Original Article

Effects of Audiovisual Education on Community Knowledge of Snakebite Management

Novita Ana Anggraini[1], Nurma Afiani[2], Rahmania Ambarika[1], Wardah Fauziah[3], Mukti Sri Haryani[1]

[1] Department of Nursing, Universitas STRADA Indonesia, Kediri, East Java, Indonesia
[2] Departerment of Nursing, Fakultas Kedokteran, Universitas Negeri Malang, East Java, Indonesia
[3] Department of Nursing, Politeknik Negeri Subang, West Java, Indonesia

ARTICLE INFO

Article History

Submit : June 5, 2025
Accepted : November 19, 2025
Published : November 21, 2025

Correspondence

Novita Ana Anggraini; Departerment of Nursing, Universitas STRADA Indonesia, Kediri, East Java, Indonesia.

Email:

phitphita@gmail.com

Citation:

Anggraini, N. A., Afiani, N. ., Ambarika, R. ., Fauziah, W. ., & Haryani, M. S. . (2025). Effects of Audiovisual Education on Community Knowledge of Snakebite Management. Journal of Applied Nursing and Health, 7(3), 716–727. https://doi.org/10.55018/janh.v7i3.343

ABSTRACT

Background: Snakebites are an emergency that can cause death if not treated immediately. Lack of community knowledge on first aid for snakebites can increase the incidence of infection or death. Education is needed to improve community knowledge. However, community education using audiovisual methods for snakebite prevention remains limited. The purpose of this study was to analyze the effects of audiovisual education on knowledge of handling snakebites in the community at UPT Puskesmas Kepanjenkidul, Blitar City.

Methods: A quasi-experimental one-group pre–posttest design was used. Participants were ≥18 years old community members recruited from the outpatient registry using simple random sampling. A validated 15-item knowledge questionnaire was administered before and after a 5-minute audiovisual educational intervention. Inclusion criteria: consent to participate; exclusion: prior training on snakebite management. Data was collected using a knowledge questionnaire used to assess community knowledge regarding snakebite management. The study reporting followed the TREND Statement for non-randomized evaluations of behavioral interventions. Data were analyzed using the Wilcoxon rank test with $\alpha < 0.05$..

Results: The level of knowledge of handling snakebites before education was in the fair category for most of the respondents (45 respondents or 51.1%). After education, almost all respondents (80 respondents or 90.9%) had a good level of knowledge. Results of the Wilcoxon test showed a $p < 0.001$.

Conclusion: Health education using audiovisual media influences knowledge of handling snakebites. Audiovisual media can display elements of images and sound simultaneously in conveying information. Video media in the learning process is more effective in increasing knowledge. Thus, health workers are expected to provide education using audiovisual media since it is easy to receive and understand by the community.

Keywords: Audiovisual Aids, Health Education, Snakebite Envenoming, Community Health.

Implications for Practice:

- Audiovisual-based clinical education should be integrated into routine primary care practice to strengthen community readiness for appropriate first-aid management of snakebites.
- Health policymakers should consider incorporating standardized audiovisual modules into public health outreach programs to improve population-level preparedness for snakebite emergencies.
- Midwifery and other health-profession training programs in LMICs should adopt low-cost, culturally adapted audiovisual materials to enhance emergency response competencies in resource-limited settings.

Introduction

Snakebites are among the health problems that often occur in tropical and subtropical countries. It can be a medical emergency that can threaten human life, since snake venom can interfere with respiratory function, cause bleeding disorders and kidney failure, and damage local tissues that cause permanent disability and amputation. (C, 2024)So far, the magnitude of the danger of snakebites has not been balanced with proper treatment, especially in the pre-hospital setting. First aid is generally carried out by the victim or the person closest to the victim at the time of the incident. However, often, giving first aid has the effect of worsening the condition of snakebite victims. This is mainly due to limited knowledge of the community. People tend to give first aid using such traditional methods as sucking wounds, burning wounds, giving traditional medicines, or making new wounds, and tying snakebite wounds tightly with rope (Cristino, 2021; Ferreira, 2022; Kasturiratne, 2021)

The World Health Organization (WHO) lists snakebites as a neglected tropical disease and remains an important global public health issue. According to the WHO, up to 4.5 million people die from snakebites each year. This number causes serious injuries to 2.7 million men, women, and children and kills around 125,000 people. In Indonesia, 35 people were bitten by snakes in 2017, 47 people in 2018, and a total of 54 people died from snake venom exposure in 2019. This figure is quite high relative to that of other countries; for example, in Malaysia, 2 people died from snake venom, in the Philippines, 15 people, in Mexico, 20 people, and in Australia, only 17 people over 5 years. A preliminary study of visit data at the UPT Puskesmas Kepanjenkidul, Blitar City, showed the number of visits in June 2024 was 875 for 875 patients. The number of visits derived from the general polyclinic, URIs Polyclinic, and Adolescent Polyclinic. The results of a brief interview of 10 patients showed that 80% of them said that they were not aware of handling snakebites, their signs and symptoms, and initial treatment after being bitten by a snake. The number of snakebite cases in the Emergency Room of the UPT Puskesmas Kepanjenkidul in 2023 was 7 cases. Based on observations, when taken to the Emergency Room, the bite wound was tied tightly using a rope or cloth. The patients did not know how to tie a tourniquet when a snakebite occurred, and some were also taken directly to the health center without having to be immobilized or the bite wound covered.

Snakebites are important medical emergencies that require hospitalization and urgent attention from well-trained medical staff. Venomous snakebites release toxins, which are substances consisting of 90% protein with enzymatic properties that paralyze their prey and, at the same time, participate in the self-defense system (Ferreira, 2022). Several pathological complications result in both local and systemic poisoning in the victims. The most common signs and symptoms of a venomous snakebite include a bite mark, pain, swelling, bruising (blood flowing into the skin), tachycardia (rapid heartbeat), fainting, nausea, decreased blood pressure, and vomiting. Major complications include immobility, thrombophlebitis (phlebitis and thrombus), local bleeding, blisters, skin bleeding, muscle damage, decreased sensation, acute kidney injury, necrosis with tissue loss, compartment syndrome, and amputation. Snakebites cause death or chronic disability if not treated immediately and properly (Joseph, 2022)

Education and knowledge of snakebites are greatly needed by the community in order to reduce the number of disabilities

and deaths. First aid or initial treatment in the form of immobilization is a currently highly recommended method that is most likely to reduce the risk of snakebites. Community education has been proven to be an effective strategy to prevent snakebites, handle snakebites, and raise awareness of the many mystical and myths about snakebites in the community (Kementerian Kesehatan Republik Indonesia, 2021). Education is an activity or effort to provide messages to the community, individuals, or groups with the aim of providing better information. Community attitudes and knowledge can be changed by various media. Audiovisual media are among the media that can be used to help health education. It makes a major contribution to the information and persuasion aspects of behavioral change. According to research by experts, the five senses that transmit the most knowledge to the brain are the eyes (approximately 75% to 87%), while 13% to 25% of human knowledge is obtained or transmitted through other senses (Tusabe, 2025). However, community understanding of evidence-based snakebite first aid remains limited, and few studies have evaluated audiovisual methods in this context. The author wants to determine how far the effects of audiovisual education are on knowledge of handling snakebites in the community at the UPT Puskesmas Kepanjenkidul, Blitar City. The use of audiovisual media is based on the Health Belief Model and Cognitive Learning Theory. Audiovisual content increases perceived risk, highlights the severity of snakebites, and builds confidence in first aid skills-key components of behavior change in HBM. From a cognitive perspective, combining visual and auditory input enhances attention, understanding, and memory, making it an effective tool for community education.

However, community understanding of evidence-based snakebite first aid remains limited, and few studies have evaluated audiovisual methods in this context. Based on this background, the author wanted to determine the extent to which audiovisual education impacts knowledge about snakebite management among the community at the Kepanjenkidul Community Health Center (UPT Puskesmas) in Blitar City.

Methods

Study Design

The present study used a quasi-experimental design with a one-group pre-posttest design.

Participants

A total of 875 patients visited the Kepanjenkidul Community Health Center (UPT) in Blitar City in June 2024. Because the total number of subjects is more than 100, 10-15% or 15-25% can be taken. In this study, the sample size is 10% x 875 = 88 patients. The simple random sampling technique produced a sample of 88 respondents. Participants were community members aged ≥ 18 years residing in Blitar, Indonesia, recruited using simple random sampling from the outpatient registry. From the June 2024 outpatient registry of 875 adult community members, 88 participants were selected using simple random sampling. Inclusion criteria were: (1) age ≥18 years, (2) residing in Blitar City, and (3) willing to provide informed consent. Individuals who had previously received formal training on snakebite first aid were excluded. The independent variable was the provision of education using audiovisual media, and the dependent variable was community knowledge of handling snakebites with a questionnaire. The statistical test to analyze the effects of audiovisual education on community knowledge of handling snakebites was the

Wilcoxon Rank test (p-value <0.05). Based on the results of the statistical test, if the value of sig p ≤ 0.05, then H0 is rejected and Ha is accepted, meaning that there is an effect of audiovisual education on community knowledge on handling snakebites at the UPT Puskesmas Kepanejnkdiul, Blitar City, East Java, Indonesia. The study was reported in accordance with the TREND Statement guidelines for transparent reporting of non-randomized behavioral and public health interventions.

Instruments

A knowledge questionnaire was used to assess public knowledge regarding snakebite management. The questionnaire was adapted from Fernanda (2023) and modified by the researchers, after which validity and reliability tests were conducted. The validity test results indicated the questionnaire was valid, with a calculated r value of 0.420–0.745, which is greater than the table r value of 0.361. The Cronbach's Alpha test showed r = 0.739, indicating the questionnaire's reliability. The questionnaire consisted of 15 closed-ended questions with right and wrong answers. Correct answers were given a score of 1 for each question, and incorrect answers were given a score of 0. Respondents' scores were divided by the maximum score of the 44 questions and multiplied by 100%. Knowledge was then categorized as good if the score was 76-100%, sufficient if the score was 56-75%, and poor if the score was <56%. Knowledge was measured using a 15-item closed-ended questionnaire assessing understanding of snakebite signs, risks, and first-aid procedures. Each item was scored 1 for correct and 0 for incorrect responses. Scores were converted to percentages and categorized. The questionnaire was adapted from Fernanda (2023) with permission from the original author and validated by three health education experts (Cronbach's α = 0.739).

Intervention

The audiovisual module was developed using the Health Belief Model and Cognitive Learning Theory, emphasizing perceived severity, susceptibility, and self-efficacy in relation to snakebite emergencies. The 5-minute video delivered via WhatsApp contained systematically structured educational content and required participants to watch it at least twice within two weeks, with intervention fidelity monitored through self-reported viewing logs. The material was designed to be clear and accessible, covering four essential components: understanding snakebites and their associated risks, identifying venomous snake species commonly found in the local area, recognizing early signs and symptoms of envenoming, and applying appropriate first-aid management while avoiding harmful practices. The visually engaging format and simple language ensured that the content was easily understood by diverse community members, while mobile-based delivery provided convenient and flexible access for all participants.

Data Collection

The researcher approached potential respondents and clearly explained the study procedures, objectives, benefits, and possible risks before obtaining written informed consent. After consent was provided, participants completed a pretest questionnaire and subsequently received the educational video via WhatsApp, which they were instructed to watch over a two-week period. At the end of this interval, the researcher distributed the posttest questionnaire and verified intervention fidelity by confirming whether participants viewed the video in full and determining the number of times it was watched. A two-week interval between pretest and posttest

was selected to minimize recall bias and prevent participants from remembering or repeating their previous responses, thereby ensuring more accurate measurement of knowledge change. This process followed a structured sequence of recruitment, consent, pretest administration, audiovisual education, posttest assessment, and final data entry and verification.

Data Analysis

In this study, researchers assessed participants' knowledge before and after the educational intervention, while respondent characteristics such as gender, age, and education level were analyzed using proportions or percentages and presented in a distribution table. Bivariate analysis was conducted to examine differences in knowledge scores between the pretest and posttest. The effect of audiovisual education on knowledge was analyzed using the Wilcoxon rank test, with a significance level set at $p \leq 0.05$. Pretest and posttest scores were compared to determine whether the intervention resulted in a statistically meaningful improvement in participants' knowledge.

Ethical Considerations

This study obtained ethical approval from Universitas STRADA Indonesia, Kediri, East Java, Indonesia, with number 0623487/EC/KEPK/I/04/2025. Informed consent was secured from all participants, ensuring confidentiality and voluntary participation.

Results

Table 1 illustrates the demographic and educational characteristics of the respondents, as well as their prior exposure to snakebite information. The majority of participants were young adults under 30 years old and predominantly female. Most had completed at least senior high school, and occupations were varied, with students and other groups representing the largest proportion. Only a small fraction had a previous history of snakebite, while a majority had received some form of information on snakebite prevention and management, primarily through electronic media and health workers.

Before the educational intervention, respondents' knowledge of snakebite management was generally moderate. Following the program, which utilized audiovisual media, there was a marked improvement in knowledge levels, indicating the effectiveness of the educational approach in enhancing understanding and awareness among the participants.

Table 1. Distribution of Respondent Characteristics and Variables

Characteristic	Category	N (%)
Age (Years)	< 30 years	47 (53.4)
	31-40 years	28 (31.8)
	41-50 years	8 (9.1)
	>51 years	5 (5.7)
Gender	Male	29 (33)
	Female	59 (67)
Educational Level	Elementary School	0 (0)
	Junior High School	5 (5.7)
	Senior High School	50 (56.8)
	University	33 (37.5)
Occupation	Housewife	17 (19.3)
	Private/self-employed	19 (21.6)
	Civil servant	20 (22.7)
	Student/other	32 (36.4)
Snakebite History	Ever	5 (5.7)
	Never	83 (94.3)
Information on snakebites	Ever	63 (71.6)
	Never	25 (28.4)
Sources of Information	Health workers	23 (26.1)
	Electronic media	40 (46.6)
	None	25 (27.3)
The level of knowledge before	Poor	14 (15.9)

Characteristic	Category	N (%)
education is provided		
	Fair	45 (51.1)
	Good	29 (33.0)
The level of knowledge after education is provided	Poor	0 (0)
	Fair	8 (9.1)
	Good	80 (90.9)
Total		88 (100)

Table 2 illustrates the findings, which show a substantial improvement in respondents' knowledge after receiving education using audiovisual media. Before the intervention, among 88 respondents, 14 (15.9%) demonstrated poor knowledge, 45 (51.1%) had fair knowledge, and only 29 (33.0%) showed good knowledge regarding snakebite management. After the educational intervention, the distribution shifted significantly, with 8 respondents (9.1%) showing fair knowledge and the majority, 80 respondents (90.9%), achieving good knowledge.

To statistically evaluate this change, the Wilcoxon Signed-Rank Test was performed. The results indicated that there were no negative ranks, while 58 respondents showed an increase in knowledge scores (positive ranks) with a mean rank of 29.50 and a total rank sum of 1711.00. A total of 30 respondents had tied scores. The test produced a Z value of –7.253 with a p-value of 0.000, indicating a highly significant difference between pre-test and post-test scores. These results confirm that educational interventions using audiovisual media effectively improved knowledge about snakebite management.

Table 2. Knowledge Levels Before and After Education and Wilcoxon Test Results

Variable	Category	N (%) / Rank	Mean Rank	Sum of Ranks	Z	p-value
Knowledge Level	Poor (Pre)	14 (15.9%)	–	–	–	–
	Fair (Pre)	45 (51.1%)	–	–	–	–
	Good (Pre)	29 (33.0%)	–	–	–	–
	Fair (Post)	8 (9.1%)	–	–	–	–
	Good (Post)	80 (90.9%)	–	–	–	–
Wilcoxon Signed-Rank Test	Negative Ranks	0	0	0	-7.253	0
	Positive Ranks	58	29.5	1711		
	Ties	30	–	–		
	Total	88	–	–		

Discussion

Community knowledge before audiovisual education on handling snakebites

The findings show that before receiving audiovisual education, most respondents demonstrated only a fair understanding of snakebite management, indicating limited baseline knowledge. Knowledge represents a cognitive process shaped by information obtained through the senses, and its development is strongly influenced by the amount and quality of information individuals access (Dossou, 2024; Mogha, 2022). In this study, community members generally lacked adequate knowledge of appropriate first-aid responses, relying primarily on personal experiences or informal sources such as social media. This situation underscores the need for structured educational strategies to strengthen public preparedness for snakebite emergencies.

The characteristics of respondents further illustrate factors that may influence knowledge levels. Most participants were

under 30 years old, suggesting that younger adults—although highly connected to digital platforms—may not have sufficient exposure to credible health information. Older individuals tend to have broader experiential knowledge and more stable decision-making capabilities, which influence their health-related behaviors. Educational attainment also contributed to variations in knowledge; respondents with higher levels of formal education demonstrated a greater capacity to process health information effectively, aligning with evidence that education enhances comprehension and awareness of appropriate health practices (Maharani, 2024; Shahmy, 2023)

Information access emerged as a key determinant. Many respondents reported having previously received information about snakebite management, mostly from electronic media, and those with such exposure tended to show better knowledge. This supports the understanding that repeated and accurate information enhances comprehension and retention. However, persistent misconceptions—such as tying limbs, ignoring symptoms, or attempting to suck out venom—suggest that some of the information available to the community is incomplete or inaccurate. Respondents who had never accessed reliable information showed the lowest knowledge levels, reaffirming that credible information sources are essential for improving health literacy.

Overall, the results highlight significant gaps in community knowledge regarding early signs of envenoming, systemic effects, and evidence-based first-aid measures. Misconceptions and harmful practices identified during interviews further indicate the risks associated with inadequate understanding. These findings emphasize the importance of targeted educational interventions to improve community knowledge and promote safer, more effective responses to snakebite incidents.

Community knowledge after being given audiovisual education on handling snakebites

After receiving audiovisual education, nearly all respondents demonstrated a good level of knowledge regarding snakebite management, indicating a substantial improvement from their initial baseline. Education functions as a purposeful effort to deliver information that enhances understanding, and health education specifically represents a dynamic process of behavioral change rooted in internal awareness rather than simple transmission of material (Chusniah Rachmawati W., 2019; Pokpahan, 2021). This aligns with prior research showing that educational interventions can effectively increase knowledge about snakebite management among various populations (Muchtar et al., 2023). In this study, respondents initially exhibited varied levels of knowledge, ranging from poor to good. Following the intervention, however, the majority achieved a high level of understanding, supporting the effectiveness of audiovisual media in conveying essential health information.

The observed improvement can be attributed to the strengths of video-based education. Video media provides visual and auditory stimulation, enabling complex concepts and processes to be illustrated clearly and engagingly. Its concise and structured format supports comprehension and improves memory retention by presenting information in an appealing and easy-to-follow manner. This multimodal approach enhances cognitive, affective, and psychomotor learning outcomes, which explains why respondents showed marked gains in knowledge after watching the educational video. These findings reaffirm the potential of audiovisual materials as

effective tools for disseminating community health information, especially when addressing high-risk conditions such as snakebites.

Despite these overall gains, a small number of respondents continued to demonstrate only a fair level of knowledge after the intervention. Similar findings have been documented in previous research, which shows that although most individuals benefit from educational programs, not all experience substantial improvements (Sayuti, 2022). Several contextual factors may help explain this pattern. Many respondents viewed the videos while waiting in crowded clinic areas, which likely reduced their concentration due to noise, distractions, and competing personal concerns (Aron, 2022). Additionally, some participants were attending to their own or their children's health needs during the viewing period, limiting their ability to focus fully on the educational content (Kurniasih, 2020). Another key factor is the absence of practical demonstration; while the video provided essential knowledge, some individuals may require hands-on practice to fully grasp and internalize first-aid procedures. Videos alone may not be sufficient for learners who struggle to visualize or apply procedural steps without direct instruction or guided simulation.

Overall, the results highlight the effectiveness of audiovisual education in improving community knowledge on snakebite management, while also emphasizing the importance of optimizing learning conditions and supplementing video materials with practical demonstrations. Such enhancements may help ensure that all individuals, including those with limited concentration or learning preferences favoring hands-on practice, can benefit fully from health education interventions.

Effects of audiovisual education on knowledge of handling snakebites

The Wilcoxon analysis demonstrated a statistically significant improvement in respondents' knowledge following the audiovisual education, indicating that the intervention effectively enhanced community understanding of snakebite management. The pattern of score changes showed that many participants experienced meaningful increases in knowledge from pretest to posttest, and no participants showed a decline after the educational session. These findings reinforce the role of education as a process that supports changes in attitudes and behaviors through increased awareness and understanding (Munawaroh et al., 2024). The effectiveness of an educational intervention is influenced by the medium through which information is delivered, and audiovisual materials are particularly advantageous because they engage both hearing and vision simultaneously, allowing learners to process information more completely. (Awaludin & Ramdani, 2024; Mukherjee, 2021).

Audiovisual media, including videos, offer strong visualization and auditory reinforcement that can simplify complex concepts and improve comprehension. Such media support cognitive processes related to remembering, recognizing, and connecting facts, making them highly suitable for teaching urgent health-related skills such as snakebite first aid. (Rocha, 2024). By combining auditory explanations with visual demonstrations, videos help translate abstract instructions into concrete, easily understood actions, thereby strengthening learning outcomes.

These findings align with previous studies that have demonstrated the effectiveness of audiovisual education in improving knowledge and attitudes across various health topics. Prior research has shown that audiovisual methods can

enhance public understanding of infectious disease prevention, increase community preparedness for emergencies, and improve first-aid competencies in rural populations (Awaludin & Ramdani, 2024; Luh & Baltiera, 2023). Collectively, this evidence supports the conclusion that audiovisual education is a powerful tool for community health promotion and can play a crucial role in improving knowledge and behavior related to snakebite management in primary care settings.

Implications and limitations

The findings of this study contribute conceptually to the growing body of evidence supporting audiovisual media as an effective modality for enhancing cognitive processing within community health education, reinforcing theoretical perspectives from the Health Belief Model and cognitive learning frameworks regarding the role of multisensory engagement in shaping knowledge acquisition. The results also extend existing literature by demonstrating that brief, low-cost audiovisual interventions can produce measurable improvements in health literacy within primary care contexts, adding empirical support for the integration of digital learning tools in public health education research. However, the study has several limitations, including the one-group pre–posttest design, which restricts causal inference; the reliance on self-reported fidelity measures; and potential environmental distractions during video viewing, which may have affected participants' attention and learning outcomes. These limitations highlight the need for future studies employing controlled designs, objective monitoring of intervention engagement, and standardized delivery conditions to better validate the educational effectiveness of audiovisual materials.

Relevance to Practice

The findings of this study underscore the relevance of audiovisual education as a practical and effective approach for strengthening community preparedness in managing snakebite emergencies, reinforcing the importance of accurate, well-delivered health information within clinical and primary care settings. By demonstrating that structured audiovisual materials significantly enhance knowledge, this study highlights the need for health workers to adopt evidence-based educational strategies, as improper or unclear instruction may contribute to misinformation and unsafe behaviors. Integrating audiovisual modules into routine health education services can support more consistent patient understanding, promote timely and appropriate first-aid responses, and ultimately improve the continuum of care from the community to clinical facilities.

Conclusion

This study demonstrates that community members initially had limited knowledge regarding the proper management of snakebites, with most respondents exhibiting only a fair level of understanding before the intervention. Following the implementation of a brief audiovisual educational program, the majority of participants achieved a good level of knowledge, indicating a substantial improvement. Statistical analysis confirmed that audiovisual education had a significant positive effect on community knowledge of snakebite management, highlighting the effectiveness of this approach as a tool for health education in primary care settings.

Funding

This research received no external funding.

CrediT Authorship Contributions

Statement

Novita Ana Anggraini: Conceptualization, Methodology, Supervision, Writing – Original Draft.

Nurma Afiani: Software, Validation, Formal Analysis, Writing – Review & Editing.

Rahmania Ambarika: Investigation, Resources, Data Curation, Project Administration.

Wardah Fauziah: Writing – Original Draft, Review & Editing, Visualization, Funding Acquisition.

Mukti Sri Haryani: Supervision, Methodology, Validation, Project Administration, Writing – Review & Editing.

Conflicts of Interest

There is no conflict of interest.

Acknowledgments

The authors would like to express their sincere gratitude to Universitas STRADA Indonesia, Universitas Negeri Malang, and Politeknik Negeri Subang for their continuous support throughout the completion of this study. Special appreciation is extended to the staff and healthcare workers at UPT Puskesmas Kepanjenkidul, Blitar City, for their cooperation and assistance during data collection. The authors also thank all respondents who willingly participated in this research, as well as colleagues and academic mentors who provided valuable feedback during the development of the study. Their contributions were essential to the successful completion of this work.

References

Aron, M. B. (2022). Health care workers' knowledge on identification, management and treatment of snakebite cases in rural Malawi: A descriptive study. PLoS Neglected Tropical Diseases, 16(11). https://doi.org/10.1371/journal.pntd.0010841

Awaludin, M. D., & Ramdani, M. L. (2024). Pengaruh Edukasi Pertolongan Pertama Snakebite Terhadap Pengetahuan dan Keterampilan Petani di Desa Larangan. Jurnal Promotif Preventif. https://journal.unpacti.ac.id/index.php/JPP/article/view/1187

C, E. A. F. (2024). Snakebites in the Americas: a Neglected Problem in Public Health. In Current Tropical Medicine Reports (Vol. 11, Issue 1, pp. 19–27). https://doi.org/10.1007/s40475-023-00309-5

Chusniah Rachmawati W. (2019). *Pendidikan kesehatan masyarakat: Konsep dan aplikasi*. Yogyakarta: Pustaka Baru Press.

Cristino, J. S. (2021). A painful journey to antivenom: The therapeutic itinerary of snakebite patients in the Brazilian Amazon (the QUALISnake study). PLoS Neglected Tropical Diseases, 15(3). https://doi.org/10.1371/journal.pntd.0009245

Dossou, A. J. (2024). Comprehensive Review of Epidemiology and Treatment of Snakebite Envenomation in West Africa: Case of Benin. In Journal of Tropical Medicine (Vol. 2024). https://doi.org/10.1155/2024/8357312

Fernanda, A. (2023). *Pengembangan dan validasi kuesioner pengetahuan masyarakat tentang penanganan gigitan ular*. Jurnal Kesehatan Masyarakat, 15(2), 120–130.

Ferreira, S. d. S. (2022). The potential of phenolic acids in therapy against snakebites: A review. Toxicon, 208, 1–12. https://doi.org/10.1016/j.toxicon.2021.12.019

Joseph, N. (2022). Updated review on venomous snakebites, therapeutic uses and future prospects of Indian traditional medicine. Natural Resources for Human Health, 2(3), 293–299. https://doi.org/10.53365/nrfhh/145144

Kasturiratne, A. (2021). Chronic health effects and cost of snakebite. Toxicon: X, 9. https://doi.org/10.1016/j.toxcx.2021.100074

Kazemi, S. M. (2021). Case report: Recent case reports of levant blunt-nosed viper macrovipera lebetina obtusa snakebites in Iran. American Journal of Tropical Medicine and Hygiene, 104(5), 1870–1876. https://doi.org/10.4269/ajtmh.20-1640

Kementerian Kesehatan Republik Indonesia. (2021). Laporan Kinerja Kementrian Kesehatan Tahun 2020. Kementerian Kesehatan Republik Indonesia Tahun 2021.

Kurniasih, L. (2020). Efektifitas Metode Demonstrasi Terhadap Peningkatan Keterampilanpenatalaksanaan Snakebite Pada Kelompok Karang Tarunadi Dusun Dadung Desa Sambirejo. repository.stikes-bhm.ac.id. http://repository.stikes-bhm.ac.id/id/eprint/795

Luh, N. I., & Baltiera, L. I. A. (2023). Pengaruh Video Edukasi Pendidikan Kesehatan Terhadap Pengetahuan Dan Sikap Orang Tua Dalam Penanganan Kegawatdaruratan Kejang Demam Pada Anak Di Wilayah Kerja Puskesmas Abang II.

Maharani, R. (2024). Pengaruh Metode Simulasi terhadap Pengetahuan dan Keterampilan Siswa/I dalam Penanganan Kegawatdaruratan Sekolah di SMK Kesehatan Fahd Islamic …. In MAHESA: Malahayati Health Student …. repository.stikesrspadgs.ac.id. http://repository.stikesrspadgs.ac.id/2061/1/jurnal KGD Rahayu.pdf

Mogha, N. G. (2022). Ethnomedicinal plants used for treatment of snakebites in Tanzania–a systematic review. In Pharmaceutical Biology (Vol. 60, Issue 1, pp. 1925–1934). https://doi.org/10.1080/13880209.2022.2123942

Muchtar, R., Siregar, A., & Putra, Y. (2023). Pengaruh edukasi kesehatan terhadap peningkatan pengetahuan remaja mengenai gigitan ular. *Jurnal Promosi Kesehatan Indonesia, 18*(1), 45–52.

Mukherjee, A. K. (2021). Prevention and improvement of clinical management of snakebite in Southern Asian countries: A proposed road map. In Toxicon (Vol. 200, pp. 140–152). https://doi.org/10.1016/j.toxicon.2021.07.008

Munawaroh, I., Audilla, A., Astuti, W. Y., & ... (2024). Edukasi Pertolongan Pertama Kegawatdaruratan pada Gigitan Ular. Jurnal Pengabdian …. https://ojs.unpkediri.ac.id/index.php/abhipraya/article/view/24299

Pokpahan, N. (2021). *Health education strategies and community behavior change*. Jakarta: Kencana.

Putri, S. L. (2021). Pengaruh media audiovisual terhadap pengetahuan dan sikap masyarakat dalam pencegahan Covid-19. *Jurnal EduHealth, 9*(2), 55–63.

RI, B. penelitian dan pengembangan kesehatan K. K. (2018). Riset Kesehatan Dasar. Riset Kesehatan Dasar.

Rocha, J. E. C. (2024). The Amazonian snakebite burden: Unveiling seasonal dynamics in a region with tenfold higher incidence compared to the Brazilian average. Tropical Medicine and International Health, 29(12),

1041–1050. https://doi.org/10.1111/tmi.14059

Sayuti, A. (2022). Pengaruh penyuluhan kesehatan terhadap peningkatan pengetahuan protokol kesehatan pada masyarakat. *Jurnal Penyakit Tropis dan Kesehatan Masyarakat, 4*(3), 210–218.

Shahmy, S. (2023). Compliance with national snakebite treatment guidelines in rural Sri Lankan hospitals: a cluster randomized controlled trial of a brief educational intervention. BMC Medical Education, 23(1). https://doi.org/10.1186/s12909-023-04375-1

Tusabe, J. (2025). Knowledge, perceptions and healthcare practices of communities for management of snakebites in Kamuli District, Eastern Uganda. Transactions of the Royal Society of Tropical Medicine and Hygiene, 119(4), 418–431. https://doi.org/10.1093/trstmh/trae105