

Factors Associated with Poor Knowledge and Poor-to-Moderate Attitude of Intestinal Parasitic Infection Prevention and Control Among Hill tribe Schoolchildren in Mae Fah Luang District, Chiang Rai, Thailand

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ABSTRACT

Introduction: Intestinal parasitic infection is one of the health threats, particularly among the vulnerable population. Hill tribe people who live in northern Thailand are living in poor economic and education and are vulnerable to intestinal parasitic infection. The study aimed to determine the factors associated with poor knowledge and poor-to-moderate attitudes toward intestinal parasite infection prevention and control among the hill tribe school children.

Methods: A cross-sectional study was used to collect data among school children in grades 4-6 in Mae Fah Luang District, Chiang Rai Province. A simple random was used to select the participants from the lists in 12 schools. A constructed and validated questionnaire and a 5-gram stool were used as the research tools. A formalin ether concentration technique was used for stool examination. Logistic regression was used for the analysis at the significant level $\alpha=0.05$.

Results: A total of 365 students were recruited; 51.8% were female, 60% were aged between 11-12 years. In the multivariable analysis, males had 1.77 times (95%CI=1.03-2.56); students aged 11-12 years and age ≥ 13 years had 5.14 times (95%CI=1.99-13.23) and 9.48 times (95%CI=2.90-30.98), students in grade five had 8.93 times (95%CI=1.00-5.74); students with family members with ≥ 7 had 2.05 times (95%CI=1.18-3.57) having poor knowledge of intestinal parasitic infection prevention and control than students who had different characteristics. In the multivariable analysis, males had 7.67 times (95%CI=3.45-17.03); students who lived with parents had 2.40 times (95%CI=1.00-5.74); and Lahu and Lisu students had 3.32 times (95%CI= 1.53-7.21) and 9.63 times (95%CI= 2.65-34.97), respectively, having poor to moderate attitudes toward intestinal parasitic infection prevention and control than those students who had different characteristics.

Conclusion: The hill tribe students have poor knowledge and attitudes toward intestinal parasitic infection prevention and control. Public health interventions to improve their knowledge

and attitudes focusing on upper grades and older students should be urgently considered.

Keywords: Hill tribe, Schoolchildren; Thailand; Factor associated; Intestinal parasite; Prevention and Control

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Introduction

Intestinal parasitic infection is one of the significant public health challenges, particularly in children living in poor socioeconomic status. The World Health Organization (WHO) estimated that 24% of the world's population was infected by parasitic, particularly intestinal parasitic infection [1, 2]. Those living with poor socioeconomic [3] and sanitation [2] are at risk for the infection. Children are vulnerable to parasitic infection due to their behaviors [4]. The infection has several impacts, including malnutrition [4,5,19], leading to physical and mental impairments [6,7]. In Thailand, there are several groups of people who are living in poor socioeconomic status and at high risk for intestinal parasitic infection. [8,9].

The hill tribe is a group of people who have migrated from South China for centuries and settled in northern Thailand [10,12]. There are six main groups, and 34% of them were hill tribe people: Akha 18%, Lahu 18%, Hmong 1%, Yao 2%, Karen and Lisu 1% [10,11]. They have their own cultures and daily life practices [10,12]. More than 80% of the hill tribe people live under the national poverty line because most people worked in agriculture with a low-income status. [10,13] and a large proportion never attended a school. With the family's financial status, the hill tribe people have limited access to daily clean water and healthy food [12,14]. Most Thai health messages are produced in Thai, so access to essential health information for the hill tribe people is very difficult. Health literacy for parasitic infection prevention and control among the hill tribe people is poor [10,12,13,15]. Knowledge and attitude are the major components of having good health literacy [13]. Those with good health literacy can maintain their health status and seek medical care.

Children are at the stage of learning and need to be cared for by their parents for proper development. Schoolchildren aged 10-12 years or attending grades 4-6 in primary school are at the stage of intestinal parasitic infection due to their behavior and hygiene, including their knowledge and attitude. A study conducted among schoolchildren in northern Thailand in 2015 reported that the prevalence of the parasitic infection was 9.7%, with the common of *Ascaris lumbricoides* [16]. While looking into the Thailand curriculum, a few sections provide information for students in grades 4-6 in Thailand's primary school programs [17-19]. Currently, the hill tribe school children live in poor socioeconomic status with poor parents' education. They are at risk for intestinal parasitic infections, and no updated scientific information on intestinal parasitic infections is available. The study aimed to determine the factors associated with poor knowledge and poor-to-moderate attitude on intestinal parasite infection prevention and control among the hill tribe school children living in

Mae Fah Luang District, Chiang Rai Province, Thailand, which Myanmar borders.

Methods

Study design and Study setting

A cross-sectional study was applied to collect data among hill tribe schoolchildren attending grades 4-6 in 12 selected schools from 32 schools in four subdistricts, Mae Fah Luang District, Chiang Rai province, Thailand. Schools were randomly selected from the full list of schools in each district. There are four subdistricts in Mae Fah Luang District, Chiang Rai Province: Terd Thai (nine schools), Mae Salong Nok (six schools), Mae Salong Nai (11 schools), and Mae Fah Luang (five schools)—a total of 2,486 children attending in 31 schools in the academic year of 2022.

Study samples and sample size calculation

The sample size was calculated using the following formula [20]:

$$n = [NZ^2_{\alpha/2} P(1-P)] / (N-1) d^2 + NZ^2_{\alpha/2} P(1-P)]$$

Where n=desirable sample size; N was the total students attending in grades 4-5 in Mae Fah Luang District, Chiang Rai Province, Thailand; $Z^2_{\alpha/2}$ was the standard normal distribution, which is 1.96; P was the prevalence of intestinal parasitic infection from a previous study which was 0.47%, and d was the accepted error. A total of 365 samples were required for the analysis.

Research tools

A validated questionnaire and a five-gram stool sample were used as the research tools. The stools were detected by the formalin ether concentration technique at the Department of Parasitology, Faculty of Medicine, Chiang Mai University. After the stool samples were collected, they were preserved with 10% formalin ether at Mae Fah Luang Medical Laboratory Center before being transferred to the Department of Parasitology, Faculty of Medicine, Chiang Mai University the next day.

There were three parts of the questionnaire. In part one, eight questions were used to collect personal information. Part two, 42 questions were used to collect personal knowledge and attitudes on intestinal parasitic infection prevention, control, and risk behaviors. Questionnaires were developed based on the literature and discussion with experts. It tested validity item objective congruence (IOC) techniques that had three experts' opinions on the quality of the questions. Nine out of 50 questions were advised to be improved before testing in the next step. A pilot was executed among 30 selected students at Mae Chan District to detect the questionnaire's validity and reliability. The

Cronbach alpha on knowledge and attitude questions were 0.82 and 0.77.

There were ten (10) questions in knowledge related to intestinal parasitic infection prevention and control. It was classified into three levels: poor ($\leq 59\%$), moderate (60-79%), and high ($\geq 80\%$) [21]. Among ten (10) questions of attitude toward intestinal parasitic infection prevention and control, it was classified into three levels: poor (1-1.67), moderate (1.68-2.33), and high (2.34-3.00) [22].

Step of data collection

After the research's ethical approval, selected school directors were contacted and appointed to provide the study information. At the date of the meeting, selected schoolteachers and directors were provided the information again. All selected schools have one class of grades 4 to 6. All students attending selected classes were invited to participate in the study. Before gathering information from students, the consent form for parents was provided to all students. After agreeing and signing the consent form for all parents the next day, students were asked to complete the questionnaire. Once they completed the questionnaire, students were provided information on the steps of 5 grams of stool collection, including materials for collecting the stool. All stool samples with labeled codes were returned to the specific box at the school the following day. All stool samples were collected and transported to the Mae Fah Luang Medical Laboratory Center to prepare the laboratory analyses at the Chiang Mai Medical Laboratory Center using formalin ether concentration techniques.

Statistical analysis

Data were analyzed in descriptive analysis and presented in means and standard deviations in continuous data, while categorical data were presented in percentages. Logistic regression was used to determine the association between independent variables and dependent variables, and the cut-off point for consideration of the statistical significance was $\alpha=0.05$. Stepwise was used in the steps of variable selection in the model. The logistic regression was executed differently based on knowledge and attitudes. In the multivariable analysis for poor knowledge of intestinal parasitic infection prevention and control, there were four variables controlled in the model before interpretation: tribe, having a Thai ID card, the condition of living with any people in their family, and annual household income. In the multivariable analysis for low-to-moderate attitude for intestinal parasitic infection prevention and control, there were five variables controlled in the model before interpretation: age, education, family size, having a Thai ID card, and annual household income.

Ethical consideration

The research protocols and their tools were approved for use by The Chiang Rai Provincial Public Health Office Research Ethics Committee, Ministry of Public Health Research, with the CRPPHO No. 142/2565.

Results

(i) Demographics of participants

The majority were aged 11-12 (60.0%), 39.2% were Akha, 49.2% attended in grade four, 56.7% had 4-6 family members, 86.6% held a Thai national ID card, and 61.1% lived with parents. Almost half of fathers attained primary education (42.3%), 48.2% of mothers never attended a school, 45.1% of parents were farmers, and 51.5% had monthly earnings of less than 10,000 baht (51.5 %) (Table 1).

Table 1 Number and percentage of demographic (characteristics) among schoolchildren in Mae Fah Luang District (n= 365)

Characteristics	n	%
Residential areas		
Terd Thai	150	41.1
Mae Salong Nai	114	31.2
Mae Salong Nok	18	5.0
Mae Fah Luang	83	22.7
Sex		
Male	176	48.2
Female	189	51.8
Age (year)		
9-10	113	31.0
11-12	219	60.0
≥ 13	33	9.0
<i>Min = 9, Max = 15, Mean = 11.2, SD = 1.1</i>		
Tribe		
Akha	143	39.1
Lahu	84	23.0
Lisu	23	6.3
Hmong	11	3.0
Yao	8	3.6
Karen	9	2.5
Other	82	22.5
Education		
Grade 4	154	42.2
Grade 5	81	22.2
Grade 6	130	35.6
Family size (persons)		
≤ 3	70	19.2
4-6	207	56.7
7-9	83	22.7
≥ 10	5	1.4
<i>Min = 1, Max = 11, Mean = 5.1, SD = 1.8</i>		

Characteristics	n	%
Having Thai ID card		
No	49	13.4
Yes	316	86.6
Identification card for people with Thai nationality	254	80.4
Identification card for non-Thai nationals	29	9.2
Identification card for persons without registration status	33	10.4
Living with		
Father	33	9.0
Mother	52	14.3
Father and mother	234	64.1
Other	46	12.6
Father's age (years) (n=267)		
≤37	100	51.5
38-43	114	21.9
44-49	54	15.6
≥ 50	18	11.0
Mother's age (years) (n=286)		
≤ 34	100	35.0
35-42	114	39.9
43-50	54	18.9
≥ 51	18	6.3
Father's tribe (n=267)		
Akha	118	44.2
Lahu	83	31.1
Lisu and other	66	24.7
Mother's tribe (n=286)		
Akha	126	44.0
Lahu	76	26.6
Lisu and other	84	29.4
Father's education (n=267)		
Uneducated	103	38.6
Primary education	113	42.3
Secondary education	51	19.1
Mother's education (n=286)		
Uneducated	138	48.3
Primary education	63	22.0
Secondary education	85	29.7
Father's occupation (n=267)		
Gardening and farming	123	46.1
Hired work and other occupations	144	53.9
Mother's occupation (n=286)		
Gardening and farming	129	45.1
Hired work and other occupations	157	54.9
Annual household income (bath)		
≤ 10,000	188	51.5
≥10,001	177	48.5

(ii) Intestinal parasitic infection rates

A total of 42 participants (11.5%) out of 365 were detected intestinal parasitic infections. Those who had been detected as intestinal parasitic infections, 26.2% were *Entamoeba coli*, 21.4% were *Giardia*

lamblia, 14.3% were *Blastocystis hominis*, 9.5% were *Endolimax nana*, and remaining 28.6% were mix infections.

(iii) Knowledge, attitude, and risk behaviors related to Intestinal parasitic infection of participants

Almost half had poor knowledge of parasitic infection prevention and control (48.8%), while 15.9% had a moderate attitude regarding prevention and control. One-third (30.4) ate raw foods, 3.0% did not use a toilet, and 9.6% used soap for hand washings after toilet use. A large proportion of participants used untreated water in daily life (39.2%) and at school (37.0%). One-third (36.2%) had used anti-parasitic drugs six months prior, and the majority were people taking care of them (Table 2).

Table 2 Number and percentage of knowledge, attitudes, and risk behaviors among schoolchildren in Mae Fah Luang District (n= 365)

Characteristic	n	%
Knowledge regarding parasitic infection prevention and control		
Poor	178	48.8
Moderate	144	39.4
High	43	11.8
Attitude regarding parasitic infection prevention and control		
Poor	0	0.00
Moderate	58	15.9
High	307	84.1
Raw pork consumption raw (LABB and LAU)		
Often and sometime	111	30.4
Never	254	69.6
Consume raw fish		
Often and sometime	59	16.2
Never	306	83.8
Consume raw beef		
Sometime	57	15.6
Never	308	84.4
Washing fresh vegetables before consumption		
Never and sometime	8	2.2
Often	357	97.8
Wearing shoes		
Never and sometime	3	0.8
Often	362	99.2
Use toilet for defecation		
Never and sometimes	11	3.0
Often	354	97.0
Washing hands with soap before eating		
Never and sometimes	27	7.4
Often	338	92.6

Characteristic	n	%
Washing hands after toilet use		
Never and sometimes	35	9.6
Often	330	90.4
Wash hands with soap after touching the ground or any dirty objects		
Never and sometimes	35	9.6
Often	330	90.4
Washing hands after caring of animal waste (dogs or cats)		
Never and sometimes	65	17.8
Often	300	82.2
Drinking water sources at home		
Untreated water	143	39.2
Bottled drinking water	86	23.6
Both types	136	37.2
Drinking water sources at school		
Untreated water	135	37.0
Bottled drinking water	63	17.3
Both types	167	45.7
Patterns of food consumption		
Hand	28	7.7
Use a spoon	252	69.0
Both types	85	23.3
Characteristics of the rice consumed		
Rice	311	85.2
Sticky rice	54	14.8
Use soap for bathing		
Sometimes	44	12.0
Everyday	321	88.0

Characteristic	n	%
Taking anti-parasitic drugs previous 6 months		
Never	233	63.8
Yes	132	36.2
Father, Mother, Guardian bought it	63	47.7
Sub-district hospital health promotion officer	33	25.0
Teacher	36	27.3

(iv) Factors associated with poor knowledge about intestinal parasitic infection prevention and control

In the univariable analysis, five variables were found to be associated with poor knowledge about intestinal parasitic infection prevention and control: sex, tribe, education, family size, and living status. After controlling for tribe, having a Thai ID card, and annual household income, four variables were found to be associated with poor knowledge of intestinal parasitic infection prevention and control: sex, age, education, and family size. Males had poor knowledge of intestinal parasitic infection prevention and control than females 1.77 times (95%CI=1.03-2.56). Those students aged 11-12 years and age ≥ 13 years had poor knowledge of intestinal parasitic infection prevention and control than those aged 9-10 years 5.14 times (95%CI=1.99-13.23) and 9.48 times (95%CI=2.90-30.98), respectively. Students in grade five had poor knowledge of intestinal parasitic infection prevention and control than those in grade four 8.93 times (95%CI=1.00-5.74). Those students who had family members with ≥ 7 had poor knowledge of intestinal parasitic infection prevention and control than those who had ≤ 6 people or more 2.05 times (95%CI=1.18-3.57) (Table 3).

Table 3 Factors associated with poor knowledge of intestinal parasitic infection prevention and control by univariate and multivariate analyses

Factors	Poor knowledge		Moderate-good knowledge		OR	95%CI	p-value	AOR	95%CI	p-value
	n	%	n	%						
Sex										
Male	31	17.6	145	82.4	0.74	0.49-1.18	0.153	1.77	1.03-2.56	0.016*
Female	12	6.3	177	93.7	1.00			1.00		
Age (year)										
9-10	14	12.4	99	87.6	1.00			1.00		
11-12	24	11.0	195	89.0	0.97	0.61-1.53	0.908	5.14	1.99-13.23	0.001*
≥ 13	4	12.1	29	87.9	1.71	0.77-3.82	0.184	9.48	2.90-30.98	<0.001*
Tribe										
Akha	15	10.5	128	89.5	1.00					
Lahu	16	19.0	68	81.0	2.02	1.15-3.55	0.013*			
Lisu	1	4.3	22	95.7	0.78	0.32-1.89	0.583			
Hmong and other	10	8.7	105	91.3	0.78	0.47-1.27	0.324			
Education										
Grade 4	17	11.0	137	89.0	1.00			1.00		
Grade 5	12	14.8	69	85.2	0.64	0.37-1.01	0.107	8.93	3.47-22.96	<0.001*
Grade 6	13	10.0	117	90.0	0.46	0.29-0.75	0.002*	1.51	0.82-2.80	0.181
Family size (persons)										
≤ 6	25	9.0	252	90.1	1.00			1.00		
≥ 7	17	19.3	71	80.7	1.95	1.19-3.19	0.008*	2.05	1.18-3.57	0.011*

Factors	Poor knowledge		Moderate-good knowledge		OR	95%CI	p-value	AOR	95%CI	p-value
	n	%	n	%						
Having Thai ID card										
No	5	10.2	44	89.8	1.34	0.73-2.45	0.341			
Yes	37	11.7	279	88.3	1.00					
Living with										
Father and mother	39	47.0	44	53.0	1.00					
Living with relatives	3	1.1	279	98.9	0.46	0.24-0.88	0.019*			
Annual household income (bath)										
< 10,000	18	9.6	170	90.4	0.85	0.56-1.28	0.441			
> 10,001	24	13.6	153	86.4	1.00					

*Statistical significance at $\alpha = 0.05$

(v) Factors associated with poor to moderate attitudes toward intestinal parasitic infection prevention and control

In the univariable analysis, two variables were found to be associated with poor to moderate attitudes toward intestinal parasitic infection prevention and control: sex and tribe. After controlling for age, education, family size, having a Thai ID card, and annual household income, three variables were found to be associated with poor to moderate attitudes toward intestinal parasitic infection prevention and control: sex, tribe, and living status. Males had poor to moderate attitudes toward intestinal parasitic infection prevention and control than females 7.67 times (95%CI=3.45-17.03). Students who lived with parents had poor to moderate attitudes toward intestinal parasitic infection prevention and control than those who lived with their relatives 2.40 times (95%CI=1.00-5.74). Lahu and Lisu students had poor to moderate attitudes toward intestinal parasitic infection prevention and control than those Akha students 3.32 times (95%CI= 1.53-7.21) and 9.63 times (95%CI= 2.65-34.97), respectively (Table 4).

Table 4 Factors associated with low-to-moderate intestinal parasite infections univariate and multivariate analyses

Factors	Low-to-moderate		High attitude		OR	95%CI	p-value	AOR	95%CI	p-value
	attitude									
	n	%	n	%						
Sex										
Male	48	27.3	128	72.7	6.71	3.27-13.76	<0.001*	7.67	3.45-17.03	< 0.001*
Female	10	5.3	179	94.7	1.00			1.00		
Age (year)										
9-10	17	15.0	96	85.0	1.00					
11-12	38	17.4	181	82.6	0.84	0.45-1.57	0.592			
≥ 13	3	9.1	30	90.9	1.77	0.48-6.45	0.387			
Tribe										
Akha	15	10.5	128	89.5	1.00			1.00		
Lahu	3	2.4	81	97.6	3.16	0.88-11.27	0.076	3.32	1.53-7.21	0.002*
Lisu	11	47.8	12	52.2	0.12	0.04-0.34	<0.001*	9.63	2.65-34.97	<0.001*
Hmong and other	29	25.2	86	74.8	0.34	0.17-0.68	0.002*	0.43	0.15-1.27	0.130
Education										
Grade 4	19	12.3	135	87.7	0.99	0.83-3.09	0.154			
Grade 5	15	18.5	66	81.5	0.15	0.48-2.03	0.992			
Grade 6	24	18.5	106	81.5	1.00					
Family size (persons)										
≤ 6	44	15.9	233	84.1	1.00					
≥ 7	14	16.0	74	84.0	1.00	0.52-1.93	0.996			

Factors	Low-to-moderate		High attitude		OR	95%CI	p-value	AOR	95%CI	p-value
	attitude									
	n	%	n	%						
Having Thai ID card										
No	10	20.4	39	79.6	1.43	0.67-3.06	0.355			
Yes	48	15.2	268	84.8	1.00					
Living with										
Father and mother	47	14.7	272	85.3	1.81	0.86-3.83	0.115	2.40	1.00-5.74	0.047*
Living with relatives	11	24.0	35	76.0	1.00			1.00		
Annual household income (bath)										
≤ 10,000	30	16.0	158	84.0						
≥ 10,001	28	15.8	149	84.2	1.00	0.56-1.73	0.971			

*Statistical significance at $\alpha = 0.05$

Discussion

The hill tribe schoolchildren had poor knowledge and attitudes toward intestinal parasitic infection prevention and control. Several factors were found to be associated with poor knowledge, including being males, having older children, attending in grade five, and having family members with $\geq$ seven who had poor knowledge of intestinal parasitic infection prevention and control. Being male, living with parents, and being a Lahu and Lisu member were associated with poor to moderate attitudes toward intestinal parasitic infection prevention and control.

In our study, male students had poor intestinal parasitic infection prevention and control knowledge. A study conducted in an urban area of Yemen reported that male students had a poorer knowledge of intestinal parasitic infection prevention than females [23]. A cross-sectional study conducted in urban slums in Brazil reported that males had poorer knowledge of intestinal parasitic infection [24]. Niamnuy et al. [25] reported that adult males had a higher rate of infections and poorer knowledge of intestinal parasitic infection prevention and control. In the context of the male hill tribe, children might pay poorer attention to education than females, and they have poorer knowledge of intestinal parasitic infection prevention and control.

Older children in grade five had a poorer knowledge of intestinal parasitic infection prevention and control than those of lower-age school children. A study in western Tigray, Ethiopia [26] reported different knowledge on intestinal parasitic infection prevention and control according to age. A survey conducted among schoolchildren in Pathumthani Province, Thailand, reported no different knowledge on intestinal parasitic infection prevention and control among schoolchildren [27]. This might be because the Thailand primary school curriculum puts the topics of intestinal

parasitic infection and control in the early years [30], and those studying late in primary school will lose their intention and knowledge of intestinal parasitic infection prevention and control.

Schoolchildren who lived with family members $\geq$ seven people had a poor knowledge of intestinal parasitic infection prevention and control compared to those who had ≤ 6 people. A cross-sectional study conducted in Bangladesh reported that those schoolchildren who lived with many family members had poor knowledge of intestinal parasitic infection prevention and control [28]. A study conducted among Orang Asli school children in rural Malaysia reported no different knowledge of intestinal parasitic infection according to the number of family members [29]. This might be because the large number of family members leads to less opportunity for education and poor knowledge of intestinal parasitic infection prevention and control.

Our study found that male students had a poorer attitude towards intestinal parasitic infection prevention and control than females. A study in Tanzania [31] reported attitudes toward the low-risk perception of parasitic infection prevention and control. A study conducted in Chaloem Phra Kiat District, Nan Province [32] reported high attitudes toward intestinal parasitic infection among school children and did not have a different significance between genders. Kaewpitayanon [33] reported that male students had a better attitude toward intestinal parasitic infection among school children in Sabayoi District, Songkhla. In the circumstance of the hill tribe, boys are favored over girls, but males might not be serious about spending their lives then. They have poorer attitudes than females.

Being part of some groups, schoolchildren had a greater chance of having poor attitudes toward intestinal parasitic infection prevention and control than

some other tribes. This coincides with a study conducted on Morgan and Organ Laut minorities [8], which reported that some groups had poorer attitudes toward parasitic infection prevention and control than others. This might be the difference in their parent's socioeconomic status that gives some groups a greater chance of contracting the infection. Then, living with parents who have poor socioeconomic status will increase the possibility of intestinal parasitic infection among the hill tribe schoolchildren.

Some limitations were found in the study. Some students, particularly those attending grade four, did not clearly understand some sentences in the knowledge and attitudes sections. However, during the data collection, the researcher explained the questions one by one to make sure that all students understood the context of the questions. Some students could not provide a stool exam the next day as an appointment, so the researcher approached them to collect five grams of stool for the laboratory. Last, questions related to attitude assessment should be carefully developed based on study participants' profiles. If a set of attitude questions could not effectively reflect participants' attitudes, it could lead to opposite conclusions.

To improve the issue, further studies should focus on community- and family-based research, particularly implementation science. The study should also consider the hill tribe norms and cultures related to intestinal parasitic infection. Specific effective strategic study designs to change behaviors alignment with these populations' cultures and lifestyles are encouraged.

Conclusion

The hill tribe students in grades four to six have poor knowledge and attitudes toward preventing and controlling intestinal parasitic infection. The training program to improve knowledge of intestinal parasitic

infection prevention control should be designed and implemented with a focus on male and older students. At the same time, group counseling to improve individuals' attitudes towards intestinal parasitic infection prevention and control, especially females and Lahu and Lisu students.

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