Original Article

E-Leaflet-Based HIV/AIDS Education and Adolescent Knowledge

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ABSTRACT

Background: HIV/AIDS continues to be a threat to public health worldwide, including in Indonesia, particularly among the elderly population, who are particularly vulnerable to the risks associated with inadequate knowledge and information access. Purpose: This study aims to understand the impact of e-leaflet media on Adolescent understanding about HIV/AIDS

Methods: The study's design uses a quantitative approach with a quasi-experimental methodology and a single-group pretest-posttest design. With a one-group pretest-posttest design and inclusion criteria that included being between the ages of 15 and 18, registered as active students, eager to participate, and able to read and comprehend Indonesian, 62 teenagers in all were chosen at random to join in the quasi-experiment. Students who did not finish the questionnaire or were enrolled in other HIV/AIDS education programs were excluded. A knowledge questionnaire regarding HIV/AIDS with 15 multiple-choice and true/false items served as the tool. Three experts used Aiken's V to examine the content validity of this questionnaire, which was adapted and adjusted from Ministry of Health recommendations and prior research material.

Results: The results showed that the instrument was valid, with results >0.85. The Kuder-Richardson 20 (KR-20) method was used for reliability testing, and the results showed a high dependability rating of 0.78. Three steps were used to obtain the data: the pretest, the intervention (digital e-leaflets), and the posttest five days later. The Wilcoxon Signed Rank Test data analysis revealed a significant difference ($p < 0.001$), suggesting that e-leaflet media education was successful in raising adolescents' awareness of HIV/AIDS prevention. Kurnia Jaya Persada University's Health Research Ethics Committee has approved this study, and prior to participation, each subject gave their informed consent.

Conclusion: Based on these results, e-leaflets are a useful educational tool that should be incorporated into adolescent health promotion initiatives in order to stop the early spread of HIV/AIDS

Keywords: HIV AIDS Prevention; Education; E-Leaflet; Adolescents; Knowledge.

Implications for Practice:

- Enhancing the Health Education Approach. According to the study's findings, e-leaflets can be employed as an extra teaching tool in health promotion initiatives in schools and adolescent communities since they are a useful tool for raising teenage knowledge.
- Enhancing Health Facilities' Preventive Interventions. Health centers, adolescent clinics, and other health services can use e-leaflet-based teaching as part of more effective and conveniently accessible preventive interventions for young populations.
- The foundation for health workers' clinical decision-making. To promote adolescent involvement and

Implications for Practice:

comprehension, health professionals may choose to use digital media, such as e-leaflets, in outreach and counseling activities, particularly when dealing with sensitive matters like HIV/AIDS.

Introduction

HIV/AIDS continues to be a significant and concerning worldwide health issue. According to (UNAIDS., 2023), people aged 15 to 24 years old are particularly affected by the rising prevalence of HIV-related diseases, primarily due to a lack of knowledge and information, as well as a lack of access to educational services that meet their needs. According to the report, even though various preventative and promotional initiatives have been carried out through schools and hospitals, the majority of Indonesians still lack enough knowledge about HIV/AIDS prevention and treatment.

Considering that there is currently no fully effective treatment to eradicate HIV/AIDS, one of the infectious diseases that remains a terrifying threat to global health is acquired immunodeficiency syndrome. Because of this, people with HIV typically have a complicated long-term prognosis and need to take antiretroviral (ARV) medication for the rest of their lives to prevent the disease's progression (Nurmawati, Thatit, 2020). The main ways that the human immunodeficiency virus (HIV) is transmitted are through intercourse, sharing of sharp objects like razors, or from an infected mother to her fetus. According to Obeagu (2023), HIV infection weakens the immune system, increasing its vulnerability to numerous infections and the emergence of certain malignancies.

Globally, young people are the main victims of the HIV/AIDS pandemic; almost half of all new infections occur in individuals between the ages of 15 and 24 (Obeagu, 2023). HIV/AIDS prevalence is still on the rise worldwide, in both developed and developing nations, including Indonesia. With almost 40.4 million deaths from HIV/AIDS since its start, this illness continues to pose a significant threat to the global public health system. This virus is still spreading throughout the world, and some nations have even recorded a rise in new infection cases. According to a study, approximately 38.4 million people were living with HIV/AIDS (PLWHA) in 2021; by the end of 2022, that number had risen to 39.0 million. The region with the biggest epidemic burden is Africa, where around two-thirds of the total population (25.6 million) reside (Bazyar, 2024).

One of the main goals of the 2030 Sustainable Development Goals (SDGs) agenda is to improve health and well-being for people of all ages. HIV and AIDS continue to be major global public health issues, with adolescents being disproportionately affected (Narti et al., 2024). The Human Immunodeficiency Virus (HIV) continues to be a serious international concern. According to UNAIDS data, 1.3 million people will contract HIV/AIDS in 2023, and a little over 630,000 people will pass away from HIV infection. There are about 360,000 HIV-positive individuals between the ages of 15 and 24 worldwide, including 140,000 1-year-olds (Govender, 2021; Oktavia, N., 2025) According to predictions from the Republic of Indonesia's (Ministry of Health of the Republic of Indonesia, 2020), there are around 543,100 individuals in Indonesia who are living with HIV/AIDS (ODHA). Up to 377,564 PLWHA were aware of their HIV infection status as of December 2019, according to data from the HIV and AIDS information System (SIHA), with 319,618 cases officially registered. The number of HIV case reports in Indonesia is steadily rising annually. The Ministry of

Health once more said in 2023 that there were over 500,000 persons living with HIV (ODHIV), demonstrating that the disease continues to pose a significant threat to the country's healthcare system. The Palopo City Health Office, South Sulawesi (Sulsel), reports that there were 111 new HIV/AIDS cases in Palopo in 2022, 148 new cases in 2023, and 114 new cases in 2024. The second-highest number of HIV/AIDS cases in South Sulawesi is found in Palopo City. Free intercourse is the primary mode of transmission, and the average age range of HIV/AIDS patients in Palopo is between 15 and 59 years of productive age. "We have also carried out several prevention efforts, especially for at-risk groups, including students and communities." He added that the Palopo City Government continues to have severe concerns about HIV/AIDS. He asserts that HIV/AIDS is a social as well as a medical condition.

These results highlight how susceptible youth are to HIV transmission, particularly in Eastern and Southern Africa, where only 25% of teenage girls and 17% of adolescent boys between the ages of 15 and 19 possess thorough knowledge about HIV/AIDS. In total, adolescents are responsible for roughly 10% of new HIV infections in adults and 4% of HIV-positive individuals worldwide. To lower the risk of HIV transmission among teenagers, this finding highlights the significance of enhancing education, facilitating access to reproductive health services, and implementing age-based interventions. Teenagers' lack of understanding of HIV/AIDS is caused by several things, including their classmates, social surroundings, and sources of both health and non-health information (such as the media). Interventions for HIV/AIDS must be customized according to social groups and intersectional determinants (Endalamaw, 2024).

Health professionals can offer accurate information, but it is ineffectual due to restricted access and unappealing delivery. Furthermore, false information is frequently disseminated on social media, leading teenagers to believe falsehoods and misconceptions regarding HIV/AIDS. Early detection of HIV is crucial to lowering transmission and improving the effectiveness of treatment. Teenagers' everyday life now revolves around digital media and information and communication technology advancements (Susiarno, 2025). HIV/AIDS can be prevented and controlled with the use of effective health education programs that include learning modules (Nontji, 2022).

Adolescents who today live in the digital age find lectures, printed flyers, and in-person seminars less appealing than the traditional kinds of intervention that have been employed up to this point (Alfiani, 2022). This results in a discrepancy between the media's qualities that are suitable for today's target teens and the instructional tactics that are employed. This study's use of e-leaflet press, a digital learning resource accessible through social media and mobile devices, is innovative. E-leaflets can be shared widely and accessed at any time, and they have the advantage of presenting information in an attractive, succinct, and visual manner (Maulianti, H., Herdhianta, 2022). In Indonesia, e-leaflets are still hardly ever used in HIV/AIDS education, particularly when it comes to experimental research-based methods that evaluate how well they increase teenage knowledge.

Teenagers are an emotionally unstable group, and because of their propensity for social conformity, they are more susceptible to outside influences. This age group is prone to experimenting with several behaviors that present serious risks for HIV/AIDS transmission, such as drinking alcohol, injecting drugs, smoking tobacco, and engaging in promiscuous sexual conduct. Promiscuity-related pre-sexual activities have become common among

youth. Teenagers' ignorance of the possible dangers of sexual activity makes them more susceptible to contracting HIV/AIDS and other sexually transmitted diseases. Finding out how health education affects teenagers' views on halting the spread of HIV/AIDS was the aim of this study (Andini, Delvira, 2024).

According to the authors, HIV/AIDS is an ongoing public health problem, especially for the adolescent population who are undergoing a period of transition and uncertainty about their risky behaviors. Although various educational programs have been implemented, the majority still use traditional methods such as group discussions, lectures, and printed media, which are often less suitable for students and are not in line with the characteristics of today's digital generation. The results of the study indicate that the effectiveness of interventions using digital media based on e-leaflets to educate Indonesian adolescents about HIV/AIDS is still quite low. The majority of previous studies have focused on passive learning or media use without assessing the effectiveness of technology-based media that are now more easily accessible to students, such as interactive videos, e-leaflets, or educational applications. In short, the use of digital technology can increase the efficiency of information, improve accessibility, and make tasks easier to complete whenever and wherever needed. In addition, national and regional policies in promoting adolescent health have not fully integrated digital as a main component of risk communication strategies for HIV/AIDS. As a result, adolescents in many areas in Indonesia continue to experience significant information gaps about HIV/AIDS, which has the potential to increase the number of new cases among the general public.

This study recommends that digital media-based interventions, such as e-leaflets, be developed and implemented more widely in Indonesian communities. Health promotion programs must adapt to the current digital landscape to improve educational effectiveness. It is hoped that health offices and academic institutions will be able to develop engaging, interactive, and knowledge-based digital modules and integrate them into school curricula and adolescent health services. Further research is also recommended to assess the comparative effectiveness of different digital media formats (e-leaflets vs. videos vs. apps), and to examine the impact of these methods on real adolescent change in the long term. Thus, digital approaches can be a strategic solution to address the information gap and improve the quality of HIV/AIDS education in Indonesia.

The main reason for choosing e-leaflets as an educational tool in this study is that this media is relevant to the behavior of digital information consumption among Indonesian adolescents today. In addition, e-leaflets also offer ease of distribution, low cost, and potential for wide reach, making them a practical and efficient educational alternative to be implemented in schools and communities. Thus, this study not only addresses the gap in the academic media used but also tests the effectiveness of innovative and modern tools to increase knowledge of HIV/AIDS prevention among adolescents.

Methods

Study Design

With a one-group pretest-posttest design strategy, this study employed a quasi-experimental design. In this design, the same group of adolescents who received education about HIV/AIDS prevention through e-leaflet media had measurements collected both before and after the intervention. Because it enables researchers to directly assess the impact of the intervention on changes in respondents' knowledge levels, this approach was selected. It should be noted, nevertheless,

that this design lacks a control group, making it more difficult to account for the impact of outside factors or other potential impacts during the intervention period. Therefore, without taking into account the potential for additional external influences, the outcomes of increased knowledge cannot be entirely attributed causally to the intervention.

Participants

The population in this study consists of all 161 SMA Negeri 6 Palopo students who are between the ages of 15 and 18. The sample is drawn from the student population using the random sampling method. Respondents comprised 62 individuals who met the following criteria: aged 15 to 18 years, listed as active students in the school under investigation, able to participate in educational programs and read educational materials in Indonesian, able to read and comprehend the contents of e-leaflets in Indonesian, and unwilling to participate in other HIV/AIDS education programs. Penentuan jumpel menggunakan rumus Slovin dengan tingkat kesalahan 5%; siswa who did not complete the pre-test or posttest, as well as siswa who participated in the HIV/AIDS education program that the three organizations implemented throughout the study period, were not included in the study

Instruments

This study used a questionnaire on knowledge about HIV/AIDS prevention consisting of 10 questions. The instrument was developed in a simple and direct true/false form, by the cognitive level and socio-cultural context of adolescents in schools. Questions cover aspects of the definition of HIV/AIDS, how it is transmitted, prevention, and myths that often develop in society. This instrument was adapted and modified from the Ministry of Health's questionnaire and previous studies to suit the local context and characteristics of the target age. Content validation was carried out by three experts in the fields of public health, health promotion, and education, using Aiken's V method. The validation results showed a V value > 0.85 for all items, indicating a high level of content validity. Reliability testing was carried out using the Kuder-Richardson 20 (KR-20) approach, producing a reliability coefficient of 0.78. This value indicates good internal consistency and supports the use of the instrument in measuring knowledge accurately and stably among adolescents. The tool utilized was a closed, multiple-choice questionnaire on HIV/AIDS prevention knowledge that was tailored to the respondents' age and local context. It was based on a standard questionnaire owned by the Indonesian Ministry of Health and earlier research (Rahman, A., Jannah, N., & Tullah, 2022).

The Guttman scale (true/false format) was utilized to assess the level of knowledge, with each correct answer scored as 1 and each incorrect answer scored as 0, resulting in a total possible score ranging from 0 to 20. The interpretation of the total score was as follows: 0–7 indicated a lack of knowledge, 8–14 represented a moderate understanding, and 15–20 signified a high level of expertise. To ensure content validity, the questionnaire was reviewed by three subject matter experts, including a community nursing lecturer, a biology instructor, and a public health specialist. Aiken's V index was employed to assess the validity, resulting in a V coefficient greater than 0.85, indicating strong content validity. A pilot test was conducted with 20 adolescents who were not part of the main study sample to evaluate the instrument's clarity and feasibility. Given that the items were dichotomous (true/false), the Kuder-Richardson Formula 20 (KR-20) was used to measure internal consistency reliability, yielding a coefficient of 0.78, which met the

acceptable standard (≥ 0.70), thus confirming reliability.

The intervention included an e-leaflet as the educational medium, which covered essential information on HIV and AIDS. The leaflet explained that HIV is a virus, whereas AIDS is the advanced stage of the disease caused by HIV infection. It detailed the primary modes of transmission, including contaminated blood transfusions, unprotected sexual intercourse, sharing injection needles, and vertical transmission from mother to child during pregnancy, childbirth, or breastfeeding. It also provided prevention strategies such as avoiding casual sex, using condoms, refraining from needle sharing, and undergoing regular HIV testing. A section titled "Myths vs. Reality" addressed common misconceptions, clarifying that HIV cannot be transmitted through kissing, hugging, sharing food, using public toilets, or mosquito bites. The core message of the leaflet encouraged adolescents to protect themselves from HIV risks, seek knowledge, become smart and informed youth, and help peers stay safe through mutual support **(Figure 1).**

Figure 1. Digital E-Leaflet on HIV/AIDS Prevention Education (Download)

Answer Key Guidelines for HIV/AIDS Knowledge Questionnaire ***(Table 1)***

This answer key provides the correct responses and brief explanations for each item in the HIV/AIDS knowledge questionnaire. The goal is to ensure clarity and accuracy in understanding key facts about HIV transmission, symptoms, and progression. Each item has been carefully reviewed based on current medical knowledge and public health guidelines.

The correct answer for Item 1 is True, because AIDS (Acquired Immunodeficiency Syndrome) is indeed a group of symptoms and infections resulting from the progressive weakening of the immune system due to HIV infection.

Item 2 is True, since HIV (Human Immunodeficiency Virus) is the virus that causes the condition, while AIDS is the most advanced stage of HIV infection.

Item 3 is False because HIV stands for Human Immunodeficiency Virus, not Human Immunization Virus.

Item 4 is True, as people living with HIV can be asymptomatic for many years without showing any outward signs of illness.

Item 5 is True because symptoms of HIV may take anywhere between 3 and 10 years to appear, depending on the individual's health status and whether they receive treatment.

For Item 6, the correct answer is True; symptoms like prolonged fever, chronic cough, significant weight loss, diarrhea, and herpes are indicators that the person may be transitioning from HIV to AIDS.

Item 7 is False because a person can look completely healthy and still be HIV-positive, especially in the early stages.

Item 8 is True, as during the AIDS stage, the severely weakened immune system makes the individual vulnerable to opportunistic infections and certain cancers.

Item 9 is False; HIV is not transmitted through casual kissing. Transmission through saliva is extremely rare and typically only possible if there are open sores or blood.

Finally, Item 10 is True; HIV can be transmitted through blood transfusions if the blood is not properly screened, though this risk is very low in settings with good blood safety practices.

Table 1. HIV/AIDS Knowledge Questions

No.	Question	Answer Options
1	AIDS is a collection of symptoms caused by a weakened immune system due to HIV infection.	True / False
2	HIV and AIDS are different diseases.	True / False
3	HIV stands for Human Immunodeficiency Virus.	True / False
4	A person infected with HIV may show no symptoms at all.	True / False
5	A person infected with HIV may develop symptoms within 3–10 years.	True / False
6	Mild symptoms indicating progression from HIV infection to AIDS include: fever, cough lasting more than a month, weight loss of more than 10%, diarrhea, and herpes.	True / False
7	A person who looks healthy is not infected with HIV/AIDS.	True / False
8	At the AIDS stage, the patient is attacked by various diseases due to a severely weakened immune system.	True / False
9	HIV/AIDS can be transmitted through kissing someone who has HIV/AIDS.	True / False
10	HIV/AIDS can be transmitted through blood transfusions.	True / False

Data Collection

The data collection procedure in this study was conducted over seven days to measure short-term knowledge retention on HIV/AIDS prevention after an educational intervention using e-leaflet media. On the first day, participants filled out a pre-test as an initial evaluation of their level of knowledge before receiving educational materials. Furthermore, participants were given access to and an explanation of the e-leaflet media containing educational information about HIV/AIDS. After the intervention period had been running for five days, participants returned to fill out a posttest on the seventh day to assess changes and retention of their knowledge after receiving the digital education. These seven days were chosen to measure the effectiveness of short-term retention, while avoiding the influence of too long a time that could give rise to other confounding factors. The implementation of the pre-test and posttest was carried out in closed conditions and was directly supervised by researchers or supervisors, so that respondents could not seek answers from other sources while filling out the questionnaire. Activities took place in March-April 2025.

Procedures for Gathering Data: 1) Pretest: Before receiving the intervention,

respondents completed a knowledge questionnaire. 2) Intervention: Digital e-leaflet media (disseminated via Google Classroom or WhatsApp groups) were used to deliver instruction. 3) Posttest: After 5 days, respondents filled out the same questionnaire again to measure increased knowledge.

Pretest and posttest results for statistical analysis were directly given as part of the questionnaire collection method. Research assistants, who were students studying public health, helped the principal investigator. They have undergone a brief training on the intricacies of completing e-leaflet-based education procedures and questions. The data collector's responsibilities include distributing leaflets, ensuring that the information is readable and accessible, supervising the pretest and posttest completion to ensure that it follows protocol, and explaining the research objectives and informed consent.

Data Analysis

The Wilcoxon signed rank test was used in SPSS 25 data analysis to determine whether or not the pre-post knowledge distribution was normally distributed.

The results of the descriptive analysis showed that the median knowledge score increased from 8 in the pretest to 13 in the posttest. This indicates an increase in the level of adolescent knowledge after the educational intervention presented in **Table 1.**

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Table 1. Descriptive Statistics

Statistik	Pretest (n = 62)	Posttest (n = 62)
Median	9,00	13,00
Mean	8,95	12,82
Standard Deviation	1,78	1,42
IQR (Q3–Q1)	2,00 (10–8)	2,00 (14–12)
Minimum Value	5	9
Maximum Value	12	15

The effect size is calculated using the formula:

$$r = \frac{6,149}{\sqrt{62}} = \frac{6,149}{7,874} \approx 0,781$$

Interpretation of Effect Size (r)

r≈0.1 = small effect

r≈0.3 = medium effect

r≥0.5 = large effect

With a value of r=0.781, the effect size is quite large, indicating that the intervention has a strong impact on changes in knowledge.

Ethical Considerations

Kurnia Jaya Persada University in Palopo, South Sulawesi, Indonesia, granted ethical approval for this study with the number 364/KJP.2.04.1/PH/F0/VI/2025.

Results

According to **Table 2,** there are 21 students (33.9%) who are male and 41 students (66.1%) who are female. Additionally, the lowest age group is 17 years old, at 3.2%, while the oldest age group, at 51.6%, is 15 years old. Demonstrates that 27.4% of respondents had little understanding before receiving a health education intervention using E-Leaflet media. However, it rose to 95.2% with a good level of knowledge following an education intervention utilizing E-Leaflet.

The bivariate analysis employs the Wilcoxon signed rank test because the Kolmogorov-Smirnov normality test results in Table 3 indicate that the pre-post knowledge value = 0.001 <0.05, indicating that the study data is not normally distributed. The Wilcoxon signed-rank test revealed a p-value of <0.001, indicating that p is less than 0.05. This suggests that the respondents' knowledge level scores on the pretest and posttest differ significantly. Therefore, the alternative hypothesis (Ha), which states that there is a substantial relationship between education using e-leaflets on raising the level of adolescent awareness about HIV/AIDS prevention at SMA Negeri 6 Palopo, is accepted, and the null hypothesis (Ho) is rejected. Based on the distribution of categories, only 17 respondents (27.4%) had good knowledge at the time of the pretest, compared to 28 respondents (45.2%) with sufficient expertise and fewer than 17 respondents (27.4%) with adequate knowledge. 59 individuals (95.2%) fell into the good group, just 3 individuals (4.8%) fell into the sufficient category, and the less category dropped to zero after receiving an intervention in the form of education via e-leaflets (posttest). The majority of respondents moved from the "sufficient" and "less" categories to "good," indicating that the educational intervention using e-leaflet media has been successful in greatly improving knowledge. This suggests that e-leaflets are an excellent educational medium for delivering knowledge that teens can comprehend and retain.

Table 2. Participant Characteristics, Knowledge Levels, and Statistical Test Results (n = 62)

Variable	Category/Test	n (%)	p-value
Gender	Male	21 (33.9%)	
	Female	41 (66.1%)	
Age (years)	15	32 (51.6%)	
	16	28 (45.2%)	
	17	2 (3.2%)	
Knowledge Level – Pretest	Low	17 (27.4%)	
	Moderate	28 (45.2%)	
	High	17 (27.4%)	
Knowledge Level – Posttest	Moderate	3 (4.8%)	
	High	59 (95.2%)	
Normality Test – Pretest	Kolmogorov–Smirnov	–	0.001
	Shapiro–Wilk	–	0.005
Normality Test – Posttest	Kolmogorov–Smirnov	–	<0.001
	Shapiro–Wilk	–	<0.001
Wilcoxon Signed Rank Test	Z-value	–6.149	
	p-value (2-tailed)	–	<0.001

Discussion

The distribution of respondent characteristics reveals that 15-year-old girls made up the majority of participants, and they were primarily classified as having sufficient knowledge at the pretest stage. 15-year-old females were very responsive to visual-digital-based instruction, as seen by the climb to the good category following the intervention. This is consistent with Piaget's Theory of cognitive development, which holds that girls aged 15 are in the formal operational phase, when their ability to think abstractly and logically starts to grow. As a result, educational and visual e-leaflet content is highly helpful in improving their comprehension. Girls are supposed to know more than boys, according to researchers. This is a result of girls' propensity to read, watch the news, or look for information elsewhere in order to learn

more. According to the findings of a study by, teenage girls are more likely than adolescent boys to seek out information about HIV/AIDS.

A crucial time between infancy and adulthood, adolescence is characterized by a number of noteworthy changes in biological, intellectual, psychological, and economic domains. At this point, people typically exhibit the development of more sophisticated reasoning and thinking skills in addition to having attained sexual and physical maturity. Additionally, adolescents start to develop the ability to make more autonomous decisions, such as those pertaining to their education and careers. Treatment is necessary to lower the prevalence of HIV/AIDS in teenagers, and one way to achieve this is by offering health education to raise awareness of the disease and create sound information about how to prevent it (Yulianti, Rizka, 2024). Generally speaking, adolescents between the ages of 15 and 16 are in a developmental stage where they are more likely than other age groups to engage in deviant behavior or juvenile delinquency. Often seen as a time of memories that make an impression on a person's life, this era of identity exploration is also one of freedom. A person's level of maturity, both in terms of thought and behavior, also develops with age. More mature people tend to be trusted by society more than those who are just starting as adults.

This represents the process of mental maturation and the collection of life experiences that continue to evolve throughout time, according to. Therefore, a critical step to lower the incidence of HIV/AIDS among adolescents is to increase teenage understanding through focused and efficient education. The findings of the study, which show a substantial correlation between teenagers' age and their degree of knowledge regarding HIV/AIDS prevention activities, support this finding. In partnership with health services, ongoing efforts will be made to impact HIV/AIDS health promotion, and it is envisaged that teenagers will look to a variety of media for health-related information (Tatisina, P. N. C., Sembiring, L. N. B., Nasrianti, N., Said, F. I., & Rainuny, 2025).

According to this study, adolescents' awareness of HIV/AIDS can be raised by enhancing their prior understanding of the disease through e-leaflet media education. This study is consistent with a study by (Carvalho et al., 2023) that demonstrated an increase following e-leaflet media treatment, which had a very influential effect on low knowledge to good knowledge. The average level of respondents' pre-educational knowledge remained low, based on the researcher's hypothesis. In general, respondents were unable to respond to questions on the definitions of HIV, AIDS, symptoms, transmission methods, and HIV/AIDS prevention. This is because respondents have never been taught about HIV/AIDS in supplementary or extracurricular classes and are not yet familiar with the full scope of the content. During the study, respondents were initially provided with information regarding HIV/AIDS; a media design was created utilizing leaflets to enhance pretest knowledge.

Teachers can use educational media to provide students with counseling or learning resources. Because it helps participants understand specific concepts by explaining or demonstrating them, educational media is frequently referred to as a teaching aid in the context of health education. The fundamental idea behind creating media or instructional tools is that knowledge is acquired through the use of the five senses; the more senses a person uses during the learning process, the better they will absorb the information. According to research, individuals absorb between 75% and 87% of their information through their eyes, with the remaining 13% to 25% coming from other senses like taste, smell,

touch, and hearing. This demonstrates that using visual aids, like e-leaflets, can significantly improve the efficacy of the teaching and learning process. This study's findings are consistent with a study that found that receiving educational intervention using e-leaflet media significantly increased knowledge. According to the statistical test results, the e-leaflet media had a substantial impact on the growth in respondents' knowledge levels following schooling, with a p-value of <0.001 (<α = 0.05).

The results of this study suggest that educating adolescents about HIV/AIDS through e-leaflet media can be a useful substitute for traditional methods of educating them. Adolescents who receive education through this medium not only gain easier access to and comprehension of material, but they also learn how the disease spreads and how to spot early symptoms. Among women of reproductive age, the prevalence of having thorough awareness of HIV/AIDS is quite low. To raise women's awareness of HIV/AIDS, policymakers and health professionals must fortify HIV/AIDS socialization initiatives (Seifu, Beminate Lemma, Gilbert Eshun, Getayeneh Antehunegn Tesema, 2024). The goal of health education is to increase the community's capacity to preserve and enhance its health. Adolescent reproductive health refers to the state of physical, mental, and social well-being of the reproductive system, functions, and processes that adolescents possess.

The study's findings suggest that educating adolescents about HIV/AIDS prevention through e-leaflet media has a major impact. This is supported by the analysis's findings using the Wilcoxon Signed Rank Test, which indicates a significant difference (p <0.05) between the knowledge levels before and after the intervention.

According to (Yosep, I., Pramukti, I., Agustina, H.R., Kurniawan, K., Agustina, H.S., & Wisdom, 2023), health education is a methodical process that attempts to enhance people's and groups' knowledge, abilities, attitudes, and behavior to attain and preserve optimal health. In this sense, health education encompasses more than just the dissemination of medical knowledge; it also involves initiatives to develop a thorough awareness of many health determinants and tactics to promote healthy lifestyle choices. Social support has a critical function. The provision of resources (such as material, financial, emotional, and friendship support) by others (such as family, friends, neighbors, and community members) when someone has needs in their everyday lives is known as social support (Huang, 2024).

This result is consistent with studies, which showed that adolescents' knowledge significantly increased following an educational intervention. This notable rise highlights the value of media-based instruction, particularly e-leaflets, in helping adolescents' knowledge evolve. The study's findings show that adolescents' knowledge of HIV/AIDS before receiving educational interventions was adequate. Numerous interconnected factors contribute to the poor level of teenage understanding of HIV/AIDS, which reflects the complexity of student life dynamics. Lack of access to correct and pertinent information on HIV/AIDS is one of the primary causes (Yanuar, I., Eka Oktavianto, 2021). Many teenagers may not yet have the information medium, educational environment, or familial support necessary to have a thorough understanding of all facets of health, including psychological issues.

Furthermore, a major barrier to the educational process is the widespread societal stigma associated with HIV/AIDS. This stigma often results in embarrassment, fear, or even a reluctance to have an open conversation about the subject. Most teenagers are reluctant to learn more about

HIV/AIDS because they feel uncomfortable talking about it or looking for information about it, which contributes to their poor understanding of the subject.

Thus, it is crucial to implement inclusive, youth-friendly media-based interventions that can break down social barriers to raise adolescents' knowledge and awareness of HIV/AIDS (Muslimin, K. D., Baso, Y. S., Hidayanty, H., Syarif, S., Aminuddin, A., & Bahar, 2022). Adolescents living with HIV/AIDS encounter intricate life obstacles that are impacted by social, emotional, and psychological elements. Because of the sociological, biological, emotional, and material components of their experiences, substance misuse is prevalent among these young people (Adraro, W., Abeshu, G., & Abamecha, 2024).

As evidenced by the rise in knowledge ratings following an educational intervention using leaflets, leaflet media is successful in raising teenage knowledge. The practicality and accessibility of leaflets, which can be read at any time and carried anywhere, as well as their ability to convey the essential information succinctly, are the reasons for their efficacy. Respondents can repeat the content of the material as needed due to its accessibility and reading time flexibility. The process of improving memory and comprehension of instructional content is enhanced when students are able to revisit knowledge independently. Additionally, this reinforces the function of leaflets as a teaching tool that encourages self-directed learning and improves teenagers' memory of material. Peer education is a strategy for health promotion whereby people of the community are assisted in promoting positive changes among their peers (Ezelote, C.J., Osuoji, N.J., Mbachu, 2024); (Susiarno, 2025).

This study does, however, have a number of significant shortcomings. First, the absence of a control group restricts the ability to draw inferences about causality because exposure to other media outside of the intervention may have had an impact on the knowledge gain. Second, the seven-day follow-up period is insufficient to assess whether the knowledge gain is maintained over the long run. Third, using the same pretest and posttest tools could lead to testing effect bias, where higher results are more likely to result from memorization of the questions rather than from a deeper comprehension of the material. Additionally, given the HIV/AIDS context, this study shows a gap in the utilization of digital media as an educational intervention among Indonesian teenagers. Compared to interactive social media or instructional movies, e-leaflets are still used in relatively small numbers. In actuality, e-leaflets are advantageous since they are inexpensive, easy to distribute, and accessible at any time through students' devices. There is a significant research vacuum indicated by the paucity of local studies evaluating the efficacy of digital e-leaflets in secondary schools.

This study has a wide range of consequences. E-leaflets are an effective teaching tool that is simple to incorporate into the School Health Unit (UKS) program when it comes to health promotion strategies in schools. Teachers or other health promotion professionals can utilize this medium to enhance their teaching of HIV/AIDS-related subjects. These findings support the need for national digitization of adolescent health education materials in the context of policy, particularly when it comes to delicate topics like HIV/AIDS that call for accessibility, privacy, and a visual approach. Therefore, it can be said that e-leaflet education has much promise to raise teenage health literacy. However, similar research should be carried out with a more rigorous experimental design, long-term assessments, and testing on different demographic and geographic groupings in order for the conclusions to be more

scientifically sound and durable in implementation.

Relevance to Clinical Practice

This study highlights the potential of digital e-leaflets as an effective, low-cost, and accessible tool for increasing adolescents' awareness of HIV/AIDS prevention, particularly in schools and primary healthcare settings such as community health centers. E-leaflets can be integrated into health education classes, extracurricular programs, the School Health Unit (UKS), or adolescent health services (PKPR), offering advantages like low bandwidth requirements and scalability in areas with limited digital infrastructure. While mobile apps and videos provide more interactivity, they require higher technological capacity, making e-leaflets a practical starting point for digital health education, especially in rural areas. To enhance effectiveness, combining e-leaflets with interactive media is recommended in urban settings. The approach aligns with the National Action Plan for HIV/AIDS Prevention 2020–2024 and Permendikbud No. 75/2019 on character and health education. The study proposes a standard operating procedure (SOP) for developing HIV/AIDS e-leaflet modules, including audience analysis, content creation based on MOH and WHO guidelines, teen-friendly design, expert validation, pilot testing, digital distribution, and ongoing evaluation. E-leaflets also serve as practical tools for nurses and health educators to facilitate counseling via smartphones or QR codes, enhancing learning without compromising content quality. Overall, this study supports the use of brief, affordable, and contextually appropriate digital materials to deliver impactful health messages to adolescents in the digital era.

Conclusion

According to this study, e-leaflet education has a powerful and quick impact on raising teenagers' knowledge about HIV/AIDS prevention, particularly among girls aged 15 and up. It has been demonstrated that this intervention is simple, affordable, and successful when used in primary health care and educational settings. As a result, it is advised that e-leaflets be extensively utilized in programs aimed at promoting the health of adolescents and that they be expanded into organized digital modules. Because e-leaflets are readily available, visually appealing, and have been shown to boost knowledge, health professionals in health centers, schools, and adolescent clinics are encouraged to use them as an educational tool. In addition to traditional methods, HIV/AIDS education is being delivered through digital channels such as school websites, Instagram, and WhatsApp. The longevity of its influence on modifications in preventative behavior requires more investigation using experimental designs with control groups and long-term assessments.

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CrediT Authorship Contributions Statement

Hermawati Hamalding: Conceptualization, Methodology, Supervision, Writing - Original Draft, Investigation, Funding acquisition

Fadilla Makmur: Software, Validation, Formal Analysis, Investigation, Data Curation

Sumiati: Investigation, Resources, Data Curation, Project Administration

Khairunnisa Batubara: Writing - Original Draft, Writing -Review & Editing, Visualization

Conflicts Of Interest

There is no conflict of interest.

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