



The Relationship of Behavior Factors with Helminthiasis Incident on Helminthiasis Infection Disease in Pregnant Mothers in Langkat Regency

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Abstract:

*The aim of the study is to find out the behavior factors helminthiasis Infection Disease in Pregnant Mothers. The sample size in this study was determined based on the sample size formula for testing the hypothesis of the proportion of one clinical study population of Skovland and Vatn (2007). The results of research on the influence of behavioral factors and environmental factors on helminthiasis in pregnant women in Langkat Regency in 2019 are Helminthiasis status. There are 175 pregnant women, 20 percent of pregnant women are infected with helminthiasis, and the most common type of worm is *Ascaris lumbricoides*. Behavioral factors. Behavioral factors have a significant influence on the incidence of helminthiasis in pregnant women, namely the habit of wearing footwear, the habit of washing hands with soap before eating and after defecation, the habit of consuming raw food and the habit of defecating in addition to toilet.*

Keywords:

behavior factors; helminthiasis; pregnant mothers

I. Introduction

One type of helminthiasis is caused by the Soil Transmitted Helminths (STH) group, which is a worm infection that is transmitted through the soil. The high prevalence of intestinal worms in Indonesia is caused by many factors that can support the life cycle and the proliferation of intestinal parasites, such as natural and environmental conditions, humidity, temperature and matters relating to people (the public) such as ignorance, lack of education and low socioeconomic. Poor environmental sanitation, personal hygiene and bad behavior such as bowel habits, population density, poor use of water in washing cooking utensils and cutlery or use of water for drinking, not using footwear when outside activities a house that is directly in contact with the ground, the habit of children playing outside the house signs using footwear is very supportive of the breeding of parasites in Indonesia (Natadisastra 2014).

Worms can cause interference with intake (intake), absorption (absorption), digestion (digestive), and the metabolism of sufferers. In general, helminthiasis can cause harm to sufferers, especially in meeting the nutritional needs due to lack of protein, calories, and blood loss. Another loss due to helminthiasis is to calculate the effects caused by this parasite. Disability Adjusted Life Years (DALYs) is a mathematical design that can calculate and estimate the amount of productive time lost due to helminthiasis (Kemenkes 2017). The global burden caused by intestinal nematode infections is estimated at 5.2 million Disability Adjusted Life Years (DALYs) (Murray et. Al. 2012).

Pregnant women are a target group that needs special attention, because it is a vulnerable group to suffer nutritional problems (MOH 2003). Pregnant women may be exposed to intestinal

worms because of poor hygiene and sanitation. Pregnant women infected with worms can reduce the weight of pregnant women, intestinal bleeding, and micronutrient deficiencies and can cause iron deficiency anemia during pregnancy and endanger the fetus in the womb (WHO 2018).

II. Review of Literature

2.1 Helminthiasis

Worms or worms are endemic and chronic diseases caused by intestinal parasitic worms that have a high prevalence, are not lethal but can be detrimental to human health slowly resulting in low conditions of nutritional status and public health (Zulkoni 2011).

Worm infectious diseases transmitted through the soil is one of the most common infectious diseases throughout the world and affects the poor. Transmission occurs through worm eggs found in human feces that pollute the soil, especially in areas with poor sanitation. Roundworms (*Ascaris lumbricoides*), hookworms (*Necator americanus* and *Ancylostoma duodenale*) and whipworms (*Trichuris trichiuria*) are the main species that infect humans (WHO 2018).

Soil transmitted helminthes (STH) is a type of intestinal nematode that requires soil in its life cycle, especially in the maturation process until there is a change in staging, from non-infective to infective. These groups of intestinal nematodes include *Ascaris lumbricoides* (roundworms) that can cause *ascariasis*, *Trichuris trichiuria* can cause *trichiuriasis*, and hookworms consisting of *Necator americanus* which can cause *necatoriasis* and *Ancylostoma duodenale* causing *Ancylostomiasis* (Natadisastra 2014). The morphology of the *Ascaris lumbricoides*, *Trichuris trichiura* and Mine Worms (*Ancylostoma duodenale* and *Necator americanus*) are: Ascariasis. The human small intestine is the habitat of the *Ascaris lumbricoides* worm. This type of worm does not require other intermediary hosts in other words humans are also called definitive hosts. Adult worms are the largest intestinal nematodes, with a yellowish white to pinkish color. Elongated round body shape, both sharp edges, the interior has a mouth with three lip folds, on the lateral lip has a pair of touch *papil* (Natadisastra 2014).

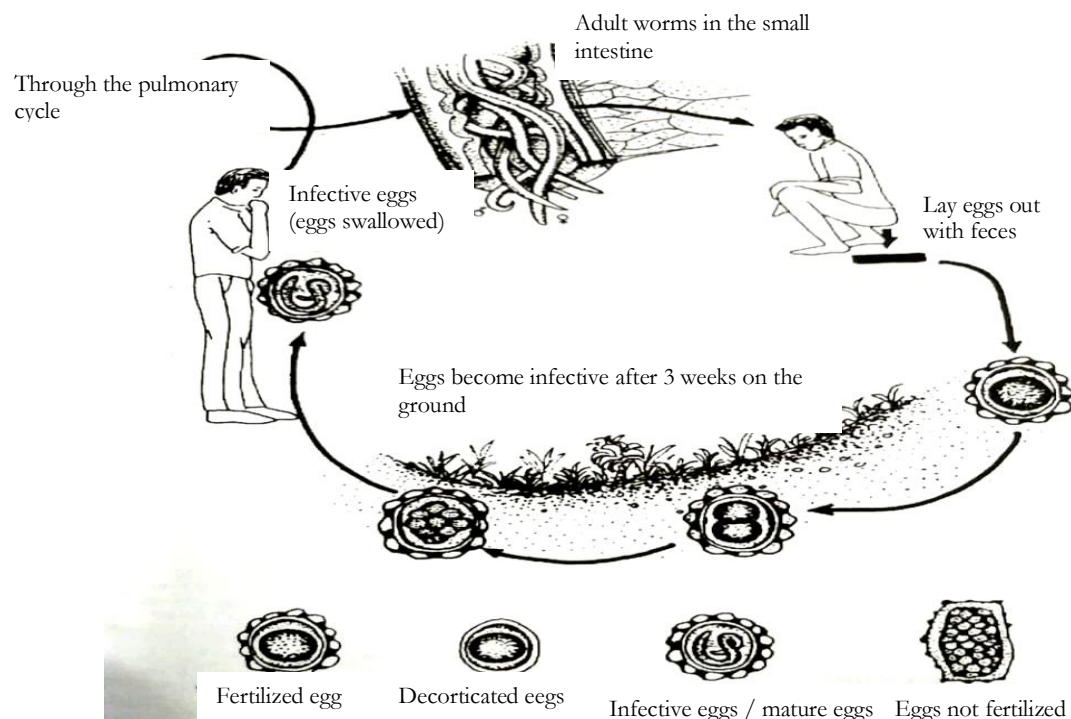


Figure 1. *Ascaris lumbricoides* (roundworm) life cycle

Female worm body size is larger than male worms. In a day a female worm can produce as many as 100,000 eggs to 200,000 eggs consisting of unfertilized eggs and fertilized eggs.

Trichiuriasis. *Trichuris trichiuria* or better known as whipworm has habitat in the large intestine. In their life cycle, this type of worm does not require an intermediary host, and humans are the definitive host. Adult worms resemble whips. A female worm can produce 3,000 to 4,000 eggs every day. Worm eggs come out along with the stool of the patient is an immature and not infective egg. It takes about five weeks for the egg to mature in the soil until the egg becomes infective and contains an embryo in it. Soil is very instrumental in the process of maturing worm eggs into infective, this is called soil transmitted helminthes. Humans can be infected with intestinal worms if ingested eggs are infective. Then the eggs hatch proximal to the small intestine, the larvae come out, and last for about three to ten days. Worms will descend into the large intestine after adulthood and can last up to several years. It takes approximately 30 to 90 days from the infective egg ingested to being a female worm that can produce eggs. (Natadisastra 2014).

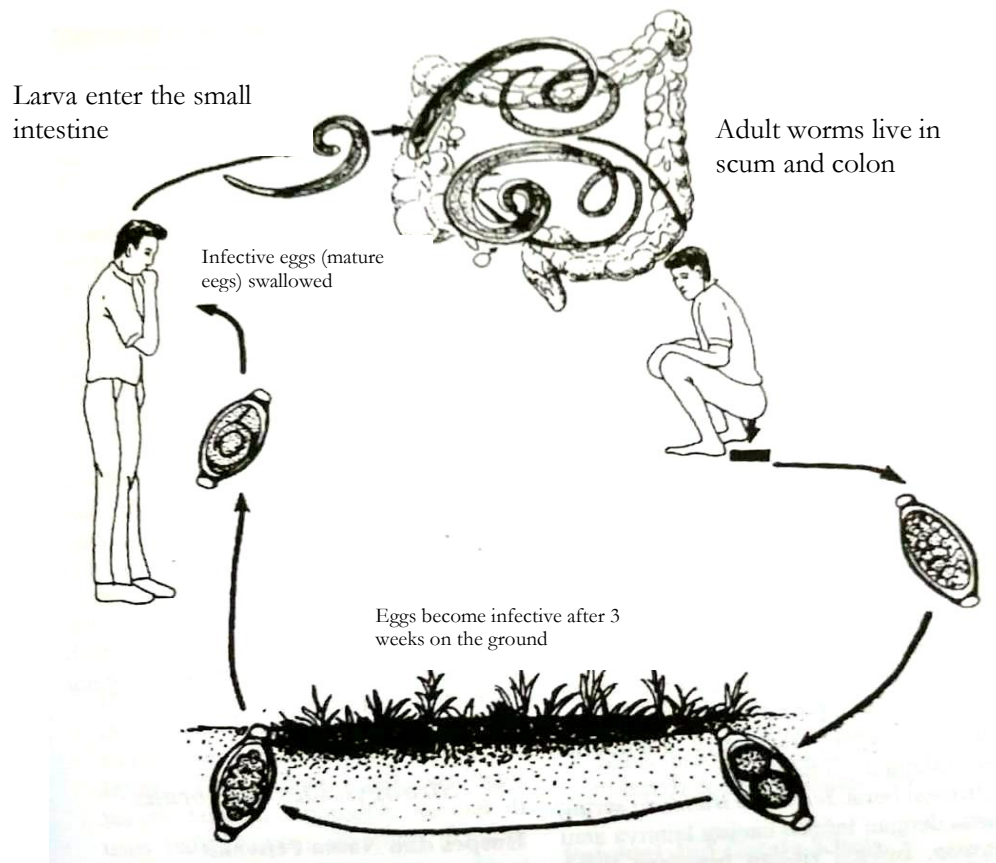


Figure 2. Life cycle of *Trichuris trichiura* (Whipworm)

Mine Worm Infection. There are two species of hookworm in humans, namely *Ancylostoma duodenale* and *Necator americanus*. Hookworm habitat is in the small intestine, especially in the jejunum. In cases of severe infection it can spread to the duodenal and colon areas. The definitive host in this worm is human and does not require an intermediary. Adult worms white gray to reddish. There are similar morphologies between each other in these two worm species. An *Ancylostoma duodenale* female worm can produce about 10,000 to 20,000 eggs every day while in the female worm *Necator americanus* can produce about 9,000 to 10,000 eggs per day. (Natadisastra 2014)

2.2 Pregnancy Physiology

Pregnancy is a process of developing embryos or fetuses in the body, this starts from conception to birth. When ovulation occurs, which is approximately 14 days after the last menstruation (estimated cycle of 28 days), at the time of conception takes place so that the duration of pregnancy lasts for approximately 266 days (Varney H 2007). An intra-uterine growth and development process that occurs from conception and ends until the onset of labor is the definition of pregnancy (Manuaba 2013).

Based on the understanding of the two sources above, the pregnancy can be interpreted as a process when the embryo or fetus grows in the body starting from conception, growth of conception, until the time of birth of a baby which is a continuous link. The pregnancy period is divided into three stages, namely a) Trimester I (≤ 12 weeks), b) Trimester II (13-27 weeks) and c) Trimester III (28-40 weeks) (Varney H 2007, Sulistyawati 2009).

2.3 Impact of *Helminthiasis* on Pregnancy

Worm infections in pregnant women can harm the health of pregnant women and their fetuses. Some of the effects caused by *helminthiasis* in pregnant women can include decreasing health conditions, nutrition, intelligence, and productivity for sufferers, causing economic losses. In addition to causing carbohydrate and protein loss, *helminthiasis* can also cause blood loss thereby reducing the quality of human resources (Kemenkes 2017).

Worms and fetuses can develop well in the body of pregnant women, both are different immunological organisms that live in the body of the mother. Worms and pregnancy both require sources of nutrition and energy such as iron, glucose, lipids and other molecules that are essential for the growth of the fetus and the worms themselves. Worms in pregnancy can result in anemia, malnutrition and bias in the immune response which can alter susceptibility to other diseases. For pregnant women, these complications can affect pregnancy outcomes and neonatal health (Blackwell 2016).

There are five species of worms that are the Soil Transmitted Helminths (STH) groups, namely *Ascaris lumbricoides*, *Trichuris trichiura*, hookworms (*Necator americanus* and *Ancylostoma sp*) and *Strongyloides stercoralis* and until now it still causes health problems. Several surveys conducted in Indonesia show that the prevalence rate of *Ascaris lumbricoides* is quite high (60% -90%). Hookworms (*Necator americanus* and *Ancylostoma sp*) are scattered throughout the equatorial region and also in other places where the environmental conditions are supportive such as plantation and mining areas that have damp and humid soil conditions. The spread of whipworms (*Trichuris trichiura*) is cosmopolitan, especially in hot and humid regions like Indonesia (Inge Sutanto 2016).

III. Research Method

The location of the study was conducted in seven sub-districts in Langkat Regency with the category of poor sanitation villages in the working area of Gebang Health Center, Gebang District, Pantai Cermin Health Center, Tanjung Pura District, Tanjung Selamat Health Center, Padang Tualang District, Tangkahan Durian Health Center, West Brandan District, Securai Health Center, Babalan District, Bahorok Health Center, Bahorok District and Pangkalan Susu Health Center, Pangkalan Susu District. The reason for choosing the location of the study was because of the preliminary survey that had been carried out there were 17.2 percent prevalence of worms in pregnant women in these locations.

The sample size in this study was determined based on the sample size formula for testing the hypothesis of the proportion of one clinical study population of Skovland and Vatn (2007), namely:

$$n = \frac{p_1(1 - p_2) + p_2(1 - p_1)}{(p_1 - p_2)^2} (Z_\alpha + Z_\beta)^2$$

Information:

- N : Minimum sample size: Minimum sample size
- Z α : 1,960 at 95% confidence level
- Z β : 80% strength test (0.842)
- p $_1$: The proportion of worm infections in pregnant women is 47.1% (Tefaye 2015)
- p $_2$: Proportion of expected cases of helminthiasis for pregnant women
Based on the initial survey (17.2%)

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Table 1. Sample Size Based on Prior Research

No	Variable	p1	Sample Size Estimation (n)	Source
1	Self-medication behavior	0,395	61	Tefaye (2015)
2	Washing Hands Use soap after defecate	0,468	35	Belyhun (2010)
3	Type of House Floor	0,449	40	Larocque (2005)
4	Latrine availability	0,471	35	Tefaye (2015)
5	Latrine type	0,433	45	Green (2015)
6	Washing Hands With Soap Before Eating	0,509	27	Belyhun (2010)
7	Clean Water Source	0,483	32	Green (2015)
8	Carelessly defecate	0,549	28	Nguyen (2006)
9	The Barefoot Habit	0,566	25	Tefaye (2015)

$$n = \frac{p_1(1 - p_2) + p_2(1 - p_1)}{(p_1 - p_2)^2} (Z_\alpha + Z_\beta)^2$$

$$n = \frac{0,471(1-0,471) + 0,172(1-0,172)}{(0,471 - 0,172)^2} (1,960 + 0,842)^2$$

$$= 34,5$$

$$= 35 \text{ people}$$

Table 2. Classification of Worm Disease Prevalence

Prevalence Category	Prevalence
High	≥ 50%
Middle	≥ 20% - <50%
Low	<20%

The prevalence of helminthiasis is obtained by dividing the number of positive feces containing worm eggs Soil transmitted helminthiasis divided by the number of stool samples examined.

Worm Prevalence:

$$\frac{\text{The number of positive stool samples of worm eggs}}{\text{Number of stool samples examined}} \times 100\%$$

Prevalence of roundworms:

$$\frac{\text{Number of positive samples of roundworm eggs}}{\text{Number of stool samples examined}} \times 100\%$$

Prevalence of whipworms:

$$\frac{\text{The number of positive stool samples from whipworm eggs}}{\text{Number of stool samples examined}} \times 100\%$$

Prevalence of hookworm:

$$\frac{\text{The number of positive stool samples from hookworm eggs}}{\text{Number of stool samples examined}} \times 100\%$$

The validity and reliability test sample consisted of 30 people with the same characteristics, namely pregnant women from poor sanitation villages in the working area of Tanjung Beringin Health Center, Hinai District. To find out the validity of the research instrument, an item analysis was performed, which correlates the score of each question with the total score which is the total score of each question. The validity test in this study uses the value of Corrected Item Total Correlation (r), with the value of r in the table ($= 0.361$) at α (5%) and $df = 28$ then it is declared valid and if the value of Corrected Item Total Correlation (r) is smaller r table then declared invalid (Hidayat 2010).

The reliability test was carried out after all the questions were declared valid then the analysis continued with the reliability test. The reliability test uses Cranach Alpha which is to analyze the reliability of the measuring instrument from one measurement with the provisions that if the Cronbach Alpha is greater than 0.60 then the measuring instrument is declared reliable whereas if the Cronbach Alpha value is smaller than 0.60 then the measuring instrument is declared non-reliable.

The questionnaire test conducted in Tanjung Mulia Village, Hinai Subdistrict, Tanjung Beringin Health Center, on 30 pregnant women showed that the Corrected Item Total *Correlaton* value was greater than the value of r table (0.361), meaning that the ten questions used to measure variables about behavior were valid. Cronbach's Alpha value of 0.836 is greater than the value of 0.60, this shows that all questions of this behavior have been reliable as a measurement tool.

Worms in pregnancy are sufferers of Soil Transmitted Helminthes worm infection based on examination of worm eggs in feces by the Kato-Katz method. The examination is carried out at the Regional Health Laboratory. Measuring results in the form of:

1 = infected (examination results in stool samples found worm eggs)

0 = not infected (results of examination in fecal samples were not found worm eggs)

The habit of not wearing footwear out of the house. The habit of not wearing footwear out of the house is the behavior of pregnant women who do not use footwear when they are out of the house. Measuring results in the form of:

1 = No (pregnant women wear footwear when moving out of the house)

0 = Yes (pregnant women do not use footwear when moving out of the house)

Habit of washing hands with soap after bowel movements. The habit of washing hands with soap after defecation is the behavior of pregnant women who always wash their hands with soap after defecating. Measuring results in the form of:

1 = No (pregnant women do not wash their hands with soap after defecation)

0 = Yes (pregnant women always wash their hands with soap after defecation)

The habit of washing hands with soap before eating. The habit of washing hands with soap before eating is the behavior of pregnant women who like to wash their hands with soap before eating. Measuring results in the form of:

1 = No (pregnant women do not wash their hands with soap before eating)

0 = Yes (pregnant women wash their hands with soap before eating)

The habit of cutting nails. The habit of cutting nails is the behavior of pregnant women cutting nails to maintain personal hygiene at least once a week. Measuring results in the form of:

1 = No (pregnant women do not cut nails at least once a week)

0 = Yes (pregnant women cut their nails at least once a week)

The nail biting habit. The nail biting habit is the behavior of pregnant women who like to bite their nails unnoticed or consciously. Measuring results in the form of:

1 = Yes (pregnant women like to bite their nails unnoticed)

0 = No (pregnant women don't like to bite their nails even though they don't realize it)

Consumption of raw food consumption (vegetables). Consumption of raw food (vegetables / vegetables) is the respondent's behavior in consuming food in the form of vegetables or vegetables. Measuring results in the form of:

1 = Frequent (pregnant women often consume raw food more than 2 times a week)

0 = Not often (pregnant women less than 2 times a week consuming raw food)

Indecision of open defecation. The habit of open defecation is defecation behavior of pregnant women and respondent family members in terms of place. Random Open Defecation is a condition when every individual in a community no longer carries out open defecation that has the potential to spread disease. Measuring results in the form of:

1 = Yes (pregnant women have bowel habits other than in the toilet)

0 = No (pregnant women defecate in the toilet)

Floor type of house. The type of house floor is the classification of the type of floor in the residence of pregnant women as respondents. A good floor is a floor that is able to hold ground water and wet steam from the ground into the room and prevent the entry of reptiles that come out of the ground (worms, snakes) or insects (Ministry PU 2011). According to the Republic of Indonesia Decree No. 829 / Ministry of Health / SK / VII / 1999 good floors are waterproof and easy to clean (Ministry of Health 1999). Measuring results in the form of:

1 = Not Eligible (if the floor of the house is not waterproof, in the form of soil, boards)

0 = Eligible (if the floor of the house is waterproof, in the form of tile / ceramic / plaster)

Toilet availability. Availability of latrines is the existence of a family toilet in the respondent's home. Healthy latrines are effective for breaking the chain of transmission of disease. Measuring results in the form of:

1 = None (if the house does not have a toilet)

0 = Yes (if the house has a toilet)

Toilet type. Types of latrines are types or forms of latrines available at the respondent's house whether the latrine is buried, in a river, in an open field or goose neck. Measuring results in the form of:

1 = Not eligible (if the pregnant woman does not have a toilet, the pregnant woman has a pit latrine and a pond / river pit)

0 = Eligible (if pregnant woman has a toilet in the form of goose neck and has a septic tank)

Toilet cleanliness. Toilet cleanliness is a state of latrines free of dirt covering clean and dry floors, no littering garbage and cleaning tools available, no puddles around the latrine, latrines in good condition with no flies and cockroaches, continuous clean water available. Measuring results in the form of:

1 = Not eligible (if there is dirt or rubbish around the latrine)

0 = Eligible (if no dirt or rubbish is found around the latrine)

Clean water source. The source of clean water is the existence of the source of clean water of the respondent whether it comes from dug wells, pipes, and rainwater or spring water. Clean water sources that meet the physical requirements are odorless, tasteless and colorless (Ministry of Health 1990). Measuring results in the form of:

1 = Not eligible (if the source of clean water is a dug well, rain water, river, spring)

0 = Eligible (if the source of clean water comes from PDAM and piping)

Table 3. Measurement Method

No	Variable	Variable Indicator	How to measure	Scale	Classification
1.	Worm infestation of pregnant women	Patients with STH worm infection based on egg examination worms in stool samples by the Kato-Katz method	Laboratory Test	Nominal	1. Infected (+) 0. Not infected (-)
2.	The habit of not wearing footwear out of the house	Behavior of wearing footwear in pregnant women	Interview	Nominal	0. Yes 1. No
3.	Habit of washing hands with soap after defecation	behavior of pregnant women washing their hands with soap after defecation (defecation)	Interview	Nominal	0. Yes 1. No
4.	The habit of washing hands with soap before eating	the behavior of pregnant women washing their hands with soap before eating	Interview	Nominal	0. Yes 1. No

5.	The habit of biting nail	the behavior of pregnant women who like to bite their nails unnoticed or consciously	Interview	Nominal	0. No 1. Yes
6.	The habit of cutting nails	cut nails to maintain personal hygiene (at least once a week)	Interview	Nominal	0. No 1. Yes
7.	Defecation habits (bowel movements)	defecation behavior of respondents' family members in terms of the place not in the toilet	Interview	Nominal	0. No 1. Yes
8.	Consumption of raw food consumption (vegetables)	respondent behavior in consuming vegetables in raw condition	Interview	Ordinal	1. Often (> 2x a week) 0. Not often (<2x a week)
9.	Floor type of house	classification of floor types at the place of residence of pregnant women as respondents	Interview	Nominal	0. Qualify 1. Unqualified
10.	Toilet availability	The existence of a family toilet in the respondent's house	Interview and observation	Nominal	0. There is 1. Nothing
11.	Toilet type	The types or forms of latrines available at the respondent's house whether they are burp latrines, in rivers, in open fields or goose necks.	Interview and observation	Nominal	0. Qualify (pipe) 1. Not eligible (put in, river, open land)
12.	Toilet cleanliness	The toilet is free from dirt	Interview and observation	Nominal	0. Qualify 1. Unqualified
13.	Clean water source	The source of clean water of the respondent whether it comes from PDAM, dug wells, pipes, rainwater or spring water	Interview and observation	Nominal	0. Qualify (PDAM) 1. Unqualified (dug wells, rain water, river, spring)

IV. Discussion

Behavior Factor. In the independent variable behavioral factors consist of habits wearing footwear out of the house, habit of washing hands with soap after defecation, habit of washing hands with soap before eating, habit of cutting nails at least once a week, habit of biting nails, habit of indiscriminate defecation and food consumption habits raw.

The habit of wearing footwear out of the house. The results of research conducted on 175 pregnant women in Langkat District, information obtained that most respondents have the habit of wearing footwear when moving out of the house as many as 166 people (94.8%) and as many as nine people (5.2%).

Habit of washing hands with soap after bowel movements. The results of research conducted on 175 pregnant women, information obtained that most respondents washed their hands with soap after defecation as many as 127 people (72.6%), but as many as 48 people (27.4%) did not wash their hands with soap after defecation.

The habit of washing hands with soap before eating. The results of research conducted on 175 pregnant women in Langkat Regency, most of them did not wash their hands with soap before eating, namely 143 (81.7%) and 32 people (18.2%) always washed their hands with soap before eating.

The nail biting habit. The results of the univariate analysis showed that most respondents did not have the habit of nail biting as many as 154 people (88%) and 21 people (12%) had the habit of nail biting unnoticed.

The habit of cutting nails. The habit of cutting respondents is seen based on whether respondents used to cut their nails at least once a week. The results of research conducted on 175 pregnant women in Langkat Regency showed that most respondents had the habit of cutting nails at least once a week as many as 161 people (92%) and as many as 14 people (8%) did not routinely to cut nails at least once a week .

Indiscriminate bowel habits. The habit of open defecation is seen from whether pregnant women defecate always in the toilet or other than a toilet (river, garden). Based on the results of research conducted on 175 pregnant women in Langkat Regency, it can be seen that the majority of pregnant women have bowel habits in as many as 149 people (85.1%) and as many as 26 people (14.9%) have bowel habits big besides being used in the toilet, namely in the river, gardens and in plastic which is then discarded.

Raw food consumption habits. Raw food consumption habits can be seen from whether pregnant women as respondents have the habit of eating raw foods, in this case vegetables or vegetables. Based on the results of research conducted on 175 pregnant women in Langkat District, it can be seen that some respondents rarely (<2 times a week) consume raw food (vegetables), as many as 68 people (38.9%) respondents said they had never eaten vegetables by reason of not like to eat vegetables both vegetables and vegetables that have been cooked, but there are 29 respondents said that often (> 2 times a week) consume raw food (vegetables).

Table 4. Frequency Distribution Based on Behavior Factors of Pregnant Women in Langkat District in 2019

Behavior Factor	Frequency	%
The habit of wearing footwear out of the house		
No	9	5,2
Yes	166	94,8
Total	175	100
Habit of washing hands with soap after bowel movements		
No	48	27,4

Yes	127	72,6
Total	175	100
The habit of washing hands with soap before eating		
No	143	81,7
Yes	32	18,2
Total	175	100
The nail biting habit		
No	154	88
Yes	21	12
Total	175	100
Nail cutting habits (at least once a week)		
No	14	8
Yes	161	92
Total	175	100
Indecision of open defecation		
No	149	85,1
Yes	26	14,9
Total	175	100
Raw food consumption habits		
Often (> 2x a week)	29	16,6
Seldom (< 2x a week)	78	44,6
Never	68	38,9
Total	175	100

Table 5. Factors Related to Worm Infection in Pregnant Women in Langkat District in 2019
Based on the Simple Logistic Regression Test

Variabel	Worm infection						<i>p value</i>	RP (CI=95%)
	Positive		Negative		Total			
	n	%	n	%	n	%		
Behavior Factor								
Wear footwear								
No	5	55,6	4	44,4	9	100	0,023	4,500 (1,225-16,531)
Yes	30	18,1	136	81,9	166	100		
CTPS after bowel movements								
No	16	33,3	32	66,7	48	100	0,008	2,842 (1,312-6,158)
Yes	19	15	108	85	127	100		
CTPS before meals								
No	31	21,7	112	78,3	143	100	0,247	1,937 (0,632-5,942)
Yes	4	12,5	28	87,5	32	100		
Nail biting								
Yes	4	19	17	81	21	100	0,907	0,934 (0,293-2,973)
No	31	20,1	123	79,9	154	100		
Cutting nails								
No	4	28,6	10	71,4	14	100	0,407	1,677

Yes	31	19,3	130	80,7	161	100		(0,632-5,942)
Open defecation								
Yes	12	46,2	14	53,8	26	100	0,001	4,696
No	23	15,4	126	84,6	149	100		(1,928-11,434)
Consumption of raw food								
Yes	26	24,3	81	75,7	107	100	0,079	2,104
No	9	13,2	59	86,8	68	100		(0,919-4,821)

Table 6. Factors Related to Worm Infection in Pregnant Women in Langkat District in 2019 Based on the Simple Logistic Regression Test

Variabel	Worm infection						<i>p value</i>	RP (CI=95%)
	Positive		Negative		Total			
	n	%	n	%	n	%		
Toilet cleanliness								
Not eligible	8	21,6	29	78,4	37	100	0,781	1,134
Qualify	27	19,6	111	80,4	138	100		(0,466 - 2,758)
Clean water source								
Not eligible	9	37,5	15	62,5	24	100		2,895
Qualify	26	17,2	125	82,8	151	100	0,032	(1,093 - 7,665)

Table 7. The Influence of Behavior Factors of Pregnant Women on Worm Infection in Langkat District in 2019 Based on Multiple Logistic Regression Test

Variable	B	<i>p value</i>	RP	95% CI	
				Lower	Upper
Selection 1					
Wear footwear	1,854	0,023	6,382	1,299	31,365
Careless defecation	1,557	0,027	4,744	1,198	18,785
CTPS before eat	1,524	0,028	4,592	1,174	17,961
CTPS after bowel movements	1,067	0,033	2,906	1,091	7,741
Consumption of raw food	0,802	0,095	2,229	0,870	5,712
Floor type	0,812	0,291	2,252	0,499	10,163
Toilet type	0,460	0,358	1,584	0,594	4,224
Clean water source	-0,210	0,788	0,811	0,176	3,734
Toilet availability	-0,339	0,695	0,712	0,131	3,873
<i>Constant</i>	-4,210	0,000	0,015		
Selection 2					
Wear footwear	1,902	0,016	6,699	1,425	31,495
CTPS before meals	1,656	0,016	5,239	1,367	20,086
CTPS after bowel movements	1,204	0,009	3,335	1,342	8,285
Consumption of raw food	0,756	0,103	2,130	0,858	5,291
Careless defecation	1,358	0,008	3,890	1,423	10,637

Constant	-4,109	0,000	0,016		
Selection 3					
Wear footwear	1,779	0,021	5,923	1,308	26,818
CTPS before meals	1,710	0,013	5,530	1,435	21,313
CTPS after bowel movements	1,15	0,012	3,160	1,289	7,748
Careless defecation	1,459	0,004	4,304	1,591	11,643
Constant	-3,650	0,000	0,026		

Based on the test results above, it can be determined the logistic regression equation model to predict the probability of pregnant women experiencing worm infection using the formula (Dahlan 2017):

$$P = \frac{1}{1 + (\exp(-y))}$$

Information:

p = probability for the occurrence of *helminthiasis*

exp = exponential

y = a constant + a1x1+a2x2+ +aixi

a = coefficient value of each variable = 1

x1 = the regression coefficient uses footwear (1,779)

x2 = CTPS regression coefficient values before eating (1,710)

x3 = CTPS regression coefficient value after defecation (1,150)

x4 = the value of the regression coefficient defecation carelessly (1,459)

y = konstanta+ a1×1+a2×2+....+aixi

y = -3,650 + 1,779 (1) + 1,710 (1) + 1,150 (1) + 1,459 (1)

y = 2,448

$$P = \frac{1}{(1 + \exp(-2,448))}$$

$$P = \frac{1}{(1 + 0,0865)}$$

$$P = 0,9203 \times 100\% = 92\%$$

Behavioral factors in this study consisted of the habit of wearing footwear out of the house, the habit of washing hands with soap after defecation, the habit of washing hands with soap before eating, the habit of nail biting, the habit of cutting nails, the consumption of raw food and the habit of open defecation . From the results of statistical tests conducted using the Multiple Logistic Regression test, the following results are obtained:

The habit of wearing footwear. The results of *univariate* analysis based on the habit of wearing footwear the majority of pregnant women use footwear when their activities go out of the house as many as 166 people (94.8%) and as many as 9 people (5.2%) said they did not use footwear when moving out of the house on the grounds that only out for a while in the yard for one reason or another.

Based on the results of *bivariate* analysis using a simple logistic regression test it was found that p value 0.023 (p <0.05), which proves that there is a significant relationship between the habit of wearing footwear with the incidence of intestinal worms in pregnant women in Langkat Regency in 2019. Prevalence Ratio values obtained of 4,500 (95% CI = 1,225–16,531), this shows that pregnant women who have a habit of not wearing footwear when they are out of the house

are at 4.5 times the risk of having a worm infection compared to pregnant women who wear footwear when leaving the house.

The results of this study are in line with Tesfaye's (2015) research with a cross-sectional design in Hossana, Ethiopia. From the statistical test results obtained p value 0.013 (AOR = 3.23 95% CI = 1.28–8.15), according to Tesfaye that pregnant women who have a habit of not wearing footwear out of the house have a risk of 3.23 times can be infected with *helminthiasis* compared to pregnant women who wear footwear out of the house.

Research conducted by Sari (2014) in Pekanbaru found that there was a significant relationship between the habit of wearing footwear and the incidence of *helminthiasis* in pregnant women ($p = 0.002$).

The habit of washing hands with soap before eating. Based on the results of a univariate analysis conducted on 175 pregnant women in Langkat District, it showed that most pregnant women did not wash their hands with soap before eating, as many as 143 people (81.7%) and only 42 people (18.3%) who had the habit wash your hands with soap before eating. The results of the bivariate analysis performed the habit of washing hands with soap before eating had p value = 0.247 ($p > 0.05$).

This is in line with research conducted by Aranzales (2018) in Bogota, Colombia. Aranzales stated that there was no significant relationship between the habit of washing hands with soap before eating with the incidence of *helminthiasis* in pregnant women with a p value of 0.63 ($p > 0.05$).

Habit of washing hands with soap after defecation. The results of the univariate analysis test conducted on 175 pregnant women in Langkat Regency showed that most of them had the habit of washing their hands with soap after defecation, which was 127 people (72.6%) and as many as 48 people (27.4%). The results of bivariate analysis conducted on the habit of washing hands with soap after defecation has a p value = 0.008 ($p < 0.05$), this shows that the behavior has a significant relationship to the incidence of intestinal worms in pregnant women. The Prevalence Ratio value is 2,842 (95% CI = 1,312 - 6,158), this shows that pregnant women who do not wash their hands with soap after defecation risk 2.8 times experiencing worm infections compared to pregnant women who have the habit of washing their hands with soap after BAB.

The nail biting habit. Based on the results of univariate tests conducted showed that the majority of respondents are not accustomed to nail biting as many as 154 people (88%) and as many as 21 people (12%) of respondents have the habit of nail biting unnoticed. The results of the bivariate analysis test showed a p value of 0.907 ($p > 0.005$), this shows that the behavior of nail biting habits does not have a significant relationship with the incidence of worming in pregnant women and is not a risk factor for worm infestation in pregnant women in Langkat Regency 2019.

This is in line with Wiryada's research (2017) in Bali, that the habit of nail biting does not have a significant relationship with the incidence of *helminthiasis* in primary school children ($p = 1$ RP = 0.93 CI = 0.35-2.47). The results of this study are also in line with research conducted by the Ministry of Health of the Republic of Indonesia (2018) in Central Aceh which found that there was no significant relationship between the habit of biting the nails of pregnant women and the incidence of *helminthiasis* ($p = 0.239$ RP = 0.575).

The habit of cutting nails. Univariate analysis test conducted showed that most pregnant women have a habit of cutting nails at least once a week as many as 161 people (92%), but there are as many as 14 people (8%) pregnant women do not cut nails routinely at least once in a week for aesthetic reasons. The results of the bivariate test obtained a p value of 0.407 ($p > 0.05$).

Raw food consumption habits. Univariate analysis test conducted showed that most pregnant women rarely consume raw food in this case are vegetables and vegetables, as many as 146 people (83.4%), but as many as 29 people (16.6%) pregnant women often consume raw food (vegetables / vegetables). The bivariate test results obtained p value of 0.079 ($p > 0.05$).

Indecision of open defecation. Based on the results of univariate analysis of 149 people (85.1%) pregnant women have bowel habits in the toilet, but there are 26 people (14.9%) pregnant women have bowel habits other than in the toilet. The results of the bivariate analysis test showed that the habit of open defecation showed a p value of 0.001 ($p < 0.05$). This indicated that the behavior had a significant relationship to the incidence of intestinal worms in pregnant women. The Prevalence Ratio value is 4,696 (95% CI = 1,928-11,434), this shows that pregnant women who have open defecation habit are 4.6 times more likely to experience worms than pregnant women who have bowel habit in the toilet.

V. Conclusion

Based on the results of research on the influence of behavioral factors and environmental factors on *helminthiasis* in pregnant women in Langkat Regency in 2019 as follows: 1) *Helminthiasis status*: Of the 175 pregnant women, 20 percent of pregnant women are infected with helminthiasis, the most common type of worm is *Ascaris lumbricoides*. 2) *Behavioral factors*: Behavioral factors have a significant influence on the incidence of *helminthiasis* in pregnant women, namely the habit of wearing footwear, the habit of washing hands with soap before eating and after defecation, the habit of consuming raw food and the habit of defecating in addition to toilet.

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