ENVIRONMENTAL SANITATION AND ITS CORRELATION WITH INTESTINAL WORM INFECTION IN ELEMENTARY SCHOOL STUDENTS IN WEST AMANUBAN DISTRICT, EAST NUSA TENGGARA, INDONESIA

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ABSTRACT

Background: Intestinal parasitic infections are still major public health problems. ntestinal parasitic infections, mainly Ascariasis, Trichiuriasis, and hookworm, are common clinical disorders in man, with resultant impairments in physical, intellectual, and cognitive development. The greater proportion of infections is associated with poor water, sanitation, and hygiene (WASH). This study aimed to examine the correlation between environmental sanitation and intestinal worm infection.
Subjects and Method: This was a cross-sectional study conducted at elementary school students in West Amanuban, East Nusa Tenggara, Indonesia. A sample of 160 elementary school students was selected by simple random sampling. The dependent variable was intestinal worm infection. The independent variables were poor latrine, type of latrine, poor drinking water sources, poor trash bins, poor sewerage, the presence of animals, and the presence of cages. The data were collected by questionnaire and analyzed by Chi square.
Results: The risk of intestinal worm infection in elementary school students increased with poor latrine (OR= 6.41; 95% CI= 2.49 to 16.53; p<0.001), type of latrine (OR= 23.93; 95% CI= 5.42 to 105.71; p<0.001), poor drinking water sources (OR= 3.94; 95%CI= 1.78 to 8.71; p=0.001), poor trash bins (OR= 8.53; 95% CI= 3.93 to 18.52; p<0.001), and poor sewerage (OR= 5.25; 95% CI= 2.42 to 11.42; p<0.001). The presence of animals(OR= 1.84; 95% CI= 0.58 to 5.80; p= 0.426) and the presence of cages (OR= 2.55; 95% CI= 0.91 to 7.09; p= 0.106) were not significantly associated with intestinal worm infection.
Conclusion: The risk of intestinal worm infection in elementary school students increases with poor latrine, type of latrine, poor drinking water sources, poor trash bins, and poor sewerage. The presence of animals and the presence of cages are not significantly associated with intestinal worm infection.

Keywords: intestinal worms, environmental sanitation, children

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BACKGROUND

Until now, helminthiasis is still a health problem for developing countries, including in Indonesia. One of the causes of intestinal worms or intestinal worm infection is Soil Transmitted Helminth (STH), which is a type of intestinal nematode that requires soil media in its life cycle. Worms belonging to this STH include *Ascaris lumbricoides*, *Trichuris trichiura*, hookworms or hook worms

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(*Ancylostoma duodenale* and *Necator americanus*) and *Strongyloides* (Supali et al., 2008). Soil transmitted helminths (STH) are a group of parasitic nematodes that cause infection in humans through contact with eggs or parasitic larvae that develop in soils with moist and warm conditions, especially in tropical and subtropical countries in the world (Bethony et al., 2006).).

Intestinal worms live in the intestinal cavity and their eggs come out with feces/feces so that they can infect other people who are contaminated with the eggs/larvae of the parasite. If a person is infected with intestinal worms, it is more likely that their feces contain worm eggs, and will mature in the soil, then re-infect humans. A person infected with STH in the early stages has no symptoms, but in severe infection it can cause more complex health problems such as abdominal pain, diarrhea, blood-protein loss, rectal prolapse, anemia and growth disorders (CDC, 2013; Putra- Wardhana, 2014; Wardhana, 2014) appropriate (humid and warm) can affect an area to become endemic for worms as well as factors for clean and healthy living behavior of the community. Endemicity is also influenced by the number of eggs that can live to become infective and enter the host. The more eggs found in the source of contamination (soil, dust, vegetables, etc.), the higher the endemicity in an area. Often in plantation and mining areas, hookworm infection is also common in the people who live around it. Hookworms in their transmission cycle require loose sandy soil, mixed with humus, and protected from direct sunlight.

The impact of this worm disease on children, among others, is that it can interfere with the child's ability to study and do activities at school properly. In moderate infections it can cause cognitive dysfunction and in adults it will decrease work productivity in the long term and reduce their income, and this will result in a decrease in the quality of human resources. Data on helminthiasis has not been found or researched until now, which is usually more commonly found in toddlers and school-age children. The process of spreading worms is transmitted through the soil which is often found in elementary school-aged children who are still playing with the soil. Soil contamination is the cause of the transmission of worm eggs from the soil and then into the mouth with food (Supali et al., 2008). The environment plays a very important role in determining the occurrence of intestinal worm infections, including the presence of latrines, types of latrines, the presence of livestock and cages, drinking water sources, type of house floor, floor conditions, trash cans and the presence of SPAL. For this reason, this study aims to determine the relationship between environmental factors and the incidence of intestinal worm infection in elementary school children.

SUBJECTS AND METHOD

1. Study Design

This research is a quantitative observational with a cross sectional study design. The research was conducted in

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2021 at an elementary school in West Amanuban District, South Central Timor Regency.

2. Population and Sample

The research sample size is 160 elementary school children in West Amanuban District, South Central Timor Regency. The sampling technique used was simple random sampling at three elementary schools in West Amanuban District, South Central Timor Regency.

3. Operational Definition

Intestinal worm infection is a child's status based on the presence of worm eggs / larvae in the feces.

Availability of latrines is the presence or absence of latrines in the respondent's house. Type of latrine is the type of latrine used for defecation.

The type of floor is the flooring material in the respondent's house.

The condition of the floor is the condition of the cleanliness of the floor of the respondent's house. Trash cans are the availability of trash cans in the respondent's house.

Waste water disposal is the availability of waste water disposal facilities at the respondent's house.

Livestock is the presence of livestock in the respondent's house.

The cage is the presence of a cattle shed around the respondent's house.

4. Variable

The independent variables of this study were environmental sanitation (presence of latrines, types of latrines, presence of livestock and cages, source of drinking water, type of house floor, floor conditions, trash cans and presence of waste water disposal) and the dependent variable was the incidence of intestinal worm infection.

5. Instrument

Data was collected by collecting feces and examining feces in the laboratory. In addition, interviews and observations were also conducted to collect environmental sanitation data.

6. Data Analysis

Data were analyzed univariately to see the percentage of each variable and bivariate analysis using Chi-Square test to see the relationship between independent and dependent variables.

RESULTS

1. Sample Characteristics

The results of the research from the research subjects were 160 elementary school children in the West Amanuban District. The frequency distribution of the characteristics of the research subjects showed that most of the subjects were male as much as 58.1%, ownership of the latrine was as much as 85.6%, the type of goose neck latrine was 56.9%, had livestock 86.9%, owned drums for livestock was 20.0%, water sources were from local water company is 78.8%, ownership of trash cans is 70.0% and ownership of sewerage is 51.2%.

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Tabel 2. Sample Characterististics

Characteristics	Category	n	%
Gender	Male	98	58.1
	Female	62	41.9
Toilet	No	23	14.4
	Yes	137	85,6
Type of toilet	Trench latrine	69	43.1
	Pit latrine	68	56.9
Animal/pet	Yes	139	86.9
	No	21	13.1
Cage	No	128	80.0
	Yes	32	20.0
Source of water	River	34	21.3
	Local water company /well	126	78.8
Rubbish bin	No	48	30.0
	Yes	112	70.0
Waste water disposal	No	78	48.8
	Yes	82	51.2

Table 3 The Relationship between Environmental Conditions and Intestinal Worm Infections in Elementary School Children

Environment sanitation	Intestinal Worm Infection				OR	p
	Yes		No			
	N	%	N	%		
Toilet						
- No	15	65.2	8	34.8	1.77	0.000
- Yes	31	22.6	106	77.4		
Type of toilet						
- Trench latrine	29	42.0	40	58.0	1.02	0.000
- Pit latrine	2	2.9	66	97.1		
Animal/pet						
- Yes	42	30.2	97	69.8	6.60	0.292
- No	4	19.0	17	81.0		
Cage						
- No	41	32.0	87	68.0	4.00	0.067
- Yes	5	15.6	27	84.4		
Source of water						
- River	18	52.9	16	47.1	0.27	0.000
- Well	28	22.2	98	77.8		
Rubbish bin						
- No	29	60.4	19	39.6	0.43	0.000
- Yes	17	15.2	95	84.8		
Waste water disposal						
- No	35	44.9	43	55.1	1.00	0.000
- Yes	11	13.4	71	86.6		

The results of the bivariate analysis with the chi-square test contained in Table 2. show that the analysis of the relationship between latrine ownership and the incidence of intestinal worm infection with $p < 0.001$ and

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OR= 1.77. Children who do not have latrines have a 1.77 times risk of infection with intestinal worms compared to children who have latrines. The relationship between the type of latrine used and the incidence of intestinal infection with p value = 0.000 and OR = 1.02. Children who use the latrine model have a 1.02 times risk of intestinal worm infection compared to children who use the goose neck model. The relationship between livestock ownership and the incidence of intestinal worm infection with p value = 0.292 and OR = 6.60. Children who own livestock have a 6.60 times risk of intestinal worm infection compared to children who do not own livestock.

The relationship between ownership of drums and the incidence of intestinal worm infection with p= 0.067 and OR= 4.00. Children who have bladders have a 4.00 times risk of intestinal worm infection compared to children who do not have drums. The relationship between water sources and the incidence of intestinal worm infection with p< 0.001 and OR= 0.27. Consuming river water is a protective factor against the incidence of intestinal worm infection in children. The relationship between the availability of waste disposal sites with the incidence of intestinal worm infection with p< 0.001 and OR= 0.43. The unavailability of waste disposal sites is a protective factor for intestinal worm infections in children. The relationship between ownership of sewerage and the incidence of intestinal worm infection with p< 0.001 and OR = 1.00. Children who do not have sewerage are not a risk factor for infection with intestinal worms.

DISCUSSION

Environmental factors are divided into three components, namely the physical environment such as geography and seasonal conditions, the biological environment, namely all living things around us that can transmit disease, and the socio-economic environment can be in the form of work, economic development, and others that can have an influence on the environment. behavior in society (Notoatmodjo, 2010).

Environmental factors that influence the infection of Soil Transmitted Helminths are physical and socio-economic factors. Physical environmental factors such as climatic conditions, namely tropical and subtropical climates, humidity, altitude areas, house floor conditions, latrine ownership, and others. While the socio-economic environment factors can be in the form of work, education, and income.

Highlands or commonly referred to as mountainous areas geographically are plains located at an altitude of above 500 meters above sea level. An area can be classified as a plateau if the plain has a set of peaks of the same height that are separated by valleys.

Environmental characteristics that distinguish it from the lowlands are much higher air humidity, low oxygen pressure, low temperature, high solar radiation, high wind speed, low nutrition, and steep topography. In addition, the dominant characteristics that can be observed are soil conditions that are denser than low-

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lying areas (Syahputra et al., 2015). With conditions of high air humidity and dense soil or clay conditions, it is very possible for this area to be an excellent habitat for the development of soil-transmitted helminths.

Lowlands are sloping areas and are located in low areas, which are less than 100 m above sea level. Lowlands generally have a relatively flat or slightly wavy shape. The characteristics of lowland areas are flat areas, areas where there are many residential areas, population activities consist of various types such as agriculture, fisheries, industry and commerce. Soil conditions in lowland areas are humus, sandy, and loose (Wardhana, 2014).

The results showed that there was a relationship between family latrine ownership and the incidence of intestinal worm infection and had a 1.77 times risk of developing intestinal worm infection in elementary school children and the type of latrine also affected intestinal worm infection. This study is different from the research of Olin et al. in Southwest Sumba, where latrines and types of latrines have no effect on helminthiasis in elementary school children, but this study is not much different from research (Fitri et al., 2012) in East Angkola District which showed that latrines had a significant effect on the incidence of helminth infections. The obtained p value = 0.000 and OR= 16.35, where houses with latrines that do not meet health requirements have 16.35 times the chance of being infected with worms compared to houses with latrines that meet health requirements. Feces have a very large role in the spread of disease. Besides being able to directly contaminate food and beverages, contamination can also occur indirectly through vector intermediaries (flies, cockroaches, etc.) and objects that have been contaminated.

The source of water used by families of elementary school children also affects the incidence of intestinal worm infections. This study is not different from research (Fitri et al., 2012) in Angkola Timur District which shows that the availability of clean water has a significant effect on the incidence of helminth infections with p< 0.001 and OR = 4.53, where houses with clean water do not meet the requirements. Health workers have 4.53 times the chance of being infected with worms compared to homes with clean water that meet health requirements. In addition to feces, unhealthy water also has a very large role in the transmission of diseases known as water borne diseases. As a result of unhealthy water can cause health problems such as cholera, diarrhea, dysentery, and other diseases including worms.

Garbage disposal sites and waste water disposal facilities affect the incidence of intestinal worm infections. Not having trash cans and waste water disposal facilities will provide breeding grounds for various germs including worm eggs and larvae, which are easily transferred by flies or cockroaches to the food eaten.

The results of this study indicate that there is a relationship between environmental sanitation and the incidence of intestinal worm infection in elementary school children, namely there is a relationship between the

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incidence of intestinal worm infection with family latrine ownership and type of latrine, drinking water source, type of house floor, floor condition, availability of trash cans and wate water disposal. While the variable presence of animals/livestock and cages is not associated with intestinal worm infection.

It is recommended that program managers at the Health Service and Puskesmas need to carry out intensive health promotion to school children and the community about environmental sanitation and its management.

AUTHOR CONTRIBUTION

WW makes proposals, discusses and writes articles, RP makes proposals, data collection and data analysis, II makes methodologies, discussions, KK makes discussion and article writing, JS designs research methodologies, SLC does data analysis and article writing, IS does collection and analysis data and YG makes research administration.

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CONFLICT INTEREST

There is no conflict of interest in this study.

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