

The Effectiveness of Snake and Ladder Game-Based Education in Increasing Knowledge About Anemia Prevention in Teenage Girls: A Pre-Experimental Study

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ABSTRACT

Anemia is one of the health issues still commonly experienced by young girls and can affect their health, learning concentration, and productivity. Low knowledge about the factors, effects, and prevention of anemia is one aspect that contributes to the high incidence of anemia. One effort that can be made to develop adolescents' knowledge is through health education using interactive learning media, such as the snakes and ladders game. This study aims to analyze the effectiveness of snakes and ladders-based education on knowledge of anemia prevention among teenage girls at SMPN 1 Banyakan, Kediri Regency. This study uses a quantitative method with a pre-experimental design using a one-group pretest-posttest approach. The study sample consisted of 79 eighth-grade students selected using proportional random sampling techniques. Data collection was carried out using knowledge questionnaires before and after education, then analyzed using the Paired Sample t-test with a 95% confidence level. The results showed that the average knowledge score before the intervention was 9.43 ± 3.003 and increased to 15.33 ± 2.147 after the intervention. The Paired Sample t-test results showed a p-value < 0.001 , indicating a difference in average knowledge scores before and after education based on the snakes and ladders game. Thus, education based on the snakes and ladders game is considered effective in increasing knowledge about anemia prevention among adolescent girls. The snakes and ladders game can be used as one of the alternative health promotion media in schools to improve knowledge about anemia prevention.

Keywords: Anemia, Health Education, Knowledge, Snakes And Ladders Game, Teenage Girls.

INTRODUCTION

Anemia is one of the public health issues that still gets global attention, especially among teenage girls. According to (World Health Organization, 2023), The majority of women aged 15–49 experience anemia. This condition is especially common among teenage girls, particularly in developing countries like Indonesia. In fact, Indonesia ranks 8th out of 11 countries in the Asia region for high anemia rates after Sri Lanka, with cases reaching 7.5 million among teenagers aged 10–19.

In Indonesia, anemia in teenage girls is still an important health issue due to the high iron requirements during growth, menstruation, and the low intake of iron from food (Silitonga et al., 2024). Anemia is a condition where the level of red blood cells or hemoglobin (Hb) concentration is low, which results in the blood's ability to carry oxygen being reduced. This problem is one of the nutrition and health issues often experienced by

teenagers, especially girls(Solehah, S. et al., 2023).

Based on the results of hemoglobin (Hb) screening at Tiron Health Center in 2025, 480 out of 500 female students have been checked. Of that number, 105 students were found to have anemia (21.9%). This condition not only affects physical health but can also lower concentration in studying, creativity, and poses risks to reproductive health in the future(Laporan Puskesmas Tiron, 2025).

Teenage girls are a group at high risk of suffering from anemia because they have an increased need for iron throughout their development, lose blood due to menstruation, and have eating habits that don't yet meet their nutritional needs(Maulina et al., 2024). Most teenage girls have knowledge about anemia but haven't put it into practice in their daily activities, like not having breakfast before going to school and often turning breakfast into lunch. Most teenage girls also hardly eat foods that contain iron (heme iron) like meat, fish, and liver(Astuti, 2023).

The high rate of anemia among teenage girls is usually caused by blood loss during menstruation, the rapidly increasing need for iron during growth spurts—sometimes up to three times more than boys—and low consumption of iron-rich foods. Regular dieting to lose weight also often makes this condition worse(Handayani et al, 2023).

The government has tried every way to prevent anemia, including regularly giving iron tablets (TTD) in schools. However, the compliance rate for taking TTD is still not optimal. This is usually influenced by a lack of knowledge, unsupportive attitudes, and negative perceptions about the taste and side effects of TTD(Yusuf et al., 2025).

Knowledge is one of the factors that helps shape personal health behavior. People who have good knowledge about a disease are more likely to understand risk factors, impacts, and prevention efforts, making it easier to adopt healthy lifestyles (Fauzi et al., 2024). Because of this, health education is an important strategy for increasing teenagers' knowledge about anemia prevention. However, delivering material through lectures often struggles to keep students' attention, so learning participation and information retention are not optimal. This situation highlights the need to develop more interactive, enjoyable educational media that match teenagers' characteristics. Game-based learning is considered able to boost student engagement, learning motivation, and understanding of health material compared to conventional methods (Y. Astuti et al., 2024).

One approach that has been widely developed in health education is using educational game-based media (game-based learning). Interactive learning media can boost students' enthusiasm, participation, and understanding of the material presented (Triana et al., 2025). Snakes and ladders is one educational medium that can be modified by including health messages on each square of the game. Through the playing process, participants get the chance to discuss, answer questions, and receive direct feedback, making the learning stage more engaging compared to conventional teaching methods (Hisanah et al., 2023).

Some studies have shown the effectiveness of the snakes and ladders game as a health education medium. Snakes and ladders has an advantage because it can present information in a more interesting way. When playing snakes and ladders, besides using their sense of sight (eyes), respondents also use their sense of hearing (Permatasari et al., 2025). In the snakes and ladders game, respondents read questions, answer them, and observe the images on the game board, making information about anemia easier to understand and remember. Game media provide opportunities for students to actively practice through interaction and direct feedback, which helps improve understanding of anemia prevention (Devriany et al., 2026).

Thus, the research conducted at SMPN 1 Banyakan is expected to be able to identify the causes related to anemia events in teenage girls. The results of this study can serve as a basis for the school, health center, and other relevant agencies to develop more effective

strategies for preventing and managing anemia, so that teenagers' health quality can improve and support the achievement of a healthy and productive generation (Triana et al., 2025).

METHODS

This study uses a quantitative method with a pre-experimental design using a one group pretest-posttest approach. The study aims to find out the effectiveness of anemia prevention education using a snakes and ladders game on the knowledge level of female students at SMPN 1 Banyakan. The population in this study is all eighth-grade female students at SMPN 1 Banyakan, totaling 104 students. The research sample consisted of 79 students who were selected using random sampling according to the research criteria. Data was collected using a knowledge questionnaire before and after providing education with the snakes and ladders media. Data analysis was done using a paired t-test to find differences in knowledge scores before and after the intervention.

RESULTS AND DISCUSSION

Table 1 : Respondent Distribution by Age (n = 79)

Age	Frequency	%
13 Years	11	13.9
14 Years	29	36.7
15 Years	39	49.4
Total	79	100.0

Based on Table 1, most of the respondents are 15 years old, totaling 39 people (49.4%), followed by 29 respondents who are 14 years old (36.7%), while those who are 13 years old total 11 people (13.9%).

Table 2 : Average Knowledge Score on Anemia Prevention Before and After Snakes and Ladders-Based Education (n = 79)

Variabel	n	Mean $\pm$ SD
Pretest	79	9,43 $\pm$ 3,003
Posttest	79	15,33 $\pm$ 2,147

Table 2 shows that the average knowledge score of respondents before being given Snakes and Ladders-based education was 9.43 ± 3.003 . After the intervention, the average knowledge score increased to 15.33 ± 2.147 , indicating an increase in knowledge after the education was provided..

Table 3 : Paired Sample t-test Results on Knowledge of Anemia Prevention Before and After Intervention

Variabel	Mean Difference	t	df	p-value
Pretest–Posttest Pengetahuan	-5,899	-19,868	78	<0,001

The results of the Paired Sample t-test showed a t value of -19.868 with $p < 0.001$, indicating a significant difference between knowledge scores before and after the education. These findings show that snakes and ladders-based education is effective in increasing anemia prevention knowledge among teenage girls.

DISCUSSION

The research results show that there was an increase in the average knowledge score about anemia prevention among teenage girls after being given education using a snakes and ladders game. The average knowledge score went up from 9.43 ± 3.003 before the intervention to 15.33 ± 2.147 after the intervention. The Paired Sample t-test results showed a p-value < 0.001 , indicating a significant difference between the knowledge scores before and after the intervention. These findings prove that education based on the snakes and ladders game is effective in increasing anemia prevention knowledge among teenage girls.

The increase in knowledge after the intervention is thought to happen because playing snakes and ladders provides a more active, interactive, and enjoyable learning experience compared to conventional teaching methods. During the education process, respondents not only receive information passively but also participate in activities like reading questions, discussing, answering problems, and getting direct feedback. This situation aligns with the health behavior concept that states knowledge is the foundation for forming someone's health behavior (Notoatmodjo, 2020).

The findings of this study are in line with the research by (Hisanah et al., 2023) which reported that education using a snakes and ladders game can improve knowledge, attitudes, and practices in preventing anemia among teenage girls. The same results were also reported by (Panjaitan et al., 2023) who showed that educational game media can boost health learning outcomes in teenage girls. In addition, according to (Nurcahyanti et al, 2022), health education provided to teenage girls can increase understanding of anemia and the importance of taking iron tablets to prevent it. This shows that providing health education is an effective way to increase teenagers' knowledge about health issues that commonly occur during adolescence.

The success of the snakes and ladders game media in this study is shown not just by the increase in knowledge scores, but also by the respondents' active engagement during the learning process. Playing the game allows students to interact directly with the educational material through discussions, problem-solving, and giving feedback, making the learning process more meaningful. Game-based learning is known to boost learning motivation, student engagement, and information retention because students take an active role during learning. This situation supports a better understanding of the health material provided and could be an effective way to promote health among teenagers. Therefore, educational game media can be one effective option to help the School Health Effort (UKS) program in increasing knowledge and awareness of teenage girls about anemia prevention. These findings are in line with research (Ghadam et al., 2023)

This study has limitations because it used a one-group pretest–posttest design without a control group, so the knowledge improvement can't be compared to a group that didn't receive the intervention. That's why the study was only conducted at one school, meaning its impact can't be generalized to all teenage girls. Even so, the results suggest that using a Snakes and Ladders game could be considered as one way to educate and improve knowledge about anemia prevention among teenage girls.

CONCLUSION

This study shows that snake and ladder-based education is effective in increasing knowledge about anemia prevention among teenage girls at SMPN 1 Banyakan, Kediri Regency. The improvement in average knowledge scores after the intervention indicates that the snake and ladder game can be used as an interactive and engaging health education medium to deliver information about anemia prevention. Therefore, the snake and ladder game can be considered as one of the health promotion media options in schools to support increasing

teenage girls' knowledge about anemia prevention. Future research is suggested to use a study design with a control group, include a larger number of respondents, and be conducted in several schools so that the research results can be generalized more broadly.

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