

Age at Menarche and Access to Sanitation Facilities as Predictors of Menstrual Hygiene Practices Among Peri-Urban Adolescents

Lisda Oktavia Madu Pamangin¹, Helen Try Juniasti¹, Fajrin Violita¹

¹Faculty of Public Health, Universitas Cenderawasih, Jayapura, Indonesia

Correspondence: **Lisda Oktavia Madu Pamangin**: Kampus Abepura, Universitas Cendrawasih, Abepura, Indonesia; lies_davia@yahoo.com

ABSTRACT

Menstrual hygiene practices, which are influenced by individual behaviors and environmental conditions, play a crucial role in preventing infection and maintaining reproductive health. This study aimed to analyze the correlation between age at menarche and access to menstrual hygiene facilities with menstrual hygiene practices among adolescent girls living in peri-urban areas of Jayapura City. An analytic observational study with a cross-sectional design. A total of 263 school-aged girls who had experienced menarche were recruited through total sampling. Data were collected using a self-reported questionnaire measuring menstrual hygiene practices, age at menarche, and access to hygiene facilities. Menstrual hygiene practices were assessed using 20 items with a maximum score of 40, while access to hygiene facilities was measured using five items scored on Likert and Guttman scales. Data were analyzed using Spearman correlation tests. The results showed that the mean age of respondents was 14.51 years, with a mean age at menarche of 12.15 years. The average menstrual hygiene practice score was 28.31, indicating a moderate level of correct hygiene behavior. Most adolescents changed their menstrual pads every 6–8 hours (44.9%), only 17.5% consistently washed their hands with soap after changing pads, and only 17.1% consistently dried the genital area after rinsing. Access to hygiene facilities was generally adequate, with 48.7% having access to clean running water and 84.8% having access to a toilet. Spearman correlation analysis demonstrated a significant positive correlation between age at menarche and menstrual hygiene practice scores ($r = 0.147$; $p = 0.017$), as well as between access to hygiene facilities and menstrual hygiene practice scores ($r = 0.588$; $p = 0.000$). These findings indicate that earlier menarche and better access to hygiene facilities are associated with improved menstrual hygiene practices. In conclusion, menstrual hygiene practices among adolescents in peri-urban Jayapura remain suboptimal, although access to hygiene facilities is relatively adequate. Strengthening hygiene education and improving facility availability may enhance menstrual hygiene behaviors and reduce the risk of reproductive tract infections.

Keywords: menstrual hygiene; age at menarche; hygiene facility access; adolescent girls; peri-urban communities

INTRODUCTION

In the context of adolescent health, one of the essential components requiring sustained attention is the prevention of infectious diseases, including infections of the reproductive tract (ISR). Geographically, Indonesia is characterized by a tropical climate with hot and humid environmental conditions, which may increase perspiration, particularly in covered body areas and skin folds such as the reproductive organs. Such conditions create a favorable environment for the proliferation of pathogenic microorganisms, including fungi and bacteria, thereby elevating the risk of infection [1]. The incidence of ISR has been reported to reach 39% among adolescents aged 10–18 years. The presence of ISR may lead to serious reproductive health consequences, including infertility, malignancies of the reproductive organs, and ectopic pregnancy. Regarding risk factors, approximately 10% of ISR cases are associated with low immunity, while 30% are attributed to poor reproductive personal hygiene.

Evidence from previous studies demonstrates a significant association between menstrual personal hygiene practices and the occurrence of ISR. Many adolescents report experiencing discomfort, including itching in the vulvovaginal area, which is often linked to inadequate menstrual hygiene practices [2,3]. Poor menstrual hygiene may contribute to persistent discomfort and increase susceptibility to infection. Consequently, effective management of menstrual hygiene practices is essential to ensure that adolescents maintain adequate personal cleanliness and reduce their risk of infection. However, a substantial proportion of adolescents continue to engage in suboptimal menstrual hygiene behaviors. These include infrequent changing of menstrual pads every 3–4 hours, the use of pads with poor absorbency, wearing underwear that does not adequately absorb sweat, and the use of soaps that disrupt the natural pH balance of the genital area [4–6]. Furthermore, components of Menstrual Hygiene Management, such as bathing more than three times during menstruation and consistent handwashing have been shown to be significantly associated with ISR [7].

According to UNICEF, several factors significantly influence menstrual hygiene practices, including knowledge and skills, social support, available facilities and services, as well as sanitation infrastructure [8]. Despite the importance of these determinants, empirical data on menstrual hygiene practices in Papua Province remain limited. In Jayapura City, adolescents reside across both urban and rural village areas, with the latter often characterized by limited sanitation facilities and restricted access to clean water. This study was conducted in three secondary schools located in rural village areas of Jayapura City, where environmental constraints, particularly limited access to clean water, pose additional challenges to menstrual hygiene management.

Based on theoretical frameworks and empirical findings, several variables are hypothesized to be associated with menstrual personal hygiene practices. Prior studies have shown, for example, that adolescent age is associated with menstrual pad use among adolescents in India [9]. Other research has also identified a relationship between toilet availability and menstrual hygiene practices [10]. These findings underscore the multifactorial nature of menstrual hygiene behavior and highlight the need to examine contextual determinants within specific populations.

The present study aims to analyze the correlation between age at menarche and access to menstrual hygiene support facilities with menstrual hygiene practices among adolescents living in peri-urban areas. The central focus of this research is to determine whether age at menarche and access to sanitation and hygiene facilities serve as predictors of menstrual hygiene practices. The study's hypothesis posits that there is a significant correlation between age at menarche and access-to-facilities scores with menstrual hygiene practice scores among adolescents residing in peri-urban areas of Jayapura City.

METHODS

The present study was conducted over a one-month period, beginning on 1 August and ending on 1 September 2024, in three secondary schools located within village-area communities of Jayapura City, Papua Province. These schools were selected because they represent peri-urban environments where access to clean water and sanitation facilities is limited, a condition that may influence menstrual hygiene behaviors

among adolescent girls. The research adopted an analytic observational approach with a cross-sectional design, allowing all variables to be measured simultaneously at a single point in time in order to identify potential correlations between the predictors and the outcome variable.

The population consisted of school-aged adolescent girls enrolled in the three selected schools. A total of 263 participants met the eligibility criteria and were included in the study. Recruitment was carried out using a total sampling technique, in which all eligible individuals were invited to participate. The inclusion criteria required that participants had already experienced menarche and were residents of village-area communities within Jayapura City. Participation was voluntary, and each respondent completed a self-reported questionnaire administered during school hours.

The dependent variable was menstrual hygiene practice, while the independent variables consisted of age at menarche and access to hygiene-supporting facilities. Measurement of the dependent variable was conducted using a structured instrument comprising twenty items that assessed several domains of menstrual hygiene behavior. These domains included the correctness of menstrual pad-changing practices, the accuracy of washing and drying the genital area, the appropriateness of menstrual pad disposal, and the suitability of underwear used during menstruation. Eight of the items employed a four-point Likert scale with response options ranging from "never" to "always," scored from one to four. Another eight items required respondents to select the option that best represented their actual behavior, with each correct response assigned a score of one. The maximum possible score for menstrual hygiene practice was forty, with higher scores indicating better hygiene practices.

The variable of age at menarche was measured by asking respondents to report the age at which they first experienced menstruation, recorded in years. Access to hygiene facilities was assessed using five items. The first three items used a three-point Likert scale with scores ranging from one to three, while the remaining two items applied a Guttman scale in which correct or adequate access was scored as one. Higher cumulative scores reflected better access to menstrual hygiene facilities. All collected data were processed and analyzed using SPSS version 25. Descriptive analysis was performed to describe the frequency distribution of each variable [11-14]. To test the study hypothesis, Pearson's correlation test was applied to determine the direction and strength of the relationship between age at menarche, access to hygiene facilities, and menstrual hygiene practice scores. The resulting correlation coefficients were interpreted to assess the magnitude of association between the variables.

RESULTS

The descriptive analysis was conducted to provide a descriptive overview of each variable examined in the study. The results illustrate the menstrual hygiene practices performed by adolescents, which were subsequently followed by bivariate analysis to obtain the correlation between menstrual hygiene practices, age at menarche, and access to menstrual hygiene facilities. The descriptive findings related to menstrual hygiene practices are presented in Table 1. The adolescents included in this study were school-aged girls attending junior and senior high schools. As shown in Table 1, the average age of respondents was approximately 14–15 years, with the mean age at first menstruation being 12 years. The respondents typically experienced menstrual bleeding for four to five days. The mean menstrual hygiene practice score was 28.31, equivalent to 70.78% of the maximum

Table 1. Overview of menstrual hygiene practices among adolescents

| Variable | Mean | Median | Standard deviation |
|---|-------|--------|--------------------|
| Age (years) | 14.51 | 14 | 1.68 |
| Age at menarche (years) | 12.15 | 12 | 1.12 |
| Duration of menstruation (days) | 4.71 | 5 | 1.46 |
| Menstrual hygiene practice score | 28.31 | 28 | 4.48 |
| Menstrual hygiene facility access score | 8.47 | 9 | 1.47 |

Table 2. Distribution of respondents based on menstrual cycle length

| Menstrual cycle (days) | Frequency | Percentage |
|------------------------------|-----------|------------|
| ≤ 20 | 51 | 19.4 |
| 21–35 | 112 | 42.6 |
| > 35 | 98 | 37.3 |
| Do not know / did not answer | 2 | 0.8 |

Table 3. Overview of menstrual hygiene practices among adolescents

| Activity Performed (n = 263) | Always f (%) | Often f (%) | Rarely f (%) | Never f (%) |
|---|--------------|-------------|--------------|-------------|
| Changing pads whenever they feel moist | 48 (18.3) | 92 (35.0) | 118 (44.9) | 5 (1.9) |
| Changing pads before going to sleep | 50 (19.0) | 75 (28.5) | 131 (49.8) | 7 (2.7) |
| Changing underwear whenever it feels moist | 49 (18.6) | 97 (36.9) | 109 (41.4) | 8 (3.0) |
| Washing hands with soap after changing pads | 46 (17.5) | 83 (31.6) | 123 (46.8) | 11 (4.2) |
| Washing reusable pads before disposal | 47 (17.9) | 70 (26.6) | 109 (41.4) | 37 (14.1) |
| Wrapping used pads & disposing them in a bin | 59 (22.4) | 155 (58.9) | 48 (18.3) | 1 (0.4) |
| Using special cleansing soap for genital area | 15 (5.7) | 62 (23.6) | 118 (44.9) | 68 (25.9) |
| Drying the genital area after rinsing | 45 (17.1) | 99 (37.6) | 102 (38.8) | 17 (6.5) |

Table 4. Overview of menstrual hygiene practices among adolescents

| No | Activity Performed | Frequency | Percentage |
|---|--|-----------|------------|
| 1 | Frequency of pad changing | | |
| | < 6 hours | 92 | 35.0 |
| | 6–8 hours | 118 | 44.9 |
| | > 8 hours | 53 | 20.2 |
| 2 | Type of menstrual pad used | | |
| | Disposable pad | 245 | 93.2 |
| | Cloth pad (washable) | 7 | 2.7 |
| 3 | Combination | 11 | 4.2 |
| | Type of underwear material commonly used | | |
| | Cotton/T-shirt fabric | 151 | 57.4 |
| 4 | Regular cotton fabric | 66 | 25.1 |
| | Thick elastic material | 46 | 17.5 |
| | Method of cleaning the genital area | | |
| Rinsing with running water | 69 | 26.2 | |
| Rinsing with stored water | 151 | 57.4 | |
| Washing with antiseptic/special soap then rinsing | 37 | 14.1 | |
| Wiping with wet tissue | 6 | 2.3 | |
| 5 | Rinsing technique | | |
| | Front-to-back rinsing | 62 | 23.6 |
| | Direct rinsing | 145 | 55.1 |
| | Back-to-front rinsing | 56 | 21.3 |
| 6 | Drying method | | |
| | Wiping with a clean towel | 115 | 43.7 |
| | Wiping with clean, dry tissue | 42 | 16.0 |
| Wiping with regular cloth / not drying | 106 | 40.3 | |

Table 5. Access to menstrual hygiene facilities among adolescents

| Availability of facilities | Yes: f (%) | Sometimes: f (%) | Not available: f (%) |
|----------------------------|------------|------------------|----------------------|
| Clean running water | 128 (48.7) | 117 (44.5) | 18 (6.8) |
| Soap | 232 (88.2) | 31 (11.8) | 0 (0.0) |
| Clean towel | 209 (79.5) | 51 (19.4) | 3 (1.1) |
| Bathroom | 262 (99.6) | – | 1 (0.4) |
| Toilet | 223 (84.8) | – | 40 (15.2) |

Table 6. Correlation between age at menarche and access to menstrual hygiene facilities with menstrual hygiene practices

| Variable | r | p-value |
|------------------------------|-------|---------|
| Age at menarche | 0.147 | 0.017 |
| Access to hygiene facilities | 0.588 | 0.000 |

possible score, indicating that adolescents generally demonstrated a moderate level of correct menstrual hygiene practices.

Most adolescents reported menstrual cycles within the normal range (21–35 days), accounting for 42.6% of respondents. A small proportion (0.8%) did not provide information or were unaware of how to calculate their menstrual cycle length. The main variables examined in this study included adolescents' hygiene practices related to genital care during menstruation and their access to menstrual hygiene facilities. The detailed distribution of menstrual hygiene practices is presented in Table 4 and Table 5. The findings indicate that a considerable proportion of adolescents still change their menstrual pads only every six to eight hours (44.9%). Only 17.5% consistently washed their hands with soap after changing pads, and merely 17.1% consistently dried their genital area after washing. Proper rinsing techniques, such as washing from front to back, were practiced by only 23.6% of respondents. These results highlight that several essential components of menstrual hygiene are still inadequately practiced.

Table 5 demonstrates that access to sanitation and menstrual hygiene facilities is generally adequate. Nearly half of the respondents (48.7%) had access to clean running water, while 84.8% reported having access to a toilet. These conditions suggest that although facilities are available, disparities remain, particularly regarding water access.

The Spearman correlation analysis (Table 6) revealed a statistically significant positive correlation ($p < 0.05$) between age at first menstruation and menstrual hygiene practice scores, as well as between access to hygiene facilities and menstrual hygiene practice scores. The positive direction of the correlation indicates that increases in each independent variable are associated with increases in menstrual hygiene practice scores. The correlation coefficient for age at menarche suggests a weak but significant relationship, whereas the coefficient for access to hygiene facilities indicates a strong and substantial association with menstrual hygiene practices.

DISCUSSION

Menstruation is a physiological event experienced by all women, with the first occurrence typically emerging during early puberty, generally between the ages of 10 and 13 years. The menstrual process is closely linked to personal hygiene, particularly the cleanliness of the reproductive organs. Menstrual personal hygiene practices among adolescents represent one of the fundamental determinants in improving adolescent reproductive health. This issue is highly relevant to the achievement of several targets within the Sustainable Development Goals (SDGs). Menstrual Hygiene Management (MHM) contributes directly to Goal 3 on good health and well-being, Goal 4 on quality education, Goal 5 on gender equality, and Goal 6 on clean water and sanitation [15]. The intended outcome is that every adolescent should have access to adequate facilities and be able to practice proper menstrual hygiene to achieve optimal health.

This study is grounded in the theoretical framework proposed by UNICEF regarding factors associated with menstrual hygiene. According to UNICEF, knowledge and skills, social support, facilities, and services are all significantly related to menstrual hygiene practices. Within this framework, age at menarche is categorized as a sociodemographic variable, while access to hygiene facilities is measured based on the availability of toilets and clean water [2,15]. The dependent variable, menstrual hygiene practice was assessed through behaviors related to genital care and environmental cleanliness, such as proper disposal of used menstrual pads. The implementation of menstrual hygiene practices among adolescents, which shows that a large proportion of adolescents still change their menstrual pads after more than six hours, despite the recommended frequency being every four hours, even when the pad does not feel full. The longer a pad is worn, the greater the opportunity for bacterial growth and contact with the genital area, increasing the risk of infection. Furthermore, used pads should be wrapped and disposed of in a waste bin to prevent them from becoming a source of disease transmission. In this study, most adolescents frequently wrapped and disposed of used pads in waste bins.

The onset of menstruation typically occurs during early puberty, between the ages of 10 and 13 years. This developmental milestone requires adolescents to possess adequate physical readiness, psychological preparedness, and sufficient knowledge regarding menstruation, its relationship to pregnancy, potential health risks, and menstrual hygiene management. Age at menarche is one factor that may influence adolescents' menstrual hygiene practices [16]. The results of the bivariate analysis indicate that the later an adolescent experiences menarche, the better her menstrual hygiene practices tend to be, and vice versa. This finding aligns with Havighurst's developmental theory, which states that one of the developmental tasks of adolescence is accepting physical changes and being able to perform associated roles while achieving independence [17]. The findings of this study are also consistent with research conducted among adolescents in Southern Ethiopia, where adolescents younger than 15 years were significantly associated with poor menstrual hygiene practices [18]. Experiencing menstruation at a very young age may result in inadequate preparedness, leading to limited skills in managing menstrual hygiene. The weak correlation observed in this study suggests that early or late menarche alone is insufficient to determine menstrual hygiene practices; rather, it must be supported by other predisposing and enabling factors to strengthen proper hygiene behaviors. Therefore, providing early education and exposure to menstrual hygiene concepts can help adolescents develop better hygiene practices even at the onset of early adolescence.

Another important enabling factor influencing menstrual hygiene practices is access to hygiene facilities. Statistical analysis also demonstrated a positive correlation, indicating that the more hygiene facilities adolescents can access, the better their menstrual hygiene practices become. In general, adolescents in this study had access to essential hygiene facilities, as shown in Table 4. The strong correlation and substantial relationship indicate that ease of access to hygiene facilities during menstruation, such as clean water for changing pads every four hours, soap for handwashing after pad changes, and clean towels for drying significantly enhances menstrual hygiene management. The availability of toilets and clean water at home and school increases adolescents' opportunities to maintain menstrual hygiene effectively. The relationship between access to hygiene facilities and menstrual hygiene practices has been supported by several studies conducted among school-aged adolescents in Indonesia and Kenya, which found that the availability of hygiene facilities was significantly associated with menstrual hygiene behaviors [19-21]. One limitation identified in this study is that adolescents did not fully understand basic menstrual concepts, including the duration of menstruation and how to calculate the menstrual cycle.

CONCLUSION

The findings of this study indicate that menstrual hygiene practices among adolescents are generally performed adequately, supported by relatively sufficient access to hygiene facilities. The study demonstrates a significant correlation between age at menarche and access to hygiene facilities with menstrual hygiene practices. Therefore, age at menarche and access to hygiene facilities serve as predictors of menstrual hygiene practices among adolescents in peri-urban areas of Jayapura City. Among these variables, access to hygiene facilities shows a strong correlation and substantial influence on menstrual hygiene practices.

Ethical consideration, competing interest and source of funding

-Ethical considerations were observed throughout the research process. Participants were informed about the study's objectives, procedures, and their rights as respondents. Each participant provided informed consent prior to completing the questionnaire. Confidentiality was strictly maintained, and respondents were assured that their answers would remain anonymous and would be used solely for research purposes. No identifying information was collected, and participation was entirely voluntary without any form of coercion.

-There is no conflict of interest related to this publication.

-Source of funding is authors.

REFERENCES

1. Noor MS, Husaini, Puteri AO, Rosadi D, Anhar VY, Laily N, et al. Buku panduan kesehatan reproduksi pada remaja. 1st ed. Rahayu A, Muddin FI, editors. Yogyakarta: Mine; 2020. 146 p.
2. Torondel B, Sinha S, Mohanty JR, Swain T, Sahoo P, Panda B, et al. Association between unhygienic menstrual management practices and prevalence. *BMC Infect Dis.* 2018;18(1):473.
3. Janoowalla H, Keppler H, Asanti D, Xie X, Negassa A, Benfield N, et al. The impact of menstrual hygiene management on adolescent health: The effect of Go! pads on rate of urinary tract infection in adolescent females in Kibogora, Rwanda. *Int J Gynecol Obstet.* 2020;148(1):87–95.
4. Putri REPE, Fitriahadi E. Perilaku kebersihan menstruasi pada siswi SMP di Kota Yogyakarta. *JHeS (Journal Health Stud).* 2021;5(1):62–8.
5. Ariyanti L, Kusumaningayu WAD, Prabandari FI, Ramadhani AN. Dysmenorrhea and practice of menstrual hygiene in adolescent females. *Gaster J Kesehatan.* 2024;22(1):25–33.
6. Kotwal S, Charak G, Kumar S, Shekhar S, Gupta KL. Knowledge and practice of menstrual hygiene and reproductive tract infection in adolescent girls in Doda District of Jammu and Kashmir Territories, India. *Int J Integr Health Sci.* 2022;10(2):59–64.
7. Ngaruiya VW, Mutisya R, Ngeranwa JJN. Relationship between menstrual hygiene management and lower reproductive tract infections among adolescent girls in informal settlements in Nakuru County, Kenya. *J Med Nurs Public Health.* 2022;5(2):88–106.
8. UNICEF. Guide to menstrual hygiene materials. 1st ed. Poirier P, editor. New York: UNICEF; 2019. 37 p.
9. Borkar SK, Borkar A, Shaikh MK, Mendhe H, Ambad R. Study of menstrual hygiene practices among adolescent girls in a tribal area of Central India. *Cureus.* 2022;14(10):1–8.
10. Gupta S, Agarwal A, Sharma A, Agrawal P. Assessment of menstrual hygiene practices and their determinants among adolescent girls in urban slums of India: A community-based cross-sectional study. *Cureus.* 2025;17(8):1–10.
11. Nugroho HSW, Santosa BJ. Misleading use of the terms of univariate and bivariate analysis in health research. *Health Notions.* 2019 Aug 31;3(8):352-6.
12. Suparji, Nugroho HSW, Martiningsih W. Tips for distinguishing nominal and ordinal scale data. *Aloha International Journal of Multidisciplinary Advancement (AIJMU).* 2019;1(6):133-5.
13. Nugroho HSW. Cangkir Santi 3: Hati-hati menafsirkan data persentase [Internet]. Facebook. 2025 Aug 19 [cited 2026 Jan 3]. Available from: <https://www.facebook.com/reel/1487784492242902>
14. Nugroho HSW. Cangkir Santi 50: Mengenal data kategorik [Internet]. Facebook. 2025 Nov 11 [cited 2026 Jan 3]. Available from: <https://www.facebook.com/reel/1491544275449826>
15. UNICEF. Menstrual health and hygiene. 1st ed. Poirier P, editor. New York: UNICEF; 2019.
16. Bahtiar H, Nasir NM. Determinan praktik kebersihan menstruasi santriwati pondok pesantren di Sulawesi Selatan. *J Relig Public Health.* 2023;5(2):101–14.
17. Putro KZ. Memahami ciri dan tugas perkembangan masa remaja. *Apl J Apl Ilmu-ilmu Agama.* 2017;17(1):25–32.
18. Belayneh Z, Mekuriaw B. Knowledge and menstrual hygiene practice among adolescent school girls in southern Ethiopia: A cross-sectional study. *BMC Public Health.* 2019;19(1):1–8.
19. Nisa AH, Dharminto, Winarni S, Dharmawan Y. Faktor-faktor yang berhubungan dengan praktik personal hygiene saat menstruasi pada remaja putri Pondok Pesantren Al Asror Kota Semarang tahun 2019. *J Kesehat Masy.* 2020;8(1):145–51.
20. Triharini M, Pratiwi IN, Kusumaningrum T, Pradanie R, Novianti RS. What affects menstrual hygiene behaviour of full-day school adolescents? *Malaysian J Med Health Sci.* 2022;18(Suppl 17):126–32.
21. Manyara MB, Okube OT. Challenges associated with menstrual hygiene among adolescent girls attending Bocharia Primary School in Nyamira County, Kenya. *Open J Obstet Gynecol.* 2023;13(9):1610–24.