



**The Effect of Personal Hygiene Environmental Sanitation and Characteristics of Children with Worms Infection in Elementary Schools in Tulehu Village, Salahutu District, Central Maluku City**

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**ABSTRACT**

Worms is a contagious disease which is a public health problem. Worms can be transmitted through soil, namely *Ascarislumbricoides* (roundworms), *Trichuristrichiura* (whipworms) *Ancylostomaduodenale* and *Necatoramericanus*, (hookworms). The age of children is a group at risk of getting worm infection because children's play activities are mostly on the ground and rivers. The most infected age group is at the age of 7-11 years or at the

elementary school stage. This study aims to analyze the effect of personal environmental sanitation and hygiene characteristics of children against worm infections in elementary school children in Tulehu Village, Salahutu District, Central Maluku City.

The results showed that the variables associated with the incidence of worms, namely environmental sanitation (home and school environment), personal hygiene (nail hygiene, use of footwear and hand washing habits), characteristics of children (knowledge, attitudes and income of parents) with each each  $\rho$  value = 0.0001 while the unrelated variable is gender with  $\rho$  value = 0.2940.

The conclusion of this research is the proportion of worm disease in 5 elementary schools in Tulehu village (72.77%). Environmental sanitation conditions, personal hygiene, child characteristics related to the incidence of worms.

**Keywords:** *environmental sanitation, personal hygiene, worms, students*

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## INTRODUCTION

Wormy disease is one of the main problems and a threat to the world community. Based on data from the World Health Organization, WHO (World Health Organization) in 2018 recorded that around 1.5 billion people in the world or the equivalent of 24 percent of the world's population as a whole have worm infections and more than 267 million children of pre-school age and 568 million children of school age residing in an area at risk where this parasite is easily infected and requires treatment and preventive measures. Indonesia is among the top ten countries that require special handling of scabs. WHO noted that Indonesia is in third place, after India and Nigeria. WHO said that 55 million Indonesian children still need worm prevention measures ([http:// www.who.int/en/news-room/factsheets/detail/ soil-transmitted-helminth-infections](http://www.who.int/en/news-room/factsheets/detail/soil-transmitted-helminth-infections)).

In Indonesia, worms are still a contagious disease which is a public health problem. Worms can be transmitted through soil, namely *Ascarislumbricoides* (wormfish), *Trichuristrichiura* (whipworms), and *Ancylostomaduodenale*, *Necatoramericanus*, (mining worms). Worms occur due to worm infection in the human body. Larvae or worm eggs can enter the body through soil transmitted helminthiasis. In addition, unclean water, food, dirty nails, and contaminated objects can help spread worms or larvae. These worms can result in decreased health, nutrition, intelligence and productivity of sufferers so that economically cause many losses. Worms cause loss of carbohydrates and protein as well as blood loss, thus reducing the quality of human resources (Ginting, 2003)

The attachment to Regulation of the Minister of Health Number 15 of 2017 concerning the Prevention of Worms states, the prevalence of worms in Indonesia is generally still very high, especially in underprivileged population groups, with poor environmental sanitation, poor hygiene habits. The prevalence of worms varies between 2.5% - 62%. The central government sets a target for deworming prevention programs in the form of worm reduction in 2019. Indicators in the attainment of deworming are a decrease in the prevalence of worms to below 10% (ten percent) in each district or city. This number increases if the prevalence of worms is calculated among school-age children, even in certain areas with poor sanitation, the prevalence becomes 80 percent (Kemenkes RI, 2017)

The age of children is the group at risk of getting infected with worms because the children's play activities are mostly on the ground and rivers. The most infected age group is at the age of 7-11 years or at the elementary school stage (Naili, 2017)

Primary school age children are an asset of the nation's future human resources whose quality must be maintained. One of them is that the child must be protected from a worm infection. worm infections have a negative impact on health and mental development and can



even hinder child development, disability and blindness. If this happens to elementary school children, the nation will experience the loss of quality human resources (Sandy, Sumarni, Soeyoko, 2015)

Worms in primary school students in particular and children in general are not trivial matters. Although worms are not deadly, they can reduce the quality of life of the sufferer, even result in less blood (anemia) and in children it can lead to ignorance. According to Maman Soleman, there are quite high school children with intestinal worms. Usually a student who is infected with worms will experience a deficiency of hemoglobin (Hb) up to 12 grams per cent, and this will have an impact on the ability of the blood to carry oxygen to various body tissues, including to the brain. As a result, worms suffer from decreased endurance and metabolism of brain tissue. In fact, in the long term, sufferers will experience physical and intellectual weakness (Kartini, 2016)

According to the results of the worm disease research conducted by Sukfitrianty (2016) on children of the Wora Inpres 1 Elementary School in Bima Regency, the prevalence of worms was recorded at 59.3%. Whereas the distribution of worms according to the type of worms in elementary school children with *Ascaris lumbricoides* infection was 55.6%, *Trichuris trichiura* 22.2%, and Hook-worm 22.2% (Sukfitrianti, 2016)

Worms are transmitted through food, feet which are directly in contact with the soil containing worm vectors, because they do not wear footwear. In addition, the habit of defecating in any place can also transmit worms. So there are several factors related to worms in children, namely the habit of washing hands, the habit of wearing footwear, nail hygiene, the habit of playing on the ground, ownership of a latrine, house floors, and the availability of clean water (Sofia, 2017).

Based on the results of research conducted by Sri Kartini (2016), there is a significant relationship between the habit of washing hands before eating, nail hygiene, toilet ownership and worm infection in children. Meanwhile, in other studies found a significant relationship between the availability of clean water and ownership of latrines with worms.

The incidence of worms cannot be separated from the sanitary conditions. Sanitation has a close relationship in worm transmission. Based on data from the Central Statistics Agency in 2017, the percentage of households with proper sanitation conditions in rural areas was 62.14% in 2016, increasing to 67.80%, increasing in 2017 to 67.89% (Badan Pusat Statistik, 2017)

Another factor related to the incidence of worms is drinking water. The percentage of households according to access to “quality” drinking water in Maluku Province in 2015 reached 64.96%, in 2016 it increased to 67.20% and in 2017 it became 68.34%. For the coverage of drinking water in Tulehu village in 2018 it reached 17.84 %, refilled water / depot reaches 13% and the need for clean water alone reaches 21.2%, latrine coverage reaches 31.72 and there are still 68.28% who do not have access to latrines and spal reaching 55% (Badan Pusat Statistik, 2017)



Based on the results of the EHRA study in Central Maluku Regency for Tulehu village, 54.9% of the community still practice open defecation and 45.1% of the community has not practiced open defecation. For this type, the number of toilets that are not safe is 847 units, while those that are said to be safe are 2,383 units with septic tank

The Faculty of Medicine, Gadjah Mada University conducted research on worms in 11 Tulehu Elementary School children, Salahutu district, Central Maluku Regency in 2016, the prevalence of *Ascaris lumbricoides* worms 31%, *Trichuris trichiura* 36%, and Hookworm 30%, others 3% (Dinkes Maluku Tengah, 2016) Based on data from the ten most diseases at the Tulehu Community Health Center in January 2018, deworming is classified as high with 97 people, 54 men and 43 women.

Tulehu Village is a village in Salahutu Subdistrict, Central Maluku Regency, Maluku Province which is a coastal area where most of the population has the main livelihood as 295 fishermen and 974 farmers. throwing feces on the beach. The total population of Tulehu Village is 28,761 people, consisting of 14,222 men and 14,539 women, 2998 family heads. Of this population, 2,629 people are children who are registered in elementary schools (Kantor Desa Tulehu, 2019 )

Preliminary survey in five public elementary schools in Tulehu Village The location of the five elementary schools in areas that are often inundated by water causes high humidity levels. The conditions of the school and home environment are still inadequate, such as dirty and smelly school toilets / water closet, limited availability of clean water, unavailability of soap and the habit of students playing with sand and dirt in the school yard.

The parents of the fifth elementary school students have different economic conditions. This can be seen from a job perspective, some work as fishermen, laborers, traders, farmers, private employees, civil servants and so on. In terms of education, there are variations from elementary school graduates to undergraduate degrees. Judging from the diversity of jobs and education, it can be said that parents of elementary school students have different income levels.

Meanwhile, the number of students registered at Tulehu 1 State Elementary School is 78 students, 140 students from 3Tulehu Public Elementary School and 163 Tulehu 4 Public Elementary School students, 212 students at State Elementary School 11, 196 Public Elementary School 12 students. (Data Sekunder, 2019)

## **METHOD**

This research is an analytical study with a cross sectional design. The number of samples in this study were 202 students at 5 elementary schools in Tulehu Village, Central Maluku Regency. The samples were determined for each school using the proportional sampling method. The school that was chosen as the research location was due to the fact that the five schools were



often inundated by water, the number of students enrolled was the largest compared to other schools and the livelihoods of the students' parents varied. Data were collected by interview method using a questionnaire and examination of student feces and samples of house and school soil in the laboratory.

## RESEARCH RESULT

Tulehu as an area of the capital city of Salahutu sub-district with an area of 151.82 km<sup>2</sup> is located in the eastern part of the island of Ambon with 14 hamlets, Tulehu as the entrance to Central Maluku district, so that the sea port facilities in the transit area between islands are Transaparua, Seram, Haruku, Nusa Laut and other islands. With a land area of 52,163 Km<sup>2</sup> and an area of the ocean 48,725 Km<sup>2</sup>. climatologically Tulehu Village, Salahutu District, Central Maluku Regency is dominated by relatively high rainfall, namely the rainy season which starts in October and the dry season in April with an average rainfall ranging from 2000-4000 mm, the highest rainfall (> 4000 mm / year) is concentrated in hilly paths and the lowest land unit with a height of < 500 meters dpal with air temperatures ranging from 25.8 C<sup>0</sup>-27.2 C<sup>0</sup>, rainfall between 3000-4000mm / year and > 9 wet months.

The availability of clean water can be said to be quite good, because almost the entire area is covered by clean water services by the Drinking Water Company of Central Maluku district and there are also many other sources of clean water in the form of rivers, traditional dug wells, electric pump wells as a source of clean water for families.

**Table 1 Population Distribution by Age Group and Gender in Tulehu Village in 2020**

No.	Age Group (Years)	Gender		Total	%
		Male	Female		
1.	0-4	519	527	1046	3,63
2.	5-14	1962	1954	3916	13,57
3.	15-29	5396	5557	10953	37,97
4.	30-49	4655	4748	9403	32,59
5.	50-74	1641	1756	3397	11,78
6.	> 74	84	50	134	0,46
<b>Total</b>		<b>14257</b>	<b>14592</b>	<b>28.849</b>	<b>100,0</b>

Source: Profile of Tulehu Village, 2019

The total population of Tulehu Village, Central Maluku Regency is 28,849 people. Of these, 14,257 males and 14,592 females and the largest population aged 15-29 years (10,953 people).



Tulehu Village has several health facilities to serve the community, namely 1 unit of the Umarella Regional General Hospital, 1 unit of outpatient Community Health Center and 17 Posyandu units scattered throughout the Rukun Tetangga / Rukun Warga.

The existing health facilities are very beneficial for the Tulehu community and people from other villages because Tulehu Village is a transit village / place for speedboats to and from other villages in the archipelago.

Based on Sanitation, the Respondents' home environment who did not meet the requirements was (144 houses) 71, 29%. while the house sanitation that fulfilled the requirements was 28.71%.

Respondents' environmental sanitation was seen from the cleanliness of the house, ownership of latrines, ownership of waste water disposal facilities, ownership of clean water sources and ownership of trash cans.

Based on the Distribution of Respondents' Nail Hygiene, it can be seen that the highest percentage is in the habit of cleaning nails that is rarely as many as 137 respondents (67, 82%) while the habit of cleaning nails that often is 65 respondents (32.18%). Respondents who rarely clean their nails can be seen when observing the respondents' nails are dirty and long and the habit of cleaning their nails in a month is only 1-2 times.

Based on the distribution of the use of footwear, the highest percentage of respondents was in the habit of respondents using rare footwear as many as 128 people (63, 37%) while in the habit of using footwear frequently as many as 73 people (36, 63%). The number of respondents who rarely use these footwear, 35 of whom have the habit of removing their footwear at school during recess, 50 respondents do not use footwear when playing the ground at home and 43 respondents have the habit of removing their footwear at school during recess and taking off their footwear at home playing land.

Based on the distribution of respondents' hand washing habits, the highest percentage was the respondents' habit of washing their hands which was less than 38.61%, while the lowest percentage was 24.26% of the respondents' hand washing habits. big and after playing always wash your hands with water but not running water and do not use soap.

Based on the Respondents Knowledge Distribution, the highest percentage was in the respondents' knowledge which was less than 52.97%, while the lowest percentage was on the respondent's good knowledge of 14.85%. The knowledge of the respondents studied was about the types of worms that interfere with health, transmission of worms, symptoms of children suffering from worms and how to prevent worms.

Based on the Distribution of Respondents' Attitudes, the highest percentage was in the attitude of respondents who were less at 51, 98% while the lowest percentage was for good respondent attitudes of 15.84%. The less attitude of respondents was shown by their responses that disagreed and strongly disagreed with some questions related to the effort. prevention of worms.



Based on the Sex Distribution of Respondents, the highest percentage was female gender at 51.49% while male gender was 48.51%. According to the results of observations and interviews, it is known that the habits of female respondents and male respondents are in an effort to prevent worms. balanced means that no one dominates.

Based on the distribution of parents' income, the highest percentage of respondents was the low income of the respondent's parents, 62.87%, while the high income of the respondents' parents was only 37.13%. Low parental income is seen from the monthly income below the Provincial Minimum Wage, namely  $\leq$  Rp. 2,400,664, - / month, with the majority of parents being farmers, fishermen, laborers, motorcycle taxis / drivers.

**Table 2 Distribution of Respondents Wormy Infection**

Variable	Total	Percentage (%)
<b>Worms</b>		
Positive	147	72,77
Negative	55	27,23
<b>Home Environment Sanitation</b>		
Not eligible	122	60,4
Qualify	80	39,6
<b>School Environmental Sanitation</b>		
Not eligible	5	100
Qualify	0	0
<b>Nail Hygiene</b>		
Not good	112	55,4
Well	90	44,6
<b>Use of Footwear</b>		
Not good	128	63,4
Well	74	36,6
<b>Hand washing habits</b>		
Not good	124	61,4
Well	78	38,6
<b>Student Knowledge</b>		
Not good	88	43,6
Well	114	56,4



<b>Attitude of Students</b>		
Not good	97	48
Well	105	52
<b>Gender</b>		
Male	104	51, 49
Women	98	48,51
<b>Parents' Income</b>		
Low	126	62, 4
High	76	37,6

Based on the table above, it shows that the incidence of worms in elementary school students in Tulehu Village was 72.77%. 74 houses (34.65%) of worm eggs were found and 3 schools of worm eggs were found in school soil (60%). The results of the univariate test on 9 variables were obtained for the sanitation variable. Home environment, there were 60.4% of the houses that did not meet the requirements for the category of houses that did not meet these requirements seen from the area of the house, type of floor, ownership of family latrines, unclean house yards, garbage piles, availability of clean water and availability of sewerage. For the school environmental sanitation variable, 5 schools (100%) did not meet the requirements. the school category that does not meet the criteria has the same criteria as the house that does not meet the requirements.

Personal hygiene variables (nail hygiene, use of footwear, hand washing habits). The steam hygiene variable, as many as 55.4% of students, had a bad habit of cleaning their nails. Nail cleanliness is seen from the habit of cleaning nails less than once a week, the habit of scratching the ground with your nails, the habit of biting your nails, and the condition of your long and dirty nails. The variable of using footwear as much as 63.4% of students had a habit of using bad footwear. The use of footwear is seen from the habit of removing footwear during recess and coming home from school, not using footwear when playing at home, not wearing footwear when defecating and having a habit of defecating on the beach and river. Variable Hand washing as much as 61.4% of students have a bad habit of washing hands. The habit of washing hands of students, seen from the habit of eating, must wash their hands, after defecating they must wash their hands, after playing with the ground they must wash their hands and wash their hands with soap.

Variable Characteristics of children (knowledge, attitudes, gender and parent's income). The knowledge variable as much as 43.6% of students have poor knowledge, 52% of students





have a bad attitude variable, the gender variable is 51.49 female and 49.51 male, the parent income variable is 62, 4 low income.

**Table 3 Distribution of Worm Egg Identification on Home Soil Respondents**

Ova	Respondents	
	n	%
Positive	70	34,65
Negative	132	65,35
<b>Total</b>	<b>202</b>	<b>100</b>

Based on the results of laboratory examinations regarding the identification of worm eggs in the soil of primary school respondents in Tulehu Village, Central Maluku Regency, it was shown that as many as 132 (65.35%) of the house soil were negative (no worm eggs were identified) while 70 (34.65%) of the respondents' houses were positive (identified as worm eggs). The soil of the house where the eggs were detected on average from a house that does not have a sewerage. Waste is disposed of in the yard.

**Table 4 Distribution of Worm Egg Identification on Soil 2020 Elementary School in Tulehu Village**

Ova	School	
	n	%
Positive	3	60
Negative	2	40
<b>Total</b>	<b>5</b>	<b>100</b>

Based on the results of laboratory examinations regarding the identification of worm eggs in the soil of primary school respondents in Tulehu Village, Central Maluku Regency, it was shown that as many as 3 (60%) of the school soil was positive (identified as worm eggs) while 2 (40%) school soil was negative (not identified as eggs. Worms) .Schools that were found with worm eggs were SD Negeri 1, SD Negeri 3 and SD Negeri 11 Tulehu.

## DISCUSSION

The results showed that out of 202 respondents from Elementary School IV, V and VI in 1 Tulehu Elementary School, 3 Tulehu Elementary School, State 4 Tulehu Elementary School, 11 Tulehu Elementary School and 12 Tulehu Public Elementary School, the feces were examined laboratory The results obtained were 147 respondents (72%) positively infected with worms with the following details: *Ascaris lumbricoides* as many as 18 respondents (12.25%), *Trichuris trichiura* as many as 83 respondents (56.46%), *Ascaris lumbricoides* and *Trichuris trichiura* as many as 46 respondents ( 31.29%)



The incidence of worm infection in public elementary school children in Tulehu is higher than the national figure for worm infection in Indonesia in 2017, which is 28%. The high number of worms in Indonesia is influenced by a lack of cleanliness, poor sanitation, water supply, population density and moist soil (Soekidjo, 2007).

According to Wikan (2017) There are several types of worms that commonly infect children. The first is roundworm (*Ascaris lumbricoides*) which enters the child's body when in the form of eggs. These worms are commonly found in vegetables and fruit that are not cleaned properly. Roundworms measuring 20 -30 cm and able to lay 200,000 eggs per day. These worms will cause damage to the lining of the small intestine, causing diarrhea, thus interfering with the absorption of carbohydrates and protein, "he said. The second is the whipworm (*Trichuris trichiura*) which can lay up to 5-10 thousand eggs per day. This worm can bury its head in a wall. large intestine thus causing injury in the intestine. In severe infections, diarrhea that contains mucus and blood will occur (Winita, 2012)

These results support the research of Endang Suriani (2017) in Lubuk Buaya Padang School children, the prevalence of worms was recorded at 53.2% (Mukono, 2000). Meanwhile, the distribution of worms is comparable to that of Risal Wintoko's (2014) research in Rajabasa Bandar Lampung elementary school children with *Ascaris lumbricoides* infection of 88.2%, *Trichuris trichiura* 5.6%, danhookworm 5.6% (Sjafii, 2017). Wahyudin and Elijohnahdi's research which identified worms in the feces of SDN 2Saloya respondents, Sindue Tombusabora District, Central Sulawesi, obtained results from the types of *Trichuris* and *Ascaris* worms, which have the most prevalence (Soekidjo, 2007).

Worms infection is still a health problem in Indonesia. Rural communities or urban areas that are very dense and slum are prone to worm infections. Worms infection does not cause serious and deadly disease but in the long term it can reduce health status (Azwar, 2020)

## CONCLUSION

Based on the results of research on the Effect of Environmental Sanitation, Personal Hygiene characteristics of children against worm infections in elementary school children in Tulehu Village, Salahutu District, Central Maluku Regency, it can be concluded as follows;

1. Proportion of worm infections in 5 elementary schools in Tulehu Village, Salahutu District, Central Maluku Regency (72.77%)
2. The proportion of worm eggs on home soil (34.65%) while on school soil was as large as (60%)
3. There is a relationship between the sanitation of the home environment and the school environment with the incidence of worm infection with  $\rho$  value = 0.0001
4. There is a personal relationship between hygiene (nail hygiene, use of footwear and hand washing habits) with the incidence of worm infection with  $\rho$  value = 0.0001
5. There is a relationship between children's characteristics (knowledge, attitudes, and parents' income with  $\rho$  value = 0.0001) while gender has no effect on worm infection.



## REFERENCES

- Azwar, A. 2020, *Hygiene dan Sanitasi*, [www.dosenpendidikan.co.id](http://www.dosenpendidikan.co.id) diakses tanggal 16 September 2019
- Badan Pusat Statistik, 2017, Persentase Rumah Tangga Menurut Provinsi dan Memiliki Akses Terhadap Sanitasi Layak 1993-2017, <https://www.bps.go.id> Diakses 09 Agustus 2019
- Badan Pusat Statistik, 2017, Persentase rumah tangga menurut akses terhadap air minum “berkualitas 1993-2017, <https://www.bps.go.id> Diakses 09 Agustus 2019
- Dinkes Maluku Tengah, 2016, Hasil Survey Mahasiswa Kedokteran UGM Kejadian Kecacangan Pada Anak SD di Kabupaten Maluku Tengah, Masohi
- Ginting S. A, 2003 *Hubungan Antara Status Sosial Ekonomi dengan Kejadian Kecacangan Pada Anak Sekolah Dasar Di Desa Suka Kecamatan Tiga Panah Kabupaten Karo Sumatra Utara*, Digitized by USU digital Library
- Irfan, Hanif dkk, 2017, *Gambaran pengetahuan penyakit cacangan (helminthiasis) pada wali murid sdn 1, 2, 3, dan 4 mulyoagung, kecamatan dau, Kabupaten malang, Jawa Timur, Universitas Negeri Malang*, Jurnal Preventia, Diakses 15 Agustus 2019
- Kantor Desa Tulehu, 2019, Profil Desa Tulehu Dalam Angka, Tulehu Kab. Maluku Tengah 2016, *Hubungan Sanitasi Dasar Dengan Infeksi Kecacangan Pada Siswa SDNegeri 067773 Di Kelurahan Paya Pasir*, Jurnal, Universitas Sumatra Utara, Diakses 28 Agustus 2019
- Kartini, Sri. 2016, *Kejadian Kecacangan pada Siswa Sekolah Dasar Negeri Kecamatan Rumbai Pesisir Pekanbaru*, Jurnal Kesehatan Komunis, Universitas Abdurrahman Pekanbaru, diakses 03 Agustus 2019
- Kemkes RI, (2017) Peraturan Menteri Kesehatan Republik Indonesia Nomor 15 Tahun 2017 Tentang Pedoman Penanggulangan Cacangan, Jakarta, [Online] <http://www.hukor.kemkes.go.id/> diakses 06 Agustus 2019
- Mukono, 2000, *Prinsip Dasar Kesehatan Lingkungan*, Airlangga University Press, Surabaya
- Naili, Rosyidah dkk, (2017), *Prevalensi Infeksi Cacing Usus Pada Anak Di kampung Pasar Keputran Utara, Surabaya*, Journal of Vocatiional Health Studies, [www.e-journal.unair.ac.id](http://www.e-journal.unair.ac.id) diakses 08 Agustus 2019
- Notoatmodjo Soekidjo, 2007, *Kesehatan Masyarakat Ilmu dan Seni*, Penerbit Rineka Cipta, Jakarta
- Rawina Winita, 2012, *Upaya Pemberantasan Kecacangan Di Sekolah Dasar*, Departemen Parasitologi, Fakultas Kedokteran makalah kesehatan vol 16, Universitas Indonesia, Jakarta



- Ridha Putri Sjafii, 2017, *Metode Pemberantasan Kecacangan pada Anak*, Tinjauan Pustaka, Kedokteran Universitas Sumatera Utara, Volum: 67, Nomor: 550 11
- Samad H. *Hubungan Infeksi Dengan Pencemaran Tanah Oleh Telur Cacing Yang Ditularkan Melalui Tanah Dan Perilaku Anak Sekolah Dasar Di Kelurahan Tembung Kecamatan Medan Tembung* [Tesis] Medan: Fakultas Kedokteran Universitas Sumatera Utara; 2009.
- Sandy S, Sumarni S, Soeyoko, 2015, *Analisis Model Faktor Risiko yang Mempengaruhi Infeksi Kecacangan yang Ditularkan Melalui Tanah pada Siswa Sekolah Dasar di Distrik Arso Kabupaten Keerom*, Papua. Media Litbangkes.Edisi 25.Vol. 1.hal: 1-14.
- Syahrir Sukfitriyanti dkk, 2016, Faktor Yang Berhubungan Dengan Kejadian Kecacangan Pada Siswa SDN Inpres No. 1 Wora Kecamatan Wera Kabupaten Bim, jurnal hygiene, vol 2 diakses 05 agustus 2019
- Sofia, Rizka. 2017, Perbandingan Akurasi Pemeriksaan Metode Direct Slide Dengan Metode Kato-Katz Pada Infeksi Kecacangan, Bagian Parasitologi Fakultas Kedokteran Universitas Malikussaleh, diakses 12 Agustus 2019
- WHO. *Soil transmitted helminths infections*. 2018. (diakses 23 Juli 2019). Tersedia dari: <http://www.who.int/en/news-room/factsheets/detail/soil-transmitted-helminth-infections>