



Utilization of Interactive Schistosomiasis Educational Media in Changing Clean and Healthy Living Behaviors to Prevent Stunting

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ARTICLE INFO

Manuscript Received: 17 Jul, 2025

Revised: 13 Feb, 2026

Accepted: 23 Feb, 2026

Date of publication: 01 Jul, 2026

Volume: 6

Issue: 2

DOI: [10.56338/jphp.v6i2.8098](https://doi.org/10.56338/jphp.v6i2.8098)

KEYWORDS

School Children;
Local Content;
Stunting;
Schistosomiasis

ABSTRACT

Introduction: Schistosomiasis disease infecting humans in Indonesia is caused by the trematode worm *Schistosoma japonicum* type with the intermediate host being the snail *Oncomelania hupensis lindoensis*. Schistosomiasis can be chronic and worsen the incidence of malnutrition so that it can increase stunting in school-aged children. The aim of the research is to assess the increase in knowledge of students who have received local schistosomiasis so that they can practice clean and healthy living habits to prevent stunting in school children.

Methods: The research was carried out using mixed methods, namely collecting qualitative and quantitative data. Data was obtained by in-depth interviews with key informants and focus group discussions.

Results: Providing schistosomiasis subject matter to school children by measuring students' level of knowledge through pre and post-tests. Based on statistical analysis, a significant increase in students' knowledge about schistosomiasis was found with a p-value < 0.001.

Conclusion: Empowering communities by integrating schistosomiasis education into the local school curriculum enhances students' understanding of the disease. It is important to continue incorporating local content about schistosomiasis so that school children remain consistent in preventing its transmission.

Publisher: Pusat Pengembangan Teknologi Informasi dan Jurnal Universitas Muhammadiyah Palu

INTRODUCTION

Schistosomiasis, commonly known as snail fever in Indonesia, is caused by the trematode parasite *Schistosoma japonicum*, with the intermediate host being the snail *Oncomelania hupensis lindoensis*. Chronic schistosomiasis reduces an individual's ability to work, and in some cases, it can lead to death across all age groups. In children, the disease can result in stunted growth, anemia, and impaired learning abilities (1,2). Schistosomiasis is a parasitic disease that can manifest in both acute and chronic forms, caused by blood flukes from the genus *Schistosoma*. This illness is endemic in Central Sulawesi Province. Transmission occurs through contact with water contaminated by the cercariae stage of the *Schistosoma* parasite, as well as freshwater snails of the genus *Oncomelania* that serve as intermediate hosts (3).

Schistosomiasis pathology arises when retained schistosome eggs trigger an immune-mediated granulomatous response, leading to both localized and systemic inflammation. Infection with *Schistosoma mansoni* can result in a range of health issues, including anemia, stunted growth, and wasting, as well as changes in the liver and spleen such as periportal fibrosis and portal hypertension. Although schistosomiasis is generally not fatal, the cumulative effects of what is known as "subtle morbidity" can significantly affect the quality of life of those infected. Like other neglected tropical diseases, it is also believed to perpetuate poverty and hinder cognitive development (4).

Malnutrition linked to intestinal nematodes and other parasites plays a significant role in hindering children's physical growth, cognitive development, and educational progress. Additionally, it leads to decreased fitness, impaired cognition, and reduced work productivity in adults, beyond the mortality associated with these related complications (5,6). The way intestinal worm infections worsen malnutrition—including protein-energy malnutrition, anemia, and other nutrient deficiencies—involves several factors. These infections can lead to anorexia (loss of appetite), poor nutrient absorption, and reduced food intake due to nutrient loss from bleeding, vomiting, or diarrhea. Malnutrition, in turn, stunts growth and impairs immune function, which increases the likelihood of further intestinal parasite infections. In school-aged children, worm infections often result in malnutrition where they may consume enough food but suffer from an unbalanced nutritional intake (7). Chronic malnutrition and intestinal worm infections can lead to stunted growth in school-aged children (8). Factors that raise the risk of intestinal parasite infections include swimming, walking barefoot, inadequate handwashing, and low parental education levels. These factors have also been linked to poor nutritional status (9).

Stunting serves as an indicator of chronic malnutrition and is linked to delayed development, which subsequently leads to reduced productivity and lower wages in adulthood (7). Interventions aimed at addressing stunting have the potential to significantly influence the growth and development of children, who are the key to shaping the future (10). Stunting is generally caused by multiple factors, including poor dietary intake, low socioeconomic status, and intestinal worm infections (11). Childhood stunting is an indicator of children's well-being and an accurate reflection of social inequality. Stunting is the most common form of childhood malnutrition, affecting millions of children worldwide. Despite its high prevalence and a lack of consensus on how to define and measure it, stunting often goes unrecognized in society and is considered normal (12,13). This model has the potential to make a long-term contribution to improving the nutritional status of children in endemic areas, which in turn can support national efforts to accelerate stunting reduction.

Efforts to control this disease have been ongoing for at least the past 35 years, providing valuable insights that its eradication requires a coordinated multisectoral approach, implemented simultaneously in endemic villages. The disease can only be fully eliminated through collaboration across different sectors and empowering communities to reduce—and eventually eradicate—parasitic infections in humans, animals, and intermediate snail hosts. In this context, active participation from multiple sectors and local communities is essential, particularly in managing livestock and the habitats of the snail vectors. Health education is most effective when combined with mass treatment (Praziquantel), clean water provision, proper sanitation, and control of the intermediate host snail. The use of multimedia media, infographics, and an "edutainment" approach has shown better results in information absorption, especially among school-age children (14).

METHOD

While this mixed-methods study provides in-depth insights into the implementation process of the Mepaturo Model, the lack of a control group limits our ability to definitively attribute changes in knowledge solely to the

intervention. Alternative explanations such as secular trends or maturation effects cannot be completely ruled out. Therefore, this study should be viewed as an initial implementation evaluation, setting the groundwork for future experimental research with a robust comparison group. The research employed a qualitative approach involving in-depth interviews with teachers. The research was conducted in all schools in West Lore District, consisting of six Elementary Schools (SD) and two Junior High Schools (SMP). Additionally, secondary data concerning students from six elementary schools (SD) and two junior high schools (SMP) in Lore Barat Subdistrict were collected. Each school was represented by two teachers selected either through a formal selection process or on the recommendation of the Coordinator of the Education Supervision and Service Unit (SP3) in Lore Barat. A total of 16 teachers were chosen to undergo training, preparing them to deliver local content on schistosomiasis to students over one semester, consisting of five sessions. For elementary schools, this instruction targeted students in grades 4, 5, and 6, while all junior high school students were included.

Student knowledge was assessed using a structured questionnaire consisting of 15 items covering three main domains: knowledge, attitudes, and behavior. This instrument was adapted from schistosomiasis control guidelines in Central Sulawesi and validated by public health experts. Reliability testing results in the pilot group showed a Cronbach's alpha coefficient of 0.86, indicating good internal consistency. The final score was calculated by summing the correct answers, with the total score ranging from 0 to 3.

Following the selection of the teacher sample, a coordination meeting was organized by the Donggala District Health Research and Development Center in collaboration with the Lore Barat Subdistrict Government. The meeting took place in the auditorium of the Lore Barat district office, with approximately 50 participants attending. The teaching team comprised representatives from each participating school: SD Tuare, SD Kageroa, SD Tomehipi, SD Lengkeka, SD Kolori, SD Lelio, SMP Satap Kageroa, and SMP 1 Lore Barat. Each school contributed two teachers, creating a team of 16 educators. This group was named "Mepaturo," a term from the Bada language meaning "to teach," reflecting the team's mission to instruct students on schistosomiasis.

During the event, details were provided regarding the integration of schistosomiasis local content into the school curriculum, alongside data collection of teachers eligible for training to deliver this material. The Mepaturo team underwent a two-day training program designed to enhance their knowledge and understanding of schistosomiasis. On the first day, the teachers received introductory information about schistosomiasis (also known as "snail fever"), covering causes, transmission, symptoms, diagnostic procedures, treatment, and prevention. The second day focused on practical training involving the *Oncomelania hupensis linduensis* snail—specifically its habitat (endemic areas) and examination methods using the crushing technique.

Upon completion of their training, the Mepaturo teachers were expected to teach schistosomiasis-related content to their students at their respective schools. This material was incorporated into the schools' local content curriculum. To support effective teaching, a syllabus for the schistosomiasis topic was developed collaboratively by the Mepaturo team and the Donggala Health Research and Development Center team, under the coordination of the SP3 Coordinator. Alongside this, each teacher prepared a Lesson Plan (RPP) to serve as a structured guide for delivering the content in their classrooms.

The initiative aimed to strengthen the capacity of teachers, students, and the wider community in schistosomiasis control. This policy facilitated the organization of training sessions and dissemination of information about schistosomiasis among religious leaders, educators, students, and community members. The training for elementary and junior high school teachers was intended to improve their knowledge, attitudes, and behaviors related to schistosomiasis prevention and control. Additionally, a "Schistosomiasis Ambassador" selection was conducted at schools to promote awareness and control efforts within the school environment and broader community.

The schistosomiasis lessons were scheduled within each school's local content curriculum, following the Lesson Plans developed by the teachers. During classroom instruction, the teaching team also provided educational materials such as leaflets, brochures, and illustrated books to enhance students' comprehension of schistosomiasis. The leaflets were sourced from the Poso District Health Office, while videos were provided by the Donggala Health Research and Development Center.

This study received ethical approval from the Health Research Ethics Committee of the Health Research and Development Agency (KEPK-BPPK) under approval number LB.02.01/2/KE.012/2019, dated January 21, 2019.

RESULTS

The teachers collectively agreed to include local content on schistosomiasis during the focused group discussion, as expressed by one of the educators:

“This is something we need to consider collectively. We are presented with ready-to-use materials, thanks to experts who initiated the development of this curriculum. However, the local Pamona language content is not accepted by all schools. Therefore, this approach is the most effective solution, and we must support it together. By providing resources such as reference books, we can equip teachers to confidently teach subjects like schistosomiasis.”

The Mepaturo team provided guidance to assess the extent to which teachers understand the schistosomiasis material delivered to students, as well as their teaching methods. So far, the team's mastery of the content is fairly good at 67.14%, and their instructional approach is similarly positive at 69.28%. However, some teachers still exhibit gaps in understanding, such as mispronouncing the term "schistosomiasis" or incorrectly explaining how the disease is transmitted.

The teaching method also emerged as a key point during the mentoring sessions, as some teachers appeared to deliver the material ineffectively. For example, some conducted lessons while sitting and simply reading from their notes, which left students somewhat confused and disengaged. An engaging teaching approach can significantly enhance students' understanding. This includes teachers speaking clearly and loudly, as well as presenting material through relatable, everyday examples that encourage students to think critically and grasp the concepts more easily.

The total number of samples included 69 middle school students who participated in both pre- and post-tests, and 101 elementary school students. Statistical analysis revealed a significant improvement in students' knowledge about schistosomiasis, with a p-value less than 0.001. The average score before the intervention was 57.4 and after the intervention was 68.7, as shown in the statistical test results, as illustrated in the table and figure below:

Table 1. Paired Sample Statistics

Pair	Mean	N	Standard Deviation	Standard Error Mean
Pre Value	57.353	170	18.3987	1.4111
Post Value	68.706	170	18.9854	1.4561

Source: Primary Data

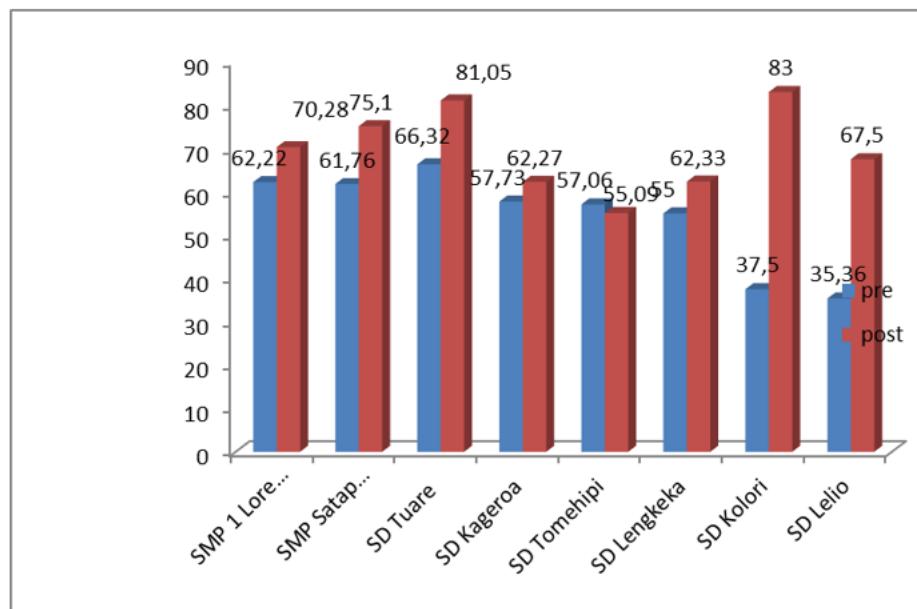


Figure 1. Improvement in Knowledge Among Elementary and Middle School Students

The study found that when teachers provide lessons on schistosomiasis, children’s knowledge about its causes, transmission, symptoms, diagnostic methods, treatment, and prevention improves significantly. Offering schistosomiasis education to students in elementary and middle schools is expected to enhance their understanding, which in turn encourages them to share this information with parents, family members, and friends. This increased awareness can contribute to reducing the prevalence of schistosomiasis and boosting participation in stool collection and medication intake programs in endemic areas.

The results of interviews with teachers can be seen in the table below:

Table 2. Results of Interviews with Teachers

Theme	Analysis Focus	Quote
Teacher Readiness	Psychological and technical aspects.	<i>“Yes, after two days of training, we were able to teach the material well in general.”</i>
Curriculum Acceptance	Value alignment.	<i>“This schisto material is very appropriate for students in our area.”</i>
Pedagogical Challenges	Execution in class.	<i>“e..not many because there aren't many students here.”</i>
Student Engagement	Teacher observations of impact.	<i>“It's not bad because this is a schisto place, so they're curious.”</i>

Source: Primary Data

DISCUSSION

According to the literature, engaging and empowering communities is a highly effective strategy for ensuring the success of disease control programs, whether they target infectious or non-communicable diseases (15). Several community interventions carried out through community empowerment in various middle-income countries, such as India and Mongolia, have demonstrated promising outcomes in terms of sustainability. Health promotion strategies centered on community empowerment require active participation from the target population, which leads to meaningful behavioral changes (16). Biologically, reducing parasite burden through health education and mass treatment is closely linked to improved micronutrient absorption (17).

Although this study did not directly measure anthropometric parameters, the changes in hygiene behaviors found are crucial steps toward broader public health goals, including preventing growth disorders in endemic areas.

Stunting is not limited to toddlers but also affects school-aged children. Research from Angola indicates that stunting is more common among children over 10 years old compared to those under 10, largely due to prolonged food shortages experienced during the previous period of conflict (12,16). Given that the prevalence of anemia, glucose levels, and protein malnutrition did not significantly differ between age groups ($p>0.05$), and the incidence of intestinal worm infections was similarly comparable between stunted and normal school-aged children ($P=0.49$), it is highly likely that stunting results from prolonged nutritional deficiencies linked to poverty, parasitic infections, and repeated infections throughout childhood (9,18).

Providing educational material about schistosomiasis to elementary and middle school students in the Lore Barat district has led to a noticeable improvement in their knowledge both before and after the lessons. This progress is attributed to the consistent delivery of information, starting with an introduction to the parasite, followed by explanations of transmission methods, prevention strategies, and recognizable symptoms. Additionally, effective teaching methods and the use of engaging educational media have made it easier for students to grasp the concepts. This outcome aligns with research conducted by Eliana, which demonstrated an increase in students’ understanding of nutrition after they were given simple, illustrated pocketbooks, making the content more appealing and easier to comprehend (19).

It is essential to provide educational materials about schistosomiasis to schoolchildren because they are highly vulnerable to infection due to their limited understanding of how the disease is transmitted and prevented. Research shows that chronic schistosomiasis in children significantly contributes to anemia and malnutrition, which can lead to stunted growth, poor academic performance, and reduced productivity later in life (19,20). Additionally, blood loss caused by worm infections can result in anemia, iron deficiency, and hypo-proteinemia (20). Children heavily infected with *Schistosoma mansoni* in Brazil (exceeding 400 eggs per gram of stool) have a 2.74 times greater risk of experiencing stunted growth compared to their uninfected peers (21). Ascariasis contributes to malnutrition in

addition to the health issues caused by the migration of worms within the body. Chronic dysentery linked to trichuriasis is also a significant factor affecting nutrition and the well-being of school-aged children (22).

One approach to controlling schistosomiasis involves providing schoolchildren with locally relevant educational materials about the disease. This student-centered learning method actively engages learners throughout the process, encouraging greater participation and involvement. As a result, students are expected to become more engaged and proactive in understanding schistosomiasis (23). Students are also provided with leaflets, brochures, or illustrated books that serve as effective learning tools. These printed materials complement the oral explanations given by the teacher, reinforcing the information conveyed during lessons. Such media are especially valuable in the learning process because they present content in a clear, organized, and straightforward manner. Additionally, their engaging format captures students' interest and attention, with the hope that the materials will become a source of information not only for the students themselves but also for their friends, family, and the wider community (19).

The approach involves educating schoolchildren about schistosomiasis by adopting the Lawa Project model, originally implemented in Thailand to combat opisthorchiasis. A key element of the Lawa Project is integrating information about opisthorchiasis into the curriculum for elementary and middle school students. This ensures that students gain a solid understanding of the disease's infection sources, enabling them to share this knowledge with others and remind their families to avoid consuming raw fish, which is a primary mode of transmission. By applying the community-based Lawa Project strategy, Thailand successfully reduced the infection rate by up to 50%, bringing the prevalence down to nearly 1%, a significant improvement from the previous rate of 70% (24). A similar finding was observed in a study conducted by Yuan in Hunan Province, China, where collaboration between the health department and public education authorities led to a two-hour educational session accompanied by the distribution of printed materials. This initiative aimed to enhance students' understanding of schistosomiasis. The results demonstrated a significant improvement in the participants' knowledge about schistosomiasis and its treatment (25).

Health education for schoolchildren is a crucial strategy in controlling schistosomiasis because this age group is at highest risk of infection due to physical activity in contaminated water. The key roles of school health education include:

Agent of Change: Through models like the Mepaturo Team in West Lore, students not only learn for themselves but also bring prevention information to their families.

Improved Treatment Compliance: School-based education significantly increased student participation in Mass Preventive Drug Administration (MPAD) using Praziquantel.

Hygiene Behavior Change: Students are taught to stop defecating in the open and avoid direct contact with river or rice field water without protection, which directly breaks the chain of transmission.

Early Detection through Screening: Schools become centers for collective stool sample collection, which facilitates monitoring of disease prevalence by community health centers.

CONCLUSION

Empowering communities through local schistosomiasis education in schools enhances children's understanding of the disease. Comprehensive knowledge about the causes, transmission, symptoms, diagnosis, treatment, and prevention of schistosomiasis enables students to share valuable information with their parents and siblings at home. Success is reflected in increased participation in stool collection and praziquantel medication intake among the community. It is hoped that the resulting decrease in schistosomiasis prevalence will also contribute to reducing stunting in school-aged children. Continuing local schistosomiasis education programs is essential to ensure students remain committed to preventing the spread of this disease. Although participation has increased, the long-term effectiveness on community health status needs to be further studied through longitudinal studies.

AUTHOR'S CONTRIBUTION STATEMENT

Ahmad Erlan, Paisal, and Yona Patunduk were responsible for designing and implementing the research, gathering data, analyzing and interpreting the findings, drafting and revising the manuscript, and granting final approval for publication. Muhammad Firdaus and Anggri Alfira Yunita Assa contributed by analyzing and interpreting the data, revising the manuscript, and providing final approval for the published version. I Kadek Wartana handled data analysis and interpretation, adapted the article to the journal's formatting requirements, submitted the manuscript, and gave final approval for publication. Veni Mornalita Kolupe and Sitti Fajrah participated in data

analysis and interpretation, critically reviewed the article, and approved the final version for publication. Niluh Desy Purnamasari, Desak Eka Susianawati, and Fitri Arni contributed through critical revision of the manuscript and also provided final approval for publication.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest, whether personal or financial, that might have affected the outcomes of this research.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors recognize the restricted and ethical application of AI technology (ChatGPT) in the development of this manuscript. Its use was confined to providing grammar corrections and paraphrasing recommendations. The authors retain full responsibility for the content and interpretations expressed herein.

SOURCE OF FUNDING STATEMENTS

The authors did not receive any financial support from any source for this study.

ACKNOWLEDGMENTS

The author expresses sincere gratitude to the Health Office of Poso Regency, the West Lore District Head, school teachers, and the students in West Lore District for their continuous support and active participation in every stage of this research.

BIBLIOGRAPHY

1. LoVerde P. Schistosomiasis [Internet]. Vol. 1154, *Advances in Experimental Medicine and Biology*. 2019. p. 45–70. Available from: <https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85069540176&origin=inward>
2. Govic Y Le. *Schistosoma haematobium– schistosoma mansoni hybrid parasite in migrant boy, france, 2017* [Internet]. Vol. 25, *Emerging Infectious Diseases*. 2019. p. 365–7. Available from: <https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85060183839&origin=inward>
3. Delapriyant FG, Ratag BT, Kaunang WPJ. Pengetahuan, Sikap Dan Tindakan Pencegahan Penyakit Schistosomiasis Masyarakat Di Desa Dodolo Kecamatan Lore Utara *Kesmas* [Internet]. 2018 [cited 2021 Jul 9];7(4). Available from: <https://ejournal.unsrat.ac.id/index.php/kesmas/article/view/23136>
4. Sircar AD, Mwinzi PNM, Onkanga IO, Wiegand RE, Montgomery SP, Secor WE. *Schistosoma mansoni* Mass Drug Administration Regimens and Their Effect on Morbidity among Schoolchildren over a 5-Year Period—Kenya, 2010–2015. *Am J Trop Med Hyg* [Internet]. 2018 [cited 2021 Jul 8];99(2):362. Available from: [pmc/articles/PMC6090338/](https://pubmed.ncbi.nlm.nih.gov/30865345/)
5. Bouma S. Diagnosing Pediatric Malnutrition: Paradigm Shifts of Etiology-Related Definitions and Appraisal of the Indicators. *Nutr Clin Pract* [Internet]. 2017 Feb 1 [cited 2021 Jul 8];32(1):52–67. Available from: <https://pubmed.ncbi.nlm.nih.gov/30865345/>
6. Sacolo-Gwebu H. Prevalence and risk factors of schistosomiasis and soil-transmitted helminthiasis among preschool aged children (1-5 years) in rural KwaZulu-Natal, South Africa: A cross-sectional study. *Infect Dis Poverty* [Internet]. 2019;8(1). Available from: <https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85067347499&origin=inward>
7. Martorell R, Horta BL, Adair LS, Stein AD, Richter L, Fall CHD, et al. The Journal of Nutrition Community and International Nutrition Weight Gain in the First Two Years of Life Is an Important Predictor of Schooling Outcomes in Pooled Analyses from Five Birth Cohorts from Low-and Middle-Income Countries 1,2. *J Nutr* [Internet]. 2010;140:348–54. Available from: <https://academic.oup.com/jn/article/140/2/348/4688964>
8. Iqbal MS, Palmer AC, Waid J, Rahman SMM, Bulbul MMI, Ahmed T. Nutritional Status Among School-Age Children of Bangladeshi Tea Garden Workers: <https://doi.org/10.1177/0379572120965299> [Internet]. 2020 Oct
9. [cited 2021 Jul 8];41(4):424–9. Available from: <https://journals.sagepub.com/doi/10.1177/0379572120965299>

10. Tariku EZ, Abebe GA, Melkisedik ZA, Gutema BT. Prevalence and factors associated with stunting and thinness among school-age children in Arba Minch Health and Demographic Surveillance Site, Southern Ethiopia. *PLoS One* [Internet]. 2018 Nov 1 [cited 2021 Jul 4];13(11). Available from: <https://pubmed.ncbi.nlm.nih.gov/30388149/>
11. Nugroho MR, Sasongko RN, Kristiawan M. Faktor-faktor yang Mempengaruhi Kejadian Stunting pada Anak Usia Dini di Indonesia. *J Obs J Pendidik Anak Usia Dini* [Internet]. 2021 [cited 2021 Jul 3];5(2). Available from: <https://www.researchgate.net/publication/350163239>
12. Ariati LIP. Faktor-Faktor Resiko Penyebab Terjadinya Stunting Pada Balita Usia 23-59 Bulan. *OKSITOSIN J Ilm Kebidanan* [Internet]. 2019 Feb 1 [cited 2021 Jul 3];6(1):28–37. Available from: <https://journal.ibrahimy.ac.id/index.php/oksitosin/article/view/341>
13. Oliveira D, Ferreira FS, Atougua J, Fortes F, Guerra A, Centeno-Lima S. Infection by intestinal parasites, stunting and anemia in school-aged children from southern Angola. *PLoS One* [Internet]. 2015 Sep 15 [cited 2021 Jul 4];10(9):e0137327. Available from: <http://hdl.handle.net/10362/15335>
14. Grimes JET, Tadesse G, Gardiner IA, Yard E, Wuletaw Y, Templeton MR, et al. Sanitation, hookworm, anemia, stunting, and wasting in primary school children in southern Ethiopia: Baseline results from a study in 30 schools. *PLoS Negl Trop Dis* [Internet]. 2017 Oct 9 [cited 2021 Jul 3];11(10):e0005948. Available from: <https://doi.org/10.1371/journal.pntd.0005948>
15. Zhang J, Lin D, Hu F, Li D, Chen J, Xie H, et al. Research on health education and health promotion during the process of schistosomiasis elimination III new approaches for student health education. *PLoS Negl Trop Dis*. 2025 Aug 1;19(8).
16. Pagès M, Fischer A, van der Wal R, Lambin X. Empowered communities or “cheap labour”? Engaging volunteers in the rationalised management of invasive alien species in Great Britain. *J Environ Manage* [Internet]. 2019 Jan;229:102–11. Available from: <https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85049497947&origin=inward>
17. Katre A, Tozzi A, Bhattacharyya S. Sustainability of community-owned mini-grids: evidence from India. *Energy Sustain Soc* [Internet]. 2019 Dec 21;9(1):2. Available from: <https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85060277241&origin=inward>
18. Naqvi FA, Das JK, Salam RA, Raza SF, Lassi ZS, Bhutta ZA. Interventions for Neglected Tropical Diseases among Children and Adolescents: A Meta-analysis. *Pediatrics*. 2022 May 1;149.
19. Adeniran AA, Mogaji HO, Aladesida AA, Olayiwola IO, Oluwole AS, Abe EM, et al. Schistosomiasis, intestinal helminthiasis and nutritional status among preschool-aged children in sub-urban communities of Abeokuta, Southwest, Nigeria. *BMC Res Notes* 2017 101 [Internet]. 2017 Nov 28 [cited 2021 Jul 8];10(1):1–7. Available from: <https://bmcresnotes.biomedcentral.com/articles/10.1186/s13104-017-2973-2>
20. Grimes JET, Tadesse G, Gardiner IA, Yard E, Wuletaw Y, Templeton MR, et al. Sanitation, hookworm, anemia, stunting, and wasting in primary school children in southern Ethiopia: Baseline results from a study in 30 schools. *PLoS Negl Trop Dis* [Internet]. 2017 Oct 9 [cited 2021 Jul 8];11(10):e0005948. Available from: <https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0005948>
21. Eliana D, Solikhah. Pengaruh Buku Saku Gizi Terhadap Tingkat Pengetahuan Gizi Pada Anak Kelas 5 Muhammadiyah Dadapan Desa Wonokerto Kecamatan Turi Kabupaten Sleman Yogyakarta. *Kes Mas*. 2012;6(2):162–232.
22. Elzain IA, Abdalla HS, Idris AB, Ahmed NM, Jomaa S, Hassan MA. Prevalence and risk factors of Schistosomiasis among school aged children in Al- Fashir, North Darfur state, Sudan: a cross sectional study [Internet]. Cold Spring Harbor Laboratory; 2022. Available from: <http://dx.doi.org/10.1101/2022.04.10.22273476>
23. King CH. Parasites and poverty: The case of schistosomiasis. Vol. 113, *Acta Tropica*. Elsevier; 2010. p. 95–104.
24. Assis A, Prado M, Barreto M, Reis M, Conceição Pinheiro S, Parraga I, et al. Childhood stunting in Northeast Brazil: the role of *Schistosoma mansoni* infection and inadequate dietary intake. *Eur J Clin Nutr* [Internet]. 2004;58:1022–9. Available from: www.nature.com/ejcn

25. Taren DL, Nesheim MC, Barbeau I, Sanjur D, Tiffany J, Tucker K, et al. Contributions of ascariasis to poor nutritional status in children from Chiriqui Province, Republic of Panama. *Parasitology* [Internet]. 1987 [cited 2021 Jul 4];95(3):603–13. Available from: <https://www.cambridge.org/core/journals/parasitology/article/abs/contributions-of-ascariasis-to-poor-nutritional-status-in-children-from-chiriqui-province-republic-of-panama/211D7EFC235D690DE65339DD6F135E5F>
26. Hidayati F, Sudarnika E, Latif H, Lukman DW, Ridwan Y, Zahid A, et al. Intervensi Penyuluhan dengan Metode Ceramah dan Buzz untuk Peningkatkan Pengetahuan dan Sikap Kader Posyandu dalam Pengendalian Rabies di Kabupaten Sukabumi. *J Penyul.* 2019;15(1):65–74. <https://doi.org/10.25015/15201920979>.