

Snakes And Ladders Game (SMENA) to Improve Knowledge And Readiness For Menarche Among Elementary School Girls: A Community Service Program

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ABSTRACT

Menarche is a natural biological process that often causes anxiety and confusion among elementary school girls due to a lack of education before their first menstruation. At the concrete operational stage of development, children require interactive and enjoyable learning methods to optimally understand information. This community service program aimed to improve knowledge and readiness for menarche among 30 fifth-grade female students at SDN 1 Nyantong. Before the intervention, participants completed a pretest questionnaire. The intervention used a modified Snakes and Ladders game (SMENA), followed by a posttest to assess changes in knowledge and readiness for menarche. The analysis showed that the average knowledge score increased from 27.4 in the pretest to 29.3 in the posttest, with a p-value of 0.002 using the Wilcoxon Signed Rank Test, indicating a significant improvement in knowledge and readiness. Qualitative observations revealed 100% student participation, a threefold increase in the number of questions asked, and high learning enthusiasm throughout the intervention. In conclusion, the SMENA game effectively improved knowledge and readiness for menarche among elementary school girls and is recommended for replication using a train-the-trainer approach for teachers, particularly in public elementary schools with limited health education resources.

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INTRODUCTION

Menarche is the first menstrual event marking the onset of reproductive function in girls and represents a crucial milestone in early adolescent biological and psychosocial development. Globally, the age at menarche has shown a downward trend over the past two decades, including in Indonesia. Analysis of data from the Indonesian Family Life Survey (IFLS) reported that the average age of menarche among Indonesian girls ranges from 12 to 13 years, with earlier onset among those with better nutritional status (Asrullah et al., 2022). These findings are supported by local studies, such as Mulyani (2018), who reported an average menarche age of 11.9–12 years among junior high school students in Bandar Lampung. Furthermore, Kholifah (2024) reported a national decline in the age of menarche to 12.8 years, associated with improvements in nutritional status and dietary intake.

Various factors influence the age at menarche, including nutritional status, protein intake, physical activity, and genetic factors. Febriani et al. (2024) demonstrated a significant relationship between nutritional status and age at menarche, with girls who had normal to high body mass index experiencing menarche earlier. This is consistent with Adyani et al. (2024), who reported that improved dietary patterns and adequate nutrition accelerate biological maturation. Consequently, the prevalence of early menarche (≤ 11 years) has increased, reaching 37.5% among Indonesian elementary school girls (Hasanah, 2024).

Although menarche is a normal physiological process, many girls experience it without adequate knowledge and emotional readiness. Limited understanding of bodily changes, menstrual hygiene, and emotional aspects often causes menarche to be perceived as a frightening experience. A study in Zambia reported that 85% of girls lacked prior knowledge of menstruation before menarche, leading to anxiety and embarrassment (Chinyama et al., 2019). Similar findings were reported in Ethiopia, where pre-menarche education in schools remains limited (Adane et al., 2024). Changes in body shape, especially in the reproductive organs, invite many questions from adolescents, such as the presence of bleeding from the vagina for the first time (menarche) and the first wet dream in boys (semenarche). Teenagers must be prepared to face puberty with various changes and the first experiences that occur. Teenagers need information that can solve the problems they face. Health education about sexual and reproductive health is very important to do, as an effort to increase knowledge in dealing with puberty. The sexual and reproductive health education program for adolescents in facing puberty is one solution that can be done to increase students' knowledge in facing puberty (Lidia H, Tri Wahyuni et al., 2023)

These conditions align with the preliminary situational analysis conducted at SDN 1 Nyantong, Tasikmalaya, in June 2025. Among ten fifth- and sixth-grade girls aged 10–12 years, none could correctly explain the definition of menarche. Reproductive health education had not been delivered systematically, as teachers considered it a sensitive topic. From a cognitive development perspective, girls at this age are in Piaget's concrete operational stage, requiring visual, interactive, and experiential learning approaches rather than conventional lecture-based methods.

Game-based learning has been proven effective in improving children's understanding of sensitive topics, including reproductive health. Ladder snake games can be given to children aged 5-6 years to stimulate various areas of development, such as cognitive, language, and social. Language skills that can be stimulated through this game, such as vocabulary, up and down, back and forth, up and down and so on. Social skills trained in this game include willingness to follow and obey the rules of the game, playing in turns (Happy Novriyanti Purwadia, Aulia Minati, and Resna A. Soerawidjaja, 2021). A systematic review by Evans et al. (2022) reported that game-based educational methods increased

knowledge about menarche by up to 35%. A local study by Sulyastini et al. (2024) in Bali showed a 22% increase in readiness for menarche among elementary school girls following a game-based educational intervention. Widiastini and Karuniad (2019) also reported a 41% reduction in anxiety after menarche education using interactive media.

In this program, a Snakes and Ladders game was selected because it is simple, easy to implement, and suitable for elementary school children's developmental characteristics. Elementary-aged children begin to learn important aspects of the socialization process in association with peer groups, so elementary-age children are very easily influenced by peer environment (Cucu Herawati, Heni Endayani, et al.; 2023). By inviting children to play snakes and ladders, it is hoped that children's knowledge Wahyuni and Putri (2024) demonstrated that snakes and ladders media increased children's nutritional knowledge by 32%. The game was modified by embedding 30 core menarche-related topics into 30 game squares, covering the definition of menarche, physical and emotional changes, menstrual hygiene, myths, and facts. Snake symbols represented myths that reduced scores, while ladders symbolized correct understanding that increased scores, creating a competitive yet safe learning environment for discussion.

This approach aligns with constructivist theory, emphasizing that children build knowledge through concrete experiences, social interaction, and repeated exposure (spaced repetition). Game dynamics encouraged peer discussion, strengthened understanding, and helped reduce stigma surrounding reproductive health topics.

Based on this background, the community service program aimed to improve knowledge and readiness for menarche among fifth-grade students at SDN 1 Nyantong through a pretest–posttest intervention using a modified Snakes and Ladders game. The program was designed to be sustainable through teacher training as facilitators, enabling regular replication and contributing to bridging gaps in reproductive health education at the elementary school level in the Tasikmalaya region.

METHOD

This community service activity employed a pre-experimental one-group pretest–posttest design conducted at SDN 1 Nyantong, Tawang District, Tasikmalaya City, on September 9, 2025. The target population comprised all 15 fifth-grade female students who had not yet experienced menarche. The sample consisted of 12 girls aged 10–11 years selected through purposive sampling based on the following inclusion criteria: not yet menstruating, having written parental consent, and being present on the intervention day. Girls who had already experienced menarche or lacked parental permission were excluded.

Menarche knowledge was measured using a 30-item multiple-choice questionnaire with a maximum score of 100, covering the definition of menarche, physical-emotional changes, menstrual hygiene, myths, and facts. The questionnaire was administered as a pretest before the intervention and as a posttest immediately afterward.

The intervention utilized a digital Snakes and Ladders application called **SMENA (Snakes and Ladders Menarche Education)** developed by the service team. The application contained 30 digital squares with menarche-related questions and materials. The game was played using five tablets shared among 30 students (2–3 students per tablet) for 90 minutes (two rounds of 45 minutes).

The activity consisted of five stages: (1) preparation for one week, including coordination with the school principal and parents, application installation, and instrument testing; (2) pretest administration

(30 minutes) following informed parental consent and verbal student assent; (3) intervention using the SMENA application (90 minutes), including ice-breaking, group gameplay, and facilitated discussion; (4) posttest and qualitative observation of student enthusiasm and participation; and (5) final evaluation on day seven, including data analysis, school feedback, and teacher training for independent use of the SMENA application.

Data were analyzed using descriptive statistics (mean and standard deviation) and inferential statistics (paired t-test or Wilcoxon signed-rank test, $\alpha = 0.05$) using SPSS version 26.0. Qualitative observations were analyzed thematically. Ethical considerations included written parental consent, verbal student assent, confidentiality, absence of financial incentives, and approval from the school principal and the Muhammadiyah University of Tasikmalaya Community Service Committee.

RESULTS AND DISCUSSION

The results demonstrated a significant improvement in menarche knowledge among the 12 fifth-grade students following the SMENA intervention. The mean pretest score was 27.4, increasing to 29.3 in the posttest. The Wilcoxon Signed Rank Test has a p-value of 0.002, indicating a statistically significant difference.

TABLE 1. Pretest–Post-test Results

Variabel	Mean	Statistical Test	p-value
Pretest	27,4	Wilcoxon Signed Rank Test	0,002
Posttest	29,3		

Qualitative observations showed very high enthusiasm, with 100% active participation. Students who were initially hesitant became more open, as reflected in a threefold increase in questions and voluntary requests to replay the game.

These findings support previous studies demonstrating the effectiveness of interactive reproductive health education. The integration of spaced repetition and social learning created a safe learning environment aligned with Piaget's concrete operational stage.

Despite significant results, limitations include a small sample size, lack of a control group, and absence of long-term follow-up. Nevertheless, the high engagement and acceptance suggest strong potential for scalability.



FIGURE 1. SMENA application education

CONCLUSION

The SMENA application significantly improved menarche knowledge among fifth-grade students at SDN 1 Nyantong ($p = 0.002$). Students showed high enthusiasm, full participation, and increased openness toward previously taboo topics. Although limited by sample size and study design, SMENA shows strong potential as an innovative community service model for reproductive health education in elementary schools with limited resources.

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