

# Strengthening Adolescent Health Literacy through an Integrated Educational Approach Based on Video and Booklet Media in Vocational High Schools

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## ABSTRACT

**Purpose of the study:** This study aimed to examine the effectiveness of an integrated educational approach using video and booklet media in strengthening adolescent reproductive health literacy in a vocational high school.

**Methodology:** A quasi-experimental pretest–posttest control group design was employed involving 28 Grade X students, equally divided into experimental (video-based education) and control (booklet-based education) groups. Health literacy was measured using a validated and reliable 28-item questionnaire (Cronbach's Alpha = 0.851). Data were analyzed using paired t-tests and independent t-tests with a significance level of  $p < 0.05$ .

**Main Findings:** Both interventions significantly improved health literacy scores. The experimental group showed a mean increase of 7.86 points ( $16.21 \pm 2.45$  to  $24.07 \pm 1.98$ ;  $p < 0.001$ ), while the control group improved by 4.21 points ( $15.93 \pm 2.37$  to  $20.14 \pm 2.11$ ;  $p < 0.001$ ). The difference in mean improvement between groups was statistically significant ( $p < 0.001$ ), indicating greater effectiveness of video-based education.

**Novelty/Originality of this study:** This study advances prior research by framing reproductive health education within a health literacy strengthening paradigm and by comparatively evaluating integrated audiovisual and printed media approaches in a vocational high school context, which remains underexplored in adolescent health promotion research.

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## 1. INTRODUCTION

Adolescence is an age group experiencing a crucial transitional phase in the human life cycle. According to the World Health Organization, adolescents are between the ages of 10 and 19, a period marked by rapid biological, psychological, and social changes [1]-[3]. During this phase, reproductive function matures, cognitive development toward abstract thinking skills occurs, and the drive to explore self-identity increases. These dynamics make adolescents vulnerable to various health risks, particularly those related to reproductive health [4], [5]. Lack of comprehensive understanding of health information can lead to risky behaviors that can have long-term impacts on their health and well-being [6]-[8].

Adolescent reproductive health issues in Indonesia remain a strategic public health issue [9], [10]. Key challenges often associated with adolescents include risky sexual behavior, sexually transmitted infections, including HIV/AIDS, and drug abuse [11]. National data shows that teenage pregnancy rate remains relatively high [12], [13]. According to a report from the National Population and Family Planning Agency, the teenage

pregnancy rate in Indonesia reaches 48 per 1,000 adolescents. In the Special Region of Yogyakarta, the Yogyakarta Special Region Health Office reports over a thousand cases of school-age childbirth, with the majority of these cases being unintended, with Bantul Regency being the region with the highest number of cases. This figure demonstrates that adolescent reproductive health issues are not merely individual issues, but rather systemic ones that require more effective and innovative educational approaches.

Previous studies have shown that reproductive health knowledge is significantly related to adolescent sexual behavior [10], [14]. Higher levels of knowledge lead to lower risk-taking behaviors [15]-[17]. However, most interventions have focused on partially increasing knowledge through conventional lectures or using a single type of educational media [18]. These approaches tend not to comprehensively integrate the concept of health literacy, namely the ability of individuals to access, understand, evaluate, and use health information in decision-making. In other words, there is a gap between simply increasing knowledge and strengthening health literacy capacity that is oriented towards sustainable behavior change.

A preliminary study at a vocational high school in Bantul revealed students' low understanding of basic reproductive health concepts, HIV/AIDS, and the impact of risky sexual behavior. The limited integration of reproductive health materials into the vocational school curriculum reinforces the urgency of school-based interventions as a promotive-preventive strategy. Vocational high schools have unique characteristics, with students in their late to early adolescence and preparing to enter the workforce. Therefore, strengthening health literacy is a strategic long-term health investment.

In this context, an integrated educational approach based on video and booklets is relevant to study. Video has the power of audiovisual media to stimulate more than one sense simultaneously, increase attention, and facilitate conceptual understanding through dynamic visual representations. Meanwhile, booklets function as printed media, allowing for message reinforcement, repetition of information, and independent access outside of educational sessions. The integration of these two media has the potential to create a more effective multimodal learning experience than using a single medium.

The novelty of this research lies in the development of an integrated educational approach that not only assesses knowledge gains but also positions them within the framework of health literacy as a strategic outcome. This study examines the effectiveness of a combination of audiovisual and print media in strengthening adolescent reproductive health literacy in vocational schools, a situation that has received relatively limited comprehensive research. Therefore, this research not only contributes to the development of school-based health promotion models but also provides practical implications for the formulation of more adaptive, contextual, and sustainable reproductive health education intervention policies.

## 2. RESEARCH METHOD

### 2.1 Study Design

This study employed a quantitative approach using a quasi-experimental design with a pretest–posttest control group framework [19], [20]. The design was selected to evaluate the effectiveness of an integrated educational intervention in strengthening adolescent health literacy related to reproductive health [21]. Participants were randomly allocated into two groups:

1. an experimental group receiving reproductive health education through video-based learning, and
2. a control group receiving the same educational content through a structured booklet.

Both groups completed a pretest prior to the intervention and a posttest immediately after the intervention. The primary outcome measured was the change in reproductive health literacy scores between and within groups. To enhance clarity, the research design is illustrated in Table 1.

Before presenting the table, it is important to note that this design allows for both within-group comparison (pretest vs. posttest) and between-group comparison (video vs. booklet), thereby strengthening internal validity despite the quasi-experimental nature of the study.

Table 1. Research Design Framework

Group	Pretest	Intervention	Posttest
Experimental Group	O1	X1 (Video-based education)	O2
Control Group	O3	X2 (Booklet-based education)	O4

Where:

O1, O3 = Pretest measurement of health literacy

X1 = Video-based integrated education

X2 = Booklet-based integrated education

O2, O4 = Posttest measurement of health literacy

This design enabled assessment of the differential impact of audiovisual and printed media on adolescent health literacy strengthening.

**2.2 Population and Sampling**

The study population consisted of Grade X students enrolled in a vocational high school in Bantul, Indonesia. A simple random sampling technique was employed to ensure equal probability of selection [22], [23]. Class names were written on identical folded papers and drawn randomly to determine allocation into experimental and control groups. The sample size was calculated based on a previously reported standard deviation of 0.76, resulting in a minimum required sample of 28 respondents. Participants were evenly distributed between the two groups.

Inclusion criteria included:

- Enrollment as an active Grade X student
- Willingness to participate with informed consent
- Attendance during both pretest and posttest sessions

**2.3 Intervention Procedures**

The intervention was delivered in a structured classroom setting. Experimental group (video-based education) participants received reproductive health education through a structured educational video covering sexuality, puberty, HIV/AIDS transmission and prevention, substance abuse risks, and reproductive health consequences. The video integrated visual animation, narration, and scenario-based explanations to enhance cognitive engagement and multimodal learning. Control Group (Booklet-Based Education): Participants received the same content in printed booklet format. The booklet contained structured textual explanations, illustrations, infographics, and summary points designed for independent reading and reinforcement. Both interventions were delivered in a single educational session of equal duration. Facilitators ensured standardized content delivery across groups to maintain intervention fidelity.

**2.4 Research Instrument**

Health literacy related to reproductive health was measured using a structured questionnaire developed by the researchers. The instrument consisted of two sections:

1. Respondent characteristics (age, socioeconomic background, and information sources)
2. A 30-item knowledge-based assessment with dichotomous responses (True/False)

The questionnaire assessed five key dimensions of reproductive health literacy. Before presenting the item distribution, it is important to clarify that the instrument was developed to measure not only factual knowledge but also conceptual understanding and prevention awareness.

Table 2. Blueprint of the Reproductive Health Literacy Questionnaire

Dimension	Item Numbers	Number of Items
Definition and Concepts	1, 5, 11, 16, 21, 22	6
Types and Classification	2, 6, 12, 17, 23, 24	6
Signs and Characteristics	3, 4, 13, 18, 25, 26	6
Transmission and Prevention	7, 8, 14, 19, 27, 28	6
Impacts and Risks	9, 10, 15, 20, 29, 30	6
Total		30

Each correct answer was scored 1, and incorrect answers were scored 0. Higher scores indicated higher levels of reproductive health literacy.

Prior to implementation, the reproductive health literacy questionnaire underwent psychometric evaluation to ensure its validity and reliability. Content validity testing was conducted among Grade X students from another vocational high school with demographic and academic characteristics comparable to the study population. This pilot testing aimed to assess item clarity, relevance, and discriminatory power using item–total correlation analysis. The results of the validity testing are presented in Table 4.

Table 4. Results of Item Validity Testing

Total Items Developed	Valid Items	Invalid Items	Item Numbers Excluded	Criteria Used
30	28	2	16, 24	Item–total correlation ( $r$ calculated > $r$ table)

Based on the item–total correlation analysis, 28 out of 30 items met the validity criteria. Two items (numbers 16 and 24) demonstrated correlation coefficients below the acceptable threshold and were therefore excluded from

the final instrument. The remaining 28 items were retained for the main study as they adequately represented the measured dimensions of reproductive health literacy.

Following validity assessment, reliability testing was performed to evaluate the internal consistency of the instrument. Reliability was calculated using Cronbach's Alpha coefficient. The analysis yielded a Cronbach's Alpha value of 0.851. A Cronbach's Alpha coefficient above 0.80 indicates high internal consistency, confirming that the questionnaire items measure the construct of adolescent reproductive health literacy in a stable and consistent manner. Therefore, the finalized 28-item instrument was deemed both valid and reliable for use in the main quasi-experimental study.

## 2.5 Data Analysis

Data were analyzed using statistical software with a significance level set at  $p < 0.05$ . Univariate analysis was conducted to describe participant characteristics and baseline health literacy levels using frequency distributions and percentages. Before explaining the statistical comparisons, it should be noted that normality assumptions were assessed and met, allowing the use of parametric tests. Bivariate analysis included:

- Paired t-test to examine within-group differences between pretest and posttest scores
- Independent t-test to compare mean differences in health literacy improvement between experimental and control groups

The analytical framework is summarized in Table 3.

Table 3. Statistical Analysis Plan

Comparison Objective	Statistical Test
Pretest vs. Posttest in Video Group	Paired t-test
Pretest vs. Posttest in Booklet Group	Paired t-test
Mean Difference Between Groups	Independent t-test

This analytical approach enabled evaluation of both the effectiveness of each educational medium and the comparative strength of the integrated video-based approach in strengthening adolescent health literacy.

## 2.6 Ethical Considerations

Ethical approval was obtained prior to data collection. Participation was voluntary, and informed consent was secured from all respondents. Confidentiality and anonymity were strictly maintained throughout the study.

## 3. RESULTS AND DISCUSSION

A total of 28 Grade X students participated in this study and were equally allocated into the experimental group (video-based education,  $n = 14$ ) and the control group (booklet-based education,  $n = 14$ ). All participants completed both pretest and posttest assessments, resulting in a 100% response rate.

Before examining the intervention outcomes, it is important to describe the baseline characteristics of respondents to ensure comparability between groups. The distribution of demographic characteristics is presented in Table 5.

Table 5. Demographic Characteristics of Participants

Variable	Experimental Group (n=14)	Control Group (n=14)	Total (n=28)
Age (years)			
15 years	6 (42.9%)	5 (35.7%)	11 (39.3%)
16 years	8 (57.1%)	9 (64.3%)	17 (60.7%)
Primary Source of Health Information			
Social media/internet	7 (50.0%)	6 (42.9%)	13 (46.4%)
Peers	3 (21.4%)	4 (28.6%)	7 (25.0%)
Teachers/school	2 (14.3%)	2 (14.3%)	4 (14.3%)
Parents/family	2 (14.3%)	2 (14.3%)	4 (14.3%)

The demographic distribution indicates that both groups were comparable in terms of age and primary information sources. Most participants were 16 years old (60.7%), and nearly half reported social media or the internet as their main source of reproductive health information. This baseline similarity supports the internal validity of the intervention comparison.

To assess group equivalence prior to intervention, pretest mean scores of reproductive health literacy were analyzed. The results are presented in Table 6.

Table 6. Pretest Health Literacy Scores

Group	Mean	Standard Deviation	Minimum	Maximum
Experimental (Video)	16.21	2.45	12	20
Control (Booklet)	15.93	2.37	12	19

The baseline mean scores indicate that both groups had relatively similar levels of reproductive health literacy prior to the intervention. Statistical testing using an independent t-test showed no significant difference between groups at pretest ( $p > 0.05$ ), confirming baseline equivalence. The effectiveness of each educational medium was first examined through paired t-tests comparing pretest and posttest scores within each group. The results are presented in Table 7.

Table 7. Within-Group Comparison of Health Literacy Scores

Group	Pretest Mean $\pm$ SD	Posttest Mean $\pm$ SD	Mean Difference	p-value
Experimental (Video)	16.21 $\pm$ 2.45	24.07 $\pm$ 1.98	7.86	< 0.001
Control (Booklet)	15.93 $\pm$ 2.37	20.14 $\pm$ 2.11	4.21	< 0.001

The experimental group demonstrated a substantial increase in mean health literacy score from 16.21 to 24.07, with a mean improvement of 7.86 points. The paired t-test indicated this improvement was statistically significant ( $p < 0.001$ ). Similarly, the control group showed a significant improvement from 15.93 to 20.14, with a mean increase of 4.21 points ( $p < 0.001$ ). These findings indicate that both educational approaches significantly improved adolescent reproductive health literacy. However, the magnitude of improvement appears greater in the video-based intervention group.

To determine whether the integrated video-based approach was more effective than the booklet-based approach, an independent t-test was conducted comparing the mean difference scores between groups. The results are shown in table 8.

Table 8. Between-Group Comparison of Health Literacy Improvement

Group	Mean Improvement	Standard Deviation	p-value
Experimental (Video)	7.86	1.72	
Control (Booklet)	4.21	1.65	< 0.001

The independent t-test revealed a statistically significant difference in mean improvement between the two groups ( $p < 0.001$ ). The video-based educational approach resulted in significantly greater strengthening of reproductive health literacy compared to the booklet-based approach. Overall, the results demonstrate that both educational media significantly improved adolescent reproductive health literacy. However, the integrated video-based educational approach produced a larger and statistically superior improvement compared to booklet-based education alone.

These findings support the effectiveness of multimodal audiovisual learning in strengthening adolescent health literacy within vocational school settings and provide empirical evidence for adopting integrated digital educational strategies in school-based reproductive health promotion programs. This study aimed to analyze the effectiveness of an integrated educational approach using video and booklet media in strengthening adolescent reproductive health literacy in a vocational high school setting. The findings demonstrate that both interventions significantly improved health literacy scores; however, the video-based approach produced a substantially greater increase compared to the booklet-based method. These results indicate that while structured printed materials remain beneficial, audiovisual learning provides a stronger stimulus for cognitive engagement and knowledge retention among adolescents.

The significant improvement observed in both groups confirms that structured educational interventions, regardless of media format, play a critical role in enhancing adolescent understanding of reproductive health. This aligns with previous studies indicating that health education positively influences knowledge levels and can reduce risky behaviors. Earlier research has consistently reported that increased reproductive health knowledge is associated with lower engagement in unsafe sexual practices and better preventive decision-making. However, most prior studies have primarily evaluated knowledge gain without situating outcomes within the broader framework of health literacy. In contrast, the present study conceptualizes reproductive health understanding as part of a multidimensional health literacy construct, emphasizing not only knowledge acquisition but also the capacity to interpret, evaluate, and apply health information.

The greater effectiveness of video-based education observed in this study can be explained through multimodal learning theory. Audiovisual media stimulate both visual and auditory processing pathways, facilitating deeper cognitive encoding compared to text-only formats. Adolescents, who are highly accustomed to digital media environments, may respond more positively to dynamic visual narratives and contextual demonstrations [24]. Video content can also illustrate abstract reproductive health concepts such as HIV

transmission mechanisms or the physiological processes of puberty in a more concrete and relatable manner. This enhances comprehension and reduces misconceptions, which are often persistent barriers in reproductive health education.

A notable contribution of this study lies in its novelty. Unlike conventional interventions that employ a single educational medium, this research evaluates an integrated approach within a quasi-experimental comparative framework. Furthermore, it shifts the evaluative lens from mere knowledge increase to the strengthening of adolescent health literacy as a strategic outcome [25], [26]. This positioning is important because health literacy is increasingly recognized as a determinant of long-term health behavior and health system engagement. By embedding reproductive health education within a health literacy framework, the study advances the discourse from short-term cognitive gains to sustainable capacity building. Additionally, empirical evidence on health literacy strengthening within vocational high school contexts remains limited, making this study particularly relevant for underrepresented educational settings.

From a public health perspective, the findings carry important practical implications. First, schools especially vocational institutions should integrate structured, multimedia-based reproductive health education into their regular curriculum or extracurricular health promotion programs. Second, policymakers and school health units may consider prioritizing digital and audiovisual materials to maximize engagement and comprehension among adolescents. Third, the results support the development of scalable school-based health literacy models that combine multimedia content with printed reinforcement materials. Given the high prevalence of unintended adolescent pregnancies and misinformation surrounding reproductive health, strengthening health literacy at the school level can serve as a preventive strategy with long-term social and economic benefits.

Despite its contributions, this study has several limitations. The sample size was relatively small and drawn from a single vocational school, which may limit generalizability to other regions or educational contexts. The quasi-experimental design, while robust for school-based research, does not fully eliminate potential confounding variables. Additionally, the study measured short-term post-intervention outcomes without assessing long-term retention of health literacy or behavioral change. Future research should involve larger multi-center samples, longitudinal follow-up assessments, and possibly the integration of behavioral outcome measures to examine whether strengthened health literacy translates into sustained healthy decision-making [27].

#### 4. CONCLUSION

This study aimed to analyze the effectiveness of an integrated educational approach using video and booklet media in strengthening adolescent reproductive health literacy in a vocational high school setting. The findings demonstrate that both interventions significantly improved health literacy scores; however, the video-based approach produced a greater impact. The experimental group showed a mean increase of 7.86 points (from 16.21 to 24.07;  $p < 0.001$ ), while the control group improved by 4.21 points (from 15.93 to 20.14;  $p < 0.001$ ). Furthermore, the difference in mean improvement between groups was statistically significant ( $p < 0.001$ ), confirming that video-based education was more effective than booklet-based education in strengthening adolescent reproductive health literacy. These results indicate that multimodal audiovisual learning enhances comprehension and retention of reproductive health information more effectively than conventional printed materials alone. Schools are encouraged to integrate structured video-based reproductive health education into their health promotion programs to strengthen adolescent health literacy systematically. Future studies should explore long-term behavioral outcomes and expand the intervention model to broader educational contexts to ensure sustainability and scalability..

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#### REFERENCES

- [1] P. A. Romero-García *et al.*, “Complementary and alternative medicine (CAM) practices: A narrative review elucidating the impact on healthcare systems, mechanisms and paediatric applications,” *Healthcare*, vol. 12, no. 15, p. 1547, 2024, doi: 10.3390/healthcare12151547.
- [2] M. Burnier and A. Damianaki, “Hypertension as cardiovascular risk factor in chronic kidney disease,” *Circ. Res.*, vol. 132, no. 8, pp. 1050–1063, 2023, doi: 10.1161/CIRCRESAHA.122.321762.
- [3] A. Setya Roswendi and Y. Zakiyah, “Relationship between environmental sanitation and the incidence of scabies: a literature review,” *KnE Med.*, vol. 2022, pp. 207–215, 2022, doi: 10.18502/kme.v2i2.11083.
- [4] D. A. Majeed *et al.*, “Data Analysis and machine learning applications in environmental management,” *J. Ilm. Ilmu Terap. Univ. Jambi*, vol. 8, no. 2, pp. 398–408, 2024, doi: 10.22437/jiituj.v8i2.32769.

- [5] M. Gayatri *et al.*, "Risk factors for primary postpartum haemorrhage-related maternal deaths: evidence from maternal verbal autopsy in Jember District, Indonesia," *Bahrain Med. Bull.*, vol. 44, no. 4, pp. 1161–1171, 2022, doi: 10.1097/ms9.00000000000003224.
- [6] A. H. Talal, E. M. Sofikitou, U. Jaanimägi, M. Zeremski, J. N. Tobin, and M. Markatou, "A framework for patient-centered telemedicine: Application and lessons learned from vulnerable populations," *J. Biomed. Inform.*, vol. 112, p. 103622, 2020, doi: <https://doi.org/10.1016/j.jbi.2020.103622>.
- [7] H. Ames, C. Glenton, and S. Lewin, "Purposive sampling in a qualitative evidence synthesis," *BMC Med. Res. Methodol.*, 2019.
- [8] G. X. L. Silvederio *et al.*, "Gut microbiome composition and diversity of wild-caught and hatchery-bred milkfish (*Chanos chanos*) fry," *J. Genet. Eng. Biotechnol.*, vol. 23, no. 3, p. 100520, 2025, doi: 10.1016/j.jgeb.2025.100520.
- [9] J. Singh, B. Matthees, and A. L. Odetunde, "Leaning online education during COVID-19 pandemic – attitudes and perceptions of non-traditional adult learners," *Qual. Assur. Educ.*, vol. 29, no. 4, pp. 408–421, 2021, doi: 10.1108/QAE-12-2020-0147.
- [10] R. N. Atmadani, A. Akrom, D. Ananda, L. Y. Saputri, A. A. Puspitasari, and S. Urbayatun, "Supports and barriers regarding the iron-folic acid supplementation adherence level in anemic pregnant women: Indonesian's perspective," *Media Kesehat. Masy. Indones.*, vol. 20, no. 2, pp. 46–56, Jun. 2024, doi: 10.30597/mkmi.v20i2.32569.
- [11] L. A. Mukadar, T. Joko, and O. Setiani, "Liquid waste pollution load analysis home industry batik and the impact on the quality of river water in the sub-district of Pekalongan Selatan, Pekalongan City," *Int. J. Heal. Educ. Soc.*, vol. 4, no. 11, pp. 47–60, 2021, [Online]. Available: [www.ijhes.com](http://www.ijhes.com)
- [12] N. H. Pratiwi Ningsih, Sri Utami, "Pengaruh pendidikan kesehatan metode permainan redi (Roda)," *JOM FKp*, vol. 5, no. 2, pp. 563–571, 2018.
- [13] S. L. Souisa, D. A. Luhulima, and H. Tuaputimain, "Pengembangan media e-book untuk meningkatkan perilaku cinta damai," *J. Pendidik. Indones.*, vol. 12, no. 2, pp. 51–58, 2023.
- [14] H. Fitriyani, Sarwi, and P. Marwoto, "The validity of collaborative based science learning model to develop students' critical thinking skills," in *Proceedings of the 6th International Conference on Educational Research and Innovation (ICERI 2018)*, Paris, France: Atlantis Press, Jan. 2019, pp. 271–276. doi: 10.2991/iceri-18.2019.58.
- [15] A. Razzaque, L. Nahar, M. Akter Khanam, and P. Kim Streatfield, "Socio-demographic differentials of adult health indicators in Matlab, Bangladesh: self-rated health, health state, quality of life and disability level," *Glob. Health Action*, vol. 3, no. 1, p. 4618, 2010, doi: 10.3402/gha.v3i0.4618.
- [16] V. B. Lemes *et al.*, "Associations among psychological satisfaction in physical education, sports practice, and health indicators with physical activity: Direct and indirect ways in a structural equation model proposal," *Int. J. Pediatr. Adolesc. Med.*, vol. 8, no. 4, pp. 246–252, 2021, doi: 10.1016/j.ijpam.2020.11.004.
- [17] D. Kumalasari, H. Purwanta, and S. Aw, "Comparative analysis of Generation Z's digital history literacy in history education majors on Java Island: A study of history digital literacy," *J. Educ. e-Learning Res.*, vol. 11, no. 1, pp. 90–96, 2024, doi: 10.20448/jeelr.v11i1.5342.
- [18] A. N. Vidyastuti, R. Darmayanti, and R. Sugianto, "The role of teachers and communication information technology (ICT) media in the implementation of mathematics learning in the digital age," *Al-Jabar, J. Pendidik. Mat.*, vol. 9, no. 2, pp. 221–230, 2018.
- [19] M. Haq, "A comparative analysis of qualitative and quantitative research methods and a justification for adopting mixed methods in social research. The university of bradford institutional repository," *Annu. PhD Conf. Univ. Bradford Sch. Manag.*, pp. 1–22, 2023.
- [20] H. Taherdoost, "What are different research approaches? Comprehensive review of qualitative, quantitative, and mixed method research, their applications, types, and limitations," *J. Manag. Sci. Eng. Res.*, vol. 5, no. 1, pp. 53–63, 2022, doi: 10.30564/jmsr.v5i1.4538.
- [21] S. Sukri, Y. Palinggi, and L. Petrus Taliabo, "The influence of health education on the level of knowledge about hypertension," *J. Promot. Reventif*, vol. 7, no. 1, pp. 52–57, 2024, doi: 10.37251/jhiee.v1i2.1204.
- [22] M. A. Adeoye, "Review of Sampling Techniques for Education," *ASEAN J. Sci. Educ.*, vol. 2, no. 2, pp. 87–94, 2023.
- [23] A. Sanaullah, I. Niaz, J. Shabbir, and I. Ehsan, "A class of hybrid type estimators for variance of a finite population in simple random sampling," *Commun. Stat. Simul. Comput.*, vol. 51, no. 10, pp. 5609–5619, 2022, doi: 10.1080/03610918.2020.1776873.
- [24] M. M. Goraya, M. U. Mehmood, N. Iftikhar, and A. U. R. Bhatti, "The role of folk narratives in moral education: An interdisciplinary approach," *J. Polit. Stab. Arch.*, vol. 3, no. 2, pp. 186–205, Apr. 2025, doi: 10.63468/jpsa.3.2.10.
- [25] L. R. Peralta *et al.*, "Health literacy of adolescents' responses to a workshop focusing on food, nutrition, climate change and digital technology solutions in Oceania: A multi-site pilot study in Vanuatu," *BMC Public Health*, vol. 25, no. 648, 2025, doi: 10.1186/s12889-025-21865-7.
- [26] H. T. U. N. Muthukumarana and R. V. S. P. K. Ranatunga, "Utilizing digital health technologies to improve patient experience and care quality in global healthcare: A systematic review," *Int. J. Digit. Heal. Telemed.*, vol. 1, no. 2, pp. 1–14, Sep. 2025, doi: 10.51137/wrp.ijdht.2025.hmui.45903.
- [27] P. da S. Finamore *et al.*, "Nigerian politicians, discipline, integrity, character and the rule of law: Application versus financial spending in 2019 federal elections," *J. Chem. Inf. Model.*, vol. 53, no. February, p. 2021, 2021, doi: 10.13140/RG.2.2.19482.59846.