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Bridging Knowledge and Readiness: The Relationship Between Menstrual Awareness and Menarche Preparedness Among Elementary School Girls in Badung, Bali

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Abstract

Menarche represents a key developmental transition in early adolescence, making it essential to understand how menstrual knowledge shapes girls' preparedness for this event. This cross-sectional study examined the relationship between menstrual knowledge and menarche preparedness among elementary school girls in Badung, Bali. A total of 150 students in grades 4–6 from five public schools, purposively selected due to low literacy and numeracy indicators, participated in the study. Data were collected using validated, self-administered questionnaires assessing menstrual knowledge and preparedness. Chi-square analysis with Odds Ratio (OR) estimation was employed. Most participants demonstrated good menstrual knowledge (60.0%) and were categorized as prepared for menarche (63.3%). A significant association was observed between menstrual knowledge and preparedness ($p < 0.001$; OR = 5.50; 95% CI: 2.65–11.41), indicating that students with higher knowledge levels were substantially more likely to be well prepared. Parental support and exposure to information from schools or health professionals also appeared to contribute to improved preparedness. These findings underscore the importance of strengthening school-based reproductive health education, complemented by active family engagement and culturally appropriate learning materials, to enhance early menarche readiness among young girls.

Keywords: menarche, menstrual knowledge, preparedness, elementary school girls, reproductive health education.

INTRODUCTION

Menarche, the onset of the first menstrual cycle, marks a major developmental milestone in early adolescence and indicates the attainment of reproductive maturity. Although it is a normal biological transition, many young girls experience fear, confusion, or anxiety when entering this stage without adequate information or emotional support(1).

Menstrual knowledge is central to preparing girls both physically and emotionally for this transition. Sufficient understanding promotes healthy hygiene practices, builds confidence, and minimizes misconceptions or negative emotions related to menstruation. In contrast, limited knowledge may lead to distress, embarrassment, or unhygienic behaviors(2,3). Prior research has demonstrated that higher levels of menstrual knowledge are associated with greater psychological readiness for menarche and reduced anxiety(4,5), highlighting the importance of structured and evidence-based education provided by both schools and families.

In Indonesia, open discussion about menstruation is still constrained by cultural norms and the lack of standardized reproductive health education at the elementary school level. Consequently, many girls rely on peers or social media as their primary information sources, increasing the potential for misinformation(6-7).

Badung Regency in Bali provides a meaningful context in which to examine this issue. Despite having relatively strong educational and health infrastructures, disparities persist, particularly in schools with low literacy and numeracy outcomes. Ac-

cording to the 2025 *Asesmen Kompetensi Minimum* (AKM) report, five public elementary schools in Badung were identified as having the lowest performance scores and were selected to represent a population that may face greater challenges in accessing or interpreting health-related information(8-11).

Although awareness of menstrual health has improved in recent years, research in Bali examining the relationship between menstrual knowledge and menarche preparedness among elementary school girls remains limited, especially in settings with lower literacy achievement. This study therefore aimed to assess menstrual knowledge among elementary school girls in Badung Regency, evaluate their level of readiness for menarche, and determine whether an association exists between the two.

METHODS

This study employed a quantitative analytic observational design with a cross-sectional approach to assess the relationship between menstrual knowledge and menarche preparedness among elementary school girls in Badung Regency, Bali. Data were collected at a single time point to characterize current conditions and evaluate associations between variables.

The research was conducted in five public elementary schools in Badung Regency: SD Negeri 5 Jimbaran, SD Negeri 1 Canggu, SD Negeri 1 Sempidi, SD Negeri 1 Darmasaba, and SD Negeri 3 Abianbase. These schools were purposively selected based on their status as the lowest-performing institutions in literacy and numeracy according to the 2024 *Asesmen Kompetensi Minimum* (AKM) report, thereby representing populations with potentially limited health literacy.

The study population consisted of female students in grades 4–6. Inclusion criteria were: (1) having not yet experienced menarche, (2) having received basic information about menstruation, (3) provision of parental consent, and (4) presence during data collection. Students who had already menstruated or who did not complete the questionnaire were excluded.

The sample size was determined using the Slovin formula with a 5% margin of error, yielding a final sample of 150 participants. Stratified random sampling by school and grade ensured proportional representation across the study sites.

The independent variable was menstrual knowledge, and the dependent variable was menarche preparedness. Control variables included age, grade level, parental support, and sources of menstrual information.

Data were collected using a structured, self-administered questionnaire developed from established adolescent reproductive health literature and adapted to the cognitive level of elementary school students. The instrument comprised three sections: (1) demographic information (age, grade, parental support, and information sources); (2) menstrual knowledge, assessed through 15 multiple-choice items scored 1 for correct and 0 for incorrect responses; and (3) menarche preparedness, measured using 10 Likert-scale statements. Content validity was evaluated by three experts, resulting in a Content Validity Index (CVI) of 0.87. Construct validity was assessed using Corrected Item–Total Correlation ($r \geq 0.30$), and reliability testing produced a Cronbach's alpha value above 0.7, indicating acceptable internal consistency.

Prior to data collection, written permission was obtained from school principals, and informed consent was secured from parents. Students received standard explanations regarding the study objectives and questionnaire procedures. All questionnaires were completed individually under supervision and checked immediately for completeness.

Data analysis was conducted using SPSS software. Univariate analysis described respondent characteristics and distributions of menstrual knowledge and preparedness. Bivariate analysis using the Chi-square (χ^2) test examined the association between the two main variables. Statistical significance was set at $p < 0.05$. The strength of association was reported using Odds Ratios (ORs) with 95% confidence

intervals (CIs). Logistic regression was considered but not performed due to limitations related to sample size and the categorical nature of the variables.

Ethical principles, including informed consent, anonymity, confidentiality, and non-maleficence, were upheld throughout the research process.

RESULTS

Characteristics of Respondents

A total of 150 elementary school girls participated in the study. Table 1 presents the distribution of respondents according to age, grade level, sources of menstrual information, and parental support.

Table 1. Characteristics of Respondents (n = 150)

Characteristics	Category	Frequency (n)	Percentage (%)
Age (years)	9	42	28.0
	10	65	43.3
	11	43	28.7
Grade Level	Grade 4	48	32.0
	Grade 5	55	36.7
	Grade 6	47	31.3
Source of Menstrual Infor-	Mother	60	40.0
	Teacher	48	32.0
	Peers / Internet	42	28.0
Parental Sup-	Supportive	94	62.7
	Not Sup-	56	37.3

Most respondents were 10 years old (43.3%) and enrolled in Grade 5 (36.7%). The mother was the most frequently reported source of menstrual information (40.0%). Additionally, 62.7% of students perceived their parents as supportive regarding menstrual education.

Menstrual Knowledge Level

Table 2 summarizes the distribution of menstrual knowledge among respondents.

Table 2. Distribution of Respondents by Level of Menstrual Knowledge

Knowledge Category	Frequency (n)	Percentage (%)
Good	90	60.0
Poor	60	40.0
Total	**150**	**100.0**

A total of 60.0% of respondents demonstrated good menstrual knowledge, while 40.0% showed poor understanding. These findings indicate that more than half of the students were familiar with fundamental concepts such as the definition of menstruation, early signs, and appropriate hygiene practices.

Menarche Preparedness

Respondents' readiness to experience their first menstruation is shown in Table 3.

Table 3. Distribution of Respondents by Menarche Preparedness Level

Preparedness	Frequency (n)	Percentage (%)
Ready	95	63.3
Not Ready	55	36.7
Total	**150**	**100.0**

Overall, 63.3% of respondents were categorized as ready for menarche, demonstrating adequate emotional and behavioral preparedness. However, 36.7% remained unprepared, indicating the need for strengthened menstrual education beginning before the onset of puberty.

Association Between Menstrual Knowledge and Menarche Preparedness

Chi-square (χ^2) analysis revealed a statistically significant association between menstrual knowledge and menarche preparedness ($p < 0.001$). Test assumptions were met, with more than 80% of expected cell counts exceeding the minimum requirement, confirming the appropriateness of the analytic method.

The Odds Ratio (OR) of 5.50 (95% CI: 2.65–11.41) indicates that students with

good menstrual knowledge were 5.5 times more likely to be prepared for menarche than those with poor knowledge.

Table 4. Relationship Between Menstrual Knowledge and Menarche Preparedness

Menstrual Knowledge	Ready (n)	Not Ready (n)	Total (n)	p-value	OR (95% CI)
Good	75	15	90	0.000	5.50 (2.65–11.41)
Poor	20	40	60		
Total	**95**	**55**	**150**		

These findings confirm a strong and statistically significant association between better menstrual knowledge and higher readiness for menarche. Girls with greater understanding were considerably more prepared to navigate their first menstruation both emotionally and behaviorally.

Supporting Factors

Descriptive observations further indicated that girls with good readiness commonly received consistent parental guidance and engaged in school-based health education activities. Open communication with mothers or teachers was associated with lower anxiety and greater confidence in anticipating menarche. Conversely, students who relied primarily on peers or internet sources tended to exhibit lower preparedness, underscoring the importance of structured, credible, and supportive educational environments.

DISCUSSION

This study investigated the association between menstrual knowledge and menarche preparedness among elementary school girls in Badung Regency, Bali. A statistically significant association was observed between the two variables ($p < 0.001$; OR = 5.50; 95% CI: 2.65–11.41), indicating that respondents with higher menstrual knowledge were substantially more likely to be classified as prepared for menarche than those with lower knowledge levels. Although the cross-sectional design limits causal inferences, the findings suggest that adequate menstrual literacy may contribute to psychological and behavioral readiness during the transition to puberty.

A majority of respondents (63.3%) were categorized as ready for menarche. This proportion may reflect increasing access to reproductive health information within schools and the growing normalization of menstrual health discussions in educational settings. However, the remaining 36.7% who were not yet ready underscore persistent gaps in menstrual literacy and emotional preparedness, reinforcing the need for earlier, more structured, and developmentally appropriate interventions for preadolescent girls.

The present findings are consistent with previous research demonstrating a positive relationship between menstrual knowledge and preparedness(4,5). Studies from various contexts have shown that greater menstrual literacy is linked to improved emotional regulation, higher confidence, and better coping during the onset of menstruation(12–15). These observations align with global recommendations that emphasize early and comprehensive menstrual health education as a cornerstone of adolescent health promotion[1,20].

Knowledge appears to play a central role in shaping psychological readiness. When menstruation is understood as a normal and healthy biological process, girls are less likely to interpret its onset as frightening or shameful(16). Higher levels of knowledge have been associated with improved hygiene management, greater self-efficacy, and more positive emotional responses during puberty(2,17–19). Accordingly, timely information may help normalize menstruation and reduce anxiety during menarche.

In this study, respondents with higher knowledge scores were more likely to be classified as ready for their first menstruation, potentially due to their ability to recognize premenstrual changes, understand hygiene practices, and anticipate bodily transitions. These elements of preparedness may facilitate a smoother psychological adjustment to early adolescence.

Parental support, particularly from

mothers, was also observed as a notable contributor to preparedness. Respondents who reported open communication within the family tended to demonstrate greater readiness and lower anxiety. This aligns with prior evidence showing that maternal involvement is associated with more positive emotional responses during menarche (20). In the Indonesian context, however, menstruation remains a sensitive topic, and open discussion may be constrained by cultural norms, especially in more traditional households. Such barriers may limit the transmission of accurate information and perpetuate misconceptions or fear(10). Strengthening parental engagement through community-based education and school–family partnerships may therefore enhance menstrual preparedness. Families play an essential role in creating supportive environments, reinforcing accurate messages, and helping girls view menstruation as a healthy developmental milestone rather than a source of embarrassment(20,21).

Schools also emerged as important sites for menstrual health literacy. A considerable proportion of respondents identified teachers as their primary source of information, highlighting the role of educational institutions as trusted and accessible channels for reproductive health instruction. Structured school health programs, such as *Usaha Kesehatan Sekolah* (UKS), and collaborations with community health centers may further enhance students' understanding through age-appropriate and interactive learning. Evidence from other countries indicates that school-based interventions improve both menstrual knowledge and preparedness(21–24). Nonetheless, program implementation must remain culturally sensitive, particularly in settings where discussing menstruation is considered private or inappropriate in mixed-gender groups. Integrating menstrual health into broader life skills or health curricula may help foster an inclusive learning environment while ensuring essential information is consistently delivered.

The cultural context of Bali presents particular considerations for menstrual health education. While the region benefits from relatively progressive education systems, traditional beliefs may still influence attitudes toward menstruation. In some families, discussions may be delayed until the girl reaches puberty, based on the belief that earlier conversations are premature. However, in this study, several respondents aged 9–10 were already approaching menarche, emphasizing the importance of initiating education earlier, a recommendation consistent with global guidance advocating reproductive health education at least two years before the anticipated onset of menstruation(19).

The inclusion of schools with lower academic performance provides additional insight into the relationship between general literacy and menstrual preparedness. Lower literacy levels may be associated with limited health literacy(2,25), reducing students' ability to understand or interpret health information independently. In such settings, teacher-led instruction and interactive pedagogy may be essential for ensuring that menstrual health information is comprehensible and developmentally appropriate.

The association observed in this study (OR = 5.50) is comparable to findings from other countries reporting that higher menstrual knowledge is linked to greater confidence, improved hygiene practices, and better preparedness among preadolescent girls(26–28). The relatively strong effect size in the present study suggests that menstrual knowledge may be a critical determinant of readiness when compared with selected sociodemographic factors. Although cultural contexts vary, the overall trend underscores the role of menstrual literacy in supporting girls during early puberty, including in more conservative environments.

These findings have several implications for reproductive health education policy and practice in Indonesia. Strengthening menstrual health content within the primary school curriculum may facilitate earlier and more consistent knowledge acquisition, addressing both biological and emotional dimensions of menarche preparedness. Collaboration between schools, fami-

lies, and health workers, particularly through local community health centers (*puskesmas*), may help sustain comprehensive support, including interactive sessions, demonstrations of menstrual products, and parental engagement activities.

Finally, the results align with gender-sensitive and culturally responsive approaches to health promotion, consistent with national adolescent health frameworks that emphasize community-based and culturally grounded reproductive health initiatives. In the context of Bali, incorporating local cultural values such as purity, mutual respect, and self-care may enhance the acceptability and effectiveness of menstrual education efforts.

Limitations of the Study

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design precludes causal inference, and the associations observed may be influenced by unmeasured or residual confounding variables. The reliance on self-administered questionnaires may also introduce response bias, as participants might overestimate their knowledge or preparedness, especially on sensitive topics such as menstruation.

In addition, the study was conducted in schools characterized by lower literacy and numeracy performance, which may limit the generalizability of the results to schools with different academic profiles in Bali or other regions of Indonesia. Although several contextual variables, such as age, parental support, and information sources, were included, multivariate adjustment was not performed due to sample size constraints and the categorical nature of the dataset. Future research should employ logistic regression or other multivariable analytic techniques to adjust for potential confounders, including socioeconomic status, parental education, and school resources. Such approaches would enable more precise estimation of the independent effect of menstrual knowledge on menarche preparedness.

Moreover, longitudinal or mixed-method designs may provide deeper insights into causal pathways and underlying mechanisms, capturing the dynamic interplay between knowledge acquisition, emotional readiness, and environmental factors.

Strengths of the Study

Despite these limitations, the study offers several significant strengths. It is among the first investigations to assess menstrual knowledge and menarche preparedness among students in low-literacy school settings in Bali, providing valuable insights into how educational and cultural contexts may shape menstrual readiness. The findings generate baseline evidence that can inform the development of locally contextualized reproductive health education programs and support national efforts to enhance adolescent health literacy and advance gender equity initiatives.

CONCLUSIONS

This study demonstrated a statistically significant association between menstrual knowledge and menarche preparedness among elementary school girls in Badung Regency, Bali. Students with higher levels of menstrual knowledge were substantially more likely to be categorized as ready for menarche than those with lower knowledge scores. Although causality cannot be inferred from the cross-sectional design, the findings indicate that menstrual literacy may play an important role in fostering psychological and behavioral readiness for puberty.

Introducing menstrual education at the primary school level may therefore support earlier awareness and promote a more comprehensive understanding that encompasses biological, emotional, social, and cultural dimensions. Strengthened collaboration among schools, families, and health providers is essential to ensure that accurate and consistent information is conveyed. Developing culturally sensitive educational materials and enhancing the capacity of teachers and health educators may help create supportive learning environments in which students feel comfortable asking questions and expressing concerns.

Family involvement, particularly en-

gagement from mothers and primary caregivers, may further enhance menarche preparedness by normalizing menstruation as a natural developmental milestone and reducing stigma. Likewise, supportive school environments that provide safe, confidential, and inclusive spaces for discussion are critical for building students' confidence and readiness.

Implications for Future Research

Future research should consider longitudinal or mixed-method designs to evaluate the long-term behavioral and emotional impacts of menstrual education interventions. Qualitative studies involving parents, teachers, and health workers may also enrich understanding of cultural barriers and opportunities for strengthening menstrual literacy programs in diverse community contexts.

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