

## Farmers' Personal Hygiene to Prevent Exposure to Soil-Transmitted Helminths (STH) Infection Agents

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**Abstract:** *STH (Soil-Transmitted Helminth) infection remains a complex problem in endemic areas today, especially in developing countries, where significant challenges to the population's lack of environmental sanitation and personal hygiene are present. This study aims to prevent work accidents and provide knowledge about occupational health and safety to farmers using complete PPE to avoid exposure to STH worm infections. Literature or reference searches conducted during the literature review use three web journal databases: Google Scholar, Ebsco, and Copernicus. Some words are searched using the keywords "Farmer" AND "Soil-Transmitted Helminth " AND "Infection" OR "Infectious" AND "Personal Hygiene ." The articles use ten journal articles spanning the last five years. Worm infection caused by Soil-Transmitted helminths is a public health problem in Indonesia. The risk of worm infection or STH can be prevented through improved personal hygiene and education to change the pattern of behavior of farmers who are not good, especially when in direct contact with the soil.*

**Keywords:** *Farmers, Personal hygiene, Infectious Agents, Soil-Transmitted Helminths*

### INTRODUCTION

The agricultural sector is still the mainstay of the Indonesian state, supporting the recovery of the people's economy because of the large amount of employment and foreign exchange generated (Kurniyawan et al., 2023). A farmer is someone who works in the fields, and a worker who grows vegetables and fruit. Farmers work in direct contact with dry or muddy soil. Farming activities are carried out from morning to evening. This situation makes farmers pay less attention to personal hygiene. They must pay more attention to personal hygiene and the cleanliness of their food. Farmers should pay more attention to the cleanliness of their nails and hands (Saftarina et al., 2020). Sometimes, their nails are long and black due to soil that gets into the long nails. Then, farmers rarely wash their hands when they want to eat. Most farmers do not wear complete PPE when applying fertilizer, so pesticides easily stick to their bodies and

clothes (Assagaff, 2023). Even though many farmers are exposed to infectious agents, which negatively impact health, farmers have not implemented adequate prevention strategies to manage this occupational risk (Kurniyawan et al., 2023).

Personal hygiene refers to an individual's ability to care for and maintain the health and cleanliness of their body through regular practices such as bathing, handwashing, oral care, and proper grooming (Idayani et al., 2021). It plays a crucial role in preventing the spread of infections, promoting overall well-being, and supporting social interaction and self-esteem (Stewart et al., 2022). Good personal hygiene is influenced by knowledge, cultural norms, access to clean water and sanitation, and individual habits developed from an early age (Yoo & Song, 2020). As a fundamental aspect of public health, understanding the factors that affect personal hygiene practices is essential for developing

effective health education programs and interventions (Mansour & Alfojery, 2025).

Poor personal hygiene among farmers significantly increases their vulnerability to infectious diseases, particularly due to frequent exposure to contaminated soil and unsanitary working conditions (Pinto et al., 2023). Infectious agents—microorganisms such as bacteria, viruses, fungi, and parasites—are the causative factors of infections, and their transmission is often facilitated by inadequate hygiene practices (Akinsulie et al., 2024). Farmers, especially those engaged in subsistence agriculture, are at heightened risk due to direct contact with soil, use of untreated wastewater, and limited access to clean water and sanitation facilities (Ali et al., 2023). One prominent example is soil-transmitted helminths (STHs), parasitic worms including *Ascaris lumbricoides*, *Trichuris trichiura*, and hookworms, which thrive in environments where human feces are used as fertilizer or where open defecation occurs (Wulan, 2023). These pathogens can penetrate the skin or be ingested, leading to chronic infections that impair nutritional status, reduce work capacity, and contribute to long-term health complications (Midha et al., 2023). Therefore, understanding the link between poor personal hygiene and the prevalence of infectious agents like STHs among farming communities is crucial for designing targeted health interventions and promoting sustainable agricultural practices, safeguarding health and livelihood (Rahmawati et al., 2020).

Soil-transmitted helminths (STH) are a group of parasitic intestinal worms, including *Ascaris lumbricoides*, *Trichuris trichiura*, and hookworm species (*Ancylostoma duodenale* and *Necator americanus*), whose life cycles depend on external development in the soil to become infective (Caldrer et al., 2022). These parasites are transmitted when eggs or larvae shed in human feces contaminate soil under warm and moist environmental conditions, where they mature into infectious forms (Khurana et al., 2021). Humans become infected through direct skin penetration—particularly by hookworm larvae when walking barefoot—or through oral ingestion of eggs from contaminated hands, food, or water (Weinstock & Leung, 2022).

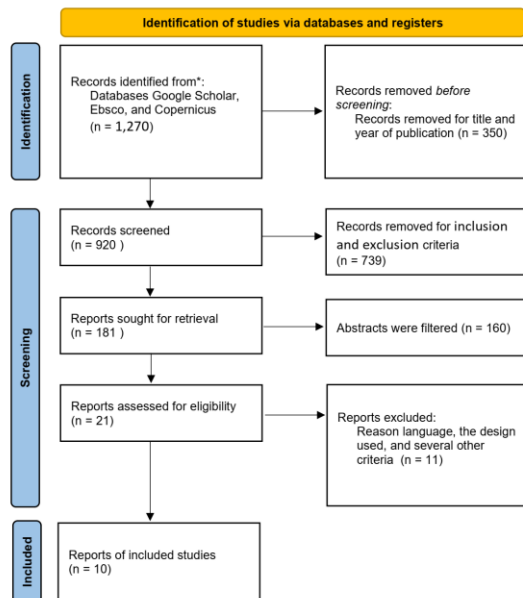
Agricultural workers and rural communities are especially at risk due to frequent soil contact, inadequate sanitation, and limited access to hygiene facilities (Aemiro et al., 2022). Once inside the human host, STHs can cause various health problems, including malnutrition, anemia, impaired physical and cognitive development, and reduced work productivity (Wilson et al., 2024). As one of the most prevalent neglected tropical diseases, STH infection remains a significant public health concern in low- and middle-income countries, underscoring the importance of integrated control strategies that include improved sanitation, health education, and regular deworming programs. (Afandi et al., 2023). In 2019, the WHO stated that around 1.5 billion people worldwide were infected with helminthiasis through soil routes, such as soil-transmitted helminths. Indonesia also has a high prevalence. For example, in the Jember district, 109 people were infected with soil-transmitted helminths, and one province in Indonesia had a prevalence rate of 76.7% in 2012 (Baidowi et al., 2019).

## METHODS

Literature or reference searches conducted during the literature review use three web journal database searches: Google Scholar, Ebsco, and Copernicus. Some words are searched using the keywords "Farmer" AND "Soil-Transmitted Helminth " AND "Infection" OR "Infectious" AND "Personal Hygiene." The articles used are 10 journal articles spanning the last five years. Literature search begins with identifying keywords determined based on the theme concept.

The identification stage has 1,270 journal articles that match the keywords used. Then, the next stage is to conduct screening by sorting back the title and year of publication according to the research criteria. The screening stage has 920 journal articles that match the criteria. After that, the screening of journal articles was adjusted to the research criteria regarding inclusion (agricultural sector) and exclusion (deviating from the topic), resulting in 181 appropriate journal articles. Abstracts were filtered to meet research criteria. Twenty-one journal articles have met the criteria. The journal article will then

be re-selected based on language, the design used, and several other criteria that have been predetermined. Finally, ten journal articles meet the research criteria and can be carried out in the analysis stage.



Picture 1. PRISMA 2020 flow diagram

## RESULTS AND DISCUSSION

Worm infection caused by Soil-Transmitted Helminths (STH) is a public health problem in Indonesia. Some of the impacts caused by worms include malnutrition, growth and development disorders, cognitive disorders in children, and reduced work productivity in adults

(Nasution *et al.*, 2022). Research stated that 81.82% of workers who used PPE properly were not infected with STH, while 100% of workers who used PPE poorly were infected (Baidowi *et al.*, 2019). Data analysis shows a significant relationship between using Personal Protective Equipment (PPE) and STH infection conditions among workers in Kaliputih plantations. According to a research study on 55 farmers in the Pinang Village, farmers with poor personal hygiene had a higher infection rate, namely 14 people (70%), compared to 6 people (30%) who were not infected (Saftarina *et al.*, 2020).

On the other hand, with good personal hygiene, only eight people (22%) were positively infected, and 27 people (77.1%) were predominantly uninfected. The analysis showed a significant relationship between personal hygiene and STH infection. This is in line with research conducted by Budi Apsari (2020) in Widodaren Plantation Workers in Jember Regency, which stated that the type of worm *A. lumbricoides* most infects workers, and is influenced by personal hygiene, namely the habit of washing hands, cutting nails, eating and defecating habits, and wearing PPE. Based on some of these studies, there is a correlation between the use of Personal Protective Equipment (PPE) and good personal hygiene to prevent farmer STH infection (Budi apsari *et al.*, 2020)

| ID Numb er | Author and Journal Identity                                                                                                                               | Journal Title                                                                                                                       | Objective                                                                                              | Population and Sample                                                                                                     | Method                                                                                 | Summary of Results                                                                                                                                                                                                |
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| A1         | <b>Author:</b><br>Zulaikha<br>Rizqina<br>Rahmawati,<br>Bagus<br>Hermasyah,<br>Erfan Efendi,<br>Yunita<br>Armiyanti,<br>Yudha<br>Nurdian<br><b>Journal</b> | The Relationship between Individual Hygiene and the Incidence of Soil-Borne Helminthiasis in Widodaren Plantation Workers in Jember | This Case Study aims to determine the relationship between individual hygiene and the incidence of STH | The population contained in this study was 208 Widodaren plantation workers, and the sample in this study was 68 workers. | The method used in this journal case study uses observational analysis research with a | In the study results, 46 were women, with only 22 male workers. Female workers are more affected by STH than male workers. The highest type of work with an incidence of STH infection is coffee pruning, with 14 |

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|    | <b>Identity:</b><br>Journal Of Agromedicine and Medical Sciences Vol. 6. No. 1. P: 7-13. 2020                                                                            | Regency                                                                                     | infection among Widodaren plantation workers in Jember Regency.                                                         |                                                                                                                                                            | <i>cross-sectional approach.</i><br>The research was conducted in Widodaren plantation, Jember Regency, and the Parasitology Laboratory from November to December 2018. | people. Study respondents have varying working hours and generally have a low level of education, namely only studying at the elementary school level, not pursuing further education at all, and only one person who graduated from high school. The type of worm A. lumbricoides infects workers the most and is influenced by individual hygiene, namely the habit of washing hands, cutting nails, eating habits, defecation, and wearing PPE. Thirty-eight people could wash their hands well, while the rest were in the less-than category. The habit of not cutting nails tends to be more infected with STH, affecting 19 workers; eating habits with fewer categories, as many as 24 people; 36 people with poor sanitation; and worm infections, as many as 20 people. |
| A2 | <b>Author:</b><br>Putu Indah Budi Aspari, NI Watan Winianti, Heny Arwati, Yoes Pritjatna Dachlan.<br><b>Journal Identity:</b><br>Journal of Environment and Development. | Description of Soil-Transmitted Helminth Infections in Farmers in Gelgel Village, Klungkung | Soil-transmitted Helminth infection is a worm transmitted through contact with warm and moist soil that often occurs in | The population and sample used in the journal were 250 active farmer populations in Gelgel village, with 162 subjects submitting questionnaires with stool | The method used in the research journal is a cross-sectional study conducted in Gelgel village, Klungkung Regency,                                                      | The results obtained from research in the journal were as many as 162 fecal samples or feces from farmers aged 25-80. Twenty-two farmers tested positive for STH infection, and 140 were negative for Soil-Transmitted Helminth (TSH). The results also                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

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|    | Vol. 4 No. 2.<br>Pp: 21-30.<br>Year 2020.<br><a href="https://ejournal.warmadewa.ac.id/index.php/wicaksana">https://ejournal.warmadewa.ac.id/index.php/wicaksana</a> .                         | Regency                                                                                                                                                                                     | farmers. This study aimed to determine the infection profile and intensity of Soil-Transmitted Helminths (STH) infection in farmers in Gelgel village, Klungkung, Bali.       | samples; the remaining 48 subjects did not submit stool samples or questionnaires that had been given.                               | Bali, obtaining questionnaires and feces from farmers with informed consent. The Kato-Katz technique is used to determine the diagnosis of Soil-Transmitted Helminths (STH) infection and the intensity of infection based on the number of eggs per gram of feces (EPG). | showed STH infection prevalence, namely 13.5% infected with single A., 1.85% infected with 1.85%, single % with lumbricoides, at 9.26%, and single % with hookworm at 0.61%. In addition, infections were also detected, namely 1.23% A. lumbricoides with T. trichiura and 0.61% A. lumbricoides with hookworms. |
| A3 | <b>Author:</b><br>Ali Napiah Nasution, Ermi Girsang, Efratiwi Marpaung, Cindy Stefanie Sinaga<br><br><b>Journal Identity:</b><br>Journal of Education and Counseling, Vol. 4 No. 5, Year 2002. | The Relationship between Soil-Transmitted Helminths (STH) Infection with Anemia and Nutritional Status of Farmers in Parhitean Village, Pintu Pohan Meranti District, Toba Samosir Regency. | The purpose of this study is for every community to know the relationship between Soil-Transmitted Helminths (STH) infection with anemia and nutritional status in farmers in | The population in this study was barefoot farmers when farming, with a sample of 28 people. Samples are taken using Cross Sectional. | This study used research conducted by descriptive analysis with an observational design to determine whether there is a relationship between STH and Anemia and Nutritional Status in barefoot                                                                            | Based on the study's results, the relationship between STH and Anemia and Nutritional Status was not found in farmers in Parhitean Village, Pintu Pohan Meranti District, Toba Samosir Regency.                                                                                                                   |

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|    |                                                                                                                                                                                                              |                                                                                                                                     | Parhitean Village, Pintu Pohan Meranti District, Toba Samosir Regency.                                                                                                                                                     |                                                                                                                                                                                   | farmers in Parhitean Village, Pintu Pohan Meranti District, Toba Samosir Regency in 2022.                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| A4 | <p><b>Author:</b><br/>Berliana Naomi Rumondang Sari Aritonang, Karolina Rosmiati, Daniati.</p> <p><b>Journal Identity:</b><br/>Journal of Medical Laboratory Science and Technology. Vol. 8 No.2 of 2022</p> | Analysis of Soil Transmitted Worm (STH) Eggs in Vegetable Farmers in Kubang Raya, Pekanbaru City.                                   | This study aims 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 farmers.                                                                                                                                     | This type of research is descriptive research, with survey and observation methods using the Quota Sampling design.                                                                                               | Based on the study's results, six fecal samples from sayu farmers in Kubang Raya, Pekanbaru, were found to contain STH worms.                                                                                                                                                                                                                                                                                                       |
| A5 | <p><b>Author:</b><br/>Ni Kadek Ayu Parweni, I Wayan Getas, Siti Zaetun.</p> <p><b>Journal Identity:</b><br/>Journal of Medical Analysis Bio Science. Vol. 5, No. 2. Year 2018</p>                            | Soil- Transmitted Helminths Infection in Green Mustard Vegetable Farmers in Bug-Bug Village, Lingsar District, West Lombok Regency. | This study aimed to determine the picture of intestinal nematode worm infection transmitted through soil (Soil- Transmitted Helminth) in green mustard vegetable farmers in Bug-Bug Village, Lingsar District, West Lombok | The population of this study is 28 samples of mustard greens farmers taken using purposive sampling techniques and then examined using direct methods with 2% Eosin dye solution. | This study describes 28 samples of mustard green vegetable farmers taken by purposive sampling technique and found two green mustard vegetable farmers positively infected with worms of the Trichuris Trichiura. | Based on the results of the study, A picture of intestinal nematode worm infection transmitted through soil (Soil- Transmitted Helminth) was obtained from hijay mustard farmers in Bug-Bug Village, Lingsar District, West Lombok Regency, with a sample of 28 respondents. It was concluded that the results of a fecal examination of green mustard vegetable farmers in Bug-Bug Village, Lingsar District, West Lombok Regency, |

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|    |                                                                                                                                                                                                                                                                                                       |                                                                                                                                             | Regency.                                                                                                                                                                         |                                                                                                                                                                    |                                                                                                                                                                                                                                                                      | were Trichuris Trichiura worm eggs. Positive mustard greens were infected with Trichuris Trichiura worms as much as 7.14%.                                                                                                                                                                                                                                                                                                                             |
| A6 | <p><b>Author:</b><br/>Sri Idayani,<br/>Ni Luh Nova<br/>Dilisca Dwi<br/>Putri, M.<br/>Fairuz Abadi</p> <p><b>Journal Identity:</b><br/>Bali Medika<br/>Journal.<br/>Vol 8 No 3,<br/>2021: 233-<br/>238, DOI:<br/><a href="https://doi.org/10.36376/bmj.v8i3">https://doi.org/10.36376/bmj.v8i3</a></p> | The Relationship Between Personal Hygiene and Soil-Transmitted Helminth Egg Infections in Vegetable Farmers in Gianyar Regency              | The purpose of this study was to determine the relationship between personal hygiene and intestinal worm egg infection (Soil Transmitted Helminth to farmers in Gianyar Regency. | The population in this study included all farmers in Gianyar Regency, and the sample used was feces of at least 100 grams or thumb-sized for STH examination       | This study used a correlative descriptive method with a cross-sectional study approach. Determining respondent uses purposive sampling techniques that meet the inclusion criteria. The data types used are primary data and data analysis using bivariate analysis. | The results of the study stated that the results of a fecal examination of vegetable farmers in Gianyar Regency. A total of 30 people indicated that vegetable farmers were infected with worm eggs. Soil-Transmitted Helminths (STH) amounted to 6 people (20%), and those who did not. Infected amounted to 24 people (80%). Types of worm eggs: Soil-Transmitted Helminths (STH) The infecting species is the hookworm, <i>Necator americanus</i> . |
| A7 | <p><b>Author:</b><br/>Farha<br/>Assagaff</p> <p><b>Journal Identity:</b><br/>GLOBAL HEALTH SCIENCE,<br/>Volume 8<br/>Number 1,<br/>March 2023,<br/>DOI:<br/><a href="http://dx.doi.org/10.33846/ghs8103">http://dx.doi.org/10.33846/ghs8103</a></p>                                                   | Identification of Soil-Infested Worm (STH) Eggs in Farmers' Nail Droppings in Kodok Talaga Hamlet, Leihitu District, Central Maluku Regency | The purpose of this study is to find out. The presence and type of STH eggs found in the nail droppings of farmers in Talaga Kodok Hamlet                                        | The population of this study was seven farmers in Talaga Kodok Hamlet, Leihitu District, Maluku Regency. The middle and samples used were nail dirt taken from the | This study used descriptive and descriptive survey methods.                                                                                                                                                                                                          | The results of the study stated that based on the results of data analysis, all samples from 7 farmers whose nail feces were taken, there were STH worm eggs with the most types: Hookworm ( <i>Ancylostoma duodenale</i> ).                                                                                                                                                                                                                           |

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|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                                                                                                                                                                        |                                                                                                                                             | Leihitu District, Central Maluku Regency.                                                                                                                                                                                                                                                 | entirety of the total population.                                                                                                                                 |                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| A8 | <p><b>Author:</b><br/>Berliana Naomi Rumondang Sari Aritonang</p> <p><b>Journal Identity:</b><br/>JOURNAL OF MEDICAL LABORATORY SCIENCE AND TECHNOLOGY – VOL. 4 NO. 2 (2019) 39-43</p> | The Relationship between Personal Hygiene and Worm Diseases (SOIL-TRANSMITTED HELMINTHS) among Kartama Vegetable Farmers in Pekanbaru City. | This research aims to Looking at Personal Hygiene Relationships (wearing personal protective equipment, habits hand washing with antiseptic soap and clean water) with helminth parasitic diseases (Soil-Transmitted Helminth) in vegetable farmers Kartama plantation of Pekanbaru City. | The population used in this study is vegetable farmers who do not use gloves or footwear when gardening. Moreover, the samples used are farmers' nails and feces. | The method used in this study is an analytical survey with Cross-sectional approach. Technique Sampling in this study is Exhaustive Sampling. | The result of this study is that as many as 30 The majority of respondents did not experience helminthic diseases. In the nail hygiene study, there were 23 Respondents (76.67%) had their nail hygiene good, and seven respondents (23.3%) cleanliness The nails are lacking. The results of the study show that obtained from hand washing habits, as many as 20 respondents (66.67%) who wash their hands well with water soap, 10(33.33%) respondents who lacked washing hands poorly with soap Both have no risk of infection worm. |
| A9 | <p><b>Author:</b><br/>Ivan Iqbal Baidowi, Yunita Armiyanti, Zahrah Febianti, Bagus Hermansyah, Yudha</p>                                                                               | The Relationship Between the Use of Personal Protective Equipment and the Status of Soil-Borne Worm                                         | This study aimed to analyze the relationship between using personal protective equipment                                                                                                                                                                                                  | The population in this journal is all garden workers who work in Kaliputih plantations, Sumber Bulus Village,                                                     | In this journal, the method carried out is by sampling technique or <i>purposive</i>                                                          | The results of this study showed that male workers had a more significant infection rate compared to women, namely 19.44%, and most at the age of 41-59 years, as much as 11.11%. Most of                                                                                                                                                                                                                                                                                                                                                |

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|     | <p>Nurdian<br/><b>Journal Identity:</b><br/>Journal of Agromedicine and Medical Sciences, Volume 5, No. 2, Pages 61-68, Year 2019</p>                                                                                      | <p>Infections in Plantation Workers at the Kaliputih Plantation, Jember Regency</p> | <p>(PPE) and the infection status of <i>Soil-Transmitted Helminths</i> in hoarding workers in Kaliputih Plantation, Jember Regency.</p> | <p>Ledokombo District, Jember Regency, which amounts to 63 people. However, only 36 people were willing to be respondents.</p>        | <p><i>sampling</i>, and observations were made at the parasitology laboratory, Faculty of Medicine, University of Jember, in December 2018. Data was obtained using questionnaires and examination of fecal samples of respondents in the laboratory. The analysis technique used is <i>Chi-Square</i> or <i>Fisher's Exact Test</i>.</p> | <p>those infected are workers with elementary education, as much as 22.22%, and have worked for 21-30 years, with a percentage of 57.14%. <i>A. lumbricoides</i> species infects workers more than any other species, about 16.67%. Some workers who use PPE well are not easily infected, as many as 81.82%. In comparison, 100% of workers who do not use PPE properly are infected with STH, so there is a significant relationship between PPE use and STH infection status in workers.</p> |
| A10 | <p><b>Author:</b><br/>Fitria Saftarina, Maryatun Hasan, Jhons Fatriyadi Suwandi, Anisya Yulida Syani<br/><b>Journal Identity:</b><br/>Kuala Journal of Shia Medicine, Volume 20 No. 3, Pages 167 - 171, December 2020.</p> | <p>Incidence of soil-transmitted worm infections in farmers.</p>                    | <p>This study aims to determine the incidence of STH infection and the factors that affect the infection.</p>                           | <p>The population in the study was 63 farmers, and the sample selected by <i>the purposive sampling</i> technique was 55 farmers.</p> | <p>The method used in this study was <i>cross-sectional</i>, with independent variables of <i>personal hygiene</i>, use of PPE, and variables bound to STH infection collected</p>                                                                                                                                                        | <p>In the results of the study, it was found that most respondents were aged 35-44 years, and most of their personal hygiene was good, namely 35 people with a percentage of 63.6%, but 38 people did not use PPE completely. Then, 22 farmers were infected with STH with hookworm types. From these results, it was found that farmers with poor personal hygiene were more</p>                                                                                                               |

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|  |  |  |  |  | simultaneously; the study was carried out from October 2018 to January 2019. | infected with STH, as many as 14 people, with a percentage of 70% compared to those with good <i>personal hygiene</i> . |
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Occupational health risks are the possibility of danger or threats occurring in the work environment, which can negatively impact workers' health and welfare (Kurniawan *et al.*, 2023). Research conducted on several groups of farmers, especially workers in plantations, has a very significant relationship related to personal hygiene; one journal found that the incidence rate is  $p < 0.05$ , with the percentage of STH *A. lumbricoides* infection at 60% and *hookworm* 40%. Direct contact of farmers with the soil also has a significant influence because moist soil is a good place for the growth of STH worm eggs, with temperatures ranging from 25 °C to 30 °C (Aritonang *et al.*, 2022). One of the journals discussed sample preparation by examining feces in plantation workers. Some sample testing methods, such as sedimentation, can identify the presence of mild infections and severe infections (Parweni *et al.*, 2018).

In the results of the table of one of the journals, nematode worm infections transmitted through soil were found in several infected farmers, amounting to 7.14% of mustard greens vegetable farmers. STH spreads due to soil contamination with feces, such as using feces as organic fertilizer, and can be a significant source of infection. In addition, the cause of infection is farmers working by planting, fertilizing, and harvesting, only wearing gloves made of rarely used cloth. So it is more likely to be infected with worms (Saftarina *et al.*, 2020).

Plantation workers who come into contact with soil most often can also cause STH infection; this was proven in one journal study with statistical tests that showed a significant relationship between frequent

contact with soil and STH infection status in plantation workers (Parweni *et al.*, 2018). Those workers were 8,313 times more likely to develop STH infection than workers who did not have frequent contact with soil. Previous research by Nurfalaq *et al.* in 2015 stated that the infection could occur because, after doing activities, many workers did not wash their hands and feet or vegetables or fruits to be consumed.

In several research results from journals that have been analyzed, it can be seen that STH infection is still a problem for residents in rural areas, especially residents who work as farmers. The main problem is the incomplete use of personal protective equipment (PPE), which infects farmers. In addition, it was found that some farmers have applied personal hygiene, but some things are still lacking or inappropriate. Some farmers must learn to use soap to clean their hands and feet. The habit of maintaining nail hygiene, especially cutting nails, is still something farmers ignore (Assagaff, 2023).

Dirty hands after work and other daily activities can be a medium for transferring microorganisms to the digestive tract, mainly when hands are used to eat and drink and are not washed using soap, so that worms that have been contaminated with hands can be the cause of infection in the digestive tract. The use of footwear also affects the risk of hookworm infection. STH infection can be transmitted through skin penetration, especially on the feet. Farmers not using footwear will easily contract STH, especially excretion, due to filariform larvae that can penetrate human skin (Aritonang, 2019).

According to Sumanto (2010), someone with the habit of not wearing footwear when in direct contact with the soil is at risk of contracting worm eggs as much as 3.29 times greater than people who wear footwear, the habit of someone who has contact with soil for a long time can also be at risk of infection 5.2 times greater than just a short contact with soil in a day.

## CONCLUSIONS

STH (Soil-Transmitted Helminth) infection is caused by dirt on the nails of farmers who have the potential to contain worm eggs due to direct and prolonged contact with soil and fertilizer made from feces. The risk of worm infection or STH can be prevented through improved personal hygiene and education provided to farmers to change the behavior patterns of farmers who are not good, especially when in direct contact with the soil. Farmers are expected to wash their hands and feet after work or before eating and drinking, using soap and running water, cut their nails so they do not become a medium for worm eggs, and use complete personal protective equipment (PPE) when working.

## CONFLICT OF INTEREST STATEMENT

None

## ACKNOWLEDGEMENTS

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