

# THE RELATIONSHIP BETWEEN INTESTINAL WORM INFECTION AND STUNTING IN ELEMENTARY SCHOOL CHILDREN IN SOUTH CENTRAL TIMOR REGENCY, EAST NUSA TENGGARA

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## ABSTRACT

**Background:** Intestinal worm infection is one of the causes of stunting in school-age children. Helminthiasis or worm infection caused by worm parasites endanger the child's age health. This study aimed to analyze the relationship between intestinal worm infection and the incidence of stunting in elementary school children in South Central Timor Regency, East Nusa Tenggara.

**Subjects and Method:** This was a cross-sectional study conducted in West Amanuban District, South Central Timor Regency, East Nusa Tenggara, from May to October 2021. A total of 160 elementary school children was selected at random. The dependent variable was stunting. The independent variable was intestinal worm infection. The data were collected using anthropometric measurement for height and fecal examination in the laboratory. The data were analyzed using simple logistic regression.

**Results:** Intestinal worm infection increased the risk of stunting in elementary school children (OR= 7.14; 95% CI= 3.33 to 16.67; p< 0.001).

**Conclusion:** Intestinal worm infection increases the risk of stunting in elementary school children.

**Keywords:** infection, worm, stunting

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## BACKGROUND

Nutritional problems in elementary school children are problems that can affect their learning achievement and development. Nutritional problems in school children include low nutritional status, poor nutrition, obesity, and stunting. Stunting or shortness is a condition of failure to thrive in infants (0-11 months) and children under five (12-59 months) due to chronic malnutrition, especially in the first 1,000 days of life, so children are too short for their age. Malnutrition occurs since the baby is in the womb and the early days after the baby is born, but the

stunting condition only appears after the child is two years old. (Ramayulis et al., 2018).

Data on stunting in Indonesia based on the results of Riskesdas shows around 37% (9 million) children, and in the Province of East Nusa Tenggara, there are 319,100 children experiencing stunting (Kemenkes., 2013). Based on Riskesdas 2018, although the prevalence of stunting in East Nusa Tenggara (Kemenkes, 2018) shows a reduction of 30.8%, the Province of NTT has a high percentage of stunting under five, namely 42.6%. The prevalence of stunting in infants

under five years of age (toddlers) in East Nusa Tenggara reaches 40.3%, the highest compared to other provinces in Indonesia. This figure is above the national stunting prevalence of 29.6%. The prevalence of stunting in NTT consists of infants with concise 18.0% and 22.3% short categories. Stunting is caused by multidimensional factors, including poor nutritional parenting practices, including the lack of knowledge of mothers about health and nutrition before and during pregnancy and after the mother gives birth (Ramayulis et al., 2018).

Soil-transmitted helminths (STH) infection is an intestinal worm infection that can significantly impact health, causing direct or indirect losses. STH can directly affect the intake, absorption, and metabolism of food into the body. Cumulatively, STH can cause failures in the form of decreased calories and protein, and blood loss. In addition to losses in nutritional deficiencies, STH can inhibit physical development, intelligence, and work productivity and reduce resistance and immunity so that they are susceptible to other diseases and infections (Kemenkes, Dikjen PP&PL RI, 2012). Worms are found in areas with high humidity, especially in groups of people with poor personal hygiene and environmental sanitation. The most important types of worms are roundworms (*Ascaris lumbricoides*), hookworms (*Ancylostoma duodenale* and *Necator americanus*), and whipworms (Dina and Mardiana, 2014).

The study results in Southwest Sumba Regency showed an effect of STH worm infection on anemia in elementary school children, where the

positive STH stool examination results were 42 (40.0%) and 63 (60.0) negative. Types of STH worms are known as *Ascaris lumbricoides* (31.0%), *Trichuris trichiura* 9 (21.4%), Hookworm *Ancylostoma duodenale* 1 (2.4%), Hookworm *Necator Americanus* 3 (7.1%), mix AL and TT 16 (38.1%). The results showed that the incidence of anemia in elementary school children in Southwest Sumba Regency was 57.1%. There is an effect of STH infection on the incidence of anemia in elementary school children with an OR of 27.3 (Paun et al., 2019). Meanwhile, Mau Fridolina's research (2017) in West Sumba and Central Sumba districts showed that 568 (91.0%) elementary school children were infected with worms. The highest prevalence was a *Lumbricoides* infection 28.5%, followed by *T. Trichiura* infection 5.9%, and mixed infection 65.6% in West Sumba Regency. The highest prevalence was *A. Lumbricoides* infection 30.0%, followed by *T. Trichiura* infection 17.1% and mixed infection 46.8% in Central Sumba Regency.

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## SUBJECTS AND METHOD

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### 1. Study Design

This study used a cross-sectional design. The research was conducted in elementary schools in West Amanuban District, South Central Timor Regency, from May to October 2021.

### 2. Population and Sample

The research sample consisted of 160 elementary school children in West Amanuban District, South Central Timor Regency. Sampling with a simple random technique.

### 3. Study Variables

The dependent variable is stunting.

The independent variable is an intestinal worm infection

#### 4. Operational Definition of Variable

##### Stunting

Definition: The result of measuring height using Flip-chart Stunting.

Measurement scale: Nominal.

##### Intestinal worm infection

Definition: The presence or absence of worm eggs/larvae in the feces based on the results of laboratory examinations.

Measurement scale: Nominal.

#### 5. Instruments Study

Data were collected using anthropometric measurements for height and stool examination in the laboratory.

#### 6. Data analysis

Data analysis used simple logistic regression.

### 1. Univariate Analysis

**Tabel 1. Characteristics Sample**

Characteristics	Frequency	Percentage
<b>Type of Worm</b>		
Ascariasis lumbricoides	14	30.4
Hookworm	30	65.2
Ascariasis lumbricoides dan Hookworm	2	4.30
<b>Primary School</b>		
SD Inpres Nulle	31	19.37
SD Inpres Neonmat	71	44.37
SD GMIT Nulle	58	36.26
<b>Laboratory Result</b>		
Positive	46	29.00
Negatif	114	71.00
<b>Measurement Result</b>		
Stunting	84	52.5
Normal	76	47.5

**Tabel 2. The Incidence of Intestinal Worm Infection Based on Nutritional Problems (Chi Square)**

Intestinal Worm Infection	Stunting				OR	p
	Yes		No			
	N	%	N	%		
Positive	38	82.6	8	17.4	7.02	<0.001
Negatif	46	40.4	68	59.6		

### 7. Research Ethics

The research was carried out by seeking approval from schools and parents, and elementary school children, maintaining confidentiality, without names, and followed by a request for approval from the ethics committee of the Health Polytechnic of the Kupang Ministry of Health.

## RESULTS

This research was conducted at 3 (three) elementary schools in Amanuban Barat District, Timor Tengah Selatan Regency, namely the Nulle Inpres Elementary School located in Tublopo Village, Neonmat Inpres Elementary School located in Nulle village, and GMIT Elementary School in Nulle village.

Table 2 above shows that most elementary school children with intestinal worm infections (82.6%) were stunted, and 40.4% were negative with

stunting. In comparison, 17.4% of children were positive with no stunting/normal and 59.6% negative norm/not stunting.

**Tabel 3. The Relationship between Intestinal Worm Infections with Nutritional Problems (Stunting) in Elementary School Children**

Variable	OR	95% CI		P
		Lower limit	Upper limit	
Intestinal Worm Infection	7.14	3.33	16.67	<0.001

Table 3 above shows the results of the Simple Logistics Regression statistical test  $p < 0.001$ . Then there is a significant relationship between intestinal worm infection and the incidence of stunting in elementary school children; with OR= 7.14, then intestinal worm infection is at risk of increasing stunting in elementary school children.

### DISCUSSION

One of the intestinal helminth infections is Soil-Transmitted Helminths (STH). (STH) is an intestinal nematode that requires soil media in its life cycle. Worms belonging to STH are *Ascaris lumbricoides*, *Trichuris trichiura*, hookworm, or hookworms (*Ancylostoma duodenale* and *Necator americanus*), and *Strongyloides stercoralis* (Supali et al., 2008). Soil-transmitted helminths (STH) are a group of parasitic nematodes that cause infection in humans through contact with parasitic eggs or larvae that develop in warm and moist soil in tropical and subtropical countries the world (Bethony et al., 2006).

The study results in West Amanuban District, South Central Timor Regency, showed that the laboratory examination results of 160 elementary

school children were 46 (29.0%) positive for intestinal worm infections. The most common types of worms (65%) were HW and Ascariasis L 30.4% and Mix HW and AL 4.3%. The results of this study differ from the results of research in Southwest Sumba Regency, where the incidence of STH worm infection is 40%, and the most common type of worm is *Ascaris lumbricoides* (31.0%), *Trichuris trichiura* 9 (21.4%), Hookworm *Ancylostoma duodenale* 1 (2.4%), Hookworm *Necator americanus* 3 (7.1%), mix AL and TT 16 (38.1%). (Paun et al., 2019). Another thing is Mau's research (2017) in West Sumba and Central Sumba, which showed that 568 elementary school children (91.0%) were infected with worms. The highest prevalence was *A. Lumbricoides* infection 28.5%, followed by *T. Trichiura* infection 5.9% and mixed infection 65.6% in West Sumba Regency, and the highest prevalence was *A. Lumbricoides* infection 30.0%, followed by *T. Trichiura* infection 17.1% and mixed infection 46.8% in Central Sumba Regency (Mau, 2017). In contrast to the Olin et al. (2020) in Kupang Regency, where the incidence of intestinal worm infection in children under five with nutritional problems (malnutrition and malnutrition) is 42%, mostly

(79.4%) are Ascariasis Lumbricoides worms. Another study in Palembang by Annisa et al. (2018) showed that of the 107 subjects examined, 27.1% were infected with STH.

This worm can infect humans if the infective larvae are ingested or penetrate the skin, usually on the skin of the feet. If the filariform larvae enter through the skin and migrate through the skin or what is known as cutaneous larva migrans, they finally find a way out in the form of veins and enter the blood circulation. This can occur due to the habit of school children playing on the ground and rarely using footwear when out of the house.

The relationship between intestinal worm infection and the incidence of stunting in elementary schools in Timor Tengah Selatan district is  $p < 0.001$ , so there is a significant relationship between intestinal worm infection and the incidence of nutritional problems (stunting) in elementary school children. The study results are the same as those of Paun et al. (2019), which showed that STH infection had a significant effect on the incidence of anemia in schoolchildren with  $p = 0.001$ . The results of other studies have a relationship between STH infection and nutritional status of children under five; the results of statistical tests using Chi-square obtained  $p = 0.037$  (Annisa et al., 2018).

STH worm infection can affect food intake, absorption, and metabolism into the body. Cumulatively, STH can cause decreased calories and protein and blood loss. In addition to losses in nutritional deficiencies, STH can inhibit physical development, intelli-

gence, and work productivity and reduce resistance and immunity to be susceptible to other diseases and infections (Kemenkes RI, 2012).

The incidence of intestinal worm infection in elementary school children is (29.0%) positive for intestinal worm infection. The most common types of worms (65%) were Hookworm (HW) and Ascaris L 31% and Mix (HW and AL) 4%. The incidence of nutritional problems (stunting) in elementary school children is 52%, and 48% are normal/not stunting. There is a positive relationship between intestinal worm infection and nutritional problems (stunting) in elementary school children.

The program manager at the Community health center should provide regular anti-helminth drug services every six months to elementary school children—socialization and health promotion about nutritious food to elementary school children in every school and the community.

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#### **ACKNOWLEDGMENT**

The researcher would like to thank the Regent of South Central Timor, the Principals of Elementary Schools in the West Amanuban District, for their permission and support for implementing this research.

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#### **AUTHOR CONTRIBUTION**

Carry out data collection, data processing, and data analysis, as well as compiling research reports and publications

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#### **FUNDING AND SPONSORSHIP**

This research is sponsored by the Center for Excellence in Higher Education

and funded by the DIPA of the Health Polytechnic of the Kupang Ministry of Health for the 2021 Fiscal Year.

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#### CONFLICT OF INTEREST

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This research was conducted with the approval of the authorities and parents, and elementary school children, so there is no conflict of interest.

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