



Research Article

Effect of Digital Media Education on Knowledge to Prevent Adolescent Pregnancy

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ABSTRACT

Adolescent pregnancy refers to pregnancy occurring at ≤ 20 years of age and often results from limited knowledge of reproductive health. Adolescents need adequate understanding because a lack of information increases pregnancy risk and may lead to medical, psychological, and social consequences. Knowledge is a key focus, as it forms the basis for preventive attitudes and behaviors. Digital educational media such as e-booklets and webtoons are used because they are engaging, accessible, and aligned with the characteristics of today's youth. This study aimed to analyze the effect of health education delivered through e-booklet and webtoon media on the knowledge of female students at SMKS Yaspri Wado regarding the prevention of teenage pregnancy. A quantitative, pre-experimental one-group pretest-posttest design was employed with 60 respondents. The instrument consisted of a 20-item multiple-choice questionnaire (score range 0–20). Data were analyzed using the Wilcoxon test due to non-normal distribution. The results showed an increase in the mean knowledge score from 13.717 to 18.60, with $p < 0.001$, indicating a significant effect of the digital education intervention. In conclusion, the combined use of e-booklet and webtoon media proved to be an effective and interactive tool for improving adolescents' knowledge of reproductive health and preventing teenage pregnancy.

INTRODUCTION

Adolescents comprise individuals aged 10–19 years who are in a transitional phase from childhood to adulthood, marked by biological, psychological, and social changes (WHO, 2024). One of the main changes during this period is the maturation of the reproductive organs, which is accompanied by curiosity about sexuality and an increase in sexual desire (Purnamawati & Aritonang, 2019). These combined changes increase adolescents' vulnerability to risky sexual behaviors, thereby raising the likelihood of teenage pregnancy is influenced by biological, psychological, and social factors (Fauziah et al., 2022).

This vulnerability makes teenage pregnancy a serious health issue with medical, psychological, social, and economic consequences (Fauziah et al., 2022). Pregnancy at the age of ≤ 20 years increases the risk of complications such as anemia, premature birth, low birth weight (LBW), stunting, and neonatal death due to the immaturity of the reproductive organs (Purnamawati & Aritonang, 2019). In addition, teenage pregnancy hinders education, limits career opportunities, and triggers emotional stress and social stigma due to unpreparedness for parenthood (WHO, 2024).

Approximately 21 million girls aged 15–19 years in developing countries experience pregnancy, and 12 million of them give birth each year. In Indonesia, 19.6% of adolescent girls aged 14–19 have experienced unplanned pregnancies, and 20% of abortion cases are performed on adolescents (Wardani et al., 2023). A BPS survey (2022) reported a adolescent pregnancy rate of 48 per 1,000 adolescent girls aged 15–19 (4,8%) (Rosdiana & Khoiriah, 2025). According to the Indonesia Demographic and Health Survey (SDKI, 2021), 10,2% of adolescent girls aged 15–19 in West Java have been pregnant, which is higher than the national average of 9,7% (Mumpuningdyah, 2024).

Data from the Sumedang District Health Office (2022) indicated that there were 448 cases of teenage pregnancy, with the majority occurring among those aged 15–19 years (Sutisna, 2022). In 2024, Wado Subdistrict recorded the highest prevalence of pregnancies among women aged ≤ 20 years, with 54 cases out of 565 pregnant women. Therefore, this area became a priority target for teenage pregnancy prevention programs, and SMKS Yaspri Wado was chosen as the research location because it had the largest number of female students (72 students from grades X–XII) and was considered representative. This situation highlights the urgent need to enhance adolescents' understanding of the risks and consequences of early pregnancy, in line with the BKKBN (2020) program, which aims to equip young people with knowledge and awareness of reproductive health.

Notably, adolescents' knowledge of reproductive health plays a crucial role in preventing teenage pregnancy. Knowledge can be obtained through formal and non-formal education, the surrounding environment, personal experience, or mass media (Syakurah & Moudy, 2020). This study focused on the aspect of knowledge because knowledge is a cognitive domain that forms the foundation for attitudes and behaviors, where changes in health behavior begin with an increase in knowledge. Therefore, without adequate knowledge, it is difficult to expect the development of positive attitudes and appropriate behaviors. This study focused on the aspect of knowledge because knowledge is a cognitive domain that forms the foundation for attitudes and behaviors, where changes in health behavior begin with an increase in knowledge. Therefore, without adequate knowledge, it is difficult to expect the development of positive attitudes and appropriate behaviors (Notoatmodjo, 2018).

Moreover, reproductive health education is an important strategy to improve knowledge, shape positive attitudes, and promote healthy behaviors among adolescents (Syakurah & Moudy, 2020; Siahaan et al., 2024). This education can be delivered through various media adapted to the characteristics of adolescents (Winarti et al., 2023). Previous studies have demonstrated the effectiveness of educational media: Nugraha et al. (2023) proved that e-booklets effectively increased knowledge scores from 58,64 to 72,64 ($p = 0,000$); Gustina & Wibowo (2020) found that flipbook media did not significantly improve knowledge ($p = 0,24$) but had an effect on behavior ($p = 0,009$); Yuliwati & Solihatul Afiah (2022) discovered that video and booklet media improved knowledge ($p < 0,001$ and $p = 0,003$); Elvina et al. (2023) reported a significant increase using leaflets ($p = 0,000$); and Yuhandini & Khulaidah (2021) demonstrated that webtoons effectively enhanced adolescents' knowledge ($p = 0,000$).

However, no study has yet combined e-booklet and webtoon media in the context of preventing teenage pregnancy. An e-booklet is an interactive digital book that can be accessed through electronic devices, while a webtoon is a digital comic featuring engaging visual narratives (Qudratullah et al., 2024). The combination of these two media has the potential to serve as an innovative, easy-to-understand educational tool that aligns with adolescents' learning styles.

A preliminary study at SMKS Yaspri Wado revealed that no educational program on teenage pregnancy prevention had ever been conducted. Interviews with school officials showed that eight out of ten female students were unaware of the impacts of teenage pregnancy. This finding confirms the low level of knowledge among students and underscores the need for engaging and effective educational interventions.

Nurses play an essential role in promotive and preventive efforts, including providing reproductive health education to adolescents in schools, clinics, and communities (Aprilia, 2020; Umaroh & Karjoso, 2021). Therefore, this study is important to examine the effect of e-booklet- and webtoon-based reproductive health education on the knowledge of female students at SMKS Yaspri Wado in preventing teenage pregnancy.

METHOD

This study employed a quantitative research method with a pre-experimental one-group pretest–posttest design. The research was conducted on October 1, 2025, at SMKS Yaspri Wado, Sumedang Regency. The study population consisted of all female students in grades X, XI, and XII at the school, with a total sample of 60 students present, selected by using the total sampling technique. The research instrument was a closed-ended questionnaire with 20 multiple-choice questions, which had been tested for validity and reliability using Microsoft Excel. Knowledge measurement was conducted twice before the intervention (pretest) and after the intervention (posttest). The intervention involved 45 minutes of reproductive health education using e-booklet and webtoon media. Meanwhile, data were analyzed using the Shapiro–Wilk normality test, which indicated that the data were not normally distributed ($p < 0,05$). Therefore, the comparison between pretest and posttest scores was analyzed using the Wilcoxon Signed Rank Test with a significance level of $p < 0,05$. Data processing and analysis were performed using Microsoft Excel and JASP software. Ethical approval for this study was obtained from the Health Research Ethics Committee of the Faculty of Health Sciences and Technology, Jenderal Achmad Yani University, under approval number 064/KEPK/FITKes-Unjani/IX/2025.

RESULTS

Table 1. Frequency Distribution of Respondents' Demographic Characteristics

Characteristics	Frequency		Percentage%
Age (Years)			
15	16		26,67%
16	24		40%
17	19		31,67%
18	1		1,66%
Total	60		100%
Ever Received Information			
Yes	16		26,67%
Never	44		73,33%
Total	60		100%
Source of Information			
Social Media	16		26,67%
Parents	-		-
Teachers	-		-
Health Worker	-		-
Total	16		26,67%

The frequency distribution of respondents based on age showed that nearly half of the students were 16 years old (40%). Furthermore, most of the students, 44 (73,33%), had never received any information regarding the prevention of teenage pregnancy.

Table 2. Frequency Distribution of Respondents' Pre-test Results

Knowledge	Pre-test			
	Freq	Percentage (%)	Med	Mean
Good	15	25%	17	16,733
Fair	33	55%	14	13,939
Poor	12	20%	9,5	9,4166
Total	60	100%	14	13,717

Based on the table above, it was found that most respondents' knowledge before being given the health education intervention (pre-test) on teenage pregnancy prevention was in the "fair" category, totaling 33 students (55%).

Table 3. Frequency Distribution of Respondents' Post-test Results

Knowledge	Post-test			
	Freq	Percentage %	Med	Mean
Good	56	93,33%	19,5	19,0178
Fair	4	6,67%	12,5	12,7500
Poor	0	0%	0	0
Total	60	100%	19	18,600

Moreover, as shown in Table 3, almost all respondents' knowledge after receiving the health education intervention (post-test) increased to the "good" category, with 56 students (93,33%) showing improved knowledge levels.

Table 4. Normality Test Results for Pre-test and Post-test Knowledge Scores

Data	Shapiro Wilk			
	N	Statistic	Sig	Note
Pre-test	60	0,927	0,002	Not Normal
Post-test	60	0,704	<0,001	Not Normal

Based on the table above, the significance values of both groups were less than 0,05 ($p < 0,05$), indicating that the pretest and posttest data were not normally distributed. Therefore, the analysis was performed using the Wilcoxon Signed-Rank Test.

Table 5. Wilcoxon Test Analysis Results

Variable	N	W	z	p-value
Pre-test-post-test	60	0.000	-6.680	< 0,001

Wilcoxon test results showed p-values of 0,002 for the pretest and < 0,001 for the posttest ($p < 0,05$), indicating a significant increase in knowledge following reproductive health education using e-booklet and webtoon media for preventing teenage pregnancy.

DISCUSSION

Demographic Characteristics of Respondents

Based on the analysis of respondent characteristics in this study, nearly half of the respondents were 16 years old (40%). In addition, 16 students (26,67%) had previously received information about reproductive health, while 44 students (73,33%) had never received such information. The main source of information among respondents was social media. The age of 16 falls into the late adolescence category, a stage when individuals begin to develop intellectual abilities, expand social interactions, and form both personal and sexual identities (Hamidah & Rizal, 2022).

Age is one of the factors that influence a person's level of knowledge. As individuals grow older, they experience cognitive development that enhances their ability to think critically, process, and interpret information more comprehensively (Notoatmodjo, 2020). Adolescence is an appropriate period to receive positive education, as it is a time marked by rapid physical, psychological, and social changes (Santrock, 2024). Moreover, adolescents begin to seek solutions to the problems they face and tend to be more receptive to and capable of understanding the information they obtain (Hofmans, 2022). Exposure to credible online health information sources plays an important role in shaping one's knowledge, as it can improve health literacy, while exposure to low-quality and unreliable information may hinder adolescents' understanding of reproductive health issues (Freeman et al., 2023).

Similarly, his finding aligns with the study by Stauch et al. (2022), which demonstrated a significant relationship between age and the level of digital health literacy among children and adolescents ($p < 0,001$), indicating that older adolescents possess better abilities in assessing the credibility of online health information than younger

children. These results are further supported by Taba et al., (2022), who found that adolescents with higher exposure to online health information and strong self-efficacy showed higher levels of digital health literacy ($p < 0,01$).

Thus, the demographic characteristics of respondents indicate that although most of them were in late adolescence and cognitively capable of receiving and processing information effectively, many had never obtained reproductive health education from credible sources. This highlights the importance of health education in optimally enhancing adolescents' knowledge.

Respondents' Knowledge Levels Before and After the Intervention on Teenage Pregnancy Prevention Through E-Booklet and Webtoon Media

Based on the study results, there was a significant increase in respondents' knowledge levels regarding the prevention of teenage pregnancy after receiving reproductive health education interventions using e-booklet and webtoon media. Before the intervention, most respondents 33 students (55%) had a fair level of knowledge, while a small portion, 12 students (20%), had a poor level of knowledge. After the intervention, there was an improvement, with nearly all 56 students (93,33%) classified as having good knowledge, and only 4 students (6,67%) remaining in the fair category. Knowledge is the result of human sensory processes in perceiving objects through the five senses, particularly sight and hearing which play an important role in shaping one's behavior and actions. Knowledge is influenced by various factors, including education, age, information, experience, culture, social environment, and economy (Notoatmodjo, 2018).

Digital media such as e-booklets, webtoons, and interactive applications can enhance learning outcomes and student

engagement because of the balanced combination of text and visuals that support comprehension (Raharjo et al., 2025). The combination of these two media can strengthen cognitive processes and facilitate concept understanding, as information is presented through two perceptual channels verbal and nonverbal (Mayer, 2020). Moreover, interactive visual media can reduce embarrassment and increase adolescent participation when learning about sensitive topics such as reproductive health (Widyastuti & Rahman, 2020). Furthermore, the improvement in respondents' knowledge may be influenced by their experiences in obtaining information through reproductive health education, such experiences play an essential role in knowledge formation through the learning process and direct exposure to materials, which enable better understanding and application of information (Notoatmodjo, 2018). The more frequently individuals are exposed to relevant information, the greater the likelihood of knowledge improvement and positive behavioral change (Buaton et al., 2019).

This finding is consistent with a study by Yuhandini and Khulaidah (2021), which utilized webtoons in reproductive health education and showed a significant increase in knowledge from the fair category (53,8%) to the good category (92,3%), with a p-value of 0,000 ($< 0,05$). Similarly, Suindri et al. (2024) found that the use of e-booklets significantly improved adolescents' knowledge about reproductive health; before the intervention, most respondents had fair knowledge (58%), while after education using booklets, the proportion of students with good knowledge increased to 90%, with $p = 0,000$ ($< 0,05$). Therefore, access to accurate information and the resulting improvement in knowledge can help prevent teenage girls from experiencing pregnancy during adolescence.

The Effect of E-Booklet and Webtoon-Based Reproductive Health Education on Preventing Teenage Pregnancy

Based on the research conducted among female students at SMKS Yaspri Wado, it was found that the respondents' knowledge level regarding the prevention of teenage pregnancy significantly increased after the health education intervention using e-booklet and webtoon media. Statistical analysis using the Wilcoxon test showed a p-value of $< 0,001$ ($p < 0,05$), indicating a significant difference between the pre-test and post-test scores. The average knowledge score increased from 13.717 (pre-test) to 18.600 (post-test), with the median score rising from 14 (pre-test) to 19 (post-test).

Health education plays an essential role in enhancing community knowledge, awareness, understanding, and skills related to health issues. Educational efforts in the form of health education are one of the most important preventive interventions in nursing practice (Lojam & Malo, 2025). Beyond merely conveying information, Health education is a systematic effort to improve knowledge, shape positive attitudes, and encourage healthy living behaviors (Mahmudiono et al., 2024). Moreover, health education serves a social function by strengthening individuals' capacity particularly among children and adolescents to make appropriate health decisions and reduce health disparities within communities (Charles Shapu et al., 2020).

The use of e-booklet media as a learning tool has been proven effective in increasing students' knowledge and learning interest due to its attractive design, systematic presentation of material, and easier accessibility compared to conventional printed books (Prananda et al., 2022). Additionally, webtoons, as interactive and visually engaging learning media, can enhance students' interest and reading comprehension because the combination of

images, text, and interactive elements helps students grasp material more easily and enjoyably, thereby improving knowledge (Misnayanti & Deffanova, 2024). This is supported by the study of Utamingtyas et al.(2024), which examined the effectiveness of health education in increasing adolescents' knowledge about the characteristics of puberty using e-booklet media, proving to be effective with a statistical test result of $p = 0,000 < \alpha (0,05)$. Consequently, health education interventions using e-booklet and webtoon media have a significant effect on improving the knowledge of female students at SMKS Yaspri Wado. Visual and narrative-based educational approaches can increase engagement and information retention among adolescents. Media combining images and narrative text are more easily accepted and absorbed by adolescents, who are generally more responsive to visual and interactive stimuli (Nurcahyanti et al. 2025). Therefore, the development of digital learning media such as e-booklets and webtoons holds great potential for application in adolescent reproductive health education.

In addition, the findings of this study have important implications for nursing practice, particularly in the role of nurses as educators and health promoters in the community (Amalia et al., 2024). Nurses have the responsibility to identify adolescents' reproductive health education needs and to design creative, engaging, and digitally based learning media to ensure effective health (Ningtias et al., 2024). Nurses play a vital role in delivering technology-based health education to improve adolescents' health literacy, especially regarding sensitive issues such as teenage pregnancy (Pratiwi & Wulandari, 2022). Therefore, nurses are expected to innovate in providing educational interventions through digital media such as e-booklets and webtoons to support promotive and preventive efforts in

reducing teenage pregnancy rates and enhancing adolescents' holistic well-being (Harahap et al., 2021).

CONCLUSIONS AND RECOMMENDATION

Based on the research conducted among female students at SMKS Yaspri Wado on October 1, 2025, it can be concluded that before receiving reproductive health education through e-booklet and webtoon media, most respondents had a fair level of knowledge, namely 33 students (55%), while a small proportion had a poor level of knowledge, namely 12 students (12%). After the intervention, a significant improvement was observed, with almost all respondents demonstrating a good level of knowledge, namely 56 students (93,33%), and only a small number remaining in the fair category (6,67%). Bivariate analysis using the Wilcoxon test showed a p-value of < 0.001 , indicating a significant difference between the levels of knowledge before and after the health education intervention. This finding demonstrates that health education through e-booklet and webtoon media has a significant effect on increasing adolescents' knowledge about the prevention of teenage pregnancy. Therefore, digital media-based health education such as e-booklets and webtoons is effective in improving reproductive health literacy and can serve as a promotive-preventive strategy to prevent teenage pregnancy.

For future research, it is recommended to expand the study variables by including aspects of attitude and behavior to obtain a more comprehensive understanding of the effectiveness of educational media in reproductive health education.

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