

Personal Hygiene Reduces the Risk of Soil-Transmitted Helminth Worm Infection

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Abstract:

Vegetable farmers risk being infected with Soil Transmitted Helminth (STH) due to frequent direct contact with soil contaminated by STH eggs. Worm infections transmitted through the soil cause disturbances in the tissues and organs of the body by taking nutrients from the vegetable growers' bodies, which can cause serious complications. The search process was carried out using a literature review using four databases, namely Google Scholar, Science Direct, WorldCat, and PubMed, with a publication range of 2018-2023. From all search results, ten articles match the research criteria. The results showed that vegetable farmers who have good personal hygiene can reduce the risk of STH infection. The presence of health workers here is expected to enable them to carry out health promotion, health education, and outreach to the community, especially to vegetable farmers, regarding good personal hygiene to prevent STH transmission.

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INTRODUCTION

Agronursing is a comprehensive and holistic client-oriented service and management in the agricultural sector (Afandi et al., 2023). Agronursing is well suited for implementation in Indonesia, a farming country because most of the Indonesian population works in agriculture (Kurniyawan et al., 2023). Agriculture is one of the agronursing sectors that can cause health problems, especially for vegetable farmers. Vegetable farmers are individuals who work by cultivating vegetables in the fields. This work is one of the jobs that often have direct contact with the soil so it can pose a significant risk of infection with the Soil-Transmitted Helminth (STH) worm (Apsari et al., 2020).

Soil-transmitted helminth infection worms are a group of nematode parasites that can cause infectious diseases in humans due to direct contact with parasite larvae or eggs in the soil. This STH infection can cause disturbances in the patient's tissues and organs by taking nutrients from the body. STH worms consist of roundworms (*Ascaris lumbricoides*), whipworms (*trichuris tichiura*), and hookworms (*ancylostoma duodenale*) (Apsari et al., 2020). Soil Transmitted Helminths (STH) infection is an endemic problem worldwide. Based on the World Health Organization (World Health Organization, 2015), more than 1.5 billion people worldwide are infected with STH.

The most extensive spread of infection is in Africa, America, China, and Southeast Asia. Based on the World Health Organization (World Health Organization, 2016), the most common viral infections in humans in the world are *Ascaris lumbricoides* or roundworms (807 million), *Trichuris trichiura* or whipworms (604 million), and *Ancylostoma duodenale* or hookworms (576

million). STH infections in the Southeast Asian region are as many as 354 million people. Indonesia is ranked second in the Southeast Asian region. The prevalence of STH infection in Indonesia varies between 20-86%. The incidence of STH infection occurred in many areas of Indonesia, including the provinces of East Java (7.95%), Central Java Province (33.8%), Bali Province (13.5%) and North Sumatra (60.4%). The high prevalence is due to Indonesia's geographical location, which has a tropical climate that affects the development level of STH worms (Armianti et al., 2023).

The life cycle of STH requires soil during reproduction to ensure infection, and it can be transmitted to humans (Afandi et al., 2023). Mode transmission of STH infection varies depending on the species. Humans can become infected with STH from orally ingested worm eggs (*Ascaris lumbricoides* and *Trichuris trichiura*) or hookworm larvae that enter through skin penetration. STH eggs and larvae then become adult worms in the human body, producing eggs excreted in the patient's feces. The habit of defecating (BAB) not in the latrines can be a route for STH transmission through environmental pollution in soil and water, so water can also be a source of transmission (waterborne diseases) (Umamah, 2020).

Based on this, the transmission of STH infection is very risky for vegetable farmers, given the high prevalence of STH worm infection in the world and Indonesia. Therefore, researchers managed to prevent the transmission of STH worm infection through a health promotion approach, namely personal hygiene.

METHOD

This study uses the literature review method. The article search strategy uses four databases available on national and international article sites, such as Google Scholar, Science Direct, WorldCat, and Pubmed. The article search begins with identification and then searches using the keywords "vegetable farmers AND Soil-Transmitted Helminth AND personal hygiene." After this search, 215 articles were found on Google Scholar, 17 on Science Direct, four on WorldCat, and three on Pubmed. The next stage is screening by selecting the title of the article and the year of publication, namely 2018-2023, and not full text so that 62 articles are obtained. After that, articles were filtered with inclusion and exclusion criteria. Thirty-two articles fit the criteria for inclusion and exclusion criteria. The next step is eligibility, namely by assessing the eligibility of 32 through re-selection who get the result in 12 articles through several selections such as the language selected, writing design, output, and several other criteria that have been determined. Finally, the number of articles that include research is ten articles.

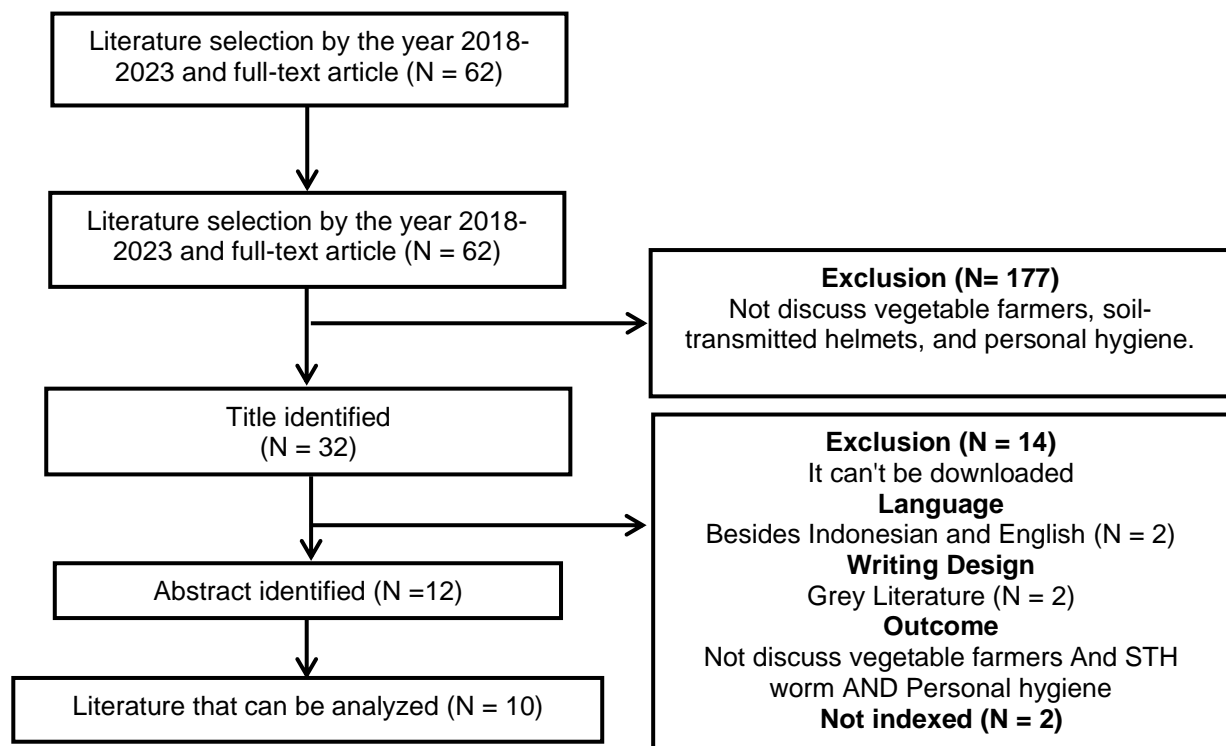


Figure 1. Flow Diagram of Analysis Literature Based on PRISMA (2009)

RESULT

STH worm infection is the entry of parasites in the form of worms into the human body. Worms in the intestine are also called intestinal nematodes. Among the intestinal nematodes, there are several soil-transmitted species called Soil Transmitted Helminths. This worm species undergoes a process of maturation or becomes infective in the soil. Soil-Transmitted Helminth in vegetable farmers is primarily due to a lack of adherence to personal hygiene, such as inadequate sanitation, not washing hands before and after carrying out activities, and not keeping the environment clean. The occupational factor is also closely related to soil-transmitted helminth worm infections, where most of those infected with these worms are in jobs directly related to the soil, such as farming, especially vegetable farmers (Umamah, 2020).

Below is a journal analysis table showing ten journals reviewed, each of which has a different research design. The overall results of the study indicate that there is a link between personal hygiene and the occurrence of soil-transmitted helminth worm infections.

Table 1. Result of Literature Review

ID Number	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Results
A1	Aritonang, B. N., Lasmini, T., & Pardede. 2020. <i>Jurnal Sains dan teknologi Laboratorium Medik</i> , 5(2): 34-39.	Analisis Telur Cacing <i>Soil Transmitted Helminth</i> (STH) Pada Petani Sayur di Kartama Pekanbaru	This study determined the presence or absence of <i>Soil Transmitted Helminth</i> (STH) worm eggs in vegetable farmers in Kartama, Pekanbaru.	Twenty-seven samples of feces and nails from vegetable farmers who did not use gloves and footwear when gardening.	This study used a cross-sectional design with the sedimentation method.	The analysis results using the sedimentation method from examining 27 samples of feces and nails from vegetable farmers in Kartama Pekanbaru were negative (no <i>Soil-Transmitted Helminth</i> worm eggs were found). This is because vegetable farmers always wash their hands with running water and soap, cut their nails diligently, and eat with a spoon.
A2	Umamah, S. and Budi Nugroho, R. 2020. <i>Journal of Health (JoH)</i> , 7(2): 59-64.	Prevalence of Intestinal Nematodes <i>Soil Transmitted Helminth</i> (STH) on Nails and Feces of Vegetable Farmers in Ngagrang Village Ampel Subdistrict Boyolali Regency.	This study aimed to determine the prevalence of intestinal nematode worms belonging to the <i>Soil-Transmitted Helminth</i> group in vegetable farmers in Ngagrang Village, Ampel District, Boyolali Regency, Central Java.	The samples examined were fecal samples taken in the morning and vegetable farmers' fingernails with the criteria of dirty fingernails, totaling 30 samples.	This research method is observational research with a cross-sectional approach. Sampling was done by purposive sampling technique.	The results of a study conducted on the feces and nails of vegetable farmers showed that one stool sample was positive for infection with eggs of Intestinal Nematodes of the <i>Soil-Transmitted Helminth</i> group. The percentage of positive results infected with <i>Soil-Transmitted Helminth</i> class parasites was 3.33%. The rate of negative results not infected with <i>Soil-Transmitted Helminth</i> class parasites was 96.7% from 30 stool samples. In the nail samples, negative results were obtained. The nail samples were not infected with the <i>Soil-Transmitted Helminth</i> group parasites, with a percentage of 100% of the 30 nail samples examined.
A3	Idayani, S., Putri, N. L. D., & Abadi, M. F. 2021. <i>Bali Medika Jurnal</i> , 8(3): 233-238.	The Relationship Between Personal Hygiene and <i>Soil-Transmitted Helminths</i> in Vegetable Farmers in Gianyar District	This study aims to determine the relationship between personal hygiene and infection with intestinal helminth eggs (<i>Soil-Transmitted Helminth</i>) for vegetable farmers in Gianyar Regency.	The sample in this study was 30 vegetable farmers in Gianyar Regency who worked in the rice fields. Stool samples taken about 100 grams (thumb size)	The type of research used in this research is descriptive correlative research with a cross-sectional study approach.	Based on the results of stool examination of vegetable farmers, as many as 30 people showed that six people (20%) were infected with <i>Soil Transmitted Helminths</i> (STH) worm eggs and 24 people (80%) were not infected. Analysis of the results of stool examination and the personal hygiene condition questionnaire using the Spearman Correlation test showed that there was no correlation between personal hygiene and infection with intestinal helminth eggs (<i>Soil-Transmitted Helminth</i>) in

						vegetable farmers in Gianyar Regency (p-value> 0.05).
A4	Wikandari, R.J. Setyowatiningsih, L, Djamil, M, Surati, dan Kahar, F. 2021. <i>Indonesia Journal of Medical Laboratory Science and Technology</i> , 3(2): 135-145.	Factors Related to Soil-Transmitted Helminth Infection in Vegetable Farmers	This study will observe factors associated with soil-transmitted Helminth (STH) infection in vegetable farmers.	The sample in this study was 55 vegetable farmers, with 31 men and 24 women.	This study used a cross-sectional approach. The final results are processed with SPSS 20 to examine feces using the Flotation method.	Data analysis revealed that 3 research subjects were positively infected with STH, consisting of 1 <i>Ascaris lumbricoides</i> egg and 2 <i>Trichuris trichiura</i> eggs. STH-positive respondents habitually did not wash their hands with soap and water before eating and defecating.
A5	Saftarina, F., Hasan, M., Suwandi, J, F, dan Syani, A. Y. 2020. <i>Jurnal Kedokteran Syiah Kuala</i> , 20 (3): 167-171.	Kejadian Infeksi <i>Soil-Transmitted Helminth</i> Pada Petani	This research aimed to determine the incidence of STH infection and the factors that influence it in Pinang Jaya Village, Lampung.	The population in this study was 63 farmers, and 55 farmers were selected as a sample using a purposive sampling technique.	This study used a cross-sectional design; the independent variables of personal hygiene, use of PPE, and the dependent variable of STH infection were collected simultaneously.	Based on the results of the study, the prevalence of STH in farmers was 40%, with <i>A. lumbricoides</i> worm eggs (22.7%), hookworms (59.1%), and both infected (18.2%). Most of the personal hygiene of farmers is good (63.6%), and most do not use personal protective equipment (69.1%). The results of this analysis indicate that personal hygiene and the use of PPE are related to the incidence of STH.
A6	Aritonang, B. N. R. S. 2019. <i>Jurnal Sains dan Teknologi Laboratorium Medik</i> , 4(2):39-43.	Hubungan Personal Higiene dengan Penyakit Cacing (<i>Soil Transmitted Helminth</i>) pada Petani Sayur Kartama Kota Pekanbaru	This study aims to determine the relationship between personal hygiene and STH worm disease (<i>Soil-Transmitted Helminth</i>) in vegetable farmers in Kartama City, Pekanbaru.	The sample population in this study was 30 people who worked as vegetable farmers and did not use gloves or footwear when gardening.	This research is an analytical survey to explore the phenomenon of health problems with a cross-sectional approach.	Based on the results of research conducted on 30 samples of vegetable farmers in Kartama Pekanbaru, no <i>Soil-Transmitted Helminth</i> worm eggs were found in the feces and nails. This is because most farmers perform personal hygiene well, such as washing hands, keeping nails clean, and eating with a spoon.
A7	Mebiana, M. S., Wardani, D. P., Mujahid, I & Supriyadi. 2021. <i>Meditory: The Journal of Medical Laboratory</i> . 9(2): 78-85.	Deteksi Keberadaan Telur <i>Soil Transmitted Helminth</i> (STH) Pada Kuku Petani	This study aimed to determine the relationship between personal hygiene and the presence of <i>Soil Transmitted Helminth</i>	The population is 17 farmers selected by random sampling.	This research was carried out using an analytical observation with a cross-sectional design in April-May 2021.	The results of this study showed that four nail samples (47.05%) were positive for <i>Ascaris lumbricoides</i> eggs, two nail samples (11.76%) were positive for Minute Intestinal Fluke, eight samples of toenails (82.35%) were positive for <i>Ascaris lumbricoides</i> eggs, and 1 sample of toenails (5.88%)

(STH) Eggs on farmers' nails.

was positive for Minute Intestinal Fluke eggs. STH eggs are found in the fingernails and toenails of farmers in Kaligondang District, Purbalingga Regency. Therefore farmers need to improve personal hygiene to avoid worm infection.

A8	Aritonang, B. N. R. S., Rosmiati, K., & Daniati. 2022. <i>Jurnal Sains dan Teknologi Laboratorium Medik</i> , 8(2):6-12	Analisis telur Cacing Soil Transmitted Helminth (STH) Pada Petani Sayur di Kubang Raya Kota Pekanbaru	This study aimed to determine the presence or absence of worm eggs in the feces of vegetable farmers in Kubang Raya, Pekanbaru City.	The population in this study was six fecal samples from farmers who did not use gloves or footwear when gardening.	Stool examination in this study used the direct method and the sedimentation method.	Based on the microscopic examination of 6 stool samples from vegetable farmers in Kubang Raya, Pekanbaru City, using the direct method, no Soil-Transmitted Helminth worm eggs were found. Meanwhile, using the sedimentation method, one positive sample of hookworm eggs was found with the GP sample code.
A9	Apsari, P. I. B., Winianti, N. W., Arwati, H, dan Dachlan, Y.P. 2020. <i>Jurnal Lingkungan & Pembangunan</i> n. 4(2): 21-30.	Gambaran Infeksi Soil Transmitted Helminth Pada Petani di Desa Gelgel Kabupaten Klungkung.	The purpose of this research is to investigate the profile of STH infection and the intensity of STH infection in farmers in Gelgel Village, Klungkung-Bali	The sample of this research was 162 feces samples of active farmers, both men and women, who were willing to participate in the study by signing an informed consent.	This study used a cross-sectional study approach in Gelgel Village, Klungkung, Bali. The Kato-Katz technique is used to diagnose STH infection and determine the intensity of the infection based on the number of eggs per gram of feces (EPG).	From 162 stool samples collected from farmers aged 25-80 years, 22 were positive for STH infection, and 140 were negative for STH infection. The results show the prevalence of single disease STH 13.5% (low category, but requires treatment). Single infection <i>A. lumbricoides</i> 1.85%, single infection <i>T. trichiura</i> 9.26%. Hookworm infection, and 0.61% single hookworm infection. Mixed infections were detected in 1.23% of <i>A. lumbricoides</i> with <i>T. trichiura</i> , and 0.61% of <i>A. lumbricoides</i> with Hookworm. Clean and healthy living behavior among farmers is still lacking, so special education is needed for these farmers.
A10	Parweni, N. K. A, Getas, I. W., & Zaetun, S. 2019. <i>Jurnal Analis Medika Bio Sains</i> , 5(2): 68-72	Infeksi Kecacingan Nematoda Usus yang Ditularkan Melalui Tanah (<i>Soil Transmitted Helminth</i>) Pada Petani Sayur Sawi Hijau di Desa Bug-Bug Kecamatan	The purpose of this study was to describe soil-transmitted helminth infection by intestinal nematode worms in mustard green vegetable farmers in Bug-Bug Village,	The population in this study were 28 mustard green vegetable farmers in Bug-Bug Village, Lingsar District, West Lombok Regency, who would	This research uses a descriptive observation method. Sampling in this study using purposive sampling and then examined using the direct method.	Based on the results of an examination of 28 stool samples from mustard greens farmers in Bug-Bug Village, Lingsar Sub-District, West Lombok Regency, the results showed that two farmers were positively infected with intestinal nematode worms with the discovery of <i>Trichuris trichiura</i> worm eggs with a percentage of 7.14%. In contrast, in other samples, no nematodes were found. Intestine or negative with a

Lingsar Kabupaten Lombok Barat	Lingsar District, West Lombok Regency.	be examined for fecal samples.	rate of 92.86%. So, 26 of 28 mustard green vegetable farmers are not infected with helminthiasis.
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DISCUSSION

Based on the journal analysis that has been carried out in the form of the table above, it can be seen that the ten reviewed journals each have a different research design. Eight journals use a cross-sectional study design, one quota sampling journal (sedimentation), and one descriptive observation journal. Overall, the study results show a link between clean and healthy living behavior (PHBS) and the occurrence of helminthic infections transmitted through this soil.

In the First Study Journal by Aritonang (2020), it was found that no vegetable farmers had confirmed worm infections because they always washed their hands with running water and soap, diligently cut their nails, and ate using a spoon. Through his research, Umamah (2020) also examined 30 samples of the dirty nails and feces of vegetable farmers collected in the morning. This study was conducted in an observational manner with a cross-sectional approach, and the results of 1 positive egg stool sample infected with Nematodes of the Intestine Class Soil-Transmitted Helminth were obtained. The percentage of positive results infected with Soil-Transmitted Helminth class parasites was 3.33%, while the negative rate infected with Soil-Transmitted Helminth class parasites was 96.7% from 30 stool samples.

Research conducted by Idayani et al. (2021) also aims to determine whether there is a relationship between personal hygiene and intestinal infection with vegetable farmers' egg worms (Soil Transmitted Helminth). The 100 grams of feces were used from 30 farmers who met the inclusion criteria. This research is a descriptive correlative study with a cross-sectional study approach, which concludes that there are six infected people (20%) and 24 other people who are not infected (80%). The results of the analysis of stool examination and questionnaires on personal hygiene conditions with the Spearman correlation test showed that there was no relationship between personal hygiene and infection with egg worms (Soil-Transmitted Helminth) in vegetable farmers in Gianyar Regency ($-p\text{-value} > 0.05$).

Then, the same study conducted by Wikandari et al. (2021) obtained the results of 3 research subjects positively infected with STH consisting of 1 *Ascaris lubricoides* egg and 2 *Trichuris trichiura* eggs. These STH-positive respondents habitually did not wash their hands with soap and water before eating and defecating without wearing gloves. So, there is a relationship between the habit of washing hands with water and soap before eating and worm infections. This study is also in line with research (Saftarina et al., 2020) which states that there is a relationship between personal hygiene and the incidence of STH using PPE among farmers. Based on the results of research conducted using a cross-sectional study, the prevalence of STH in farmers was 40%, with *A. lumbricoides* worm eggs (22.7%), hookworms (59.1%), and transmitting both (18.2%)).

Previous research conducted by Aritonang (2019) also found that if personal hygiene is good, such as washing hands, keeping nails clean, and eating with a spoon, this will harm the results of STH worm infection. In addition, Mebiana (2021) participated in research to find out the relationship between personal hygiene and the presence of soil-transmitted helmet (STH) eggs on farmers' fingernails. The study was carried out using analytic observation with a cross-sectional design in April-May 2021. The results showed 4 nail samples (47.05%) were positive for *Ascaris lumbricoides* eggs, two nail samples (11.76%) were positive for Minute Intestinal Fluke, 8 nail

samples of toes (82.35%) were positive for *Ascaris egg lumbricoides* and 1 sample of toenails (5.88%) was positive for Minute Intestinal Fluke eggs. Therefore, farmers need to improve their personal hygiene to avoid worm infections.

Aritonang et al. (2021) conducted a study to find out the presence or absence of worm eggs in vegetable farmers' feces. Based on the microscopic examination of 6 vegetable farmers' feces samples, no Soil-Transmitted Helminth worm eggs were found. Meanwhile, using the sedimentation method, one positive sample of hookworm eggs was found with the GP sample code.

In a study conducted by Apsari et al. (2020) using a cross-sectional study approach on 162 fecal samples of active male and female farmers, the results showed that clean and healthy living behavior among farmers was still lacking, so special education was needed for farmers. This can be seen from 162 stool samples collected from farmers aged 25-80 years; 22 farmers were positive for STH infection, and 140 were negative for STH infection. The results showed the prevalence of a single STH infection was 13.5% (low category, but needs treatment).

The latest research by Parweni et al. (2019) also aims to describe soil-transmitted helminth infection by intestinal nematode worms (Soil-Transmitted Helminth) in mustard greens farmers. Then, the results obtained from the examination of 28 samples of feces from mustard greens farmers showed that two farmers were positively infected with intestinal nematode worms and found *Trichuris trichiura* worm eggs with a percentage of 7.14%. In contrast, in other samples, no intestinal nematodes were found or negative, with a rate of 92.86%. As many as 26 of 28 mustard greens farmers were not infected with worms. The ten journals that have been analyzed show the effect of personal hygiene on soil-transmitted helminth worm infections in farmer's vegetables.

CONCLUSION

Personal hygiene is crucial to vegetable farmers to reduce the risk of soil-transmitted helminth worm infection. The use of personal protective equipment, such as footwear when working in the fields, washing hands before eating, keeping nails clean, and eating using a spoon, is expected to be implemented by farmers. Therefore, the role of health workers in providing health promotion, health education, and counseling to farmers is needed to reduce the risk of STH infection.

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