



Analysis of Internal Factors for the Worm Case on the Nutritional Status of Children in Roof Tile Craftsmen Areas

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Abstract

Worm is an infectious disease caused by parasites in the form of worms. Worm infections that are transmitted through soil or commonly referred to as Soil Transmitted Helminths (STH) types, namely *Ascaris lumbricoides*, *Trichuris trichuira*, *Ancylostoma duodenale* and *Necator americanus*. The purpose of this study was to analyze internal factors related to the case of worms and have an impact on the nutritional status of children in the roof tile craftsmen area in Karanggeneng Village, Boyolali Regency. This research is a quantitative study, with a cross sectional approach. The research sample was 119 respondents obtained by simple random sampling technique. Data collection techniques are interviews, observation and laboratory tests. Data analysis in this study used descriptive statistical tests and linear regression. The results of research in the roof tile craftsmen area of Karanggeneng Village, Boyolali Regency, showed that there was a relationship between the variables of hand washing ($p = 0.000$), cutting nails ($p = 0.000$), defecation habits ($p = 0.000$) on the case of worms. This study also showed that the variable eating habits ($p = 0.040$) and the case of worms were related to the nutritional status of children ($p = 0.007$).

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INTRODUCTION

Worm infection (hereinafter referred to as intestinal worms) is an environmentally based disease which is still a problem for public health in Indonesia today. More than one billion people are infected by Soil Transmitted Helminth (STH) (Freeman et al., 2015). Data from the World Health Organization (WHO) in 2019 stated that more than 1.5 billion people or 24% of the world's population were infected by worms transmitted through soil.

The prevalence of worms in Indonesia is still high, ranging from 40-60%, Brooker's Geographical Information System (GIS) states that the distribution of Soil Transmitted Helminths in Indonesia covers all islands in Indonesia, where the highest prevalence is in Papua and North Sumatra with prevalence between 50% to 80% (Dewi and Laksmi, 2017).

The prevalence of STH is 7.8%, unhygienic play habits such as open air defecation, cutting nails or eating food falling on the ground are important risk factors for Soil Transmitted Helminths infection (Kattula et al., 2014)

The phenomenon that occurs in the roof tile craftsmen area of Karanggeneng Village, Boyolali Regency, is that children under five and primary schools are mostly in direct contact with the ground, this is because many children are invited by their mothers to work as tile craftsmen. The main ingredient for roofing tiles is clay which is muddy and moist and can make a good place for the development of stomach worms.

The number of children under five in Karanggeneng Village is 767 and the results of nutritional status show that 3.3% of children under five are malnourished. Preliminary study results from soil laboratory checks in Karanggeneng Village showed that there were worm eggs and larvae of *Ancylostoma Duodenale* rabbitiform, as well as initial examination results on 5 toddlers in Karanggeneng Village showed that 1 was negative and 4 were positive for worms, namely *Ascaris Limbricoides* worms.

The purpose of this study was to analyze the internal factors associated with the case of worms and have an impact on the nutritional status of children in critical craftsman areas.

METHOD

The study was conducted using a cross sectional approach. The population in this study were all tile craftsmen who have children under five in the tile craftsman area of Karanggeneng Boyolali Village, with a population of 167 children under five. The sample in this study were 119 people, determined by the Slovin formula using simple random sampling technique.

The independent variables in this study were the habits of washing hands, cutting nails, eating habits, defecating and wearing footwear. The intervening variable or intermediate variable in this study was the case of worms. The dependent variable in this study is the nutritional status of children under five. Data collection techniques in this study were carried out by means of interviews, observation and laboratory tests.

In this study, multivariate analysis was carried out to determine the direct and indirect effects and mediation of a variable on other variables using Path Analysis.

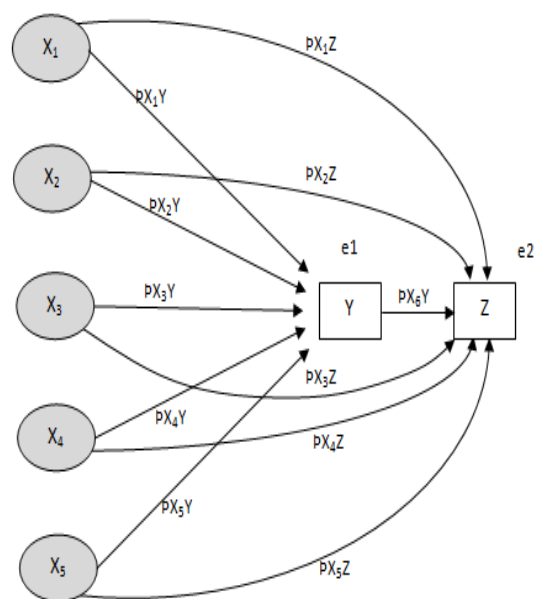


Figure 1. Path Analysis Scheme

Based on the analysis scheme above, the following equation is made:

$$Z = PX_1Z + PX_2Z + PX_3Z + PX_4Z + PX_5Z + PX_6Z$$

$$Y = PX_1Y + PX_2Y + PX_3Y + PX_4Y + PX_5Y$$

RESULTS AND DISCUSSION

This research was conducted in the roof tile craftsmen of Karanggeneng Village, Boyolali, with the aim of knowing the internal factors associated with the case of worms and having an impact on the nutritional status of children in the roof tile craftsmen area.

Table 1. Univariate Analysis of Frequency Distribution Internal Factors (washing hands, cutting nails, wearing footwear, eating, and defecating habits) (n=120)

InternalFactor	Category	Frequency
Washinghands	Less	0 (0)
	Sufficient	26 (21.7)
	Good	94 (78.3)
Cuttingnails	Less	2 (1.7)
	Sufficient	23 (19.2)
	Good	95 (79.2)
Wearingfootwear	Less	0 (0)
	Sufficient	24 (20.0)
	Good	96 (80.0)
Eating	Less	0 (0)
	Sufficient	16 (13.3)
	Good	104 (86.7)
Defecating	Less	0 (0)
	Sufficient	26 (21.7)
	Good	94 (78.3)

Based on the data in table 1 shows that of the 120 respondents, most of them have good hand washing habits, namely 94 respondents (78.3%), the majority of the habit of cutting nails is good, a number of 95 (79.2%) the habit of using stiff mats, the majority is good, numbering 96 (80%), eating habits, a good majority of 104 (86.7%) and the majority of good defecation habits of 94 respondents (78.3%).

The risk factor for worm infection is caused by a lack of habit of washing hands before eating, possibly related to the worm status as a food borne disease. This causes the prevention of worms in addition to improving the habit of washing hands before eating, it can be done by improving the hygiene and sanitation of food processing. This result is in line with research conducted by Ali (2016) who found that the majority of vegetable farmer workers were positively infected with *Ascaris* worms with a lack of hand washing habits.

Erna's research (2015) states that there is a relationship between the habit of washing hands and worms. The habit of washing hands using soap has a greater chance of avoiding the risk of transmitting STH infections (Nuryanti & Subrata 2018). The habit of washing hands before and after eating is less likely to be infected with STH (Sofiana, 2018).

The habits of children in cutting nails in this study were seen from the time they cut their nails, how to cut nails and maintenance of nails. The condition of the nails is associated with worms because the nails are one of the places where worms enter the body easily. This is in accordance with previous research by Rowardho (2015) which states that in conditions that are not short clean nails reach 64.3% and those with clean short nails reach 97%. There was a relationship between the

condition of the nails and the presence of nail worm eggs (p = 0.006 and OR: 17.778).

Another study conducted by Ranjan et al. (2015) describe the relationship between walking barefoot outdoors and hookworms but the reason for *Trichuris* infection is still unclear. This Delhi study showed that although not significant, the sample who did not wear footwear when outdoors also had a 1.27 times higher chance (95% CI: 0.57, 2.84; p = 0.555) of infection compared with those who wore footwear.

The results of research by Anwar (2014) stated that the relationship between the use of footwear and intestinal worms infection based on statistical tests, there was no significant relationship between the use of footwear and intestinal worm infection (*Soil Transmitted Helminths*) in SDN 25 and 28 Purus students who were respondents.

This study as a whole is in line with Anwar's research (2013), the probability value for the relationship between the variable hand washing habits is 0.235, nail hygiene is 0.564, the use of footwear is 0.133, and the habit of bathing with intestinal worm infections is 0.753. Sari's research (2014) shows that there is a significant relationship between the habit of washing hands before eating and after defecating using soap and STH infestation (p value = 0.002).

Another factor related to worm infection is the habit of defecating in which defecation is assessed from the place of defecating, washing habits and washing hands after washing. The habit of defecating most closely related to worms is the habit of washing hands after defecating.

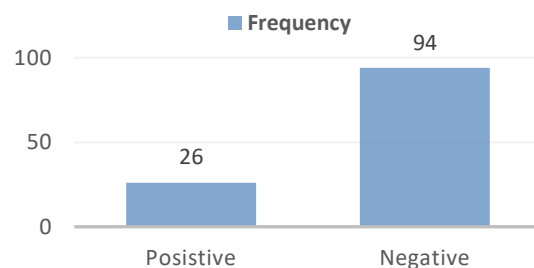


Figure 2. Frequency distribution of worm case in children in roof tile craft areas (n = 120)

Figure 2 shows that the majority of worms were negative, namely 94 respondents (78.3%), and the rest were positive, namely 26 respondents (21.7%). This can be caused by internal factors that show generally good results.

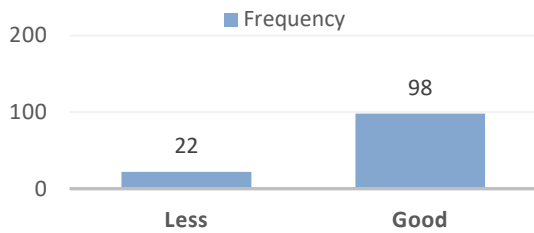


Figure 3.Frequency distribution of nutritional status of children under five(n=120)

Figure 3 shows that the majority of respondents in the study had a good nutritional status. The result is that 98 of all respondents or as much as 81.7% have good nutrition and the remaining 22 respondents have less nutritional status (18.3%).

Table 2. Bivariate analysis - the results of the internal factors analysis (eating habits, washing hands, cutting nails, defecating and wearing footwear) with the case of worms in children in roof tile craftsmen areas (n = 120)

Variable	BetaCoefficients	p value	Conclusion
Wash hands with worm infections in children	0.454	0.000	There is a relationship between hand washing habits and worm infections in children
Cut nails with worm infections in children	0.248	0.000	There is a relationship between nail clipping and worm infections in children
Footwear with worm infections in children	0.059	0.104	There is no relationship between the habit of wearing footwear with worm infections in children
Feeding habits with worm infections in children	0.039	0.126	There is no relationship between food habits and worm infections in children
Defecating habit with worm infections in children	0.218	0.000	There is a relationship between defecating habits and worm infections in children

The results of the study in table 2 indicate that the internal factors of hand washing, cutting nails and bowel habits are related to the case of worms in children in the roof tile craftsman area. The use of footwear and eating habits were not related to the case of worms in children.

Prevention and eradication of worms, among others, can be done by getting into the habit of washing hands before eating and after each time having a bowel movement using soap and water. The habit of washing hands using soap before eating is less risky for worm infection (Fitri, 2012). The habit of washing hands with a value of p (0.000), which means that there is a relationship between hand washing habits and worm infections in children. This is in line with Strunz's (2014) study that washing hands before and after eating is likely to reduce *Ascaris* worm infection with a value of OR = 0.38.

The habit of cutting nails is closely related to the hygienic aspect. If the nails are long and unclean, the dirt on the hands is accompanied by long and

dirty nails, if they are not washed before consuming food, causing worm eggs to enter the body. Sari's research results (2014) show that there is a significant relationship between nail cutting habits and STH infestation (p value = 0.007).

Defecation (defecating) that is not good and in any place even though you already have a family toilet is thought to be a risk factor for hookworm infection. Theoretically, hookworm eggs require soil media for their development. The presence of hookworm eggs in the feces of patients who do defecation in open ground increases the chance of catching hookworm larvae in the surrounding community. Habits such as defecating around the house, eating without washing hands, playing on the ground around the house, especially children under five are constantly getting reinfection. The results of research conducted by Sumanto (2010) show that there is a significant relationship between family defecation habits and the case of worm infection in schoolchildren (p value = 0.010) where

the habit of defecating in the garden is still mostly practiced by family members.

Table 3. Linear regression model 1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.991 ^a	.982	.981	.05703

Predictors: (Constant), eating habits, washing hands, cutting nails, defecating and wearing footwear

Based on the results of the linear regression analysis model 1, it can be concluded that internal factors (eating habits, washing hands, cutting nails, defecating and wearing footwear) are associated with the case of worms in children in the roof tile craftsmen area of 98.2% (based on the results of R square 0.982), the remaining 1.8% is other factors not examined in this study. The value of e1 in model 1 is $e1 = \sqrt{1-0.982} = 0.018$. Another study by Islamudin (2017) shows that the prevalence of children infected with Soil Transmitted Helminth is 11.3% and good personal hygiene behavior is 54.9%. When viewed from the behavior associated with worm infections, namely, cutting nails well 60.0%, washing hands well 57.7%, playing with the ground 62.0%, good waste processing 56.3%, good house floor processing 73.2%, good latrine processing 69.0%, water management good clean 78.0%.

Table 5. Multivariate Analysis - Table Results of Analysis Relationship between internal factors (eating habits, washing hands, cutting nails, defecating and wearing footwear) with the case of worms and having an impact on the nutritional status of children in roof tilecraftsmen areas (n=120)

Variable	BetaCoefficients	p value	Conclusion
Wash hands with nutritional status of children	0.087	0.781	There is no relationship between hand washing habits and children's nutritional status
Cut nails with the nutritional status of the child	0.036	0.884	There is no relationship between nail cutting habit and children's nutritional status
Footwear with children's nutritional status	0.030	0.788	There is no relationship between the habit of wearing footwear and the nutritional status of children
Eating habits with the nutritional status of the child	0.394	0.040	There is a relationship between eatinghabits and children's nutritional status
Defecation habits with the nutritional status of children	0.078	0.718	There is no relationship between defecation habits and children's nutritional status
Worm infection with children's nutritional status	1.232	0.007	There is a relationship between worm infection and children's nutritional status

The results showed that the internal factors of eating habits had an effect on the nutritional status of children. The factors of washing hands, cuttingnails, wearing footwear and defecating

Table 4 . Linear regression model2

Mod el	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.770 ^a	.593	.572	.25430

Predictors: (Constant), worm, eating habits, washing hands, cutting nails, defecating and wearing footwear

Based on the results of the linear regression analysis model 2, it can be concluded that internal factors (eating habits, washing hands, cutting nails, defecating and wearing footwear) are related to the nutritional status of children in the roof tile craftsmen area by 59.3% (based on the results of R square 0.593), the remaining 40.7% are other factors not examined in this study. The value of e1 in model 1 is $e1 = \sqrt{1-0.593} = 0.407$.

Research by Roebiakto (2016) there is a significant relationship between nutritional status and worm infection obtained $p = 0.044$ with a value of $OR = 3.10$. Another study by Nurcahyo (2010) states that the hygiene of mothers in the process of feeding their children affects infectious diseases such as diarrhea. Toddlers who suffer from infectious diseases such as diarrhea for a long period of time cause weight loss so that it affects their nutritional status. This is in line with Debby's (2012) research which states that maternal knowledge about nutrition and environmental sanitation hygiene has a close correlation.

habits are not related to the nutritional status of children. Furthermore, the case of worms in children is related to the nutritional status of the child.

The dietary factor is one of the factors that has a direct effect on a person's nutritional condition because the consumption of food that is not in accordance with the body's needs, both quality and quantity can cause nutritional problems. In addition, research on nutrition carried out by Handayani et al. (2016) argued that improving nutrition programs should consider access to food itself, including transportation policies in food distribution and local food systems to facilitate healthy food and economic status related to the ability to buy food in urban peripheries.

A good diet consists of the consumption of quality foods, namely the consumption of healthy and varied foods, and the consumption of sufficient food in terms of quantity followed by applying the correct eating behavior. If this is implemented, eating will result in a normal nutritional status of the child. This is in accordance with previous research by Sari (2016) which shows that eating patterns have a relationship with nutritional status.

Another study by Waladow (2013) shows that 51 respondents have a good diet with a good nutritional status, 4 respondents have a good diet with poor nutritional status, 8 respondents have a bad diet with good nutritional status, and 87 respondents have a diet with poor nutritional status. In conclusion, there is a strong relationship between diet and nutritional status in children aged 3-5 years, with p (0.000).

The case of worms in children is related to the nutritional status of the child. Worm infection can cause nutritional losses in the form of lack of calories and protein and loss of blood. Besides being able to inhibit physical development, intelligence and work productivity, it can also reduce body resistance so that it is susceptible to other diseases (Kemenkes RI, 2006). As a result of consuming nutrients and sucking blood by worms, the longer the body will lack nutrients needed by the body, causing the patient's body to become thin and his nutritional status decreases. This has an impact on the child's nutritional status which is still low. These results indicate that there is a statistically significant relationship between STH infection and nutritional status. The results of this study correlate with several previous studies, including the results of research conducted by Simarmata et al. (2015) at 3 primary schools in Simpang Empat and Kabanjahe District, Karo District, North Sumatra, which stated that there was a significant relationship between STH infection and nutritional status ($p = 0.001$).

Another study conducted by Abdulhadi (2019) explained that there was a significant relationship between the nutritional status index of TB / U ($P = 0.031$) and BW / U ($P = 0.483$) on infection with Soil Transmitted Helminths. The results of the research by Annisa (2018) showed that there was a significant relationship between Soil Transmitted

Helminths infection and nutritional status ($p = 0.036$; OR = 3.167; 95% CI; 1,163-15,237).

CONCLUSION

The habit of washing hands, cutting nails, and habit of defecating are significantly associated with the case of worms in children in the roof tile craftsmen area. The use of footwear and eating habits were not significantly associated with the case of worms in the roof tile craftsmen area. Food habits significantly affect the nutritional status of children in the roof tile craftsmen area. The habit of washing hands, cutting nails, wearing footwear and defecating was not significantly related to the nutritional status of children in the roof tile craftsmen area. There is a relationship between the case of worms and the nutritional status of children in the roof tile craftsman area.

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