

Interactive School-Based Reproductive Health Education to Improve Adolescents' Knowledge: A Community Engagement Experience

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ABSTRACT

Background: adolescents require accurate reproductive health information to support healthy physical and psychosocial development. However, misconceptions and limited access to age-appropriate education remain common. Situation analysis: students at SMP “X”, South Tangerang, demonstrated varying levels of knowledge regarding puberty, menstruation, nocturnal emissions, personal hygiene, and reproductive health. Problem: inadequate reproductive health literacy may increase adolescents' vulnerability to unhealthy behaviors and misconceptions during puberty. Solution: A school-based community engagement program was conducted using interactive educational strategies, including audiovisual presentations, educational videos, group discussions, and Kahoot based quizzes. The sessions were delivered separately for male and female students to facilitate open discussion of gender-specific topics. Results: A total of 116 students participated in the program. Knowledge improved in both groups, with a mean increase of 37.6% among male students and 38.0% among female students. Female participants also demonstrated a high prevalence of menarche and dysmenorrhea, highlighting the importance of menstrual health education. Conclusion: Interactive, school based reproductive health education effectively improved adolescents' knowledge and engagement. Integrating age-appropriate reproductive health education into routine school health programs may strengthen adolescents' health literacy and promote healthier behaviors.

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INTRODUCTION

Adolescence is a critical developmental stage characterized by rapid physical growth, psychological maturation, and the establishment of lifelong health behaviors. During this period, profound biological changes associated with puberty are accompanied by increasing curiosity about sexuality, relationships, and reproductive health. Although these transitions are part of normal human development, inadequate knowledge and misconceptions may expose adolescents to preventable health risks, including poor menstrual hygiene, sexually transmitted infections (STIs), unintended

pregnancy, sexual violence, and unhealthy reproductive behaviors. Ensuring that adolescents receive accurate, age appropriate reproductive health information is therefore recognized as a fundamental strategy for promoting healthy development and protecting their future reproductive well-being (WHO, 2024, Wahyuningsih et al., 2024).

Globally, adolescent sexual and reproductive health remains a major public health priority. The World Health Organization (WHO) estimates that approximately 21 million pregnancies occur annually among girls aged 15–19 years in low- and middle-income countries, with nearly half being unintended. Adolescents who experience pregnancy face substantially higher risks of obstetric complications, while their infants are more likely to experience adverse neonatal outcomes, including preterm birth and low birth weight. Beyond pregnancy related risks, insufficient reproductive health literacy has also been associated with delayed health seeking behavior, poor menstrual health management, increased vulnerability to sexual coercion, and limited capacity to make informed decisions regarding reproductive health throughout adolescence and adulthood (WHO, 2024, Wahyuningsih et al., 2024).

Indonesia is home to nearly 46 million adolescents, representing one of the largest youth populations in Southeast Asia. This demographic offers tremendous opportunities for future national development but simultaneously presents important public health challenges. Recent national reports indicate that Indonesian adolescents continue to experience substantial health risks, including tobacco use, mental health disorders, violence, and limited utilization of adolescent friendly health services. Despite continued governmental efforts through school health programs and adolescent friendly services (Pelayanan Kesehatan Peduli Remaja/PKPR), access to comprehensive and scientifically accurate reproductive health information remains uneven. Social stigma, cultural sensitivity surrounding discussions of sexuality, and variability in educational delivery frequently limit adolescents' opportunities to obtain reliable information during early adolescence (UNICEF, 2025).

School based reproductive health education has been widely recognized as one of the most effective approaches for improving adolescents' knowledge, attitudes, and health behaviors because schools provide continuous access to young people before they become involved in high-risk behaviors. However, evidence from Indonesia suggests that reproductive health education is often fragmented across several school subjects and extracurricular activities, resulting in inconsistent learning experiences. Furthermore, educational delivery frequently relies on conventional lecture based approaches, while interactive strategies that actively engage adolescents, such as audiovisual media, educational games, and digital learning platforms, remain underutilized despite growing evidence supporting their effectiveness in increasing knowledge retention and student engagement (Lahope and Fathurrahman, 2024).

Interactive educational approaches are particularly relevant for early adolescents because they correspond with their cognitive development and learning preferences. Multimedia presentations, videos, gamification, and classroom discussions encourage active participation, facilitate understanding of sensitive topics, and create a more supportive learning environment than passive information delivery alone. Such approaches may also improve students' willingness to ask questions regarding puberty, menstruation, wet dreams, body changes, and personal hygiene topics that many adolescents hesitate to discuss openly within their families or communities. Consequently, interactive school-based education represents a promising strategy to strengthen reproductive health literacy during the transition from childhood to adolescence (Wahyuningsih et al., 2024, Saparini et al., 2024).

Despite increasing recognition of adolescent reproductive health education in Indonesia, reports evaluating community based educational interventions among junior high school students remain relatively limited, particularly those describing participant characteristics alongside changes in knowledge following interactive educational sessions. Documenting these initiatives is important for informing schools, health professionals, and policymakers regarding practical approaches that can be implemented within existing educational settings.

Therefore, this community engagement project aimed to provide an interactive reproductive health education program for junior high school students at SMP "X", South Tangerang, Indonesia,

using audiovisual presentations, classroom discussions, and game based learning. The program also evaluated participants' baseline reproductive health characteristics and assessed changes in knowledge following the educational intervention.

IMPLEMENTATION METHOD

This community engagement program was conducted at SMP “X”, South Tangerang, Indonesia, on 14 September 2024 as part of the community service activities organized by the Midwifery Department of STIK Sint Carolus. The program was designed to improve adolescents' knowledge of reproductive health through an interactive educational approach that combined health education, audiovisual media, classroom discussion, and game-based learning. Prior to implementation, coordination meetings were held with the school management to identify participants, determine the educational schedule, and adapt the learning materials to the developmental characteristics of junior high school students.

A total of 116 students from grades VII to IX participated in the activity, comprising 66 female students and 50 male students. To encourage active participation and create a comfortable learning environment, male and female students attended separate educational sessions. This approach enabled participants to discuss gender specific topics more openly while ensuring that the educational content was tailored to their developmental needs.

The educational intervention consisted of interactive health education covering physical and emotional changes during puberty, reproductive organ development, menstrual health, nocturnal emissions, personal hygiene, healthy adolescent behaviors, and common myths and facts related to reproductive health. The learning process integrated PowerPoint presentations, educational videos, question and answer sessions, group discussions, and quizzes delivered through the Kahoot platform. Interactive educational methods have been shown to enhance adolescents' engagement, facilitate knowledge acquisition, and improve learning motivation compared with conventional lecture-based approaches (Dale, 1969, DeSmet et al., 2014).

Program evaluation was conducted using a pretest posttest approach. Before the educational session, participants completed a five-item questionnaire to assess their baseline knowledge of adolescent reproductive health. Following completion of the educational activities, participants answered a posttest with comparable content. Different questionnaires were prepared for male and female students to reflect gender specific aspects of puberty while maintaining similar levels of difficulty. In addition, female participants completed a brief questionnaire regarding menstrual status, age at menarche, and history of dysmenorrhea to provide an overview of their reproductive health characteristics.

The results of the community engagement program were analyzed descriptively. Participant characteristics were summarized using frequencies and percentages, while the effectiveness of the educational activity was evaluated by comparing the average percentage of correct responses between the pretest and posttest. The findings were then interpreted to describe the immediate educational outcomes of the program and to identify the potential contribution of interactive reproductive health education in improving adolescents' knowledge.

RESULTS AND DISCUSSION

A total of 116 junior high school students participated in the reproductive health education program, comprising 66 female students (56.9%) and 50 male students (43.1%) from grades VII to IX. The high level of participation demonstrated strong collaboration between the school and the organizing team and reflected the relevance of reproductive health education among early adolescents. Adolescence represents a critical period during which young people experience rapid physical, emotional, and psychosocial changes, making timely reproductive health education particularly important for establishing healthy behaviors throughout adulthood.

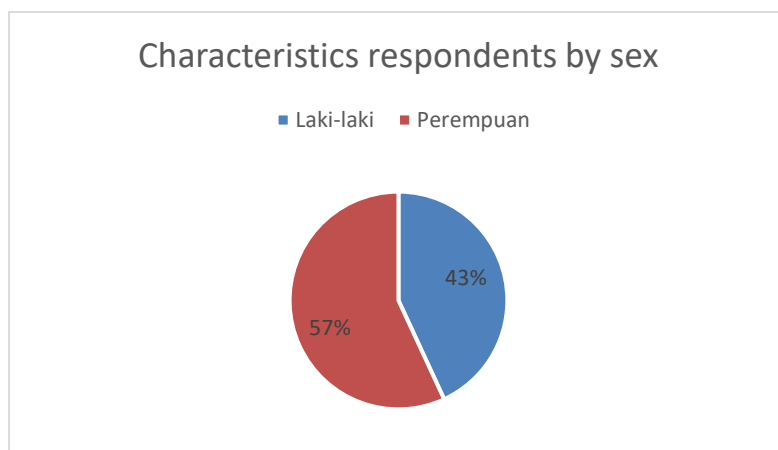


Figure 1. Characteristics respondents by sex

The female session included 66 participants. At the beginning of the session, participants completed a baseline questionnaire collecting information on their grade level, menarche status, age at menarche, and five pretest questions designed to assess their baseline knowledge before the educational intervention.

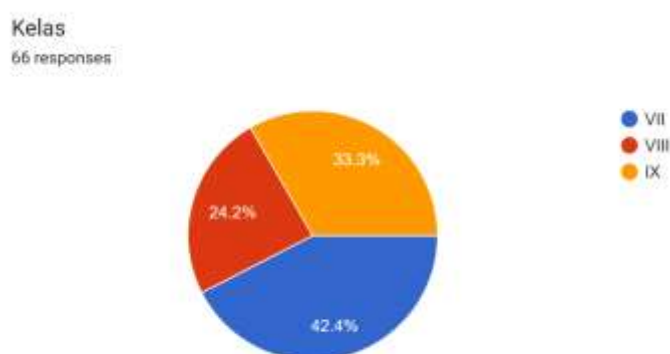


Figure 2. Distribution of Female Participants by Grade Level

As shown in Figure 2, female participants were recruited from all grade levels, with a relatively balanced distribution across classes. The largest proportion of participants were seventh-grade students. In Indonesia, junior high school education consists of three grade levels: Grade VII (first year), Grade VIII (second year), and Grade IX (third year).

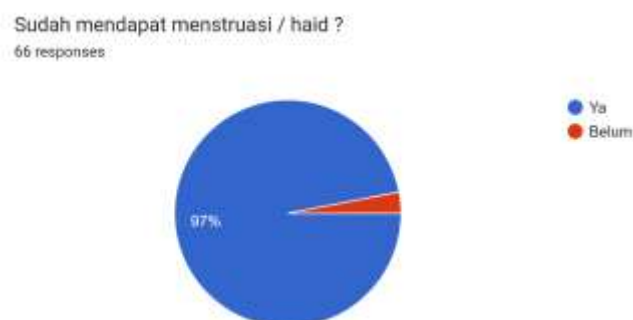


Figure 3. Menstrual Status of Female Participants

As presented in Figure 3, almost all female participants had experienced menarche (97.0%), while only a small proportion (3.0%) had not yet begun menstruation. This finding indicates that most participants had already entered puberty, highlighting the importance of providing reproductive health education during early adolescence. Delivering education at this stage enables adolescents to better understand the physical and emotional changes associated with puberty and promotes healthy menstrual hygiene and self care practices.

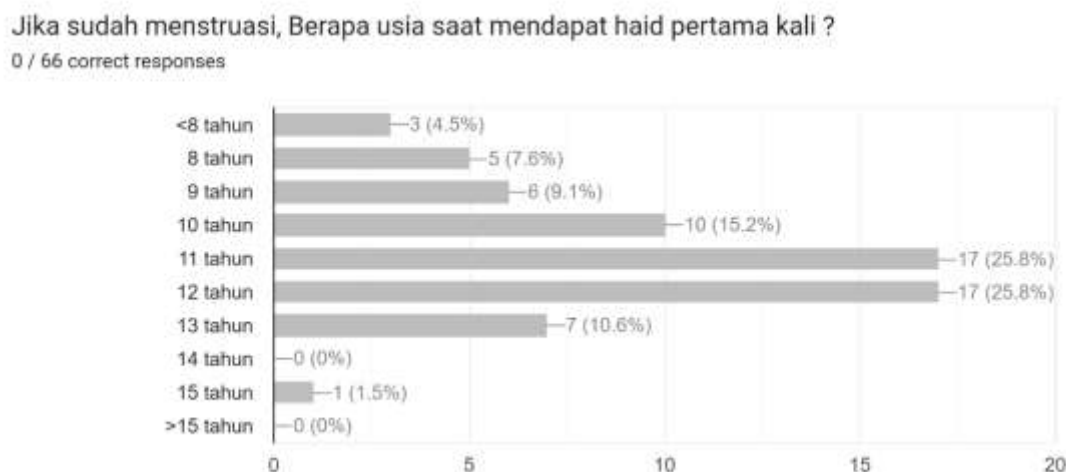


Figure 4. Age at Menarche Among Female Participants

Figure 4 illustrates the distribution of age at menarche among the female participants. The reported age at first menstruation ranged from younger than 8 years to 15 years, demonstrating considerable individual variation in pubertal onset. Three participants (4.5%) reported experiencing menarche before the age of 8 years, whereas the majority experienced menarche between 11 and 12 years of age. These findings are generally consistent with previous studies indicating that the average age at menarche typically falls between 11 and 13 years, although the timing of pubertal onset varies according to genetic, nutritional, environmental, socioeconomic, and health-related factors. Early or delayed menarche may influence adolescents' physical and psychosocial well-being, underscoring the importance of providing reproductive health education before or during the onset of puberty.

The observed variation in the age at menarche reflects the multifactorial nature of pubertal development. Menarche is a biological milestone that marks the maturation of the female reproductive system, but its timing is influenced by a complex interaction of genetic, nutritional, environmental, and socioeconomic factors. Genetic predisposition has been shown to contribute substantially to the timing of menarche, with maternal age at menarche serving as an important predictor of daughters' pubertal onset. In addition, adequate nutritional status and a higher body mass index (BMI) are generally associated with earlier menarche, whereas chronic undernutrition may delay pubertal development. Environmental factors, including psychosocial stress, socioeconomic conditions, and exposure to endocrine-disrupting chemicals, have also been implicated in influencing the timing of menarche. Furthermore, chronic illnesses and high levels of physical activity, particularly among competitive athletes, may contribute to delayed menarche. These findings highlight that the onset of menstruation reflects not only normal biological maturation but also broader interactions between genetic susceptibility, health status, and environmental influences.

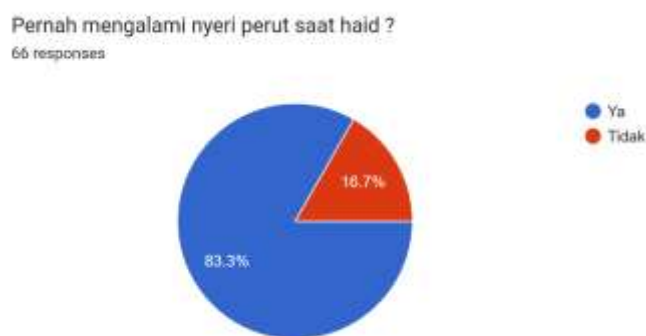


Figure 5. Prevalence of Dysmenorrhea Among Female Participants

As shown in Figure 5, 83.3% of female participants who had experienced menarche reported experiencing abdominal pain during menstruation (dysmenorrhea). This finding is comparable with global estimates indicating that the prevalence of dysmenorrhea among adolescent girls ranges from 60% to 90%, making it one of the most common gynecological complaints during adolescence. Most participants described their menstrual pain as mild to moderate in intensity.

Although primary dysmenorrhea is generally considered a normal physiological condition during menstruation, recurrent menstrual pain may substantially affect adolescents' quality of life by increasing school absenteeism, reducing concentration and academic performance, limiting participation in daily activities, and contributing to emotional distress, including anxiety and stress. When adolescents have limited knowledge about menstrual health and pain management, these impacts may become even more pronounced. Therefore, menstrual health education should be introduced before or during early adolescence to improve girls' understanding of menstrual physiology, promote appropriate self-care practices, and help them distinguish between normal menstrual discomfort and symptoms that require professional medical attention. Integrating menstrual health education into school-based reproductive health programs is an important strategy to empower adolescent girls to manage menstruation confidently while minimizing its impact on their health, education, and overall well-being.

The male session included 50 participants. At the beginning of the session, participants completed a baseline questionnaire that collected information on their grade level and five pretest questions.

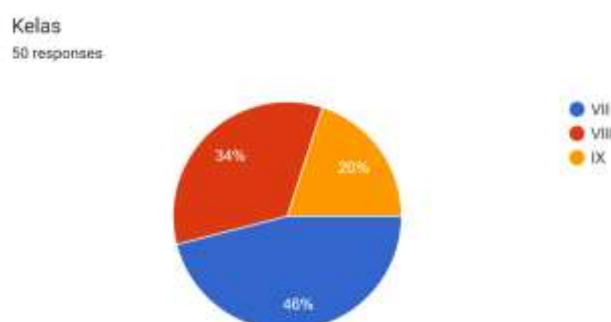


Figure 6. Distribution of Male Participants by Grade Level

As shown in Figure 6, participants were recruited from all grade levels, with a relatively balanced distribution across classes. The largest proportion of male participants were seventh-grade students. In Indonesia, junior high school consists of three grade levels: Grade VII (first year), Grade VIII (second year), and Grade IX (third year). The inclusion of students from different grade levels

allowed the educational program to reach adolescents at various stages of early pubertal development, each with distinct educational needs regarding reproductive health.

The educational intervention employed an interactive learning approach integrating audiovisual presentations, educational videos, classroom discussions, and Kahoot-based quizzes. Students actively participated throughout the sessions by asking questions, responding to case scenarios, and engaging in educational games. Interactive learning encourages active participation rather than passive information reception, thereby improving students' motivation, attention, and knowledge retention. Previous evidence has demonstrated that multimedia-assisted reproductive health education enhances adolescents' understanding of puberty and reproductive health more effectively than conventional lecture-based approaches.



Figure 7. Educational Sessions on Adolescent Reproductive Health for Female and Male Students

Table 1. Item Analysis and Knowledge Improvement Among Male and Female Participants

Group	Item analysis					Score		Mean
	Q1	Q2	Q3	Q4	Q5	Highest	Lowest	Score
Male participant								
Pretest	68%	38%	42%	64%	86%	100	20	59,6%
Posttest	98%	96%	92%	100%	100%	100	70	97,2%
Improvement	30%	58%	50%	36%	14%	-	-	37,6%
Female participant								
Pretest	46%	72%	42%	56%	84%	100	40	60%
Posttest	100%	94%	96%	100%	100%	100	80	98%
Improvement	54%	22%	54%	44%	16%	-	-	38%

Table 1 presents the pretest and posttest results for each knowledge item among male and female participants. Before the educational intervention, the lowest individual score was 20 in the male group and 40 in the female group. Following the intervention, the highest score reached 100 in both groups, while the lowest posttest score increased to 70 among male participants and 80 among female participants, indicating an overall improvement in participants' knowledge.

The mean knowledge score increased by 37.6% among male participants and 38.0% among female participants. Improvements were observed across all five knowledge items in both groups. Among male participants, the greatest improvement was observed for Question 2 (58 percentage points), followed by Question 3 (50 percentage points). Among female participants, the largest increases were found for Questions 1 and 3, each improving by 54 percentage points. In contrast, the smallest improvements were observed for Question 5 in both groups (14 percentage points for males and 16 percentage points for females), likely because baseline knowledge for this topic was already relatively high before the intervention.

Overall, these findings suggest that the reproductive health education program effectively improved adolescents' knowledge regardless of sex. The comparable improvement observed among

male and female participants indicates that the educational materials and interactive teaching methods were appropriate and effective for both groups.

The observed improvement may be explained by several factors. First, the educational materials were specifically designed according to the participants' developmental stage and addressed issues commonly encountered during puberty, including menstruation, nocturnal emissions, bodily changes, personal hygiene, and healthy adolescent behaviors. Second, separating male and female students during discussions of sensitive topics created a more comfortable learning environment, encouraging participants to ask questions more openly and actively engage in the learning process. Finally, the integration of audiovisual media, educational videos, interactive discussions, and game based learning using Kahoot enhanced students' attention and participation, thereby facilitating active learning and improving knowledge acquisition (Dale, 1969, Mayer, 2021).

The effectiveness of this educational approach is consistent with Dale's Cone of Experience, which proposes that learning is enhanced when learners are exposed to multiple forms of educational experiences, ranging from abstract representations to more concrete and interactive activities (Dale, 1969). This concept is further supported by the Cognitive Theory of Multimedia Learning, which explains that students learn more effectively when information is presented through complementary verbal and visual channels rather than through a single mode of instruction (Mayer, 2021). In this program, information was delivered through a combination of presentations, audiovisual materials, group discussions, and interactive quizzes, allowing students to engage simultaneously through visual, auditory, and participatory learning experiences. Such multimodal learning environments have been shown to strengthen comprehension, increase learner engagement, and improve knowledge retention compared with passive learning methods (Mayer, 2021, DeSmet et al., 2014, Suhaid et al., 2025).

These findings are also supported by previous studies demonstrating that school based reproductive health education significantly improves adolescents' reproductive health literacy (Goldfarb and Lieberman, 2020, Dewi et al., 2023, Suhaid and Dewi, 2023). Interactive educational strategies promote two-way communication between educators and students, enabling misconceptions to be clarified immediately while fostering critical thinking and greater confidence in discussing sensitive reproductive health issues. Furthermore, multimedia learning and educational games have been shown to increase motivation, sustain attention, and facilitate meaningful learning experiences by engaging multiple sensory pathways (DeSmet et al., 2014, Mayer, 2021, Suhaid, 2022).

Beyond improving knowledge, this community engagement program also strengthened collaboration between higher education institutions and schools in promoting adolescent health. Schools provide an ideal setting for preventive reproductive health interventions because they enable systematic delivery of age appropriate education before adolescents engage in risky behaviors (WHO, 2022, Suhaid et al., 2025). Integrating reproductive health education into routine school health promotion activities may therefore contribute to improving adolescent health literacy and supporting healthier behavioral choices during adolescence.

Although this program demonstrated encouraging immediate outcomes, several limitations should be acknowledged. Knowledge was assessed immediately after the educational session, preventing evaluation of long-term knowledge retention and behavioral change. In addition, the activity involved students from a single school, limiting the generalizability of the findings to other educational settings. Future community engagement programs should consider repeated educational sessions, longer follow-up periods, and greater involvement of parents and teachers to reinforce reproductive health education beyond the classroom.

CONCLUSION

The school-based reproductive health education program effectively improved adolescents' knowledge of puberty and reproductive health among both male and female junior high school students. The use of interactive educational strategies, including audiovisual media, educational videos, group discussions, and game-based learning, created an engaging learning environment that facilitated knowledge acquisition and active participation. Delivering the sessions separately for male and female students also provided a supportive environment for discussing gender-specific reproductive health issues.

Beyond increasing knowledge, the program strengthened collaboration between higher education institutions and schools in promoting adolescent reproductive health. These findings highlight the value of integrating comprehensive, age-appropriate reproductive health education into routine school health promotion activities. Future community engagement programs should include repeated educational sessions, involve parents and teachers, and evaluate long-term knowledge retention and behavioral outcomes to maximize the sustainability and impact of reproductive health education.

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