

Review

PENCEGAHAN INFEKSI CACING SOIL TRANSMITED HELMINTHS (STH) PADA PETANI: Literatur Review***Prevention of Soil-Transmitted Helminths (STH) Worm Infections in Farmers: Literatur Review*****Enggal Hadi Kurniyawan^{1*}, Nor Muslikah¹, Mohammad Adib Masruri¹, Azkiatulfikroh¹, Alfid Tri Afandi¹, Dicky Endrian Kurniawan¹, Kholid Rosyidi Muhammad Nur¹**¹ Prodi Keperawatan, Universitas Jember, Indonesia¹ Faculty of Nursing, Universitas Jember, Indonesia.**ABSTRACT****Corresponding author:****Enggal Hadi Kurniyawan**
enggalhadi.psik@unej.ac.id**Keywords:** Worm,
infection, farmers,
prevention**Background:** Worm infection is a severe health problem in many countries, especially in areas with poor sanitation. The factors that cause worm infections can vary, such as environmental factors and human behavior.**Purpose:** This study aims to collect and analyze relevant literature on preventing soil-transmitted helminths (STH) worm infections in farmers.**Method:** Literature search sources include Google Scholar, SpringerLink, PubMed, and ScienceDirect, published between 2019-2023, and discuss infection exposure agents, organic substances, and personal hygiene. This study involves a farmer's population and uses Indonesian and English articles.**Result:** The literature review results indicate the importance of personal hygiene, good sanitation, and access to clean water in preventing Soil-Transmitted Helminth (STH) infections among farmers. Awareness of personal hygiene practices and personal protective equipment (PPE) needs to be improved to reduce the risk of infection. Sanitation, water source improvement, and specific education are required to ensure farmers' health in rural, urban, and peri-urban areas. The role of nurses in preventing worm infections among farmers in rural areas includes education on sanitation, hygiene practices, and the use of protective equipment. Nurses must also conduct regular health monitoring, collaborate with other healthcare teams, and improve communication with local health institutions. They should stay updated with research developments and implement the findings in care and education for farmers and the community.

Kata Kunci: Cacing, infeksi, petani, pencegahan

ABSTRAK

Latar Belakang: Infeksi cacing adalah masalah kesehatan yang parah di banyak negara, terutama di daerah dengan sanitasi yang buruk. Faktor-faktor yang menyebabkan infeksi cacing dapat bervariasi, seperti faktor lingkungan dan perilaku manusia.

Tujuan: Penelitian ini bertujuan untuk mengumpulkan dan menganalisis literatur yang relevan tentang pencegahan infeksi cacing yang ditularkan melalui tanah (STH) pada petani.

Metode: Sumber pencarian literatur termasuk Google Scholar, SpringerLink, PubMed, dan ScienceDirect, diterbitkan antara 2019-2023, dan membahas agen paparan infeksi, zat organik, dan kebersihan pribadi. Penelitian ini melibatkan populasi petani dan menggunakan artikel bahasa Indonesia dan Inggris.

Hasil: Hasil kajian pustaka menunjukkan pentingnya kebersihan diri, sanitasi yang baik, dan akses air bersih dalam mencegah infeksi Soil-Transmitted Helminth (STH) di kalangan petani. Kesadaran akan praktik kebersihan diri dan alat pelindung diri (APD) perlu ditingkatkan untuk mengurangi risiko infeksi. Sanitasi, perbaikan sumber air, dan pendidikan khusus diperlukan untuk memastikan kesehatan petani di daerah pedesaan, perkotaan, dan pinggiran kota. Peran perawat dalam mencegah infeksi cacing di kalangan petani di daerah pedesaan termasuk pendidikan tentang sanitasi, praktik kebersihan, dan penggunaan peralatan pelindung. Perawat juga harus melakukan pemantauan kesehatan rutin, berkolaborasi dengan tim kesehatan lainnya, dan meningkatkan komunikasi dengan institusi kesehatan setempat. Mereka harus tetap diperbarui dengan perkembangan penelitian dan menerapkan temuan dalam perawatan dan pendidikan bagi petani dan masyarakat

BACKGROUND

Soil-transmitted helminths (STH) are a class of nematode parasites that cause infection through direct contact with parasite eggs that develop in the soil. Soil-transmitted Helminths (STH) infection often occurs in endemic areas with low environmental sanitation and poor personal hygiene (Mebiana et al., 2021). This STH infection can disrupt the tissue and organs of the sufferer's body by taking nutrients from the body (Kurniawan et al., 2023). Farmers are at significant risk of soil-transmitted Helminth (STH) infection because farmer workers always have direct contact with soil contaminated with STH egg cells (Saftarina et al., 2020). The cause of STH infection is poor personal hygiene in farmers, such as not wearing footwear when doing activities outside the home and not wearing PPE in the form of closed footwear when working (Saftarina et al., 2020).

Worldwide, an estimated 1.5 billion people are infected with Soil-transmitted Helminths, or about 24% of the world's population. The most prevalent infections are from sub-Saharan Africa, China, South America, and Asia. (WHO, 2023). About 807 million people are infected with ascaris worms, 604 million whipworms, and 576 million hookworms (CDC, 2022).

The main species of soil-transmitted helminths that infect humans are roundworms (*Ascaris lumbricoides*), whipworms (*Trichuris trichiura*), and hookworms (*Necator americanus* and *Ancylostoma duodenale*). These species are grouped based on similar diagnostic procedures and similar drug responses. *Strongyloides stercoralis* is an intestinal worm with a distinctive characteristic namely the parasite requires a different diagnostic method from other soil-borne worms, and for this reason, it is often not identified (WHO, 2023). People with mild STH infection usually have no

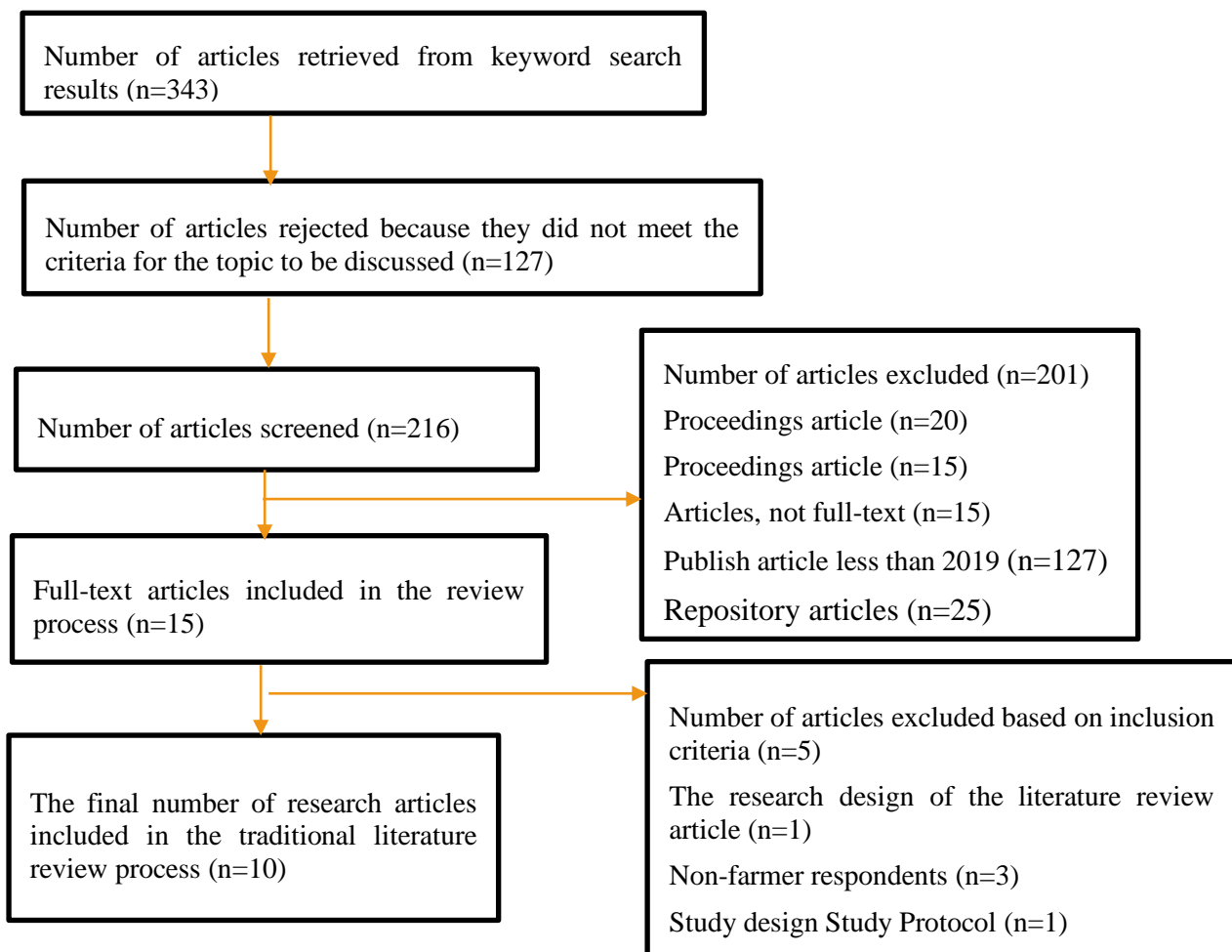
symptoms. However, if it is heavily infected, it can cause various health problems such as abdominal pain, diarrhea, blood and protein loss, and physical and cognitive growth retardation (CDC, 2022).

Several factors that cause worm disease in Indonesia are closely related to the climate and personal hygiene of individuals, homes, and the surrounding environment, as well as high population density. The occurrence of worm disease is often related to the sufferer's environmental conditions, the sufferer's socio-economic conditions, and the sufferer's educational level. Worm disease is also related to hookworms in the yard's soil, poor sanitation, the habit of playing for a long time on the ground, and the habit of defecating in the garden. Poor people in tropical areas walk barefoot, children crawl or sit naked on the ground, and pets often suffer from hookworm infections, so the prevalence of hookworms associated with cutaneous migrans larvae is high (Wijaya, 2021).

METHOD

This article used literature search sources, including Google Scholar, SpringerLink, PubMed, and ScienceDirect, published between 2019-2023, and discusses infection exposure agents, organic substances, and the relationship between personal hygiene and intestinal worm infection. The inclusion criteria for this article include articles in Indonesian and, or English, the population taken is agricultural workers, and the research design taken is qualitative and quantitative. Published articles are articles from 2019-2023. The selected articles discuss exposure to infectious agents and organic substances, infection of intestinal helminth eggs (soil-transmitted helminths), and an explanation of the relationship between personal hygiene and the incidence of intestinal helminth egg infections (soil-transmitted helminths). Exclusion criteria are studies that do not follow the specified topic, articles from proceedings or conferences that are incomplete articles, and articles that contain abstracts only. Article literacy search used Google Scholar, SpringerLink, PubMed, and ScienceDirect. The keywords are "infection," "soil-transmitted helminths," "farmer," AND "risk factors."

Chart 1. Literature Search Process



RESULT

Farmers have heavy and prolonged work demands, so they are at risk of occupational injuries and illnesses such as pesticide poisoning, infectious diseases, cardiovascular diseases, and mental stress disorders (Kurniyawan et al., 2023). Farmers in rural areas have jobs that are always in contact with the soil. Soil is a medium for the growth of intestinal worm eggs into infective forms (mature eggs and larvae), so exposure or contact with soil will increase the risk of STH infection). Like the research conducted by Armiyanti et al. (2023), the examination of fecal samples showed that the incidence of STH infection in farmers in Jenggawah District was 7.1%. In the study, farmers worked in rice fields without using personal protective equipment (PPE) like gloves, shoes, or boots. All farmers infected with STH in the study had poor personal hygiene. Statistical test results proved a significant relationship between personal hygiene and the incidence of STH (P value <0.05) in the area.

Aritonang (2019) states that personal hygiene is essential to avoid worm infections. Nails should always be cut short to avoid transmission of helminthiasis from hand to mouth. If we leave our nails long, we should always maintain cleanliness by wearing gloves when doing work that is in direct contact with soil that may be contaminated with worm eggs. Vegetable farmers are workers at risk of helminthiasis infection because they often come into direct contact with the soil. Therefore, it is essential for farmers always to maintain cleanliness and cut their nails to avoid worm infections.

The research by Apsari et al. (2020) stated that there was a role of households in one yard on the transmission of STH infection in their research. Transmission between family members is related to environmental similarities, lack of clean and healthy living behavior, food eaten together, and the habit of not using gloves, footwear, and protective clothing when working in rice fields. People living in the same yard can be infected by each other, for example, children with mothers, fathers with mothers or brothers-in-law, grandparents and grandmothers.

Table 1. Result of Literature Review

Author/ Year	Article Title/Journal Name/Volume	Sample	Method	Result
Idayani, et al. / 2021	Relationship between Personal Hygiene and Soil-Transmitted Helminths Infection among Vegetable Farmers in Gianyar Regency / Bali Medika Journal / Vol.8 (3): 233-238	All vegetable farmers in Gianyar Regency who work in the fields.	Correlative descriptive research with a cross-sectional study approach.	The personal hygiene condition of vegetable farmers in Gianyar Regency is poor (83.3%). The species of Soil-Transmitted Helminths (STH) that infected vegetable farmers in Gianyar Regency were <i>Necator americanus</i> eggs (hookworm), as many as 6 (20%). There is no relationship between personal hygiene and the incidence of Soil-Transmitted Helminths (STH) infection in vegetable farmers in Gianyar Regency with a -p> 0.05 value.
Paller et al./2019	Soil-Transmitted Helminth (STH) Eggs Contaminating Soils in Selected Organic and Conventional Farms in the	A total of 600 soil samples from selected organic (n = 10) and conventional (n	Cross-sectional study approach.	This analysis shows that hookworm is the dominant STH in Comé, with a persistent reservoir in adults. WASH should be improved as this study found that improved sanitation and access to better water sources were associated with lower

	Philippines/Parasite Epidemiology and Control/Vol.7: e00119	= 10) farms in Northern and Southern Luzon, Philippines, were collected and examined for the presence of soil-transmitted helminth (STH) eggs.		prevalence and intensity of hookworm infection. Program efforts should pay special attention to farmers and impoverished populations in urban, rural, and peri-urban settings.
Saftarina, et al/2020	Incidence of Soil-transmitted Helminth Infection among Farmers / Journal of Syiah Kuala Medicine / Vol. 20, N. 3	The population in this study was 63 farmers, and sampling was selected using a purposive sampling technique of as many as 55 farmers.	This study uses qualitative research with a cross-sectional design.	The activities of farmers who are directly in contact with the soil will have a great risk of STH infection in farmers. Farmers in Pinang Jaya Village still have low awareness of personal hygiene and the importance of wearing personal protective equipment. So, there is a relationship between the use of PPE and personal hygiene. The number of farmers affected by soil-transmitted helminth infection, the lower the awareness of farmers about personal hygiene and the use of PPE, one of which farmers must wash their hands, use gloves when working, routinely cut their nails once a week because nail hygiene significantly affects the cause of the movement of microorganisms into the digestive tract.
Berliana Naomi Rumondang Sari Aritonang/2019	Relationship between Personal Hygiene and Soil-Transmitted Helminth Disease among Vegetable Farmers in Kartama City Pekanbaru / Journal of Medical Laboratory Science and Technology / Vol. 4 No. 2 (39-43)	30 respondents were vegetable farming workers in Kartama Pekanbaru city	Qualitative research using a cross-sectional approach.	The results showed that most karna vegetable farmers did not experience worms. This is due to the farming community's awareness of good personal hygiene. One of them is that farmers are aware that washing hands with running water and keeping nails clean is essential to reduce the risk of transmission of this worm infection. However, this study explained that the use of PPE is still lacking. Farmers should be able to use personal protective equipment such as boots, gloves, long sleeves, masks, and headgear because using this ADP can reduce the risk of transmission of soil-borne helminth infections, especially in farm workers.
Nasution, et al/2022	Relationship of Soil-Transmitted Helminths (STH) Infection with Anemia and Nutritional Status among Farmers in Parhitean Village,	The sample in this study consisted of 28 farmers in Parhitean Village, Pintu Pohan Meranti District, Toba	The method used by researchers is Cross-sectional.	The results showed that the prevalence of farmers who did not suffer from Anemia in Parhitean village, Pintu Pohan Meranti sub-district, Tobasa district, was still high due to an adequate diet. So, the test results can describe the relationship between STH and Anemia and Nutritional Status

	Pintu Pohan Meranti Subdistrict, Toba Samosir Regency / Journal of Education and Counseling / Vol. 4 N. 5	Samosir Regency.		that does not exist in farmers.
Apsari et al./2020	Overview of Soil-Transmitted Helminth Infection among Farmers in Gelgel Village, Klungkung Regency / WICAKSANA, Journal of Environment & Development / Vol. 4 No. 2: Pp. 21-30	From December 2017 to January 2018, 250 active farmer populations in Gelgel village were selected as the sample, i.e., 162 subjects submitted complete questionnaires with fecal samples.	The method used in this research is a cross-sectional study.	The prevalence of infection among farmers in Gelgel Village is 13.5%, which is in the low category but still a health problem that requires handling. Clean and healthy living behavior among farmers is still lacking, so special education is needed for these farmers.
Armiyanti, et al./2023	Contamination of Water Sources by Intestinal Worms and Sanitation Hygiene as Factors of Helminthiasis Infection in Farmers/Journal of Indonesian Environmental Health/22 (1), 60 - 68	The population involved in this study was 56 farmers	The research method used was cross-sectional.	The results of the fecal sample study showed that the incidence of STH infection among farmers in the Jenggawah sub-district was 7.1%. Contamination of water sources, including well water and river water, by STH eggs and larvae was 22.2% in well water, and 100% of river water contained STH larvae and eggs. The contamination of STH eggs and larvae in well water may be due to the poor condition of wells and the proximity of wells to household waste disposal, especially in septic tanks. Less deep well construction (<3 meters) makes it easier for pathogens or parasites to enter and live in the water. As many as 35.7% of respondents still do bathing, washing, and toilet activities in the river, which causes river water to contain worm eggs or larvae.
Rosdarni et al./2022	Identification of Soil-Transmitted Helminths in Rice Paddy Farmers Using the Flotation Centrifugation Method in Jati Bali Village, Ranomeeto Barat Subdistrict, South Konawe Regency / Scientific Journal of Mandala Waluya Health / Vol. 2 (1), pp. 1-6	The population of rice farmers in this study is as many as 30.	The type of research used is descriptive with a Purposive sampling technique.	From the stool examination results, 20 samples were positive for intestinal nematodes, namely 11 (37%) samples contained <i>Ascaris lumbricoides</i> , three samples (10%) contained <i>Trichuris trichiura</i> , and six samples (20%) contained hookworm.

Kiki Fatmasari, et al./2020	Identifying Intestinal Nematode Worm Eggs Using the Sedimentation Method in Nail Samples of Rice Field Farmers in Tanete Village, Bulukumpa District, Bulukumpa Regency/Journal of TLM Blood Smear/Vol. 1(1): 18-23.	The sample used is representative of rice field farmers, with as many as 21 people who meet the criteria.	Laboratory observation research using sedimentation method with purposive sampling technique.	There were intestinal nematode eggs, namely one positive sample, 4%, with the type of <i>Ascaris lumbricoides</i> worm eggs, and 21 negative samples, or 96%. No intestinal nematode eggs were found in the nail samples of rice field farmers in Tanete Village, Bulukumpa District, Bulukumpa Regency.
Mebiana et al./2021	Detection of Soil Transmitted Helminth (STH) Eggs in Farmers' Nails / MEDITOTY/Vol. 9(2): 76-85.	The respondents were 17 farmers.	This study is an analytical observational type with a cross-sectional design and a random sampling technique.	This study found two types of eggs: <i>Ascaris lumbricoides</i> and Minute Intestinal Fluke. The prevalence of <i>A. Lumbricoides</i> eggs in fingernails eight respondents (47.05%) and in toenails were 14 respondents (82.35%), while the prevalence of MIF eggs in fingernails was two respondents (11.76%) and in toenails was one respondent (5.88%). The personal hygiene of farmers in Kaligondang Subdistrict, Purbalingga Regency, included poor as many as ten respondents (58.8%), moderate as many as six respondents (35.3%), and good as many as one respondent (5.9%). There was no relationship between personal hygiene and the presence of STH eggs on farmers' nails ($p>0.05$).

DISCUSSION

In Use of PPE

Based on the Regulation of the Minister of Manpower and Transmigration Number PER.08/MEN/VII/2010 concerning Personal Protective Equipment, PPE or personal protective equipment is a tool that functions to isolate part or all of the body to protect a person from potential hazards in the workplace. By farmers using PPE, worm infections can be reduced. Farmers should use personal protective equipment such as gloves, headgear/hats, masks, boots, and long shirts and pants. Incomplete use of PPE can make it easier for worm eggs to enter the pores of the skin, hands, and mouth (Aritonang, 2019).

Based on research conducted (Saftarina et al., 2020), 52.6% of farmers who did not wear PPE completely were infected with STH, and of farmers who wore PPE completely, only 11.8% were infected. This research is in line with research conducted by (Baidowi et al., 2019) in the Kaliputih Plantation, Sumber Bulus Village, Ledokombo sub-district, Jember district, that as many as 91.67% of workers use PPE well, and 8.33% use PPE poorly. This study showed a significant relationship between the use of PPE and the incidence of STH infection. Workers who do not wear footwear are 13 times more at risk of STH infection than workers who wear footwear. By using footwear, the transmission of STH infections, especially hookworm and *strongyloides stercoralis*, which can penetrate the skin of human feet in larval form, can be interrupted.

Using long sleeves and long pants is also significantly associated with STH infection status. Workers who rarely wear long clothes are 11.5 times more at risk of STH infection than those who wear long clothes. Long clothing will protect against the penetration of worms directly into the skin when in direct contact with the soil (Baidowi et al., 2019). Farmers are advised to increase awareness about using personal protective equipment when working to avoid exposure to dangerous agents (Kurniyawan et al., 2023).

Personal Hygiene

According to the 2004 R1 health department, Personal Hygiene is maintaining and protecting personal hygiene to maintain health. Meanwhile, according to Andarmoyo (2012), Personal Hygiene is maintaining individual hygiene and health to achieve physical and psychological well-being. Farmers are occupations that have a high risk of worm infection due to direct contact with the soil. Work in direct contact with the soil can affect the frequency of worm infections (Rosdarni, 2022). Based on research conducted (Saftarina et al., 2020), the underlying factor for STH infection in Pinang Jaya Village, Lampung, is the lack of personal hygiene habits, such as wearing footwear when doing activities outside the home, with 70% of farmers infected with STH due to lack of personal hygiene and 30% not infected. According to research (Idayani et al., 2021), Soil-Transmitted Helminths (STH) infection in vegetable farmers in Gianyar Regency has no relationship with personal hygiene habits. This study's results align with research (Aritonang, 2019) in Kartama Pekanbaru, where there is no relationship between personal hygiene, such as hand washing and nail hygiene, Soil Transmitted Helminths (STH) worm infections.

The results of another study showed no relationship between personal hygiene and the presence of STH eggs in farmers' nails (Mebiana et al., 2021). This study is in line with the results of research (Fatmasari et al., 2020) that as many as 96% of the samples proved negative or there were no helminth eggs on the nails of farmers in the Tanete Village area, Bulukumpa District, Bulukumpa Regency.

Although there is no significant relationship between hand washing and worm infection, maintaining personal hygiene is still carried out to prevent infection with other diseases. Personal hygiene is vital in minimizing microorganisms that enter the body to prevent a person from being infected with the disease (Suraini et al., 2018). Good personal hygiene habits can prevent and control disease and various hygiene-related health problems (CDC, 2022). According to the Centers for Disease Control and Prevention, essential times for germs to spread and cause disease are after going to the toilet, touching garbage or soil, and touching animals, animal feed, or animal feces.

Environmental Sanitation

The environment is an inseparable part of human life activities. Based on Law Number 32 of 2009 concerning Environmental Protection and Management, "An environment is a unit of space with all objects, forces, conditions, and living things, including humans and their behavior, which affects nature itself, the continuity of life, and the welfare of humans and other living things." Environmental sanitation is a condition of control over human physical environmental factors to maintain and protect environmental cleanliness so as not to affect health adversely (Slamet, 2002). Several studies have shown contamination of worm eggs or larvae in water and soil sources.

Research conducted (Armiyanti, 2023) in the Jenggawah sub-district, Jember district, showed that 7.1% of feces samples were infected with STH. The water sources used by the community, including well water and river water, have been contaminated with STH by 25%. Well, water contamination by STH eggs and larvae is caused by good conditions that do not meet health requirements, such as water sources that are too close to septic tanks. This aligns with research by Ali

(2016) on vegetable farmers in the Maharatu village of Pekanbaru city, where all respondents who had unclean water sources were positively infected with worms. According to research (Ali, 2016), drinking healthy water must have health requirements. 1) Water that is colorless, odorless, and has no taste. 2) Water that is free from all bacteria, especially pathogenic bacteria. 3) Water that contains certain substances in certain amounts as well.

CONCLUSION

Personal Hygiene is maintaining individual Hygiene and health to achieve physical and psychological well-being. Farmers are occupations that have a high risk of worm infection due to direct contact with the soil. Work directly related to the soil can affect the frequency of worm infections. Farmers should use personal protective equipment such as gloves, headgear/hats, masks, boots, and long shirts and pants. Incomplete use of PPE can make it easier for worm eggs to enter the pores of the skin, hands, and mouth. Personal hygiene is important in minimizing microorganisms entering the body to prevent someone from being infected. The important times for germs to spread and cause disease are after going to the toilet, touching garbage or soil, and touching animals, animal feed, or animal feces. Contamination of well water by STH eggs and larvae is caused by good conditions that are not under health requirements, such as water sources that are too close to septic tanks.

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