

RESEARCH ARTICLE

Digital Media-Based Reproductive Health Education on Adolescent Girls' Attitudes Toward Anemia Prevention

Pendidikan Kesehatan Reproduksi Berbasis Media Digital terhadap Sikap Remaja Putri tentang Pencegahan Anemia

Maylatita Zunianto¹, Reny Retnaningsih², Nila Widya Keswara³

¹Program Studi Kebidanan, Teknologi Sains dan Kesehatan RS dr. Soepraoen, Malang, Indonesia

Abstract

Anemia is a major public health concern among adolescent girls in Indonesia, particularly due to increased iron requirements and menstrual blood loss. Digital health education may provide an accessible and engaging approach to promoting anemia prevention. This study aimed to determine the difference in adolescent girls' attitudes toward anemia prevention before and after digital media-based reproductive health education at SMP Negeri 06 Singosari, Malang Regency. A pre-experimental one-group pretest-posttest design was conducted among 42 eighth-grade female students aged 12–15 years. Data were collected using a structured attitude questionnaire administered before and after a 30-minute educational video intervention. Data were analyzed using a paired-sample t-test with a significance level of 0.05. Before the intervention, 18 students (42.9%) demonstrated positive attitudes, while 24 (57.1%) demonstrated negative attitudes. After the intervention, the number of students with positive attitudes increased to 32 (76.2%), while those with negative attitudes decreased to 10 (23.8%). The mean attitude score increased from 38.95 at pretest to 44.74 at posttest, with a statistically significant difference between the two measurements ($p < 0.001$). Digital media-based reproductive health education was associated with a significant increase in adolescent girls' attitudes toward anemia prevention. Digital educational media may therefore be a useful approach to support school-based health promotion and anemia prevention programs among adolescent girls.

Keywords: adolescent girls, anemia, attitudes, digital media, health education

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Address:

Jl. Dr. Ratulangi No. 75A, Baju Bodoa, Maros Baru,
Kab. Maros, Provinsi Sulawesi Selatan, Indonesia

Email:

info@salnesia.id, jika@salnesia.id

Phone:

+62 85255155883

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Abstrak

Anemia merupakan salah satu masalah kesehatan masyarakat yang penting pada remaja putri di Indonesia, terutama karena meningkatnya kebutuhan zat besi dan kehilangan darah selama menstruasi. Edukasi kesehatan berbasis media digital dapat menjadi pendekatan yang mudah diakses dan menarik untuk meningkatkan sikap dalam pencegahan anemia. Penelitian ini bertujuan untuk mengetahui perbedaan sikap remaja putri terhadap pencegahan anemia sebelum dan sesudah diberikan edukasi kesehatan reproduksi berbasis media digital di SMP Negeri 06 Singosari, Kabupaten Malang. Penelitian menggunakan desain pra-eksperimental dengan pendekatan one-group pretest–posttest pada 42 siswi kelas VIII berusia 12–15 tahun. Data dikumpulkan menggunakan kuesioner sikap terstruktur yang diberikan sebelum dan sesudah intervensi berupa video edukasi selama 30 menit. Data dianalisis menggunakan paired-sample t-test dengan tingkat kemaknaan 0,05. Sebelum intervensi, sebanyak 18 siswi (42,9%) memiliki sikap positif dan 24 siswi (57,1%) memiliki sikap negatif. Setelah intervensi, jumlah siswi dengan sikap positif meningkat menjadi 32 (76,2%), sedangkan sikap negatif menurun menjadi 10 (23,8%). Rerata skor sikap meningkat dari 38,95 pada pretest menjadi 44,74 pada posttest, dengan perbedaan yang bermakna secara statistik ($p < 0,001$). Edukasi kesehatan reproduksi berbasis media digital menunjukkan adanya peningkatan sikap remaja putri terhadap pencegahan anemia. Media edukasi digital dapat menjadi salah satu pendekatan yang mendukung promosi kesehatan di sekolah dan upaya pencegahan anemia pada remaja putri.

Kata Kunci: anemia, media digital, pendidikan kesehatan, remaja putri, sikap

*Correspondance Author:

Reny Retnaningsih, email: renyretna@itsk-soepraoen.ac.id



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Highlight:

- Video-based educational interventions provide comprehensive insights into the etiology, adverse consequences, risk factors, and preventive strategies associated with anemia.
- The integration of visual and auditory modalities significantly enhances cognitive comprehension and fosters the development of positive attitudes.
- Enhanced knowledge acquisition has been empirically demonstrated to drive meaningful changes in health-related behaviors.

INTRODUCTION

Anemia remains a major nutritional and public health problem among adolescent girls worldwide. Adolescence is characterized by rapid physical growth, increased nutritional requirements, and the onset of menstruation, all of which increase the risk of anemia in girls compared with other population groups (Iriyanti and Retnaningsih, 2025). The condition can adversely affect physical health, concentration, cognitive performance, academic achievement, and daily productivity, thereby reducing overall quality of life. Anemia is clinically defined as a condition in which hemoglobin levels are lower than the normal range according to an individual's age, sex, and physiological status (Suprapti et al., 2025). Given its widespread occurrence and negative

consequences, anemia among adolescent girls continues to be a significant health concern requiring effective preventive efforts.

The burden of anemia among females remains substantial at both global and national levels. It is estimated that nearly 30% of women aged 15–49 years worldwide experience anemia. In Indonesia, the prevalence of anemia among adolescents is also considerable, reaching 26.8% among individuals aged 10–14 years and increasing to 32% among those aged 15–24 years. These figures indicate that anemia remains a persistent health issue among Indonesian adolescents. The situation is even more concerning in East Java Province, where approximately 42% of adolescent girls have been reported to suffer from anemia. Similarly, in Malang Regency, the prevalence of anemia among adolescent girls has reached 34.41%, which is higher than the national prevalence (Aji *et al.*, 2024). These findings highlight the need for targeted interventions to address anemia among adolescent girls, particularly in Malang Regency.

The high prevalence of anemia among adolescent girls is associated with several behavioral and educational factors. Previous studies have identified limited awareness regarding anemia, inadequate motivation to engage in preventive practices, and low adherence to iron supplementation programs as important contributing factors (Aji *et al.*, 2024). These conditions reflect challenges related to adolescents' attitudes toward anemia prevention, as attitudes play a crucial role in shaping health-related behaviors. Negative attitudes may reduce adolescents' willingness to consume iron-rich foods, follow nutritional recommendations, and take iron supplement tablets regularly. Therefore, improving attitudes toward anemia prevention is an essential strategy for reducing the risk of anemia among adolescent girls.

Educational interventions are widely recognized as an effective approach to improving health attitudes and behaviors. However, conventional health education methods commonly used in schools are often perceived by adolescents as monotonous and less engaging, limiting their effectiveness in promoting behavioral change (Sa'adah *et al.*, 2023). Consequently, there is a growing need for innovative educational strategies that are more aligned with the characteristics and preferences of today's adolescents. One promising strategy is the use of digital media-based educational tools, including educational videos, animations, and other interactive audiovisual learning materials delivered through digital platforms (El-Mahmudiyah and Kurniasari, 2024).

Previous evidence has demonstrated the potential benefits of digital media in health education programs. Health education on anemia combined with iron supplementation has been shown to improve adherence to iron tablet consumption and contribute to the reduction of anemia prevalence among adolescents (Yanisah and Widati, 2023). In addition, Amperatmoko *et al.* (2022) found that video-based educational interventions significantly improved adolescents' knowledge, attitudes, and self-efficacy regarding anemia prevention. Subjects who received education through video media achieved higher average scores than those who received education through poster media, suggesting that audiovisual approaches may be more effective in delivering health information to adolescents.

Similar findings have been reported in reproductive health education. Interactive educational methods, including audiovisual media, group discussions, and peer education, have been found to enhance adolescents' understanding and engagement with reproductive health topics more effectively than traditional educational approaches. Educational interventions utilizing videos and brochures have also been associated with improved reproductive health knowledge among adolescents (Maulina *et al.*, 2025).

These findings suggest that digital media can facilitate learning by providing both visual and auditory stimulation, thereby supporting the development of positive attitudes and health-related behaviors.

Although previous studies have explored the effects of digital educational media on adolescents' knowledge, self-efficacy, and health behaviors, limited research has specifically examined changes in adolescent girls' attitudes toward anemia prevention through digital media-based reproductive health education. Furthermore, evidence from Malang Regency, an area with a relatively high prevalence of anemia among adolescent girls, remains limited. Therefore, further research is needed to examine changes in adolescent girls' attitudes toward anemia prevention following digital media-based reproductive health education, particularly in the junior high school setting. Based on this background, this study aimed to determine the difference in adolescent girls' attitudes toward anemia prevention before and after digital media-based reproductive health education at SMP Negeri 06 Singosari, Malang Regency.

METHODS

This study employed a quantitative approach using a pre-experimental one-group pretest-posttest design. This design was used to determine differences in adolescent girls' attitudes toward anemia prevention before and after receiving digital media-based reproductive health education. Since the study did not include a control group, the findings should be interpreted as changes associated with the intervention rather than evidence of a causal relationship. The research was conducted at SMP Negeri 06 Singosari, Malang Regency, Indonesia, in January 2026.

The study population consisted of eighth-grade adolescent girls aged 12–15 years enrolled at SMP Negeri 06 Singosari. A total of 42 students participated in the study. Subjects were selected using purposive sampling based on the following inclusion criteria: female students aged 12–15 years, willing to participate in the study, able to attend the educational session, and willing to complete both the pretest and posttest questionnaires. Students who were absent during the intervention or did not complete all research procedures were excluded from the study.

The independent variable in this study was digital media-based reproductive health education on anemia prevention, whereas the dependent variable was adolescent girls' attitudes toward anemia prevention. The educational intervention was delivered through a digital video containing information about the definition of anemia, causes, signs and symptoms, risk factors, consequences, prevention strategies, the importance of consuming iron-rich foods, and adherence to iron supplementation programs.

Data were collected using a structured attitude questionnaire. The questionnaire consisted of statements regarding anemia prevention and was administered before and after the intervention. Prior to data collection, the instrument underwent validity and reliability testing to ensure its appropriateness for measuring subjects' attitudes. Higher scores indicated more positive attitudes toward anemia prevention.

The research procedure began with the administration of a pretest to assess subjects' baseline attitudes toward anemia prevention. Following the pretest, subjects attended one educational session using digital media in the form of an educational video lasting approximately 30 minutes. The educational session was conducted collectively in the classroom under the supervision of the researchers. All subjects received the same educational materials and learning conditions to ensure consistency of the intervention. After the intervention, a posttest was administered using the same

questionnaire to evaluate changes in attitudes toward anemia prevention.

Several measures were implemented to minimize potential sources of bias. Selection bias was reduced by applying the same inclusion and exclusion criteria to all subjects. Information bias was minimized through the use of a standardized questionnaire that had undergone validity and reliability testing. Response bias was reduced by assuring subjects that their responses would remain confidential and would be used solely for research purposes. In addition, all subjects received the same educational content, duration, and delivery method to maintain consistency throughout the intervention.

Data analysis was performed using SPSS software. Descriptive statistics were used to summarize participant characteristics and attitude scores. Prior to hypothesis testing, data normality was assessed to determine the suitability of parametric analysis. Differences between pretest and posttest attitude scores were analyzed using a paired-sample t-test. Statistical significance was determined at a $p < 0.05$.

This study received ethical approval from the Health Research Ethics Committee (KEPK-EC) under approval number KEPK-EC/419/XII/2025. Before participation, all subjects received a complete explanation regarding the objectives, procedures, benefits, and voluntary nature of the study. Written informed consent was obtained from all subjects before data collection. The confidentiality and anonymity of subjects were strictly maintained, and all data collected were used exclusively for scientific and research purposes.

RESULTS AND DISCUSSIONS

Subject characteristics

Table 1 presents the demographic and socioeconomic characteristics of the subjects. The majority of subjects were aged 14–15 years (78.6%), indicating that most subjects were in middle adolescence, a developmental period characterized by rapid physical, psychological, and cognitive changes. According to [Safitri et al. \(2024\)](#), adolescence is a transitional stage between childhood and adulthood marked by increasing cognitive maturity and greater capacity to process and evaluate health-related information.

Table 1. Subject characteristics of adolescent girls (n = 42)

Characteristics	Category	n	%
Age	12–13 years	9	21.4
	14–15 years	33	78.6
Age at Menarche	10–11 years	12	28.6
	12–13 years	28	66.7
	14–16 years	2	4.7
Menstrual Duration	3–5 days	9	21.4
	5–7 days	16	38.1
	>7 days	17	40.5
Previous Anemia Education	Within 1 month	7	16.7
	Within 2 months	9	21.4
	Never received	26	61.9

Characteristics	Category	n	%
Parents' Occupation	Private employee	28	66.7
	Civil servant	2	4.8
	Entrepreneur	12	28.5
Parents' Monthly Income	< IDR 2,000,000	18	42.9
	IDR 2,000,000–3,000,000	24	57.1

Source: Primary data, 2026

Most subjects experienced menarche at the age of 12–13 years (66.7%), which is considered a normal age range for reproductive maturation. Menarche is an important physiological milestone because it marks the onset of regular menstrual blood loss and consequently increases iron requirements among adolescent girls. Furthermore, 40.5% of subjects reported menstrual periods lasting more than seven days, which may contribute to a higher risk of iron deficiency and anemia if not accompanied by adequate nutritional intake.

Most subjects (61.9%) had never received previous education regarding anemia prevention. This finding suggests that many adolescents still have limited exposure to health information related to anemia. According to Dewi et al. (2024), inadequate knowledge regarding anemia prevention remains a major challenge because anemia can negatively affect learning concentration, physical fitness, immune function, and future reproductive health outcomes. Therefore, educational interventions targeting adolescent girls remain highly relevant and necessary.

Differences in in attitudes toward anemia prevention before and after video-based health education

Table 2 shows a change in subjects' attitudes toward anemia prevention before and after the educational intervention. Before receiving video-based education, 24 subjects (57.1%) demonstrated negative attitudes toward anemia prevention, while 18 subjects (42.9%) demonstrated positive attitudes. Following the intervention, the proportion of subjects with positive attitudes increased to 76.2% (32 subjects), whereas the proportion with negative attitudes decreased to 23.8% (10 subjects).

Table 2. Distribution of subject attitudes before and after video-based health education (n = 42)

Attitude Category	Before Education n (%)	After Education n (%)
Positive	18 (42.9)	32 (76.2)
Negative	24 (57.1)	10 (23.8)

Source: Primary data, 2026

The observed increase in attitudes toward anemia prevention may be explained by the Knowledge-Attitude-Practice (KAP) framework, which describes the relationship between knowledge, attitudes, and health-related practices. Health education provides information that can contribute to the formation of individuals' beliefs, perceptions, and evaluations regarding health issues. In the present study, subjects received information about the causes, consequences, risk factors, and prevention of anemia. This information may have enhanced their understanding of anemia and increased their awareness of the importance of preventive measures.

Health education serves as a systematic process aimed at improving individuals' knowledge, attitudes, and skills related to health maintenance and disease prevention. Pueyo-Garrigues et al. (2019) emphasized that health education empowers individuals to make informed health decisions, while Redican (2021) highlighted the importance of health literacy in enabling individuals to access, understand, and utilize health information effectively. Therefore, the improvement in attitudes observed among subjects may have resulted from increased understanding and awareness generated through the educational intervention.

The findings of this study are consistent with those reported by Mahrorani et al. (2025), who found that digital health education significantly improved adolescents' understanding of anemia prevention and encouraged positive health attitudes. Similarly, Wijaya et al. (2024) reported that electronic educational media effectively enhanced health literacy among adolescents due to their accessibility, interactivity, and suitability for the digital generation. The consistency between previous studies and the present findings strengthens the evidence supporting the effectiveness of digital educational interventions for adolescent health promotion.

Video-based health education on adolescent girls' attitudes toward anemia prevention

Table 3 demonstrates that the mean attitude score increased from 38.95 before the intervention to 44.74 after the intervention, resulting in a mean difference of 5.79 points. The paired-sample t-test revealed a statistically significant difference between the pretest and posttest attitude scores ($p < 0.001$), indicating a significant increase in adolescent girls' attitudes toward anemia prevention following the video-based health education intervention.

Table 3. Comparison of attitude scores before and after video-based health education (n = 42)

Variable	Mean Score	Mean Difference	t(df)	p-value
Pretest	38.95	5.79	11.959 (41)	< 0.001*
Posttest	44.74			

Note: paired-sample t-test, significant if p-value < 0.05

The observed increase in attitude scores may be explained through Multimedia Learning Theory, which proposes that information can be processed more effectively when presented through both visual and auditory channels. Educational videos integrate narration, text, images, and animations, which may facilitate understanding and retention of health information. Adolescents may also be receptive to digital learning approaches because they are familiar with technology-based media in their daily lives. Consequently, video-based education may enhance engagement, facilitate comprehension, and support the development of positive attitudes toward anemia prevention.

Several factors may also have contributed to the observed improvements. Most subjects had never previously received education regarding anemia prevention, making the educational content relatively new and impactful. Additionally, the majority of subjects were aged 14–15 years, an age characterized by increasing cognitive maturity and improved ability to critically evaluate health information (Safitri et al., 2024). These developmental characteristics may have enhanced the effectiveness of the intervention.

Nevertheless, several confounding factors may have influenced the observed changes in attitudes. Previous studies have shown that dietary habits, nutritional status, family support, peer influence, exposure to health information through social media, and socioeconomic conditions can affect adolescents' attitudes toward anemia prevention. [Lestari et al.](#) (2020) reported that low iron intake and poor dietary patterns are associated with increased anemia risk among adolescents. Similarly, [Mulianingsih et al.](#) (2025) found that poor nutritional status significantly increases the likelihood of anemia among adolescent girls. Other studies have highlighted the role of menstrual characteristics, parasitic infections, and adherence to iron supplementation in influencing anemia risk ([Sari et al.](#), 2022; [Wiafe et al.](#), 2023). Although these factors were not directly measured in this study, they may have contributed to subjects' perceptions and attitudes regarding anemia prevention.

Study limitations

This study has several limitations, including the use of a *one-group pretest–posttest* design without a control group, a relatively small sample size, and the assessment of attitudes immediately after the intervention. These limitations restrict the generalizability of the findings and the assessment of whether the observed changes in attitudes are sustained over time. Future studies are recommended to involve larger samples, include a control group, and conduct follow-up assessments. Overall, video-based reproductive health education shows potential for supporting improvements in adolescent girls' attitudes toward anemia prevention and may be considered as part of school-based health programs.

CONCLUSIONS

This study found that 30-minute digital video-based reproductive health education was associated with an increase in adolescent girls' attitudes toward anemia prevention. The proportion of positive attitudes increased from 42.9% ($n = 18$) before the intervention to 76.2% ($n = 32$) after the intervention, while negative attitudes decreased from 57.1% ($n = 24$) to 23.8% ($n = 10$). The mean attitude score also increased from 38.95 to 44.74, with a significant difference between the pretest and posttest scores. These findings suggest that digital video-based education may be an accessible and engaging strategy that can be integrated into school health programs, adolescent reproductive health services, and community health promotion activities. The findings are consistent with the Knowledge–Attitude–Practice (KAP) framework and Multimedia Learning Theory, as the combination of visual and auditory information may facilitate understanding and support the development of positive attitudes toward anemia prevention. Future studies should involve larger samples, control groups, and follow-up assessments to determine whether the observed changes in attitudes are sustained over time and translate into actual anemia-prevention behaviors.

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