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AI-Powered Educational Videos as an Innovative Approach to Increase Knowledge of Stunting Prevention among Adolescent Girls

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Abstract: Stunting remains a public health problem in Indonesia with long-term impacts on health, education, and productivity. Prevention efforts starting from adolescent girls are crucial because mothers' knowledge influences the risk of stunting in the next generation. This study aimed to assess the effectiveness of Artificial Intelligence (AI)-based educational videos in improving adolescent girls' knowledge about stunting prevention. A quasi-experimental pretest–posttest design was conducted on 72 respondents, selected proportionally from the student population. The intervention took the form of education through AI-based video media, with respondents' knowledge measured before and after the intervention, and then analyzed using paired statistical tests. The results showed that the average knowledge score increased significantly from moderate to high after the intervention ($p < 0.05$). These findings support previous studies that confirm the effectiveness of digital media and AI in improving adolescent health literacy. In conclusion, AI-based video media are effective in increasing adolescent girls' knowledge about stunting prevention and have the potential to be integrated into health education programs as a preventive strategy to reduce the prevalence of stunting in Indonesia.

Keywords: Adolescent girls; Artificial intelligence; Educational videos; Health Education; Knowledge; Stunting

Introduction

Stunting, a condition of growth failure due to chronic malnutrition during the first 1,000 days of life, remains one of the major public health problems in Indonesia. According to UNICEF data (2024), the prevalence of stunting among toddlers in Indonesia reaches 21.6%, placing the country high on the global list of nutrition problems. This condition causes physical growth and cognitive development disorders that can have long-term effects on the quality of human resources and national productivity. Strengthening stunting prevention is a national priority that requires innovative and multisectoral strategies.

Adolescent girls, as future mothers, have a strategic role in preventing stunting across generations. Knowledge and healthy behaviors during adolescence contribute significantly to the nutritional quality and health of pregnant women, which have a direct impact on child growth (Nuraini et al., 2024). However, nutrition education for adolescents often faces challenges in the form of a lack of engaging delivery methods, limited access to information, and low motivation to learn in traditional settings.

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Advances in digital technology and Artificial Intelligence (AI) have opened new opportunities for delivering health education that is more effective, personalized, and widely accessible. AI-based video media can tailor content to individual needs and levels of understanding in real time, increasing the appeal and effectiveness of learning (Wong et al., 2023; Khan & Bhutta, 2022). The implementation of this technology is important given the high penetration of social and digital media among adolescents, which is shifting communication patterns and ways of obtaining information.

Previous studies have shown that interactive digital media such as educational videos and social media platforms can increase knowledge and positive behavioral changes related to stunting prevention (Dermawan, 2024; Marlinawati, 2023; Rahmadani et al., 2025). Audiovisual media have proven to be superior to conventional methods due to their ability to present practical instructions visually and through inspirational narratives (Rahmadani et al., 2025).

However, various obstacles such as uneven access to technology, low digital literacy, and cultural and economic barriers still need to be addressed in designing technology-based educational interventions (Setyarsih, 2024). A multisectoral approach and the adaptation of content to local conditions are key to the success of sustainable nutrition education programs (Astuti et al., 2025; Riswanti et al., 2023).

The Indonesian government has established a national strategy for stunting prevention that prioritizes innovative educational media and community empowerment. Therefore, evaluating the effectiveness of AI-based video media in the context of stunting prevention education among adolescent girls is crucial for developing adaptive and sustainable educational models.

This study aims to provide empirical evidence on the contribution of AI technology in video educational media as a potential innovative approach to increasing adolescent girls' knowledge and readiness in preventing stunting, while also serving as a reference for the development of more effective and inclusive digital-based public health programs.

Method

This study is a quantitative study with a quasi-experimental design using a one-group pretest–posttest design. The population consists of all 252 female students, with a sample of 72 respondents selected through cluster sampling using the Isaac and Michael formula. The research instrument was Artificial Intelligence (AI)-based educational media that were validated by media experts and subject matter experts. The media contained material on stunting, its prevention, and management. Knowledge was measured using a multiple-choice questionnaire consisting of 20 questions with a score of 1 for correct answers and 0 for incorrect answers.

The research procedure included providing explanations and informed consent, completing a pretest questionnaire, conducting the intervention through AI-based educational videos, and completing a posttest questionnaire. The researchers monitored the process directly to ensure that the media were watched by the respondents.

Data analysis was performed descriptively using frequency distributions to describe the characteristics of the respondents, while inferential statistical tests used the Wilcoxon test to determine the difference in knowledge scores before and after the intervention, with a significance level of $p \leq 0.05$. Research ethics were maintained through the principles of self-determination, anonymity, confidentiality, privacy, justice, and protection from discomfort and harm.

Result and Discussion

The results of the study show a significant increase in the knowledge scores of adolescent girls after being given an Artificial Intelligence (AI)-based video media intervention. Before the intervention, the average score of respondents was in the moderate category (mean = 49.93), which then increased to an average of 77.92 after the intervention ($p < 0.05$). These findings are in line with national and international studies that confirm the role of digital media and AI in improving adolescent health knowledge, particularly related to stunting prevention.

The effectiveness of AI-based video media has been proven by various studies. Dermawan (2024) showed that educational videos on stunting prevention were able to significantly improve the knowledge and attitudes of adolescent girls. Strong visualizations and inspirational narratives in videos effectively build deep awareness and encourage healthy behaviors. Similarly, Liu et al. (2022) emphasized that AI-based media with personalized content can improve retention and understanding of material, as the content adapts to individual needs and levels of understanding.

The widespread use of digital media has also been proven effective in preventing stunting. Darusman et al. (2024) in a systematic review, mentioned that digital interventions such as video-based applications, social media, and learning platforms can increase knowledge and behavioral changes related to stunting. This is reinforced by Junedik et al. (2025), who found that multimedia-based nutrition education and interactive videos can increase mothers' knowledge and behavior in

preventing stunting. These findings are relevant to adolescent girls as future mothers.

Social media is also an effective means of reaching adolescents. Research by Marlinawati (2023) shows that the use of platforms such as TikTok and Instagram in the form of short educational videos can increase adolescents' knowledge, even reaching an increase of up to 36.75% on TikTok. This fact highlights the importance of using platforms that align with adolescents' digital lifestyles in delivering educational messages.

Furthermore, the use of AI technology adds value to the health education process. AI enables the creation of adaptive and personalized video content, tailoring the material to the audience's responses in real time (Wong et al., 2023). Additionally, AI can provide instant feedback and monitor participants' understanding, making learning more effective (Khan & Bhutta, 2022). Ramesh et al. (2024) even reported that 3D AI animations can strengthen understanding of nutritional concepts through realistic simulations that are easier for adolescents to understand and remember.

The role of adolescent girls is very important in the stunting prevention cycle. Qualitative research by Nuraini et al. (2024) confirms that increasing nutritional knowledge and healthy lifestyles from adolescence will have a direct impact on the nutritional quality of pregnant women in the future, which is a major factor in preventing stunting across generations.

The effectiveness of video-based educational media is also demonstrated by research by Rahmadani et al. (2025), in which interventions through videos, leaflets, and interactive discussions successfully increased the average knowledge score of mothers of toddlers from 58.4 to 85.6 ($p < 0.001$). Audiovisual media are considered more effective than conventional methods because the delivery of material is more interesting and easier to understand. Moreover, educational videos allow for the visualization of practical instructions, such as how to prepare nutritious meals and proper parenting, which can improve mothers' skills in preventing stunting.

The success of educational media interventions is influenced by several factors, such as delivery methods, the suitability of content to the local cultural context, and the support of health workers and posyandu cadres (Rahmadani et al., 2025; Sentika et al., 2024). However, there are still obstacles in the form of limited access to technology, low levels of education, and limited resources in remote areas (Rahmadani et al., 2025). Therefore, media interventions must be designed with local conditions in mind to be effective and sustainable.

The policy implications of these findings highlight the importance of making AI-based video media part of the national strategy for stunting prevention. The government and health institutions are advised to develop interactive education programs supported by training for health workers so that they can optimize the use of digital media at the community level (Astuti et al., 2025). A multisectoral approach that includes providing access to nutritious food and improving maternal and child health services is also needed to address the socioeconomic factors underlying stunting (Durevall & Isaksson, 2024).

Various innovative education models have also been developed. Herawati et al. (2025) developed a technology-based nutrition education gamification model that has been proven to increase the involvement of mothers and the community. Riswanti et al. (2023), through PaSti PenTing, combined educational videos with local wisdom to increase family support in preventing stunting. In addition, behavioral change theories such as the Health Belief Model (HBM), Theory of Planned Behavior (TPB), and Integrated Behavior Model (IBM) are still relevant for changing perceptions of risk, benefits, barriers, and increasing self-efficacy (Nenobais, 2021; Noviana, 2024).

Evaluating the effectiveness of health education media interventions is also important. Commonly used methods include pre- and post-tests, in-depth interviews, participatory observation, and long-term surveys (Dinkes Paser, 2025; Rahmadani, 2025). Sarah et al. (2024) showed that audiovisual media are superior to booklets in promoting behavioral change to prevent stunting. Meanwhile, social media interventions have been proven effective in promoting health literacy, although challenges related to digital literacy and content accuracy must still be anticipated (Setyarsih, 2024; Indriani, 2024).

Conclusion

The study highlights the effectiveness of AI-based video media in enhancing adolescent girls' knowledge about stunting prevention, significantly improving their knowledge scores. This intervention demonstrates the potential of digital technology as an innovative, adaptive educational tool, offering personalized and interactive learning. It emphasizes the importance of integrating AI-based education into both formal and non-formal education systems, alongside training for health workers and improved access to technology, especially in resource-limited areas. A multisectoral approach, adapting content to local contexts, is crucial for ensuring the sustainability and success of these interventions in preventing intergenerational stunting.

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Conflicts of Interest
The authors declare no conflict of interest.

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