

Understanding of Menstruation on Anxiety in Facing Menarche Among 4th–6th Grade Students at SDN Tebon, Barat District, Magetan Regency

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Abstract

Menarche is a major developmental event for girls because it marks the beginning of reproductive maturity and requires both physical and psychological adjustment. Limited knowledge about menstruation may cause fear, confusion, and anxiety, especially among elementary school students who have not yet experienced their first menstruation. This study aimed to determine the relationship between knowledge about menstruation and anxiety in facing menarche among female students in grades 4 to 6 at SDN Tebon, Barat District, Magetan Regency. This study used a quantitative correlational design with an analytical survey and a cross-sectional approach. The sample consisted of 32 female students who had not experienced menarche and met the study criteria. Data were collected using a menstruation knowledge questionnaire and the Zung Self-Rating Anxiety Scale. Data were analyzed using descriptive statistics and the Spearman Rank correlation test with a significance level of 0.05. The results showed that most respondents had moderate knowledge about menstruation, accounting for 14 students or 43.8%. Anxiety in facing menarche was mostly in the moderate category, with 12 students or 37.5%. The Spearman Rank test showed a significant relationship between knowledge about menstruation and anxiety in facing menarche, with a p-value of <0.001 and a correlation coefficient of 0.873. These findings indicate a very strong relationship, where better menstrual knowledge is associated with lower anxiety. The study concludes that early menstrual education is needed at the elementary school level to improve readiness, reduce fear, and support girls in facing menarche more confidently.

Introduction

Menarche is an important biological event in the development of adolescent girls. It marks the beginning of reproductive maturity and shows that the body has entered a new stage of puberty. For many girls, however, menarche is not only a physical change. It is also an emotional experience that can produce fear, shame, confusion, and anxiety, especially when girls do not understand what menstruation means and how to respond to it. Puberty brings visible changes in the body, changes in self-perception, and new social expectations. These changes may feel more stressful for girls who receive limited information before their first menstruation (Erickson et al., 2020; Vasilenko et al., 2021). Menstrual health therefore needs attention not only as a reproductive health issue, but also as a psychosocial issue that affects confidence, readiness, and emotional adjustment among young girls (Baker et al., 2020; Bunga & Zela, 2022; Maqbool et al., 2022; Long et al., 2022; Sundari et al., 2022; Srivastava et al., 2025; Gajalakshmi & Meenakshi, 2024). Menstruation is a normal physiological process, but many young girls still view it as frightening because they do not have accurate information before menarche. Lack of knowledge can lead to misconceptions, such as assuming that menstrual

blood is a sign of disease, injury, or abnormality. These misconceptions may increase anxiety when the first menstruation occurs. Girls who understand the meaning of menstruation, the signs of puberty, menstrual hygiene, and the normal menstrual cycle tend to show better readiness in facing menarche (Proverawati & Misaroh, 2020; Atikah & Siti, 2020). In contrast, girls with poor knowledge may respond with panic, fear, embarrassment, or avoidance because they cannot interpret the physical changes that happen to them (Yanti & Sari, 2016; Nurjanah, 2019; Esterley et al., 2026). This condition shows that menstrual knowledge has an important role in helping children build a more positive and rational perception of menarche.

Anxiety before menarche can appear in several forms. Some children feel worried because they do not know when menstruation will occur. Others feel afraid of pain, blood, stains on clothes, teasing from friends, or negative comments from family and peers. Anxiety may also arise because menstruation is often discussed indirectly, secretly, or with a sense of taboo in some social environments. Psychological responses such as fear, restlessness, discomfort, and reduced self-confidence can occur when children face an event that they perceive as unfamiliar or threatening (Hawari, 2019; Stuart & Laraia, 2005). In the context of menarche, anxiety becomes stronger when children have limited preparation, weak emotional support, and incomplete access to reproductive health information (Varcarolis & Halter, 2010; Tarwoto, 2003; Rahmadani & Istiqomah, 2025; Gao et al., 2025). Therefore, anxiety in facing menarche cannot be separated from children's level of understanding, family communication, school education, and social environment.

Knowledge plays a central role in shaping health behavior. Health knowledge helps individuals recognize body changes, understand health risks, make decisions, and develop positive attitudes toward self-care. In reproductive health, knowledge also helps girls understand that menstruation is a natural process that requires proper hygiene management, not fear or shame (Notoatmodjo, 2012; Ariyanti, 2021). Previous studies have shown that reproductive health education can improve readiness among adolescent girls in facing menarche (Fitriani, 2020). Knowledge also relates to attitude formation, because girls who receive correct information tend to show more positive responses toward menstruation (Agustina & Prasetyowati, 2020). In addition, access to information from mothers, teachers, health workers, books, and school programs can influence how girls understand menarche and how prepared they feel before experiencing it (Sholicha, 2020; Afriani & Fitriani, 2019; Long et al., 2022; Ghandour et al., 2022; Mataraarachchi et al., 2023).

Early adolescent girls need information that matches their developmental stage. Elementary school students in grades 4 to 6 are generally in a transition period from late childhood to early adolescence (Tian et al., 2023; Zheng et al., 2024; Mascia et al., 2023). At this age, cognitive ability continues to develop, but children may still interpret body changes through simple, concrete, and emotional understanding. When information is unclear or given too late, children may develop inaccurate beliefs about menstruation. Developmental psychology explains that children's ability to understand new experiences improves when they receive information that is clear, repeated, and connected to their daily lives (Piaget, 1972; Vidya, 2018; Gualtieri & Finn, 2022; Larivière-Bastien et al., 2022). This makes school-based menstrual education important for elementary school girls, especially those who have not experienced menarche. Simple explanations about the meaning of menstruation, body changes, menstrual hygiene, emotional responses, and when to seek help can reduce uncertainty and support mental readiness. The role of family is also important. Mothers are often the first source of information about menstruation, but not all children receive open communication at home. Some parents may feel uncomfortable discussing reproductive topics with young children. Others may assume that menstruation will be understood naturally when it occurs. This assumption can

leave children unprepared. Studies on readiness for menarche indicate that information sources and parental support are related to children's confidence in facing their first menstruation (Nurjanah, 2019; Maharani & Rahayu, 2017; Larivière-Bastien et al., 2022; Bjorklund, 2022). When mothers or caregivers explain menstruation in a calm and supportive way, children are more likely to view menarche as a normal life event. When communication is absent, children may depend on peers or informal sources that may provide inaccurate information. This can increase confusion and anxiety.

School also has a strategic role in supporting menstrual preparedness. Elementary schools can provide early reproductive health education before girls experience menarche. This is important because some girls experience menarche during late elementary school age. School-based education can help reduce misinformation, normalize discussions about menstruation, and strengthen personal hygiene behavior (Fitriani, 2020; Ariyanti, 2021). Teachers and school health programs can create a supportive environment where students feel safe to ask questions. In rural or semi-rural settings, schools may become an important source of accurate health information, especially when access to reproductive health services and educational materials remains limited. National adolescent health data also emphasize the need to improve reproductive health literacy among young people in Indonesia (Departemen Kesehatan RI, 2018; Kementerian Kesehatan RI, 2019; Harjana et al., 2026; Fitri et al., 2025).

Although many studies have discussed menstruation knowledge and readiness for menarche, attention to elementary school girls remains limited compared with studies involving junior high school students. This gap matters because preparation should begin before menarche, not after girls have already experienced fear or confusion. Research in elementary school settings can provide a clearer picture of children's actual understanding before their first menstruation. It can also show how knowledge relates to anxiety in a younger age group that is still developing cognitively and emotionally. Several studies have reported that better knowledge is associated with better readiness and lower anxiety in facing menarche (Siti Nazarina, 2017; Agustina & Prasetyowati, 2020). However, local context may influence this relationship, including family communication patterns, school support, cultural beliefs, and availability of health information.

Based on this background, the relationship between knowledge about menstruation and anxiety in facing menarche needs further attention among elementary school girls. This issue is relevant because children who are not prepared may experience unnecessary psychological distress during a normal developmental process. Strengthening menstrual knowledge can help girls understand their bodies, manage hygiene, reduce fear, and build confidence before menarche occurs. The present study focuses on children at SDN Tebon, Barat District, Magetan Regency, as a local educational context that needs empirical attention. The findings are expected to support the development of appropriate menstrual health education in elementary schools and help reduce anxiety among girls who are preparing to face menarche.

Method

Research Design

This study used a quantitative correlational research design with an analytical survey approach. A cross-sectional design was applied because the independent and dependent variables were measured at one point in time. This design was considered appropriate because the study sought to examine the relationship between students' knowledge about menstruation and their anxiety levels in facing menarche without providing any intervention. The quantitative approach

allowed the researcher to measure both variables objectively through structured questionnaires and analyze the statistical relationship between them.

Research Setting and Time

The study was conducted at SDN Tebon, Barat District, Magetan Regency. This location was selected because the school had female students in grades 4 to 6 who were in the age range of early puberty and had the possibility of facing menarche. The school setting was also relevant because elementary school students are often still in the early stage of receiving reproductive health information. Data collection was conducted after the researcher obtained permission from the school and after consent had been given by the parents or guardians of the respondents.

Population, Sample, and Sampling Technique

The population in this study consisted of female students in grades 4 to 6 at SDN Tebon, Barat District, Magetan Regency, who had not yet experienced menarche. The sample consisted of 32 female students who met the predetermined inclusion and exclusion criteria. The sampling technique used in this study was purposive sampling. This technique was applied because respondents were selected based on specific characteristics that were relevant to the research objective. The inclusion criteria included female students in grades 4 to 6, students who had not experienced menarche, students who were willing to participate, and students who received permission from their parents or guardians. Students who were absent during data collection, had difficulty completing the questionnaire, or did not receive parental consent were excluded from the study.

Research Variables

This study consisted of one independent variable and one dependent variable. The independent variable was knowledge about menstruation. This variable referred to the students' understanding of the meaning of menstruation, signs of puberty, menstrual cycle, menstrual hygiene, and basic preparation for menarche. The dependent variable was anxiety in facing menarche. This variable referred to the psychological response experienced by students when thinking about or preparing for their first menstruation, including feelings of fear, worry, restlessness, nervousness, and discomfort.

Research Instruments

Data were collected using two structured questionnaires. The first instrument was a menstruation knowledge questionnaire designed to measure respondents' understanding of menstruation and menarche. The questionnaire included items related to the definition of menstruation, physical changes during puberty, signs before menarche, menstrual hygiene practices, and appropriate responses when menstruation occurs. The second instrument was the Zung Self-Rating Anxiety Scale, which was used to measure the level of anxiety experienced by respondents in facing menarche. This instrument assessed anxiety symptoms based on respondents' self-reported feelings and responses. The use of structured questionnaires helped ensure that all respondents received the same questions and that the data could be analyzed quantitatively.

Validity and Reliability of Instruments

Before the instruments were used for data collection, validity and reliability testing were conducted to ensure that the questionnaires were appropriate and consistent. Validity testing was carried out to determine whether each item measured the concept that it was intended to measure. Items that met the validity criteria were retained, while items that did not meet the criteria were revised or removed. Reliability testing was conducted to determine the

consistency of the instrument in measuring the variables. A reliable instrument was needed to ensure that the results were stable and dependable. These procedures were carried out to improve the quality of the data and reduce measurement bias.

Data Collection Procedure

The data collection process began with administrative permission from the school. After permission was granted, the researcher coordinated with the school to identify eligible respondents based on the inclusion and exclusion criteria. The researcher then provided information about the purpose of the study, the data collection process, and the rights of respondents. Informed consent was obtained from parents or guardians before the students participated. Respondents were also informed that their participation was voluntary and that they could withdraw at any time. After consent was obtained, the questionnaires were distributed to the respondents. The researcher provided clear instructions before the questionnaires were completed and assisted respondents when they had difficulty understanding the questions, without influencing their answers.

Data Processing

After the questionnaires were completed, the data were checked for completeness and consistency. The data processing stages included editing, coding, scoring, data entry, and tabulation. Editing was conducted to ensure that all questionnaire items had been completed properly. Coding was used to classify the responses into numerical categories. Scoring was conducted according to the scoring guidelines for each instrument. The data were then entered into a statistical software program and organized into tables to support further analysis. This process was conducted carefully to minimize errors during data management.

Data Analysis

Data analysis consisted of univariate and bivariate analysis. Univariate analysis was used to describe the characteristics of respondents and the distribution of each research variable. The results were presented in the form of frequencies and percentages. Bivariate analysis was used to examine the relationship between knowledge about menstruation and anxiety in facing menarche. Because both variables were measured in ordinal categories, the Spearman Rank correlation test was used. The level of significance was set at 0.05. If the p-value was less than 0.05, the relationship between the two variables was considered statistically significant. The correlation coefficient was also interpreted to determine the strength and direction of the relationship.

Result and Discussion

This section presents the findings of the study on the relationship between knowledge about menstruation and anxiety in facing menarche among female students in grades 4 to 6 at SDN Tebon, Barat District, Magetan Regency. The results are presented in three parts: the distribution of respondents based on knowledge about menstruation, the distribution of respondents based on anxiety levels in facing menarche, and the relationship between both variables. The data were analyzed using descriptive statistics to show frequencies and percentages, while the Spearman Rank correlation test was used to determine the relationship between knowledge about menstruation and anxiety in facing menarche.

Table 1. Frequency Distribution of Respondents Based on Knowledge About Menstruation Among Grade 4 to 6 Female Students at SDN Tebon, Barat District, Magetan Regency, December 2025

Knowledge About Menstruation	Frequency	Percentage (%)
Good	10	31.3
Moderate	14	43.8
Poor	8	25.0
Total	32	100.0

Source: Primary Research Data, December 2025

Table 1 shows that most respondents had a moderate level of knowledge about menstruation, with 14 students or 43.8% of the total respondents. A smaller proportion had good knowledge, with 10 students or 31.3%, while 8 students or 25.0% had poor knowledge. These findings indicate that most female students had already received some information about menstruation, but their understanding was not yet complete. The proportion of students with poor knowledge also shows that a considerable number of respondents still lacked basic menstrual information, including the meaning of menstruation, signs of puberty, menstrual hygiene, and preparation for menarche.

Table 2. Frequency Distribution of Respondents Based on Anxiety in Facing Menarche Among Grade 4 to 6 Female Students at SDN Tebon, Barat District, Magetan Regency, December 2025

Anxiety in Facing Menarche	Frequency	Percentage (%)
Mild Anxiety	3	9.4
Moderate Anxiety	12	37.5
Severe Anxiety	10	31.3
Very Severe Anxiety	7	21.9
Total	32	100.0

Source: Primary Research Data, December 2025

Table 2 shows that moderate anxiety was the most common anxiety level among respondents, with 12 students or 37.5%. Severe anxiety was experienced by 10 students or 31.3%, while very severe anxiety was found in 7 students or 21.9%. Only 3 students or 9.4% experienced mild anxiety. These findings show that anxiety in facing menarche was not a minor issue among the respondents. More than half of the students experienced severe or very severe anxiety, which suggests that many students were not emotionally prepared to face their first menstruation. This condition highlights the need for earlier, clearer, and more child-friendly menstrual education at the elementary school level. Relationship Between Knowledge About Menstruation and Anxiety in Facing Menarche Among Grade 4 to 6 Female Students at SDN Tebon, Barat District, Magetan Regency

Table 3. Cross-Tabulation of Knowledge About Menstruation and Anxiety in Facing Menarche Among Grade 4 to 6 Female Students at SDN Tebon, Barat District, Magetan Regency, December 2025

Knowledge About Menstruation	Mild Anxiety n (%)	Moderate Anxiety n (%)	Severe Anxiety n (%)	Very Severe Anxiety n (%)	Total n (%)
Good	3 (9.4)	7 (21.9)	0 (0.0)	0 (0.0)	10 (31.3)
Moderate	0 (0.0)	5 (15.6)	9 (28.1)	0 (0.0)	14 (43.8)
Poor	0 (0.0)	0 (0.0)	1 (3.1)	7 (21.9)	8 (25.0)
Total	3 (9.4)	12 (37.5)	10 (31.3)	7 (21.9)	32 (100.0)

Source: Primary Research Data, December 2025 Spearman Rank test: p-value < 0.001, Spearman's rho = 0.873

Table 3 shows a clear pattern between knowledge about menstruation and anxiety in facing menarche. Respondents with good knowledge were found only in the mild and moderate anxiety categories. None of the respondents with good knowledge experienced severe or very severe anxiety. Respondents with moderate knowledge were mostly found in the moderate and severe anxiety categories. Meanwhile, respondents with poor knowledge were concentrated in the severe and very severe anxiety categories. This pattern indicates that poorer knowledge about menstruation was associated with higher anxiety in facing menarche.

The Spearman Rank correlation test showed a p-value of < 0.001. This means that the relationship between knowledge about menstruation and anxiety in facing menarche was statistically significant at the 0.05 level. The correlation coefficient was 0.873, which indicates a very strong relationship. Based on the direction of the category pattern, the finding shows that students with better menstrual knowledge tended to experience lower anxiety, while students with poorer menstrual knowledge tended to experience higher anxiety. Therefore, knowledge about menstruation can be understood as an important factor related to emotional readiness in facing menarche.

Menstrual Knowledge as a Foundation for Menarche Preparedness

The findings of this study indicate that knowledge about menstruation plays a central role in shaping children's readiness to face menarche. Menarche is not only a biological event, but also a psychological and social transition that requires understanding, emotional adjustment, and practical preparation. When children know what menstruation is, why it occurs, what physical signs may appear, and how to maintain menstrual hygiene, they are more likely to interpret menarche as a normal developmental process. This knowledge reduces uncertainty and helps children respond to bodily changes with greater confidence. In contrast, limited knowledge can make menarche appear sudden, frightening, or abnormal. This condition is especially relevant for elementary school students because many of them are still in the early stage of puberty and may not yet have the cognitive or emotional maturity to process reproductive changes without guidance.

The role of knowledge in this context should not be understood as simple information transfer. Menstrual knowledge functions as a framework that helps children give meaning to their first menstruation. A child who understands menstruation as a normal sign of growth will respond differently from a child who thinks menstrual blood is a sign of illness, injury, or danger. This

is consistent with the view that health knowledge influences perception, attitude, and behavior (Notoatmodjo, 2012). Previous studies have also shown that girls with better menstrual knowledge tend to demonstrate better readiness and more positive attitudes toward menarche (Maharani & Rahayu, 2017; Nurjanah, 2019; Agustina & Prasetyowati, 2020). Therefore, the practical meaning of this study is clear: menstrual education must begin before menarche occurs, not after children experience fear, embarrassment, or confusion.

Anxiety in Facing Menarche as a Developmental and Psychological Response

Anxiety in facing menarche reflects the psychological burden that can appear when children encounter an unfamiliar bodily change. For young girls, menarche may create fear of blood, fear of pain, fear of staining clothes, fear of being teased, and fear of not knowing what to do. These fears are not irrational when viewed from the child's developmental position. Elementary school students often still rely on concrete explanations and emotional reassurance from adults. If they receive incomplete information or no information at all, anxiety becomes a predictable response. This explains why menarche preparation must address both knowledge and emotion.

Psychological literature explains that anxiety often emerges when a person evaluates a situation as uncertain, threatening, or difficult to control (Hawari, 2019; Stuart & Laraia, 2005; Varcarolis & Halter, 2010). In the case of menarche, uncertainty becomes stronger when menstruation is treated as a private, shameful, or taboo topic. Children may then feel that menstruation is something that should be hidden rather than understood. This can increase shame and reduce help-seeking behavior. Menarche anxiety should therefore be understood as a developmental response shaped by information, family communication, peer culture, school support, and social norms. The implication is that reducing anxiety requires more than telling children what menstruation means. It requires a supportive environment where children can ask questions, receive reassurance, and learn practical menstrual care without embarrassment.

The Relationship Between Menstrual Knowledge and Anxiety

The strong relationship between menstrual knowledge and anxiety in this study confirms that cognitive readiness is closely connected with emotional readiness. Children who understand menstruation have a stronger basis for controlling fear because they can interpret body changes more rationally. Knowledge helps transform menarche from an unknown event into an expected and manageable experience. This does not mean that knowledge removes all anxiety. Some anxiety may still occur because menarche is a first-time experience. However, adequate knowledge can prevent anxiety from becoming excessive because it gives children the ability to anticipate what will happen and what steps they should take.

This finding aligns with previous studies that reported a relationship between menstrual knowledge and readiness or anxiety in facing menarche (Siti Nazarina, 2017; Afriani & Fitriani, 2019; Agustina & Prasetyowati, 2020; Fitriani, 2020). It also supports the broader argument in adolescent health that reproductive health education should strengthen both understanding and psychological preparedness. The important point is that knowledge must be complete, accurate, and age-appropriate. If children only know that menstruation is bleeding but do not understand hygiene practices, pain management, emotional changes, or how to seek help, their knowledge remains partial. Partial knowledge may reduce some confusion, but it may not be enough to build full readiness. Therefore, menstrual education must move beyond definitions and include practical guidance that children can use in daily life.

The Importance of Early Menstrual Education in Elementary Schools

This study strengthens the argument that elementary school is an appropriate and necessary setting for menstrual health education. Menstrual education is often introduced late because adults assume that reproductive health topics are more suitable for junior high school students. This assumption is problematic. Many girls begin puberty during late elementary school. Some experience menarche before they receive formal reproductive health education. When education comes after menarche, it loses its preventive function. It may still provide information, but it cannot fully prevent the fear and confusion that occur during the first experience.

School-based education has strategic value because schools can reach children systematically. Teachers, school health units, and local health workers can work together to provide basic menstrual health education in a safe and structured way. The content should include the meaning of menstruation, signs of puberty, normal menstrual patterns, menstrual hygiene, emotional changes, and practical steps when menstruation occurs at school. This education should use simple language because the target group is still in elementary school. It should also avoid frightening explanations. The goal is not only to increase knowledge, but also to normalize menstruation as part of healthy development. Studies on reproductive health education show that structured health education can improve readiness and positive attitudes among adolescent girls (Fitriani, 2020; Ariyanti, 2021; Proverawati & Misaroh, 2020).

Family Support and Communication in Preparing Children for Menarche

Family support remains one of the most important factors in preparing children for menarche. Mothers, older sisters, and female caregivers often become the first sources of menstrual information. However, not all families communicate openly about menstruation. Some parents may feel uncomfortable, while others may assume that children will understand menstruation naturally when it happens. This silence can leave children emotionally unprepared. When menstruation is not discussed at home, children may seek information from friends or informal sources. These sources may provide incomplete or inaccurate information, which can increase fear and misconceptions.

Open family communication can reduce anxiety because it gives children emotional security. A mother who explains menstruation calmly can help the child understand that menarche is normal and manageable. A supportive family can also teach practical matters such as how to use sanitary pads, how to clean the body, how to dispose of menstrual materials, and how to speak to an adult when menstruation occurs at school. Previous studies have shown that information sources and family support influence readiness in facing menarche (Nurjanah, 2019; Maharani & Rahayu, 2017; Sholicha, 2020). Therefore, menstrual health programs should not involve students only. Schools should also provide simple guidance for parents so that menstrual education continues at home.

School Support and the Need for a Menstrual-Friendly Environment

The role of schools should not stop at classroom education. A school that wants to reduce menarche anxiety must also create a menstrual-friendly environment. Children need privacy, access to clean toilets, water, disposal facilities, emergency sanitary pads, and a trusted adult who can help them when menstruation occurs unexpectedly. Without these supports, knowledge may not fully translate into confidence. A child may understand menstruation but still feel anxious if she does not know where to go, whom to tell, or how to manage menstruation at school.

This point is important because menarche often occurs unexpectedly. If the school environment is not ready, the first menstrual experience may become embarrassing or stressful. Teachers should be trained to respond calmly and respectfully. School health units should prepare basic menstrual supplies. Female students should know that they can ask for help without being shamed. This practical readiness can reduce fear and support school participation. Menstrual health should therefore be integrated into school health programs, not treated as a one-time topic. The implication of this study is that schools need to combine knowledge, emotional support, and practical facilities.

The findings of this study have direct implications for reproductive health education at the elementary school level. First, menstrual education should be introduced earlier, especially for girls in grades 4 to 6. Second, the content should be age-appropriate, practical, and emotionally supportive. Third, education should involve teachers, parents, and health workers. Fourth, menstrual education should not only discuss biological facts, but also address fear, embarrassment, hygiene, and help-seeking behavior. These four points are important because menarche preparedness is not achieved through knowledge alone. It requires the integration of cognitive, emotional, social, and practical readiness.

A strong menstrual education program should be designed as a preventive intervention. It should prevent fear before it develops. It should correct myths before they shape children's beliefs. It should build confidence before menarche occurs. It should also reduce stigma by presenting menstruation as a normal part of female development. This is consistent with the broader principle of health promotion, which emphasizes the improvement of knowledge, attitudes, and behavior through planned education (Notoatmodjo, 2012). In this context, menstrual education becomes a form of early psychological protection for girls entering puberty.

This study provides important evidence, but it also opens space for further research. Future studies should examine other factors that may influence anxiety in facing menarche, such as maternal communication, peer influence, cultural beliefs, teacher support, school sanitation, media exposure, and previous reproductive health education. Knowledge is clearly important, but it is not the only factor that shapes anxiety. A child may have adequate knowledge but still feel anxious if she lacks emotional support or fears social embarrassment. Therefore, future research should use broader models that include cognitive, emotional, family, school, and sociocultural variables.

Future studies should also consider longitudinal and intervention-based designs. A longitudinal design would allow researchers to examine whether knowledge before menarche predicts emotional responses when menarche actually occurs. An intervention study would help identify which educational strategy is most effective, such as teacher-led education, mother-daughter sessions, peer education, booklet-based learning, or health worker counseling. Qualitative studies are also needed to explore children's own voices about what they fear, what information they need, and what kind of support makes them feel safe. These directions would strengthen the field by moving beyond statistical association toward deeper explanation and practical intervention.

Conclusion

This study concludes that the substitution of catfish flour and pregelatinized red bean flour in dried sponge cake has practical potential for developing a healthier local functional food product for maternal nutrition management. Although the reduction in saturated fat content was not statistically significant, the substitution formulas showed a lower saturated fat tendency

than the control. More importantly, the substitution significantly reduced trans-fat content, with Formula B, consisting of 15% catfish flour and 20% pregelatinized red bean flour, producing the most favorable result. These findings indicate that combining locally available animal and plant-based ingredients can improve the lipid quality of bakery products while supporting product diversification for pregnant women. From a management perspective, this study highlights the importance of transforming local food resources into value-added products through evidence-based formulation, quality control, and responsible health positioning. Further research should examine sensory acceptance, protein content, shelf life, production feasibility, and consumer willingness to purchase so that this product can be developed into a scalable functional food innovation that supports broader maternal nutrition and stunting prevention strategies.

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