In addition, poor social support (Masruroh et al., 2021), fear, stigma, uncertainty, menstrual information from family and community, and personal barriers are barriers to managing safe menstruation (Panda et al., 2024).

Achieving adequate menstrual hygiene and health (MHH) remains a significant challenge for adolescent girls in low- and middle-income countries (Shenkman et al., 2023). For instance, in Ethiopia, 52.69% of adolescent girls faced difficulties in implementing safe menstrual hygiene practices, with the main barriers being limited WASH facilities, lack of privacy, inadequate use of absorbent materials, social stigma, and lack of education (Sahiledengle et al., 2022). Similarly, in rural Gambia, challenges arose due to limited WASH facilities in schools, where 75% of adolescents were at risk of urinary tract infection (UTI), 47% were at risk of reproductive tract infection (RTI), and 21% showed symptoms of depression (Nabwera et al., 2021). Likewise, in Lao PDR, although 85.4% of adolescent girls used disposable pads, only 44% practiced good menstrual hygiene, while 63% had limited access to private facilities to dispose of used pads (Sychareun et al., 2020). In Tangerang Regency, Indonesia, it was reported that among 409 junior high school female students, 48.9% had moderate knowledge of menstruation, and 70.4% had neutral practical attitudes towards menstrual hygiene management (Wihdaturrahmah & Chuemchit, 2023). This neutral, practical attitude suggests that many adolescents neither fully adhere to optimal MHM practices nor completely neglect them. These challenges underscore the global and contextual variations in access to menstrual health care.

Menarche is a significant physiological change that adolescent girls must learn about, including healthy hygiene management practices (Habtegiorgis et al., 2021). The most basic knowledge about menstruation begins with recognizing that menstrual bleeding is a normal experience for women (Hennegan et al., 2022). Menstrual hygiene management (MHM) refers to the specific hygiene and health requirements for girls during menstruation, including the information, materials, and facilities needed to manage menstruation effectively and personally (Davis et al., 2018; Harerimana et al., 2025). In low- and middle-income countries, adolescent girls face major challenges such as myths, taboos, and socio-cultural barriers that limit access to accurate information about menstruation (Mohammed & Larsen-Reindorf, 2020).

Proper menstrual hygiene management supports the achievement of the 17 Sustainable Development Goals, particularly in the areas of education, gender equality, health, water, sanitation, and hygiene (Sommer et al., 2021). Adolescent girls need education and access to information on menstrual biology and menstrual hygiene management practices, including how to use and manage sanitary pad waste (Ghandour et al., 2022). Ideal menstrual products should be comfortable, not reduce mobility, not cause injury to the perineum, vulva, and vagina, and not cause genitourinary tract and skin infections (van Eijk et al., 2021). Educational interventions effectively improved knowledge about menstruation, and skills training improved competencies to manage menstruation more hygienically and comfortably (Evans et al., 2022). Policies and programming have evolved rapidly, seeking to address unmet menstrual needs (Hennegan et al., 2020). Free menstrual products can reduce social stigma by providing menstruators with a reliable way to obtain the products they need without negative social consequences (DeMaria et al., 2024). Private space to change and dispose of used materials, as well as access to clean water and soap for washing (Worku et al., 2024).

Despite growing attention to menstrual health, most studies have primarily examined the knowledge, attitudes, and access to menstrual products. However, relatively few have analyzed the broader determinants of menstrual hygiene management (MHM), particularly the combined influence of demographic, psychological, and social factors (Wihdaturrahmah & Chuemchit, 2023). Evidence from Indonesia remains scarce and fragmented, with previous research often limited to descriptive findings and inconsistent results regarding the predictors of MHM practices. Therefore, this study aimed to analyze the factors influencing menstrual hygiene management practices among adolescents in Indonesia, providing evidence to inform targeted interventions and health education programs.

2. Methods
2.1. Research design
This study applied an online cross-sectional design. This design was chosen because it allows researchers to capture the relationships between variables at a single point in time while reaching a large and geographically diverse population. Compared to longitudinal or experimental designs,

the cross-sectional approach was more practical, time-efficient, and cost-effective, particularly when involving adolescents in multiple regions.

2.2. Setting and samples

This study was conducted in Indonesia from July to November 2024. The study setting spanned various provinces in Java and outside Java, across both urban and rural areas, as online-based recruitment enabled a wide geographical reach. Indonesia, with its diverse cultural and socioeconomic backgrounds, provides an important context for understanding adolescent menstrual hygiene practices.

The population of this study was adolescent girls aged 12–24 years who had experienced menstruation. According to Sawyer et al. (2018), adolescence can be defined as spanning from ages 12 to 24 years, reflecting ongoing brain maturation, delayed social role transitions, and later age at marriage and parenthood. Therefore, participants up to 24 years old in our study were included within the broader definition of adolescence. The sample size was calculated a priori using G*power (version 3.1) for multiple linear regression analysis. With a medium effect size (f^2 = 0.15) as recommended by Cohen (1981), an α level of 0.05, and a statistical power (1–β) of 0.80, the minimum required sample size was 118 participants. To increase statistical power, ensure better subgroup representation, and anticipate incomplete responses, the target sample was expanded. In total, 365 adolescent girls were recruited using purposive sampling. Inclusion criteria were: (1) female adolescents aged 12–24 years, (2) had experienced menstruation, and (3) were willing to participate by providing informed consent (with additional parental consent for those under 18 years). Exclusion criteria included incomplete responses or refusal to participate.

2.3. Measurement and data collection

This study utilized questionnaires consisting of four sections: demographic and physiological data, Menstrual Hygiene Management (MHM), the Depression Anxiety Stress Scale (DASS-21), and the Multidimensional Scale of Perceived Social Support (MSPSS). Demographic variables included age, age at menarche, religion, provincial origin, education level, occupation, family income, and place of residence. Physiological factors included menstrual cycle length (days), menstrual cycle regularity, and history of dysmenorrhea. Psychological factors consisted of depression, anxiety, and stress, which were measured using the Depression, Anxiety, and Stress Scale (DASS-21). Social factors included perceived social support, measured using the Multidimensional Scale of Perceived Social Support (MSPSS), and family structure (nuclear or extended family).

2.3.1. Menstrual Hygiene Management (MHM)

Menstrual hygiene management practices were measured using the MHM scale developed by Ramaiya & Sood (2020). The instrument consists of 17 items covering hygiene practices, use and disposal of absorbents, privacy, and access to sanitation facilities. Although there are 17 items, the total score ranges from 0 to 12 because several items are combined into composite indicators. Higher scores indicate better menstrual hygiene practices. For this study, we used the Indonesian translated version of the scale. The translation process followed the standard forward–backward procedure: first translated into Indonesian by two bilingual experts, then back-translated into English by independent translators. Discrepancies were discussed and resolved by a panel of nursing and public health experts to ensure semantic, conceptual, and cultural equivalence. A pilot test was conducted with 30 adolescents to confirm clarity and comprehensibility. The Indonesian version of the MHM scale was tested for validity and reliability. Content validity was assessed by a panel of three experts, yielding an average CVI of 0.89. Construct validity was examined using corrected item–total correlations, which ranged from 0.36 to 0.71, and all exceeded the 0.30 threshold. Reliability testing showed good internal consistency (Cronbach's alpha = 0.82), indicating that the instrument was reliable for use among Indonesian adolescents.

2.3.2. Depression Anxiety Stress Scale (DASS-21)

This study used the DASS-21, developed by Lovibond and Lovibond (1995), to measure participants' psychological changes. This instrument comprises 21 questions across three domains: depression, anxiety, and stress. Each domain includes 7 items – depression (items 3, 5, 10, 13, 16, 17, and 21), anxiety (items 2, 4, 7, 9, 15, 19, and 20), and stress (items 1, 6, 8, 11, 12, 14,

and 18). Each item is rated on a 4-point Likert scale (0=did not happen to me; 1=sometimes; 2=quite often; 3=very often). The scores for the 7 items in each domain are summed and then multiplied by 2 (Susanti et al., 2022). The total scores are interpreted as follows: 0-78 = normal; 79-87 = mild; 88-95 = moderate; 96-98 = severe, and >98.1 = very severe).

The Indonesian version of the DASS-21, validated by Susanti et al. (2022), was used in this study. It demonstrated strong reliability (Cronbach's α = 0.95). The validity test of the DASS-21 in this study showed corrected item–total correlation values ranging from 0.354 to 0.749, all of which exceeded the minimum acceptable threshold of 0.30. This indicates that all items were valid and appropriately measured the constructs of depression, anxiety, and stress.

2.3.3. *Multidimensional Scale of Perceived Social Support (MSPSS)*

This study also used the Multidimensional Scale of Perceived Social Support (MSPSS) scale developed by Zimet et al. (1990) to measure social support. This instrument consists of 12 items grouped into three domains: family, friends, and significant others. The family domain includes four items (numbers 3, 4, 8, and 11); the friends domain includes four items (numbers 6, 7, 9, and 12); and the significant others domain also includes four items (numbers 1, 2, 5, and 10). Each item is rated on a seven-point Likert Scale (1=strongly disagree; 2=disagree; 3=somewhat disagree; 4=neutral; 5=somewhat agree; 6=agree; 7=strongly agree). The MSPSS scores are interpreted as follows: 12-35 = low perceived support; 36-60 = moderate perceived support; 61-84 = high perceived support.

In this study, the Indonesian version of the MSPSS, validated by Laksmita et al. (2020) among Indonesian adolescents, was used. The MSPSS validity test showed corrected item–total correlations ranging from 0.555 to 0.802, all above the 0.30 threshold, indicating good construct validity. The reliability analysis produced a Cronbach's alpha of 0.928, indicating excellent internal consistency (Laksmita et al., 2020).

Data were collected between July and November 2024 using an online questionnaire distributed via Google Forms through WhatsApp and Instagram to reach a broad range of adolescents. The survey required approximately 10–15 minutes to complete. On the first page of the survey, participants were provided with a detailed explanation of the study background, objectives, procedures, and data protection. They were required to provide electronic informed consent before accessing the questionnaire. For participants under 18 years old, an additional parental/guardian consent process was applied: adolescents were instructed to obtain permission from a parent/legal guardian, and parents/guardians confirmed consent electronically before their children could proceed. Only after both parental consent and participant assent were provided could the adolescent proceed with the survey.

2.4. *Data analysis*

Statistical analyses were conducted using SPSS version 25, and data were coded in Microsoft Excel. Descriptive statistics were computed as means, standard deviations, frequencies, and percentages. The relationship between menstrual hygiene management and independent variables was examined using Pearson's correlation for continuous variables (age, menarche, family income), and independent t-tests for categorical variables (menstrual cycle, history of dysmenorrhea, latest education, and residence). P-values of <0.01 and <0.05 were used as the significance thresholds for Pearson's correlation test and independent t-test. In this study, multivariate linear regression was used to identify factors influencing menstrual hygiene management among adolescents. The analysis assumed a normal distribution, and the dependent variable (menstrual hygiene management) was interval-scaled. The skewness value ranged from 0.361 to 1.877, and the kurtosis values ranged from -0.643 to 2.804, indicating that the data were normally distributed.

2.5. *Ethical considerations*

This study protocol was reviewed and approved by the Research Ethics Committee of Universitas Muhammadiyah Malang, Indonesia (Approval No. E.4.d/082/KEPK/FIKES-UMM/X/2024). Participants were provided with a detailed explanation of the study objectives, procedures, and data protection, and informed consent was obtained prior to data collection. Participation was voluntary, anonymous, and could be withdrawn at any time without consequences.

3. Results

3.1. Characteristics of the participants

A total of 365 adolescents completed the survey. The mean age of respondents was 16.8 years (SD=3.58), and the mean age at menarche was 12.3 years (SD=1.50). Most respondents were senior high school students (50.7%), Muslim (94.5%), lived in Java (94.2%), had a normal BMI (55.9%), and were unmarried (100%). The majority did not smoke (98.4%), participate in social activities (72.1%), or engage in sports (62.2%). Most lived in nuclear families (75.9%) with a monthly income of IDR 1–1.9 million (52.1%), and resided in rural areas (83.8%) (Table 1).

Regarding menstruation, 97.3% of respondents had a cycle length of 28–35 days, 72.1% reported regular cycles, and 81.9% experienced a menstrual duration of 3–7 days. Most had a history of dysmenorrhea (73.4%) and no history of illness (95.9%). Based on the DASS-21, most respondents (95.1%) exhibited normal psychological status during menstruation, while the MSPSS indicated high perceived social support (55.3%). The mean MHM score was 9.82 (SD=0.59), reflecting good menstrual hygiene management.

Table 1. Characteristics of the participants

Variable	Mean	SD	Frequency (f)	Percentage (%)
Age (year)	16.80	3.58		
Age at menarche (year)	12.30	1.50		
Religion				
Muslim			345	94.5
Non-muslim			20	5.5
Provincial origin				
Java			344	94.2
Outside Java			21	5.8
Last education				
Elementary			176	48.2
Junior high			9	2.5
Senior high			180	49.3
Marital status				
Unmarried			365	100
Married			0	0
Occupation				
Students of elementary to junior high			185	50.7
Students of senior high school			180	49.3
Family in the household				
Extended family			88	24.1
Nuclear family			277	75.9
Place of residence				
Rural			306	83.8
Urban			59	16.2
Family income (IDR)				
1-1.9 million			190	52.1
2-2.9 million			56	15.3
3-3.9 million			38	10.4
4-4.9 million			26	7.1
≥ 5 million			55	15.1
BMI (kg/m2)				
0-18.4			125	34.2
18.5-24.9			204	55.9
>25			36	9.9
Smoking history				
Smoking			6	1.6
No smoking			359	98.4
Social activities				
No			263	72.1
Yes			102	27.9
Sports activities				
No			138	37.8
Yes			227	62.2
Menstrual cycle (days)				
<28 and >35			10	2.7
28-35			335	97.3

Table 1. Continued

Variable	Mean	SD	Frequency (f)	Percentage (%)
Regularity of menstrual cycle				
Irregular			102	27.9
Regular			263	72.1
Duration of menstruation (a month)				
>7 days			66	18.1
3-7 days			299	81.9
History of dysmenorrhea				
No			97	26.6
Yes			268	73.4
Disease history				
No			350	95.9
Yes			15	4.1
Depression Anxiety Stress Scale (DASS-21)				
Normal			347	95.1
Mild			10	2.7
Moderate			3	0.8
Severe			1	0.3
Very severe			4	1.1
Multidimensional Scale of Perceived Social Support (MSPSS)				
Low			9	2.5
Moderate			154	42.2
High			202	55.3
Menstrual Hygiene Management (MHM)	9.82	0.59	365	100

3.2. Relationship between demographic characteristics, social support, psychological changes, and menstrual hygiene management

Table 2 presents the bivariate analysis used to examine the relationships between the studied variables – age, age at menarche, religion, provincial origin, BMI, latest education, marital status, smoking history, social activities, sports activities, menstrual cycle (days), menstrual cycle regularity, duration of menstruation (per month), history of dysmenorrhea, history of disease, family in the household, occupation, family income, place of residence, psychological changes, and social support – and menstrual hygiene management.

The analysis indicated that several variables were significantly associated with menstrual hygiene management. Age (r=0.290; p=0.000), age at menarche (r= 0.173; p=0.001), menstrual cycle (r=0.122; p= 0.020), latest education (r= 0.288; p=0.000), occupation (r=0.277; p=0.000), family income (r=0.130; p=0.013), and place of residence (r=0.132; p=0.012) were positively associated with better menstrual hygiene management among adolescent girls. Conversely, the history of dysmenorrhea showed a negative correlation (r=-0.159; p=0.002), indicating that adolescent girls with a history of dysmenorrhea tended to have a poorer menstrual hygiene management.

3.3. Factors affecting menstrual hygiene management in adolescents in Indonesia

As shown in Table 3, the linear regression results were used to identify factors influencing menstrual hygiene management. The analysis showed that the menstrual cycle was the most significant factor associated with menstrual hygiene management (B=0.408; p=0.028). This finding indicates that adolescents with regular menstrual cycles tend to manage their menstrual hygiene better. In contrast, a history of dysmenorrhea showed a significant negative association with menstrual hygiene management (B=-0.160; p=0.020). Both variables were statistically significant (p<0.05), suggesting that adolescents who experience dysmenorrhea are more likely to have poorer menstrual hygiene management practices.

Table 2. Relationship between the studied variables and menstrual hygiene management

Variable	Menstrual Hygiene Management (MHM)	
	(R)	*p*-value
Age	0.290	0.000[a] **
Age of menarche	0.173	0.001[a] **
Religion	-0.051	0.328[b]
Provincial origin	0.074	0.158[b]
BMI (kg/m2)	0.064	0.225[b]
Last education	0.288	0.000[b]**
Smoking history	0.035	0.506[b]
Social activities	0.082	0.116[b]
Sports activities	0.075	0.151[b]
Menstrual cycle (days)	0.122	0.020[b] *
Regularity of menstrual cycle	0.022	0.674[b]
Duration of menstruation (a month)	0.005	0.921[b]
History of Dysmenorrhea	-0.159	0.002[b] **
Disease history	0.032	0.538[b]
Family in the home	-0.059	0.257[b]
Jobs	0.277	0.000[b] **
Family income	0.130	0.013[a] *
Place of Residence	0.132	0.012[b] *
Depression Anxiety Stress Scale -21	0.007	0.896[a]
Social Support	0.029	0.582[a]

Note: R; Correlation, [a]Pearson correlation, [b]Independent t-test, ** *p*-value <0.01, * *p*-value <0.05

Table 3. Factors affecting menstrual hygiene management among adolescents in Indonesia

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	19.993	.802		24.921	.000**
Age	.020	.021	.120	.948	.344
Age of menarche	.016	.024	.041	.659	.510
Religion	-.035	.133	-.014	-.264	.792
Provincial origin	-.072	.143	-.029	-.508	.612
BMI (kg/m2)	-.009	.050	-.009	-.175	.861
Last education	.178	.207	.300	.858	.392
Smoking history	.220	.244	.048	.903	.367
Social activities	.039	.069	.030	.573	.567
Sports activities	.100	.063	.083	1.582	.115
Menstrual cycle (days)	.408	.185	.114	2.208	.028*
Regularity of menstrual cycle	.010	.069	.008	.147	.883
Duration of menstruation (a month)	-.012	.079	-.008	-.157	.875
History Dysmenorrhea	-.160	.068	-.121	-2.344	.020*
Disease history	.024	.157	.008	.153	.878
Family in the home	-.105	.071	-.077	-1.485	.138
Jobs	-.186	.388	-.159	-.479	.632
Family income	.026	.021	.066	1.234	.218
Place of residence	.003	.096	.002	.029	.997
DASS -21	.001	.001	.024	.456	.649
MSPSS	.003	003	.054	1.015	.311

Note: ** *p*-value <0.01, **p*-value <0.05

4. Discussion

This study aimed to identify the determinants of menstrual hygiene management (MHM) practices among adolescent girls in Indonesia. Overall, the findings revealed significant relationships between various demographic, social, and psychological factors of adolescents and their MHM practices, addressing the main objectives outlined in the background section.

The descriptive analysis found that most adolescents demonstrated good menstrual hygiene management practices. This finding reflects a fairly high level of awareness of the importance of hygiene during menstruation, although individual variation remains. This aligns with the findings of Ene et al. (2024), who reported that comfort with menstrual products increases compliance with hygiene practices. The high prevalence of good MHM practices among participants may be attributed to several factors. One possible explanation is the comfort and familiarity with menstrual products, which enhances usability and confidence. Comfort in using sanitary products reduces anxiety and facilitates routine menstrual care. In this study, such comfort likely contributed to consistently high MHM scores, reflecting both behavioral ease and increased awareness of hygiene standards.

The bivariate analysis showed that factors such as age, age at menarche, latest education level, occupation, and family economic status were significantly associated with MHM practices. Age showed a positive relationship with MHM, suggesting that older adolescents were more likely to demonstrate good menstrual hygiene. This may be because older girls have more experience in managing menstruation and greater exposure to health education. Similar findings were reported in Ethiopia, where age was a predictor of safe menstrual practices, as maturity often increases awareness and self-efficacy in managing menstruation (Ayele et al., 2025; Lakew et al., 2025). Age at menarche was significantly associated with MHM. Adolescents who experienced menarche at an older age tended to have better menstrual hygiene practices. This may be explained by the fact that delayed menarche provides adolescents more time to acquire knowledge, observe peers, and prepare for menstrual care. Evidence from Permatasari et al. (2025) confirmed that a later menarche age was associated with greater preparedness and healthier hygiene behaviors among Indonesian adolescents. Educational level also played a strong role in shaping MHM practices. Adolescents with higher education were more likely to demonstrate good menstrual hygiene. Education equips girls with biological knowledge, critical thinking, and access to accurate information that helps them overcome myths and stigma surrounding menstruation. Recent reviews highlighted that secondary and tertiary education enhances menstrual health literacy and improves personal care practices (Muzaffar & Saeed, 2025; Shinde et al., 2025).

Occupation was also found to be associated with MHM practices. This study showed that adolescents who were employed or engaged in part-time work demonstrated better hygiene behaviors, possibly due to increased autonomy and financial ability to purchase sanitary products. In line with this finding, Permatasari et al. (2025) reported that adolescents with independent income showed better menstrual preparedness and product use compared to those who were unemployed. Furthermore, family economic status also emerged as a significant determinant. Adolescents from higher-income families reported better MHM practices, likely due to greater affordability of sanitary products and improved access to WASH facilities. A multi-country survey in 2025 (Pillai, 2025) similarly found that economic resources, including the ability to purchase menstrual products and access to private sanitation, were among the strongest predictors of safe MHM practices.

In summary, older age and higher educational attainment were associated with improved hygiene practices among adolescents. Alenizy et al. (2024) also found that knowledge and readiness for menstruation increase with age and education. In addition, family support and economic ability also affect affordability and access to hygiene products and facilities, as revealed by Ghandour et al. (2022) in the context of adolescent populations in conflict areas.

This study also found that physiological factors such as menstrual cycle and history of dysmenorrhea had significant impacts. Regular menstrual cycles facilitated consistent hygiene practices, while menstrual pain associated with dysmenorrhea often hindered adolescents from maintaining optimal menstrual hygiene. Adolescents with regular cycles tend to be better equipped to manage menstruation, whereas those with a history of dysmenorrhea experience barriers to optimal hygiene practices (Kaur et al., 2018; Susanti et al., 2025). Panda et al. (2024) similarly reported that severe menstrual pain can be a barrier to consistent hygiene routines.

When all factors were analyzed together in a multivariate model, menstrual cycle (days) and history of dysmenorrhea emerged as the two main factors influencing MHM practices. This suggests that, in addition to educational and economic aspects, biological factors also play an important role (Fatmawati & Hasanah, 2013; Saputra et al., 2021). These findings are consistent with those of Hennegan et al. (2024), who reported that menstrual predictability helps adolescents plan hygiene actions more effectively.

Differences between this study and several other studies may be explained by regional variations, such as differences in access to clean water and sanitation. DeMaria et al. (2024) found that populations living in areas with limited infrastructure face major challenges in implementing appropriate MHM practices. Adolescents residing in urban areas may benefit from greater access to WASH infrastructure, educational materials, and affordable menstrual products, enabling better MHM practices. In contrast, those living in rural areas often face more pronounced cultural stigma and taboos around menstruation, which may hinder open discussions, limit access to accurate information, and reduce the availability of hygiene products and supportive facilities. These contextual factors likely contribute to disparities in MHM practices between urban and rural populations. Thus, this study not only strengthens the scientific evidence on factors influencing menstrual hygiene management but also provides a foundation for community-based interventions and public policies aimed at improving adolescent menstrual health more comprehensively.

5. Implications and limitations

The findings of this study have important implications for nursing practice, particularly in strengthening the role of community and school nurses in educating adolescents about the needs-based menstrual hygiene management. The finding that menstrual cycle and dysmenorrhea history significantly influenced hygiene practices underscores the importance of individualized nursing approaches that are sensitive to clients' physiological conditions. Supportive health policies need to be developed to ensure the availability of WASH facilities and access to safe menstrual products in educational settings, especially in rural areas identified as vulnerable populations in this study.

However, this study has certain limitations. The cross-sectional design and online sampling method may limit the generalizability of the findings due to potential sampling bias among adolescents with internet access. Furthermore, the exclusion of qualitative perspectives from respondents limits a deeper understanding of the emotional and social barriers that adolescents face during menstruation. Therefore, further studies employing longitudinal designs and mixed-method approaches are recommended to strengthen evidence-based nursing practice and policies related to adolescent menstrual health.

6. Conclusion

In conclusion, this study found that most adolescent girls in Indonesia demonstrated good menstrual hygiene management. Significant associations were found between age, age at menarche, the latest education level, menstrual cycle, history of dysmenorrhea, occupation, family income, and place of residence with menstrual hygiene management. The key determinants of menstrual hygiene management practices among adolescents were menstrual cycle (days) and history of dysmenorrhea. These findings highlight the importance of integrating both biological and physiological considerations into adolescent health education and nursing interventions to promote better menstrual hygiene practices. Public health programs should also integrate menstrual cycle education and dysmenorrhea management strategies to improve hygiene practices.

Author contribution

HDS, NK, IRA, MHC, and MM contributed to data analysis, interpretation, and drafting of the manuscript. MDM contributed to data collection, analysis, interpretation, and drafting of the manuscript.

Conflict of interest

We declare that there is no conflict of interest.

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