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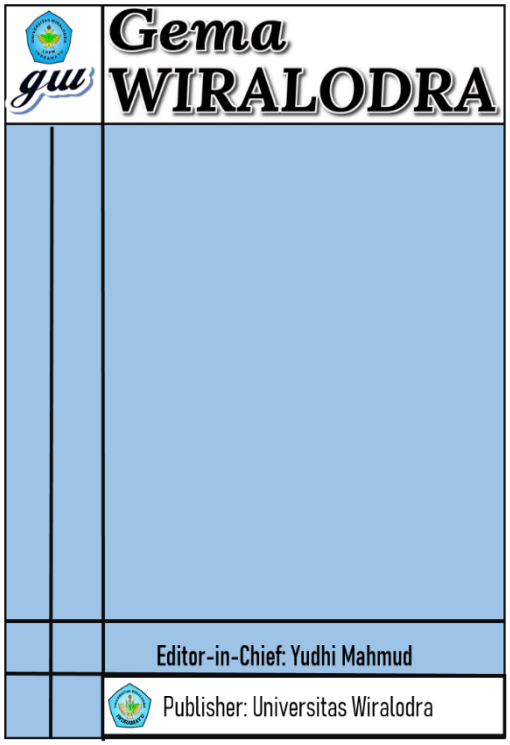

The relationship between environmental sanitation and nutritional status with soil-transmitted helminths infection in elementary school children

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The relationship between environmental sanitation and nutritional status with soil-transmitted helminths infection in elementary school children

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Abstract
Soil-Transmitted Helminths (STH) infection is still a significant public health problem worldwide, including in Indonesia. This infection is caused by worms whose life cycle requires a soil medium in the maturation of eggs or larvae into an infective form and mainly occurs in children of primary school age. Poor environmental sanitation and malnutrition are the leading causes of STH infection. This study aims to determine the relationship between ecological sanitation, nutritional status, and STH infection incidence in elementary school children. This type of research is descriptive research. The research location is SDN 22 Telaga Biru, Telaga Biru District, Gorontalo Regency. The sample was 32 SDN 22 Telaga Biru students, obtained using the total sampling technique. Data was collected using questionnaire instruments, Body Mass Index (BMI) examinations, and fecal examinations at the UPTD Regional Health Laboratory Center of Gorontalo Province. The data were further analyzed univariately. The results showed that most environmental sanitation conditions did not qualify, such as latrine conditions (68.8%), SPAL conditions (75.0%), trash can conditions (87.5%), and clean water facilities (68.8%). Nutritional status (BMI/U) was most in the normal category (65.6%), and no helminth eggs were found in respondents (negative STH), so a relationship analysis could not be carried out. It is suggested that the school and parents support government programs related to providing mass worm-prevention drugs.
Keyword(s): STH, Environmental Sanitation, Nutritional Status

1. Introduction

Health problems are complex problems in all countries and even the world that cannot be avoided and arise due to several factors. Many health problems appear almost every year. One of the health problems, such as Soil-Transmitted Helminths (STH), is a problem that often occurs in society and is considered normal by society. STH infection is most at risk at the age of children because it is the most susceptible to disease, not only STH disease but almost all diseases (Ekayanti et al., 2022; Pan, 2019).

STH infection is an intestinal infection transmitted through soil media, in which worm larvae originating from the soil are then swallowed and hatched in the intestine, causing symptoms such as nausea, diarrhea, and abdominal pain. Four types of worms are usually transmitted to humans, namely roundworms (Ascaris lumbricoides), whipworms (Trichuris trichi-ura), hookworms (Ancylostoma duodenale and Necator americanus), and threadworms (Strong-yloides stercoralis). The main factor for STH infection is poor environmental sanitation (house sanitation, clean water sources, and trash bins that do not meet the requirements) (Subrata & Nuryanti, 2016). STH infection rarely causes death but can cause long-term health problems for sufferers, including declining health conditions, nutrition, intelligence, and productivity of sufferers, and economically causing many losses, thus reducing the quality of human resources, and can interfere with the absorption of food intake. Food in the digestive system can cause complications such as damage to the intestinal wall and anemia (Agustianingsih et al., 2020).

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Based on data from the World Health Organization/UNICEF's Joint Monitoring Program for Water Supply and Sanitation in 2014, Indonesia is ranked third globally with poor environmental sanitation. This is because around 109 million Indonesians need environmental sanitation that meets the requirements. Many Indonesians still defecate openly, so they are easily infected with STH (UNICEF, 2014).

Based on data from the World Health Organization (WHO) in 2018 states that there are more than 1.5 billion world population, or 24%, affected by STH infection where the infection is the most widespread with a very high incidence rate, namely in tropical and subtropical regions such as sub-Saharan Africa, America, China, and East Asia. Most STH infections are at preschool age, with 267 million children and around 568 children living in STH-endemic areas requiring rare treatment and prevention (Silva et al., 2022).

Based on data from the Permenkes Number 15 0f 2017 Concerning Deworming. It states that the worm prevalence rate in Indonesia is still very high and varies between 2.5% -62%—low economy and environmental sanitation factors that do not meet the requirements. The government made several efforts to prevent STH infection in 2017 by breaking the chain, including health promotion, giving mass drugs to elementary school children, handling sufferers, helminthiasis surveillance, and controlling risk factors. However, many Indonesians still suffer STH infections (Mascarini-Serra, 2011).

Based on data obtained from the Gorontalo Provincial Health Office in 2021 states that out of 5 districts in Gorontalo Province, four sections have received deworming medication given to preschool and school children, including Gorontalo District 66.7%, Bone Bolango District 78.5%, Pohuwato district 84.2% and Boalemo district 78.5%. Based on data obtained from the Gorontalo District Health Office, it was stated that out of 21 Puskesmas, 1 Puskesmas had high coverage of drug administration, namely the Biluhu Health Center at 99.1% and the lowest deworming medication, namely the Telaga Biru Health Center at 40.3%. Based on data obtained from the Telaga Biru Health Center, it was stated that the administration of deworming drugs in the Telaga Biru Health Center work area in stage 1 in March 2021 was the highest in Modelidu village at 67.37% and the lowest was in Pentadio Timur village, namely 27.43%. Meanwhile, in the administration of deworming drugs in Stage 2 of September 2021, the highest was in the Modelidu village at 51.58%, and the lowest was in the West Pentadio village at 23.32%. Based on the results of interviews with health workers at the Telaga Biru Health Center on Thursday, January 27, 2022, according to the survey of officers, most of the residents in the Telaga Biru Health Center work area had the highest education status, high school, with the most jobs, namely farmers and homemakers. Then the condition of environmental sanitation in the working area of the Telaga Biru Health Center is still inadequate, such as clean water facilities that do not meet the requirements, do not have trash cans at home, and do not have sewerage channels (SPAL) that meet the requirements.

Based on the results of observations on Thursday, February 10, 2022, at 22 Telaga Biru Public Elementary School, it was found that environmental sanitation in schools still did not meet the requirements and also that the personal hygiene of students was still poor; this made it possible for these children to get STH infection. Then Telaga Biru 22 Public Elementary School is also far from the Telaga Biru Health Center, making it difficult to get information and health services. Research conducted by Ginting, 2019 regarding the Determinant Analysis of Deworming Incidence in Elementary School Children in Janur Village, Karo District, states that home sanitation and family income are related to the incidence of helminthiasis in elementary school children.

The incidence of helminthiasis in elementary school-age children can hamper their growth and physical and cognitive development in infancy. At this age, children should get balanced and quality nutrition. Children can suffer from malnutrition if left for a long time; they can even become Protein Energy Deficiency (PEM). This situation results in disruption to the

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growth and development of children and a decrease in the quality of life of children. Research by Fathmaulida, 2013 on students of SDN 200 Kemasrindo Village, Kertapati District, Palembang City, showed that the proportion of STH infections was 27.1%, the proportion of undernourished status was 43.9%, and there was a relationship between nutritional status and Soil-Transmitted Helminths infection (p=0.036).

Based on the background of the health problems above, the researcher is interested in researching the "Relationship of Environmental Sanitation and Nutritional Status with the Incidence of Soil-Transmitted Helminths Infection in Elementary School Children".

2. Methods

The research location is SDN 22 Telaga Biru, Telaga Biru District, Gorontalo Regency. The time of the research was carried out from March to June 2021. This type of research is an analytic observational study using a cross-sectional study design. The cross-sectional research design is a study that studies the correlation between exposure or risk factors (independent) and effects or effects (dependent) by collecting data simultaneously at one time between risk factors and their effects, meaning that all variables, both independent and dependent variables, are observed at the same time (Irwan, 2021). The dependent variable in this study was the incidence of Soil-Transmitted Helminths (STH) infection. The independent variables in this study were environmental sanitation (latrine conditions, SPAL, trash can conditions, and clean water sources) and nutritional status.

The population in this study was 67 students at SDN 22 Telaga Biru, which were distributed to each class I totaling 14 people, class II totaling ten people, class III, totaling ten people, class IV totaling 11 people, class V totaling 11 people, and class VI numbered 11 people. The sampling technique uses total sampling so that the number of samples equals the total population, namely 32 people. Data in this research were collected using questionnaires, and laboratory tests were carried out to collect data related to worm infection status by looking for the presence or absence of worm eggs in the respondent's stool sample. Then the data is analyzed using univariate analysis using table distribution frequency.

3. Results And Discussion

STH incident

Based on the results of research that has been done, the obtained distribution of students based on STH events is as follows.

Table 1
Distribution Student Based on STH incident

STH incident	Total	
	N	%
Negative	32	100.0
Total	32	100.0

Source: Primary Data, 2022

Based on Table 1, got is known that of 32 students Where all student negative STH infection ie as many as 32 people (100.0%).

Sanitation Environment

1) Distribution Respondents Based on Condition Toilet

Based on the results of research that has been done, then obtained distribution respondents based on condition toilet as following.

Table 2

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Distribution Respondents Based on Condition Toilet

Condition Toilet	Total	
	n	%
Not Qualified	22	68.8
Qualified	10	31.3
Total	32	100.0

Source: Primary Data, 2022

Based on Table 2, got is known that of the 32 respondents at most own condition latrines that do not fulfill the condition that is as many as 22 respondents (68.8%), and the least that is respondents with condition-fulfilling latrines condition as many as ten respondents (31.3%).

2) Distribution Respondents Based on Condition Channel Waste Water Disposal (SPAL)

Based on the results of research that has been done, then obtained distribution Respondents based on SPAL conditions as follows.

Table 3

Distribution Respondents Based on SPAL condition

SPAL condition	Total	
	n	%
Not Qualified	24	75.0
Qualified	8	25.0
Total	32	100.0

Source: Primary Data, 2022

Based on Table 3, got is known that of the 32 respondents, most have SPAL conditions which do not fulfill the condition that is as many as 24 respondents (75.0%), and the least that is respondents own SPAL conditions that meet conditions as many as eight respondents (25.0%).

3) Distribution Respondents Based on Condition Place Rubbish

Based on the results of research that has been done, then obtained distribution Respondents based on the condition placed rubbish as follows.

Table 4

Distribution Respondents Based on Condition Place Garbage

Condition Place Rubbish	Total	
	N	%
Not Qualified	28	87.5
Qualified	4	12.5
Total	32	100.0

Source: Primary Data, 2022

Based on Table 4, get is known that of the 32 respondents, the most conditioned Place trash that does not fulfill the condition that is as many as 28 respondents (87.5%) and the least that is respondents own condition place overflowing trash condition as many as four respondents (12.5%).

4) Distribution Respondents Based on Condition of Clean Water Facilities

Based on the research results, the obtained distribution of Respondents based on the condition of clean water facilities is as follows.

Table 5

Distribution Respondents Based on Condition of Clean Water Facilities

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Condition Place Rubbish	Total	
	n	%
Not Qualified	22	68.8
Qualified	10	31.3
Total	32	100.0

Source: Primary Data, 2022

Based on Table 5, got is known that of the 32 respondents, most have condition clean water facilities that do not fulfill the condition that is as many as 22 respondents (68.8%), and the least that is respondents own clean water recommendation conditions that meet condition as many as ten respondents (31.3%).

Nutritional Status (BMI/U)

Based on the research results, the obtained distribution of Respondents based on nutritional status (BMI/U) is as follows.

Table 6

Distribution Respondents Based on Nutritional Status (BMI/U)

Nutritional Status (BMI/U)	Total	
	n	%
Normal	21	65.6
Overweight	7	21.9
Obesity	4	12.5
Total	32	100.0

Source: Primary Data, 2022

Based on Table 6, it can be seen that of the 32 respondents, most of them had normal nutritional status, namely 21 people (65.6%) and the least, namely obesity, were 4 people (12.5%).

Discussion

1) Incidence of STH infection

Based on the results, it was found that of the 32 students where all students were negative for STH infection, there were 32 people (100.0%). Based on these data, the results of laboratory examinations carried out at UPTD Labkesda Gorontalo Province using the Easel method on microscopy observations of 32 students in grades I-III at SDN 22 Telaga Biru showed that they were not infected with STH worms. This can happen because, based on the results of interviews with Telaga Biru health center officers, these students received deworming medication in the form of albendazole in February 2022. *Deworming* is a government program routinely carried out by the Gorontalo Provincial Health Office and the Telaga Biru Health Center to prevent STH infection in children, especially at elementary school age. This is in line with research from Rehgita (2017) based on laboratory tests on Parasitology at USU's Faculty of Medicine with a total sample of 50 students in grades I-VI at SD Negeri 068005 Medan Tuntungan District; none of them were infected with STH worms (0.00%), this was because the school had received deworming medicine from the local health center. This is also in line with research by Juliana (2021) that based on the results of research in the village of Gumantar Kwanyar in toddlers aged 2-5 years using microscopic examination with a sample of 20 respondents, 100% negative results were found, meaning that there were no eggs, larvae, and STH worms found.

2) Environment sanitation

Latrine Condition

Based on the results, it was found that out of the 32 respondents the most had latrine conditions that did not meet the requirements, namely 22 respondents (68.8%), and the least,

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namely respondents who had latrine conditions that met the requirements, were ten respondents (31.3%).

Based on the results of direct observation at the research location, it was found that most of the respondents did not have private latrines, so they had to defecate in the river or a neighboring toilet, but this did not allow the child to get STH infection, as well as latrines at schools which were no longer used and had been it was so dirty that students had to defecate in people's homes close to the school.

This is in line with research from Paridah et al. (2021) showed that physical environmental factors (clean water facilities, latrine conditions, SPAL conditions, types of house floors, RT waste management) did not affect helminthiasis in elementary school students in Seberang Tembilahan Village, Indragiri Hilir Regency. Even though it is statistically unrelated, it does not rule out the condition of the latrines as a risk factor for helminthiasis. This is because helminthiasis is one of the environmental-based diseases in which the latrine factor is included. Lack of adequate environmental sanitation causes the environment to be polluted with feces containing worm eggs or larvae. Unsanitary latrines cause worm eggs to spread quickly in the environment. So that efforts to clean and healthy the environment (sanitation) must continue to be carried out to prevent the breeding and spread of these worms to humans.

SPAL condition

Disposal of waste as a component of environmental sanitation can affect the incidence of helminthiasis because it can spread worm eggs into the environment. According to Sumanto (2010), Soil moisture is an essential factor in maintaining the development of worm eggs in the soil. The SPAL requirements are to have a channel and flow smoothly, have a particular shelter, and be sanitary (the distance between the SPAL and the water source is at least 10 meters).

Based on the results, it was found that out of the 32 respondents, most had SPAL conditions that did not meet the requirements, namely 24 respondents (75.0%), and the least, namely respondents who had SPAL conditions that met the requirements, were eight respondents (25.0%). Based on these results, most respondents did not meet the requirements for SPAL conditions. This is by the results of direct observation at the research location that most people or respondents needed latrines that met the requirements, such as not having SPAL and causing odor due to the disposal of residual wastewater indiscriminately placed.

This is supported by research by Sumanto (2010), who found exposure to hookworm eggs in the soil of as much as 77.8% of respondents who disposed of household liquid waste anywhere. At the same time, those flowing into the ditch should have only found 22.2% exposure. The same thing was also found in research by Nurhaedah (2006), which shows that there is a significant relationship between the provision of SPAL and the incidence of helminthiasis in Al-Akhyar elementary school students at Pondok Madinah Islamic Boarding School Sudiang Makassar. Improper waste disposal will have effects, such as becoming a disease carrier and damaging the plants around it. Therefore, wastewater must be appropriately managed.

Trash Condition

The effect of waste on the environment and health is no different from other pollutants. However, waste is not the cause (agent) of disease. However, it is a condition or medium for illness because waste is a medium for the growth and development of bacteria and parasites, and vectors for several diseases.

Based on the results, it was found that out of the 32 respondents, most had trash bin conditions that did not meet the requirements, namely 28 respondents (87.5%), and the least, namely respondents who had trash bins that met the requirements, were four respondents (12.5%).

The results of observations in the field were that respondents generally disposed of garbage behind the house and even disposed of it in the garden and the river, while observations

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of the condition of the trash cans at SD 22 Tapaluluo did not meet the health requirements where garbage was still scattered everywhere. According to the local community, the waste that is usually disposed of in the house's backyard is treated by burning the waste.

This is in line with research by Fitri et al (2012) showed no relationship between the conditions of the trash can and the incidence of helminthiasis. This research is also in line with research conducted by Nurhaedah, 2006 who found that waste is one of the factors that can contribute to the incidence of helminthiasis. Likewise, research (Puji, 2003) found a significant relationship between the provision of family trash cans and the incidence of helminthiasis in Bustanul Islaminah Elementary School students.

Condition of Clean Water Facilities

Based on the results, it was found that out of the 32 respondents, most had clean water facilities that did not meet the requirements, namely 22 respondents (68.8%), and the least, namely respondents who had clean water conditions that met the requirements, were ten respondents (31.3%). The results of interviews and observations in the field show that the water source used by the community for their daily needs is a spring that has been tested for water quality by health workers later. However, many conditions for clean water still need to meet the requirements, such as no cover in a water storage container. This is in line with research from Yusriati (2017), shows that the variables that do not affect worm infection are the use of clean water, use of latrines, availability of clean water, waste disposal facilities, and availability of latrines.

3) Nutritional Status (BMI/U)

Based on the results, it was found that out of the 32 respondents, most of them had normal nutritional status, namely 21 people (65.6%), then seven people (21.9%) had more nutritional status, and the least were obese, four people (12.5%). Based on these results, it can be concluded that most respondents have overweight status so that the child is not infected with STH; other factors include socioeconomic level, the mother's nutritional behavior, the mother's knowledge about nutrition, and the child's eating pattern. This is in line with the research of Azizaturridha et al., 2016 that the results of Fischer's Exact statistical test showed that there was no significant effect of worm infection on nutritional status based on BMI/U in children at SDN 2 Barabai Darat with a value of p = 1.000 (> 0.05).

4. Conclusion

Incident STH infection at SDN 22 Telaga Biru based on results laboratory of 32 samples stated negative or No found case positive STH infection. Condition sanitation environment that does not fulfill condition seen from a number of an indicator like condition toilet that is as many as 22 respondents (68.8%), SPAL conditions namely as many as 24 respondents (75.0%), Condition place rubbish that is as many as 28 respondents (87.5%) and clean water facilities that are as many as 22 respondents (68.8%). The most nutritional status (BMI/U). Own category normal nutrition, i.e., as many as 21 people (65.6%). So they need to guard the sanitation environment at home and children's personal hygiene. Besides that, schools should also support government programs related to gift drug prevention bulk wormy and necessary means of sanitation like providing places to wash hands, place disposal of trash, and proper toilets in schools.

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