


Research Paper

Menstrual hygiene management in the remote rural highlands of eastern Indonesia

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ABSTRACT

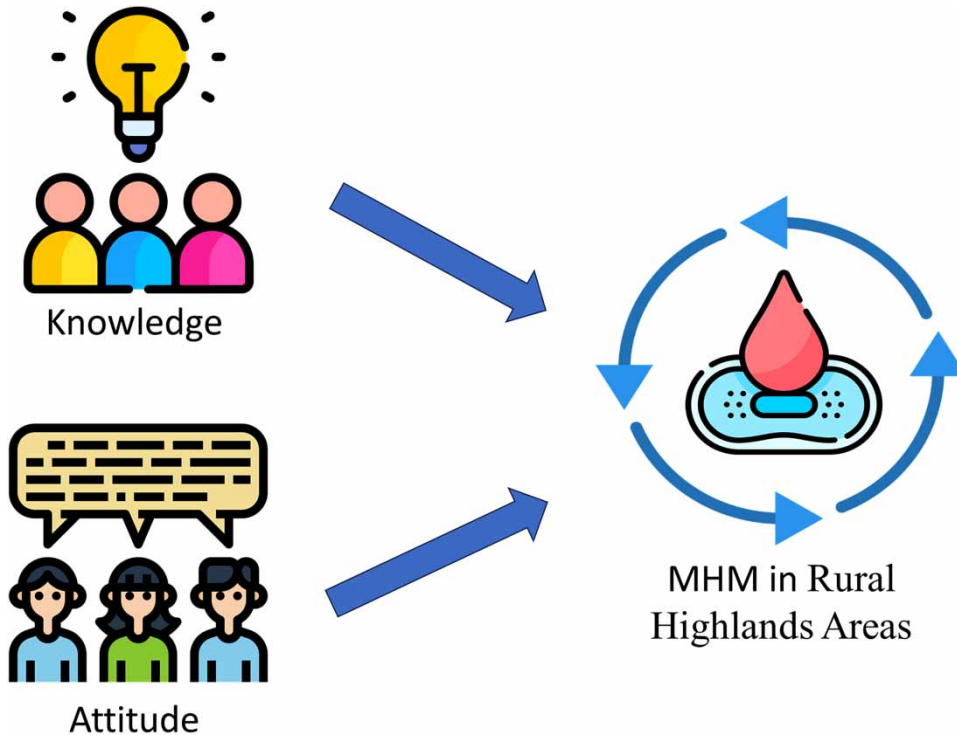
Menstrual Hygiene Management (MHM) is essential for women's health, but it is often regarded as a taboo topic. This study investigates the practice of MHM in rural and remote Indonesian highlands. A cross-sectional study was conducted among 492 adolescent girls and adult women in the Jayawijaya and Central Mamberamo Districts of Papua Province. Principal component analysis and multiple regression analyses were used to examine the relationships among the respondents' knowledge, attitudes, and MHM practices. The perception that discussing MHM is taboo exists in this area, and certain cultural rituals are associated with a young girl's first period. The respondents have moderate knowledge and attitudes regarding MHM. Furthermore, their practices after using sanitary pads are unhygienic, may increase the risk of reproductive tract infections, and may pollute the environment. Some variables are positively associated with appropriate MHM practice, namely knowledge of MHM, the perception that menstruation must be kept private, and the importance of using sanitary pads. Finally, the results show that schools do not provide a supportive environment for girls during their period. Overall, there is a need to increase MHM knowledge and foster positive attitudes to enhance healthy MHM among women in the rural and remote highlands of Indonesia.

Key words: highlands, Indonesia, knowledge, menstrual hygiene management, Papua

HIGHLIGHTS

- We assess MHM practice in remote rural highlands of Indonesia.
- We assess the MHM-related perceptions.

GRAPHICAL ABSTRACT



INTRODUCTION

Adolescence is a transitional period between childhood and adulthood characterized by physical and mental changes in females. The onset of menstruation for the first time (menarche) is one such change. Prior to menarche, females must be aware of the monthly menstrual cycle that lasts for several days, in order to practice Menstrual Hygiene Management (MHM). The issue of menstrual health is a human right (Babbar *et al.* 2022). According to the Sustainable Development Goal (SDG)6.2, special attention must be given to the needs of women and girls, i.e., MHM.

MHM consists of hygiene practices and health requirements that are necessary during menstruation, including a lavatory with running water and soap, sanitary pads, and a place to dispose of MHM materials. Davis *et al.* (2018) define a poor or insufficient MHM as a woman performing any of the following practices: changing MHM materials less frequently than every 8 h; or not cleaning hands before and after changing MHM materials; or not washing the external genitalia at least once per day. Therefore, water, sanitation, and hygiene (WASH) facilities are required for effective MHM practice. Although MHM is closely related to health, there are still disparities in MHM practice, including access to sanitary napkins, in low- and middle-income countries (LMICs) (Rossouw & Ross 2021). Access to appropriate WASH facilities is also a problem in some LMICs, including disparities between urban and rural areas and between wealthy and poor people (WHO & UNICEF 2021).

Women need MHM knowledge to improve their own health (Wall *et al.* 2016). As observed in Ethiopia (Shumie & Mengie 2022), those with insufficient knowledge are unable to practice MHM correctly, whereas in Bhutan (Tshomo *et al.* 2021), MHM is practiced effectively despite poor levels of MHM knowledge. In many contexts, including Indonesia (Triharini *et al.* 2022), menstruation is a taboo perception that discourages women from discussing menstruation and engaging in appropriate MHM practices. Consequently, we contend that the factors associated with MHM practices are complex.

Davis *et al.* (2018) discovered that approximately 60% of schoolgirls in Indonesia practice insufficient MHM. They also found that poor MHM practices are associated with rural living and lack of menstrual knowledge that menstruation is frequently considered unclean and that discussing menstruation is forbidden. Nudy Purwanto *et al.* (2022) reported that in Indonesia, MHM practice is associated with knowledge, attitude, and interpersonal factors. A multi-country study, which included Indonesia, discovered disparities in MHM practices based on affluence, education, and urban–rural status (Rossouw & Ross 2021). These studies suggest that contextual and psychological factors influence MHM practices in Indonesia.

In addition, we may hypothesize that the knowledge, attitude, and practice (KAP) levels are predominantly poor in areas with restricted access to MHM materials, MHM information, or even cultural barriers, i.e., remote rural areas, are predominantly poor. However, to the best of our knowledge, no study has investigated MHM-related KAP in these areas of Indonesia. Therefore, the present study seeks to investigate this phenomenon by focusing on two mountainous regions of Papua Province as case studies. This is an ideal location for two reasons. First, mountains of Papua are inaccessible by road because they can only be accessed by air (Ananta *et al.* 2016), which may hinder the distribution of MHM products and also information. Second, insufficient access to water is also a problem in this region. Therefore, the findings of this study may expand our understanding of MHM practices in remote and rural areas of Indonesia and facilitate the implementation of programs that can increase the proper practice of MHM in similar locations.

METHODS

Data collection

The cross-sectional study was conducted from April to June 2022 in two districts of the province of Papua: the Central Mamberamo (Ninugagas, Ilugwa, and Kelila Villages) and Jayawijaya (Abusa, Air Garam, and Wollo Villages) Regencies (Figure 1). A quarter of the population of Papua Province is impoverished, making it the poorest region in Indonesia (Nugraha & Bhwana 2023). Due to the mountainous and hilly terrain, coupled with limited access to transportation, it is difficult to transport materials and resources to all communities in these areas (Saktina & Khoirunnurrofik 2022).

We originally targeted 500 participants for this study which we assumed to be sufficient for statistical analysis and the maximum number of participants that can be handled by the project funding. However, during data collection, only 486 adolescent girls and adult women participated. In total, 15 schools, three public health centers (*Puskesmas* in Bahasa), and five churches served as interview locations. First, we chose several villages in each district. We then purposively selected the largest schools in those areas for interviewing of adolescent students. Notably, not every village in that area has its own school, i.e., one school is used by two or nearby villages. After securing permission from the headmasters or teachers of these schools to collect data, the girls who wanted to participate were asked to stay longer at school for interviews.

For the adult women, we approached the leaders of the largest church in those areas and asked them to invite adult women who are married and have children to be interviewed. In that area, every village has at least one or two small churches. We also asked *Puskesmas* to invite the women to be interviewed. The main inclusion criteria were native residents in that village, while for the adolescent students, they must have already experienced menstruation. The Ethics Committee of the Health

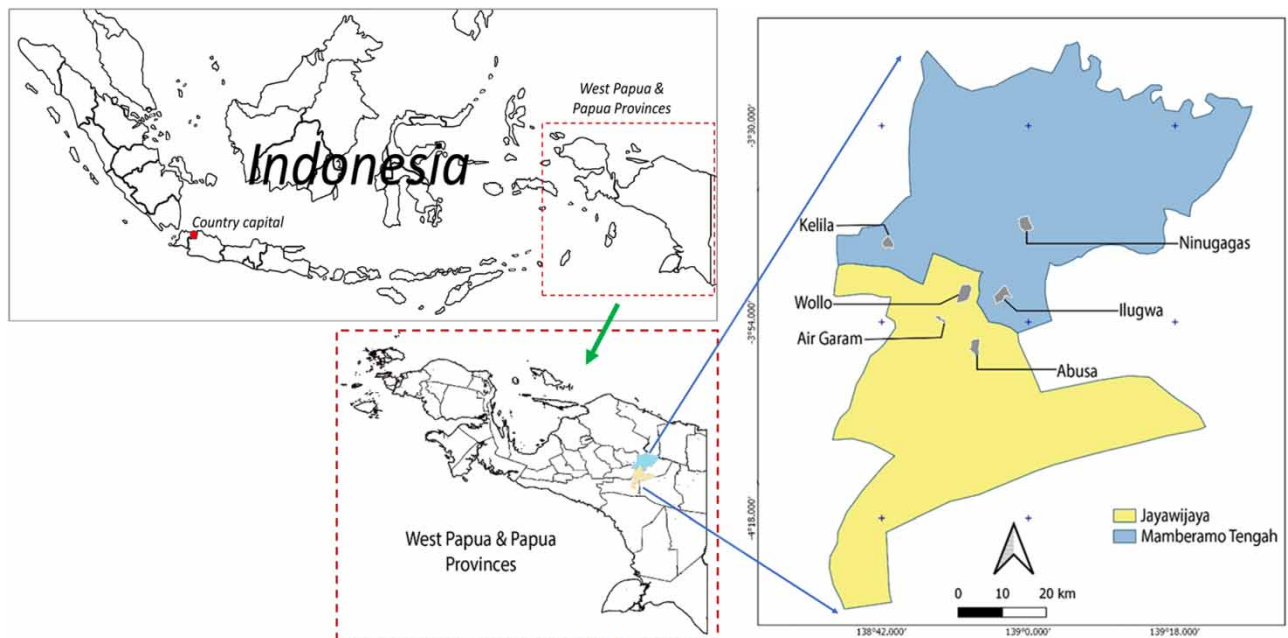


Figure 1 | Map of the study areas.

Polytechnic of the Ministry of Health in Jayapura approved the study protocol with Statement of Ethical Eligibility No. 005/KEPK-J/III/2022. Prior to the interviews, all participants gave their informed consent. If a respondent was below the legal age, the parent or trustee was required to accompany the respondent during the interview.

Instruments

Consultations with some experts led to the improvement and modification of the questionnaire design. In the survey, data collection was disaggregated based on characteristics, particularly for female adults and adolescents. We conducted different surveys for adolescent girls and adult women, in which the lists of questions had slight variation. The girls' questionnaire had a total of 205 questions, while the adult women's questionnaire had 171 questions. The questionnaires were written in Bahasa Indonesia and included the following sections: (1) respondent's identification, (2) knowledge of menstrual hygiene, (3) attitude toward menstrual hygiene, (4) MHM and related practices, (5) beliefs related to MHM, (6) cultural values related to MHM, (7) access to sanitary napkins, (8) support from family and others, and (9) facilities related to MHM. Using the ODK Collect application on the enumerators' phones, questionnaires designed as digital surveys were used to collect data. The enumerators (all women) were asked to upload the data to the main server when there was an internet signal. The enumerators were local people who have experience in conducting interviews and understood the local language and local culture. They were also trained before data collection.

Data analysis

The knowledge-related statements in the questionnaires for adolescent girls and adult women are comparable. However, the attitude and MHM practice-related queries or statements were slightly different between the two questionnaires, i.e., those for adolescent girls and adult women. As we combined data from both questionnaires for this analysis, we chose similar attitude and MHM practice-related questions and statements from both questionnaires. For this analysis, there are 13 correct-incorrect statements regarding MHM knowledge, five questions on MHM attitudes, and six questions on MHM practice. The questions regarding MHM practice cover several aspects: use of sanitary pads during the period, drying of reproductive organs, cleaning and disposal of sanitary pads, and foods eaten during menstruation. We assumed that these questions cover the entire process of safe MHM practice, including steps to minimize the careless disposal of sanitary pads. Furthermore, we did not distinguish between different types of pads in this study, e.g., reusable and disposable pads.

We added all correct responses to create a composite variable related to knowledge, with a range of 0 (no correct answers) to 13 (all correct answers). For the attitude-related queries, we utilized a four-point Likert scale (ranging from 1 = 'not at all agree' to 4 = 'strongly agree'). The highest result indicates a favorable opinion of the MHM. Six queries on MHM practices were either 'correct' (score of 1, i.e., they should be practiced), or 'not correct' (score of 0). For example, in the query 'Do you use feminine hygiene products during your period?', the answer is '1' if they respond 'yes' and '0' if they respond 'no'. All queries and statements can be found in [Table 1](#). We also summed up the scores for all correct practices to obtain a composite variable related to practice, ranging from 0 (no correct MHM practice at all) to 6 (respondent performs all correct MHM practices).

Due to missing information, such as age, education, or attitude variables, 41 observations were excluded from the analysis. Thus, 451 respondents' data, or 92% of the original respondents, were included in the statistical analysis. The final sample consisted of 329 adult women (66.9%) and 163 adolescent girls (33.1%). The composite scores of the MHM practices were utilized as the dependent variable for a forced-entry multivariate regression analysis. The knowledge composite score and all five attitude-related variables acted as independent variables. Using principal component analysis (PCA), we previously attempted to merge all five attitude variables into a single composite variable. The assumptions of a decent PCA were not met, i.e., Cronbach's of 0.7 and Kaiser-Meyer-Olkin (KMO) of 0.5 ([Daniel et al. 2020](#)). Therefore, we chose to include all five attitude-related variables in the regression analysis. Age, years of education, and district were also included as control variables in the regression. Thus, the regression analysis included a total of nine independent variables.

RESULTS

Descriptive information of the respondents

The average age of all respondents was 27.88 years (SD = 13.28). Among all adolescent girls, the majority (41%) had at least a high school degree, followed by 35% of junior high school students. Among all adult women, the majority (52%) did not have

Table 1 | Descriptive statistics of MHM-related knowledge, attitudes, and practices

Variables	Scale	Mean (SD)
Knowledge related to the MHM		
Composite scores of the knowledge from 13 variables	0–13	6.40 (2.20)
Attitude		
1. Menstruation is something that must be kept secret	1–4	1.78 (0.90)
2. For me, using a cloth/towel during menstruation makes me uncomfortable	1–4	2.22 (1.03)
3. For me, keeping myself clean during menstruation is unnecessary and troublesome.	1–4	2.30 (1.10)
4. I feel the need to wash my hands before and after changing sanitary napkins during menstruation	1–4	3.02 (1.02)
5. Do you think that using sanitary pads during menstruation is important?	1–4	3.62 (0.81)
Practices		
1. Do you dry your reproductive organ area after cleaning it?	0–1	0.70 (0.46)
2. Do you use sanitary pads during menstruation?	0–1	0.82 (0.38)
3. How do you dispose of sanitary napkins or menstrual supplies that you no longer use?	0–1	0.28 (0.45)
4. Where do you clean sanitary napkins/cloths/towels during menstruation?	0–1	0.26 (0.44)
5. Where do you dispose of sanitary napkins/cloths/towels during menstruation?	0–1	0.55 (0.50)
6. What foods do you usually eat when you are menstruating?	0–1	0.02 (0.14)
Composite scores of the MHM practice from six variables	0–6	2.63 (1.17)

any formal education, followed by 17% of primary school students and 11% of high school students. These results imply that the adult women respondents had relatively low levels of education.

Around 70% of the respondents used disposable pads ($n = 340$), while 30% used cloth or traditional materials ($n = 146$). For the latter, plant-based elements such as stems, leaves, bark, and roots were rolled (23 people), woven (two people), and worn as a skirt (one person) to create traditional materials. One of three respondents stated that a special ceremony was performed when they began to menstruate, indicating that menstruation was considered part of the local culture. Around 20% of the respondents stated that it was forbidden to discuss menstruation in public because it was regarded as dirty blood and a humiliating subject. Each respondent purchased disposable pads from a store or market.

More than half of the respondents reported discussing their first period with their mothers. Similarly, mothers served as the primary caregivers at the onset of menstruation. However, almost 20% of all respondents said that they did not receive any help from anyone else during their first period. Nevertheless, almost half of the adolescent girls received an explanation about menstruation from their parents, and the parents also motivated them to maintain hygiene during menstruation. Less than 30% of the adolescent girls said that their peers remind them to maintain hygiene during menstruation. In addition, one in four respondents did not share their experiences with anyone. More than 80% of the respondents had never heard any information about menstruation from any media.

The survey from the adolescent respondents shows some information about MHM practices at school. More than 60% of the girls said that they always or often did not go to school during their periods. Furthermore, almost all girls reported that the school did not provide any menstrual products that can be used during the period, and almost all of them said that they had never heard teachers talk about MHM to male students. Moreover, about two-thirds of the female respondents said that MHM should be taught at school.

Table 1 displays the results of the MHM-related KAP questions and statements. The respondents' knowledge regarding MHM was moderate, with a mean score of 6.40 out of a maximum of 13. The average value of the five attitude-related variables was 2.60 (SD = 0.41, range = 1–4), indicating a moderate level of attitude toward MHM. The attitude variable with the lowest mean score is 'Menstruation is something that must be kept a secret', indicating that the majority of respondents believed that they should not discuss their periods with others. In addition, the greatest mean attitude score was related to the significance of using menstrual pads.

Comparing the level of knowledge between adult women and adolescent girls, the level of knowledge of adult women ($M = 6.78$, $SD = 2.28$) was higher than that of adolescent girls ($M = 5.63$, $SD = 1.80$) ($t(397) = 6.05$, p -value < 0.001). Among all five attitude-related statements or questions, there were significant differences between adult women and adolescent girls in three statements or questions: (Statement no. 2) 'For me, using a cloth/towel during menstruation makes me uncomfortable' ($t(300) = -2.54$, p -value $= 0.12$), (no. 4) 'I feel the need to wash my hands before and after changing sanitary napkins during menstruation' ($t(416) = -6.65$, p -value < 0.001), and (no. 5) 'Do you think using sanitary pads during menstruation is important?' ($t(458) = -3.53$, p -value < 0.001). In statements 2 and 4, the mean values were higher in adolescent girls than in adult women, but the mean value in statement 5 was higher in adult women than in adolescent girls.

Overall, the respondents' MHM practices were relatively inadequate, with a mean score of 2.63 out of a maximum of 6, i.e., the composite variable of six questions. Among six questions, good MHM practices, as indicated by relatively high mean scores, included using a sanitary liner ($M = 0.82$, range = 0–1) and drying the reproductive organ area after cleansing ($M = 0.7$). However, the practices following the use of sanitary napkins were unhygienic, as indicated by the low mean scores of the questions 'How do you dispose of sanitary napkins?' ($M = 0.28$) and 'Where do you clean sanitary pads?' ($M = 0.26$). In addition, the respondents did not eat iron-rich foods during their menstrual cycle ($M = 0.02$).

Regression results

Table 2 shows the results of the regression analysis. Four variables were significantly related to MHM practice ($p < 0.001$): (1) respondents' location in the Memberamo Tengah District, (2) their knowledge, (3) their attitude that menstruation is a secret, and (4) their attitude that it is essential to use sanitary napkins. All significant coefficients were positive, indicating that an increase in the values or levels of these four variables was associated with improved MHM practice. Knowledge about MHM was the most influential variable (the highest β value in Table 2), indicating that the respondents were more likely to exercise an appropriate MHM if they had a solid understanding of it. The influence of the other three significant variables on MHM practice was comparable, as indicated by their corresponding values. Furthermore, the regression equation explained 24.4% of the variance in the MHM practice output variable.

DISCUSSION

To the best of our knowledge, this is the first study to investigate the levels of MHM-related KAP among adult and young women in remote rural highlands in developing countries. While past studies have focused more on urban locations or school settings, only a few have investigated rural areas, including highland areas. The levels of knowledge and attitude were considered moderate, whereas the MHM practice was considered poorly applied. This research is similar to another study in rural Nepal (Adhikari *et al.* 2007), where the levels of knowledge and attitude are found to be better than the respondents' practices. Worse conditions were even found in rural Pakistan, where the levels of all KAP were poor (Shah *et al.* 2023).

Table 2 | Results of the regression analysis

Independent variables	B	SE B	β	95% CI
Constant	0.19	0.31		-0.42–0.80
District = Memberamo Tengah	0.43	0.10	0.19*	0.25–0.62
Age	0.00	0.00	0.02	0.00–0.00
Education	-0.02	0.02	-0.04	-0.05–0.02
Knowledge	0.11	0.02	0.22*	0.07–0.16
Attitude -menstruation is a secret	0.24	0.06	0.19*	0.13–0.34
Attitude – cloth is uncomfortable	-0.05	0.05	-0.05	-0.15–0.04
Attitude – clean menstruation is unnecessary	0.06	0.04	0.05	-0.03–0.14
Attitude – need to handwash when changing sanitary pads	-0.02	0.05	-0.02	-0.11–0.08
Attitude – important to use sanitary pads	0.33	0.08	0.19*	0.18–0.49

Adjusted $R^2 = 0.244$, $n = 451$.

* $p \leq 0.001$.

In our study, knowledge and two items related to attitude, i.e., ‘menstruation is a secret’ and ‘important to use sanitary pads’, were positively associated with the practice of MHM. The association between knowledge and the practice of MHM has also been reported in other MHM studies in Indonesia (Davis *et al.* 2018; Nudy Purwanto *et al.* 2022). Interestingly, if the respondents thought that menstruation should be kept a secret, they were more likely to engage in a good MHM practice. This is in line with a previous study in Indonesia (Davis *et al.* 2018), but in contrast with another study in Bhutan (Tshomo *et al.* 2021). Women who do not like to talk about their period may possibly think that MHM is something that needs to be taken care of personally. Additionally, if the respondents felt the importance of using sanitary pads, they were more likely to practice good MHM which could be because they already understood the benefits of using sanitary pads.

We found that the use of feminine hygiene products, e.g., sanitary pads, during menstruation was relatively common. However, the practices following the use of sanitary pads were less hygienic, i.e., the way women clean and dispose of sanitary napkins. This was also observed in a separate study conducted in Indonesia (Davis *et al.* 2018). In our survey, the cleaning and disposal of menstrual products, e.g., throwing them without cleaning, burning them in open spaces, combining them with domestic waste, or flushing them in the toilet, were considered unsafe, potentially causing pollution to the environment, and creating related health hazards. This may be the result of the average levels of knowledge and disposition related to disposal, as indicated in another study (Kaur *et al.* 2018). It is also conceivable that they lack proper facilities, such as a handwashing station or a restroom (Elledge *et al.* 2018). Therefore, it is necessary to promote the safe disposal of MHM materials among women in this region, such as by educating the women about the negative impacts of improper disposal of menstrual products on the environment.

According to Sooki *et al.* (2016), the family, particularly the mother, is the primary source of MHM information in the home. Nevertheless, not all respondents in our study informed their mothers. It is uncertain why this is the case. Therefore, we contend that the dissemination of MHM knowledge should target both mothers and daughters. One of the primary messages is the significance of informing mothers about the girl’s period or menstruation.

Our findings indicated that schools in the study areas did not provide a supportive and favorable environment for the female students, i.e., there were no available menstrual products and teachers never talked about MHM to male students. As a result, most female students did not attend school during their periods. These facts underline the importance of creating female or menstruation-friendly schools in these areas. Furthermore, teachers must be knowledgeable about MHM, and there should be a committee of teachers and parents, including both male and female members, at schools. Making male students aware of MHM is also necessary. This is because bullying from male students often occurs, making female students uncomfortable (Benshaul-Tolonen *et al.* 2020). This could be because of a lack of knowledge and misinformation about MHM among male students (Kaur *et al.* 2018; Gundi & Subramanyam 2020). Therefore, male students should also be targeted in the education about MHM. All these efforts should also be accompanied by the provision of menstrual products at school (Rawat *et al.* 2023), especially in cases where female students forget to bring menstrual products to school. Finally, good support from all elements at the school can create a favorable environment for female students during their periods.

This research demonstrates that menstruation is closely tied to the existing culture in remote rural Papua. When females experience their first menstruation, the community performs certain rituals, and the family must invite close relatives to the ceremony. One of the reasons for this is to pray for the girl’s future. Another ritual requires the girl’s relative to braid their hair to prevent excessive blood loss. Many women in villages, regardless of their socio-economic status, still adhere to their customs and perform this ritual. This type of belief and ritual can also be found in India (Garg & Anand 2015) and Nepal (Kumar & Maity 2022). However, we do not consider these rituals harmful to a wholesome MHM practice, but rather an opportunity to promote good MHM practice. For example, an explanation about appropriate MHM that is shared by the mothers with their daughters who are experiencing their first menstruation can be included in the ritual ceremony.

Moreover, our findings indicate that there are still respondents who believe that menstrual blood is filthy and that discussing it is socially unacceptable. This finding is similar to findings in many settings, such as India (Vishwakarma *et al.* 2021; Singh *et al.* 2022), Pakistan (Mansoor *et al.* 2020), Bangladesh (Pandit *et al.* 2022), Ghana (Gyasi-Gyamerah *et al.* 2022), Nigeria (Odey *et al.* 2021), and Vanuatu (Wilbur *et al.* 2022). As further elaborated by Garg & Anand (2015), this perception of menstrual taboo may hinder the spread of healthful MHM practices in this region. Women, particularly young females, may be hesitant to learn about or discuss this topic with their peers.

Our study has some limitations. First, one may see this study as a preliminary study in this area. There is a need to learn more about the perceptions of women related to MHM. For this, we recommend using a more advanced psychological framework, e.g., the risk, attitude, norms, ability, and self-regulation (RANAS), and also including socio-economic factors in the

analysis to investigate behavioral determinants of MHM at a deeper level (Daniel *et al.* 2021b). A comprehensive analysis of financial, institutional, environmental, social, and technical factors is also needed, including the relationship among them to better understand the situation in rural areas (Daniel *et al.* 2021a). The relationship between socio-economic conditions (SECs), perceptions, and MHM practice is also worthy of further analysis in this rural-remote setting. This is because 'unsupportive' SEC may influence perceptions and then the practices related to such perceptions (Daniel *et al.* 2020). For example, difficult access to social media may limit their understanding of MHM. This study also relies on self-reported answers which have the potential for self-reported bias. Furthermore, future studies should also investigate barriers for supportive schools regarding MHM. We also did not distinguish the variation of sanitary pads often used by women, e.g., reusable (cloth) or disposable pads. We acknowledge that there should be a variation of attitudes between the different sanitary pads used. Thus, future studies should distinguish this variation. Finally, future MHM studies in these areas should investigate the reproductive health aspect of women, e.g., the risk or occurrence of reproductive tract infections (RTI), and relate it to MHM practices. This will provide a comprehensive understanding of the situation and serve as a baseline for any kind of health or MHM-related intervention.

CONCLUSION

In the remote highlands of Papua, most respondents had never heard of MHM-related information from any media platform. In contrast, MHM practice is significantly influenced by their level of knowledge. Based on the data, the level of knowledge related to MHM is moderate, i.e., half of the total score. In this kind of society, there are taboo assumptions regarding menstruation, making it difficult to educate the community about MHM. Thus, there is a need to raise public awareness to reduce the presumption that menstruating women are unclean and to increase discussions about menstruation in society. To prevent environmental contamination, it is crucial to educate adolescent girls and women about proper hygiene in relation to changing and disposing of sanitary pads. Since increasing knowledge and attitudes about MHM is the most effective way to enhance MHM in society, program officers and health promoters should think about how they can promote MHM effectively and make it more culturally acceptable, without changing any important cultural values. Mothers should also use the moment of the first menstruation ritual to teach their daughters about MHM. Finally, efforts should be made toward MHM education that targets male students and other stakeholders at school. Such efforts should create a supportive environment to make women comfortable during their menstruation.

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DATA AVAILABILITY STATEMENT

Data cannot be made publicly available; readers should contact the corresponding author for details.

CONFLICT OF INTEREST

The authors declare there is no conflict.

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