

DEVELOPMENT, VALIDATION, AND RELIABILITY TESTING OF A MENSTRUAL HEALTH AND HYGIENE QUESTIONNAIRE (MHHM-Q) FOR FEMALE SECONDARY SCHOOL STUDENT

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ABSTRACT

Menstruation is a regular physiological process for women and adolescent girls across the globe. For a young girl, the onset of menstruation is a significant milestone in her life. In many cultures, menarche represents a transition into womanhood. The ability to menstruate symbolizes her fertility and the capacity to create new life. Poor management of menstrual health and hygiene can predispose young girls to various health-related issues, such as an increased risk of infection. Therefore, assessing their understanding and practices related to menstrual health and hygiene management (MHHM) is crucial to ensuring their menstrual health and safety. The objective of this study is to develop and validate a questionnaire to assess the knowledge and practices of MHHM among female adolescents. A cross-sectional study was conducted to develop the questionnaire, and items were identified and generated through a literature review. Content validation was performed by experts, and the content validity index (CVI) was calculated. Face validation was conducted with 10 secondary school girls, and the face validity index (FVI) was measured. Reliability analysis was carried out to assess the internal consistency of the MHHM-Q. Results: A total of 26 MHHM-Q items were finally developed. The item CVI and FVI values were both greater than 0.8. The Cronbach's alpha values for the MHHM domains were 0.834 for the knowledge components and 0.716 for the practice component. In conclusion, the MHHM-Q demonstrated good validity and reliability for measuring MHHM understanding among female secondary school adolescents. This study provided evidence of validity in terms of content, response process, and internal structure, supporting the use of MHHM-Q in assessing menstrual health and hygiene management knowledge among female adolescents.

Keywords: Menstrual health, menstrual hygiene, menstrual health questionnaire.

INTRODUCTION

Menstrual health and hygiene management (MHHM) are vital components of adolescent health, significantly influencing the well-being, reproductive health, and future quality of life of young girls. Menstruation, a normal physiological process, is a universal experience for females worldwide, marking a key developmental milestone during adolescence. However, this natural process is often surrounded by social stigma, misconceptions, and a lack of accurate information, which can lead to adverse health outcomes and hinder young girls' academic and social potential (Patel et al., 2020). Ensuring proper menstrual health management is crucial, as inadequate practices can increase the risk of infections, reproductive health issues, and reduced psychological well-being (Geertz et al., 2021).

Despite its importance, many adolescent girls remain underinformed about menstruation and lack access to safe and appropriate menstrual hygiene products. A recent review by Kuhlmann et al. (2022) found that in many contexts, young girls face barriers to accessing menstrual products and are often unaware of basic menstrual hygiene practices, such as changing pads regularly, using clean materials, and maintaining genital hygiene. These barriers are frequently rooted in cultural beliefs, social taboos, and the absence of comprehensive menstrual health education in schools (Benshaul-Tolonen et al., 2020). As a result, adolescent girls may experience feelings of shame and discomfort, leading to a negative body image, poor self-esteem, and reluctance to participate in daily activities during their menstrual periods.

The implications of poor menstrual hygiene management extend beyond health, significantly disrupting educational attainment and social engagement. Research indicates that inadequate MHHM resources, the unavailability of appropriate sanitation facilities, and a lack of menstrual products are primary contributors to school absenteeism among adolescent girls (Hennegan et al., 2021). Studies in low-resource settings have documented that over one in five girls miss school during their menstrual periods due to fears of leaks, lack of sanitary facilities, and bullying related to menstrual stains (Mason et al., 2022). These challenges can have lasting effects on girls' education, reducing their academic performance and perpetuating gender disparities in educational outcomes.

The early teenage group, particularly girls approaching menarche, represents a critical population for study. Inadequate menstrual health knowledge and poor hygiene practices at this stage can lead to long-term consequences, including increased risk of reproductive tract infections, school absenteeism, and negative impacts on self-esteem. Addressing these issues early can help prevent adverse outcomes and promote healthier menstrual habits.

In recent years, global efforts to improve menstrual health and hygiene have focused on creating effective, evidence-based strategies to provide comprehensive education and adequate resources to support girls' menstrual needs. One such approach is the development of reliable and culturally sensitive assessment tools to evaluate menstrual health knowledge, attitudes, and practices (Rosenbaum et al., 2020). These tools are essential for understanding factors influencing menstrual health and designing targeted interventions to address knowledge gaps and promote positive practices.

The existing literature on menstrual health predominantly emphasizes menstrual hygiene practices, which vary significantly across cultural contexts (Hennegan et al., 2021; Nwimo et al., 2022). Although studies on menstrual hygiene in Malaysia have explored various aspects of menstrual practices among women and older adolescents, such as university students, a significant gap remains in addressing menstrual health knowledge and practices among early teenage girls in secondary schools (Mariappen et al., 2022; Mat Daud et al., 2024). Existing research, including studies on university students in Pahang and urban women in Kuala Lumpur, has primarily focused on older age groups or specific populations (Roselan et al., 2024; Mohamad Bakro et al., 2023).

A study by Mat Daud et al. (2024) assessed the knowledge of menstruation among young adolescent girls in rural areas of Negeri Sembilan, Malaysia, using the Menstrual Practices Questionnaire (MPQ) developed by Hennegan et al. (2020). The findings revealed that most respondents still require additional information on menstrual health and hygiene. However, while the MPQ covers various aspects of menstrual practices, it has limitations, as it does not fully capture the cultural, religious, and social nuances specific to Malaysian adolescents.

This study aims to address this gap by developing and validating a Menstrual Health and Hygiene Management Questionnaire (MHHM-Q) tailored to female secondary school students. The MHHM-Q is designed to assess two primary dimensions: knowledge of menstrual health and hygiene practices. The questionnaire was developed through a rigorous process, including item generation based on an extensive literature review, expert content validation, and face validation with a group of secondary school students to ensure clarity, relevance, and cultural appropriateness. The content validity index (CVI) and face validity index (FVI) were used to evaluate the items, and internal consistency was assessed using Cronbach's alpha to ensure reliability.

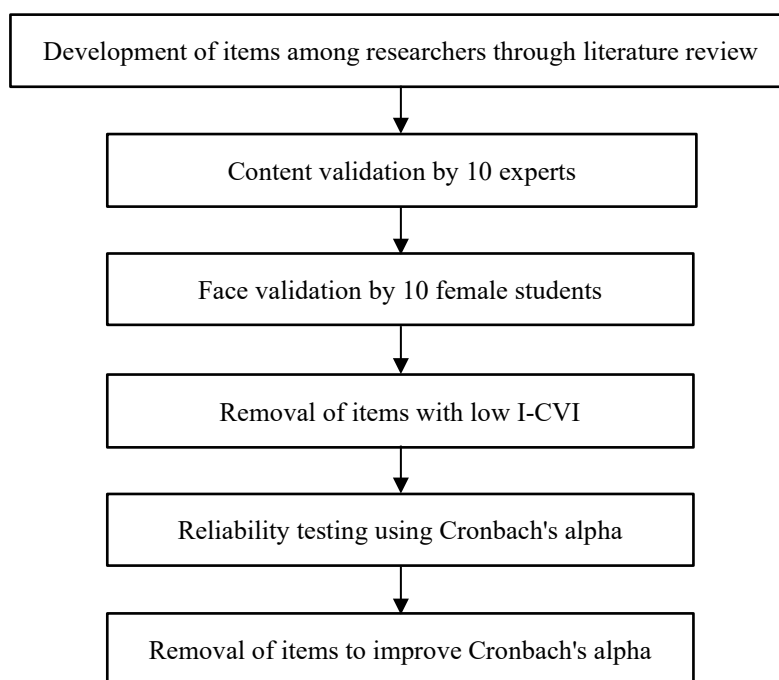
The primary objective of this study is to establish a robust tool for measuring MHHM knowledge and practices among female adolescents. Specifically, the study seeks to (1) outline the development process of the MHHM-Q, (2) present the results of content and face validation, and (3) report the reliability outcomes. A validated MHHM-Q will provide researchers, educators, and policymakers with a comprehensive instrument for assessing menstrual health knowledge and practices among female adolescents, facilitating the identification of knowledge gaps and the design of evidence-based health interventions. Furthermore, the MHHM-Q can serve as a baseline tool in future research to evaluate the effectiveness of educational programs aimed at improving menstrual health management and reducing stigma and misconceptions.

METHODOLOGY

This study was conducted in two phases. The first phase involved identifying domains of menstrual health and hygiene through a comprehensive literature review, followed by item generation.

The second phase focused on validating the items in terms of content (content validation) and response processes (face validation), followed by an assessment of internal consistency. Content validity refers to the extent to which an instrument is relevant to and representative of the construct being measured for a specific purpose (Yusof, 2019). Face validity refers to the extent to which respondents understand and interpret the test content as intended (Yusof, 2019). The development and validation process of the MHHM-Q is summarized in Fig. 1.

Figure 1: Flowchart of Research Questionnaire Development



Development of MHHM-Q items

The items in the knowledge and practice domains were developed by researchers through literature review and discussion with experts in family medicine. A total of 35 items were brainstormed and developed by research team members for the knowledge and practice of MHHM. The items were initially constructed in the English language and underwent forward and backward translation process to obtain the final version of English and Malay version.

Validation of MHHM-Q items

Content validation

The first version of MHHM (MHHM 1.0) was sent out to a panel of content experts to review the relevancy of MHHM-Q items. The experts were selected based on their qualification and research experience related to the family medicine and gynaecologist field. The minimum numbers of content experts for the content validation process were set at least six experts (Yusof,2019). A total of 10 experts were invited to perform the content validation task through an official email invitation letter. These 10 experts consist of five family medicine specialist and another five from gynaecologist specialist. The experts were provided with a content validation form and requested to judge the degree of relevance of each item based on the recommended 4-rating scales for the content validation (1 = the item is not relevant to the measured domain; 2 = the item is somewhat relevant to the measured domain; 3 = the item is quite relevant to the measured domain, and 4 = the item is highly relevant to the measured domain) (Yusof,2019; Polit et al,2007). They were also requested to provide written comments on any items that required modifications or subjected to removal. Content validity index (CVI) was calculated based on the following parameters (Yusof,2019; Polit et al,2007).

- i. I-CVI (item-level content validity index): The proportion of content experts giving an item a relevance rating of 3 or 4.
- ii. S-CVI (scale-level content validity index): The average of the I-CVI scores for all items on a scale.

The acceptable I-CVI value was set at a minimum of 0.78, while the acceptable S-CVI value was at a minimum of 0.80 (Yusof,2019; Polit et al,2007). Based on the I-CVI values, items with I-CVI less than 0.80 were rejected, items with I-CVI at least 0.83 but less than 1 were re-discussed, and items with I-CVI of 1.0 were accepted.

Face Validation

The face validation was performed after the content validation and the main purpose was to examine the clarity of instructions and language whether there were ambiguities or multiple ways to interpret the items (Yusof,2019). The second version of MHHM-Q (MHHM-Q 2.0) was sent out to a panel of test respondents to review the clarity of all the items. The number of test respondents for face validation was set at a minimum of 10 (Yusof,2019).

In our study, the test respondents were females secondary school adolescent. A total of 10 female secondary school adolescents in Kuantan were approached and invited to perform the face validation task. They were requested to judge the clarity of each item based on the recommended 4-rating scales (1 = item is not clear; 2 = item is somewhat clear; 3 = item is quite clear and 4 = item is highly clear) [25]. They were also requested to provide written comments on any items that required modifications.

All students involved in the face validation step had grant a written consents from their parent prior to fill in the face validity form. Face validity index (FVI) was calculated based on the following parameters (Yusof,2019).

- i. I-FVI (item-level face validity index): The proportion of test respondents giving an item a clarity rating of 3 or 4.
- ii. S-FVI (scale-level face validity index): The average of the I-FVI scores for all items on a scale.

The acceptable I-FVI value was set at a minimum of 0.80, while the acceptable S-FVI value was at a minimum of 0.83 (Yusof,2019). Based on the I-FVI values, items with value less than 0.80 were rejected, and items with value more than 0.80 were accepted.

Following the content and face validation process, the reliability analysis was performed to assess the internal consistency of MHHM-Q items. The questionnaire was distributed to the 40 females secondary school students in Kuantan Pahang after received approval and consent from Ministry of Education, school principal and parents. The reliability of our MHHM-Q was represented by Cronbach’s alpha coefficient. Field (2009) suggested any scales with Cronbach’s alpha values of more than 0.70 are considered as having a high level of internal consistency.

Scoring method

The scoring marks for all the items was based on the marks that were achieved by the participants. There were three possible response which were YES, NO and DON’T KNOW for all the items. The DON’T KNOW option was included to reduce the likelihood of guessing and score ‘0’.

Participants scored one mark for a correct response and no mark were given for a wrong or don’t know response. The maximum score for all the items based on the total number of items in the final MHHM-Q tool while the minimum score was zero. There was no cut off point to describe either good or poor knowledge and practice score for MHHM-Q. The higher the score means the better their knowledge and practice.

RESULT

A total of 35 initial items in the English language were generated from a literature review. During a research meeting, the items were reviewed by all researchers, and a consensus was reached to finalize 28 items for MHHM-Q 1.0.

Content Validity Index (CVI)

The CVI assessed the relevance and representativeness of each item for specific domains, as evaluated by a panel of experts. Each item was rated on a Likert scale ranging from 0 (not relevant or not representative) to 4 (highly relevant or highly representative). Ten expert panel members were invited to participate in the content validation study. The panel comprised five family medicine specialists and five gynaecologist specialists from the Ministry of Health Malaysia. All were female and had over 10 years of experience in the medical field.

The S-CVI score was 0.82 for the knowledge section and 0.95 for the practice section of the MHHM-Q. Out of the 28 items, 27 were accepted without modification, while one item was rejected due to an I-CVI score of less than 0.80. This process resulted in the development of MHHM-Q 2.0, which consisted of a total of 27 items.

Face Validity Index (FVI)

The FVI assessed the comprehensibility and clarity of each item from the perspective of the respondents. Items were rated on a Likert scale ranging from 0 (difficult to comprehend or unclear) to 4 (easy to comprehend or clear). The raw scores were entered into Microsoft Excel to calculate the item-level face validity index (I-FVI) and scale-level face validity index (S-FVI) for both comprehensibility and clarity.

Based on the ratings, the S-FVI was 0.96 for the knowledge section and 0.95 for the practice section. No items were rejected following the face validation study, as all 27 items had an I-FVI score greater than 0.80. At this stage, MHHM-Q 3.0 was finalized, retaining a total of 27 items.

Table 1: The I-CVI, S-CVI, I-FVI, S-FVI

| Knowledge | Items | I-CVI | S-CVI | I-FVI | S-FVI |
|-----------|---|-------|-------|-------|-------|
| K1 | Average of menstrual cycle day | 1 | 0.87 | 1 | 0.96 |
| K2 | Timing of menstruation | 0.9 | | 0.8 | |
| K3 | Menstruation -breakdown of uterus lining | 0.9 | | 1 | |
| K4 | Menstruation more than 7 days is normal | 0.8 | | 1 | |
| K5 | Menstruation cycle is controlled by brain | 1 | | 1 | |
| K6 | Achieved menstruation indicate puberty | 1 | | 0.9 | |

| | | | | | |
|-----------------|--|-----|------|-----|------|
| K7 | Menstruation stopped when reach menopause | 1 | | 1 | |
| K8 | Menstruation is a curse by Allah/God | 0.3 | | 0.9 | |
| K9 | Menstrual cycle consists of three phases | 0.9 | | 0.9 | |
| K10 | Personal hygiene during menstruation is crucial to prevent infection | 1 | | 1 | |
| K11 | Bad odor during menstruation is normal. | 1 | | 1 | |
| K12 | "Pain or cramps during menstruation are normal." | 1 | | 1 | |
| Practice | | | | | |
| P1-a | Absorbent during menses-sanitary pad | 1 | 0.96 | 0.8 | 0.93 |
| P1-b | Absorbent during menses-Cloth/reusable/washable materials | 1 | | 0.8 | |
| P1-c | Absorbent during menses-Tampon | 1 | | 1 | |
| P2 | Genital hygiene | 1 | | 1 | |
| P3 | Hand hygiene | 1 | | 1 | |
| P4 | Sanitary pad changing frequency | 0.9 | | 1 | |
| P5 | Undergarments changing frequency | 1 | | 1 | |
| P6 | Disposal technique | 1 | | 0.9 | |
| P7 | Privacy of sanitary pads changing area | 0.8 | | 1 | |
| P8 | Waste disposal system at school | 0.9 | | 1 | |
| P9 | Food restriction during menstruation | 0.8 | | 0.8 | |
| P10 | Absent from school during menstruation | 1 | | 1 | |
| P11 | Ingestion of painkiller during menstruation pain | 1 | | 1 | |
| P12 | Avoiding religious places during menstruation | 1 | | 1 | |
| P13 | Storage of sanitary pads in the bathroom | 0.9 | | 0.8 | |
| P14 | Wrapping of used sanitary pads before disposal | 1 | | 1 | |

I-CVI item-level content validity index; S-CVI scale-level content validity index; I-FVI item-level face validity index; S-FVI scale-level face validity index.

Reliability Analysis

The consistency of the survey results can be verified by checking the reliability of the questionnaire. The consistency and hence reliability of a questionnaire can be determined and evaluated using its internal consistency, test-retest reliability, inter-rater reliability, parallel form reliability, and split-half reliability. Internal consistency is a measure of the inter-correlation of the items of the questionnaire and hence the consistency in the measurement of intended construct. The commonly used method for measuring internal consistency is by calculating the Cronbach Alpha coefficient (Aithal et al,2020).

The initial Cronbach's alpha for the entire questionnaire, which consisted of 27 items, was 0.694, indicating moderate internal consistency. Upon reviewing the item-total statistics, it was observed that removing item P12, which was related to visiting religious places during menstruation, increased the Cronbach's alpha to 0.745 (Table 2). This suggests that item P12 might have been problematic, as its inclusion reduced the overall reliability of the scale. Statistically, when the removal of an item improves Cronbach's alpha, it often indicates that the item does not correlate well with the other items, possibly due to being conceptually different or inconsistent with the overall domain being measured. In this case, the question on religious practices during menstruation may not align closely with the other items related to menstrual hygiene practices, contributing to its weaker correlation.

Finally, the Cronbach's alpha for the knowledge scale was found to be 0.834, indicating strong internal consistency, while the practice scale, after removing the item P 12, showed a reliability coefficient of 0.761, reflecting an acceptable level of consistency (Table 2). The final version of MHHM-Q comprises of 11 items in the knowledge section and 15 items in the practice section.

Table 2: Cronbach's Alpha for Knowledge and Practice Scales

| Scale | Number of Items | Cronbach's Alpha |
|-------------------------|-----------------|------------------|
| Whole Questionnaire | 27 | 0.694 |
| After Deleting Item P12 | 26 | 0.745 |
| Knowledge Scale | 11 | 0.834 |
| Practice Scale | 15 | 0.761 |

DISCUSSION

The Development and Validation of the Menstrual Health and Hygiene Management Questionnaire (MHHM-Q) represent a significant step toward addressing menstrual health challenges among adolescent girls in Malaysia. The findings from this study not only demonstrate the validity and reliability of the MHHM-Q but also provide critical insights into the menstrual knowledge and hygiene practices of secondary school students. These findings have vital implications for health education initiatives aimed at improving menstrual hygiene management (MHM) among adolescents, particularly in regions where cultural taboos and limited resources persist.

Content Validity Index (CVI)

The strong item-content validity index (I-CVI) scores for knowledge items indicate that the content experts found the questionnaire to be relevant and appropriate for assessing menstrual health knowledge. These scores reflect the consensus among experts regarding the questionnaire's content but do not directly measure adolescents' understanding of menstrual health and hygiene. For instance, items such as the average menstrual cycle length (K1) and the normalcy of cramps during menstruation (K12) were rated highly by the experts, confirming their importance in evaluating menstrual health knowledge. However, the high I-CVI does not necessarily imply that students themselves possess a strong understanding of these topics.

Face and Content Validation

The content validation process, involving ten experts in family medicine and gynecology, confirmed that the MHHM-Q adequately reflects the core components of menstrual health knowledge and practices. The S-CVI scores of 0.82 for the knowledge section and 0.95 for the practice section indicate a well-constructed tool. These results align with similar studies employing rigorous validation methods for health-related questionnaires (Polit & Beck, 2020). Furthermore, the high face validity index (S-FVI = 0.96 for knowledge and 0.95 for practice) suggests that the items are clear and easily understood by adolescent respondents. This clarity is essential for successful administration of the MHHM-Q in school settings, where literacy and health awareness levels may vary among students.

The high face validity scores are consistent with findings from Bolarinwa (2018), who emphasized the importance of clarity and comprehensibility in questionnaires designed for adolescents. The use of Likert scales and the involvement of a panel of experts in the validation process further enhanced the face validity of the MHHM-Q.

Reliability Analysis

Reliability is a crucial aspect of instrument development, ensuring that the tool consistently measures the intended constructs over time and across populations (DeVellis, 2017). In this study, the Cronbach's alpha value for the entire questionnaire was 0.694, indicating moderate internal consistency. After removing item P12, the Cronbach's alpha increased to 0.745, suggesting that removing this item improved the overall reliability of the questionnaire. This result aligns with the principles of scale refinement, where removing poorly aligned items enhances the tool's consistency (DeVellis, 2017).

The knowledge scale showed strong internal consistency (Cronbach's alpha = 0.834), indicating that the knowledge items were well-correlated and effectively assessed the intended construct. In contrast, the slightly lower reliability of the practice scale (Cronbach's alpha = 0.761) highlights potential variability in respondents' understanding and engagement with menstrual hygiene practices. This variability may arise from cultural differences, limited access to menstrual hygiene products, or differing levels of education, as reported in similar contexts (Kuhlmann et al., 2022; El-Gilany et al., 2018).

The removal of item P12 (related to avoiding religious places during menstruation) improved the Cronbach's alpha for the practice scale, indicating that cultural or religious beliefs may not significantly influence menstrual hygiene practices among the study population. This finding contrasts with studies in India and Kenya, where religious beliefs significantly impacted menstrual practices (Benshaul-Tolonen et al., 2020). The weaker correlation of item P12 with other practice-related items suggests that menstrual hygiene education should prioritize health-related behaviors over cultural practices.

The Cronbach's alpha values observed in this study align with similar research on health-related questionnaires. For instance, Aithal and Sheeraman (2020) noted that Cronbach's alpha values between 0.70 and 0.80 are acceptable for newly developed instruments, particularly in early validation stages. Polit and Beck (2020) also emphasized that while higher alpha values

are desirable, they are not always necessary for practical use, especially in complex social and health domains where behaviors vary widely among populations.

Future Directions

Test-retest reliability is another critical component of evaluating an instrument's stability over time. Although this study did not include test-retest analysis, future research could aim to assess this aspect to confirm the MHHM-Q's stability when administered at different time points. Test-retest reliability is particularly important in educational settings where students' knowledge and practices may evolve over time due to learning or external factors (DeVellis, 2017).

Implications for Menstrual Health Education

The findings of this study highlight the necessity of creating culturally tailored educational tools that encompass both menstrual knowledge and practices. The gap between knowledge and practice, as highlighted by the lower practice domain scores, suggests that while adolescents may understand the biological aspects of menstruation, they may struggle to adopt proper hygiene practices. This is particularly concerning given the link between poor menstrual hygiene and increased risk of reproductive tract infections (RTIs) (Kuhlmann et al., 2022; El-Gilany et al., 2018). As such, school-based menstrual health education programs should prioritize practical demonstrations of hygiene practices, such as the correct use of sanitary products, proper disposal techniques, and the importance of maintaining genital hygiene. In addition to addressing menstrual health and hygiene, it is critical to consider the psychosocial aspects surrounding menstruation among adolescents, particularly in cultural contexts where menstruation remains a taboo topic. Studies have shown that young girls often experience shame and social isolation during menstruation, which can lead to lowered self-esteem and reluctance to engage in daily activities, including school (Geertz et al., 2021). Integrating menstrual education within broader reproductive health programs can provide adolescents with essential knowledge while fostering a supportive environment that normalizes menstruation and reduces stigma. Research highlights that comprehensive menstrual health education is linked with improved menstrual management practices, which in turn enhances psychological well-being and academic participation among adolescent girls (Hennegan et al., 2021). Addressing these psychosocial dimensions in menstrual health initiatives may be particularly beneficial in promoting a holistic approach to adolescent health, impacting both educational and social outcomes (Kuhlmann et al., 2022).

Furthermore, the exclusion of item P12 highlights the need to carefully balance cultural sensitivity with health education. While it is important to respect cultural practices, menstrual health education should prioritize scientifically supported practices that promote health and well-being. The high I-CVI scores for items related to personal and genital hygiene (P2 and P3) suggest that these topics resonate well with the respondents and should be emphasized in future interventions.

LIMITATIONS AND FUTURE RESEARCH

While this study has developed and validated the MHHM-Q, certain limitations must be acknowledged. The sample for face validation consisted of only 10 respondents, all from a single geographical location. Future studies should aim to test the MHHM-Q in a more diverse population to ensure its applicability across different cultural and socio-economic contexts. Additionally, while the study achieved good internal consistency, further research is needed to assess the test-retest reliability of the MHHM-Q, which would provide insight into its stability over time.

Another area for future research is the inclusion of qualitative data to complement the quantitative findings from the MHHM-Q. Conducting focus group discussions with respondents could provide deeper insights into the social and cultural factors that influence menstrual health practices. Understanding these factors would allow for more targeted interventions that address the specific needs and challenges faced by adolescent girls.

CONCLUSION

In conclusion, the development and validation of the MHHM-Q fill an important gap in menstrual health research in Malaysia. The content and face validity, along with reliable internal consistency scores, indicate that the MHHM-Q is a reasonably effective instrument for assessing menstrual health knowledge and practices among secondary school students, despite the absence of construct validity testing. As schools and health educators strive to promote improved menstrual health practices, the MHHM-Q can serve as a useful tool for assessing the impact of these interventions and informing future health education initiatives.

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