

# Knowledge, Attitude and Practice of Mothers on Prevention and Control of Intestinal Parasitic Infestations in Sekota Town, Waghimra Zone, Ethiopia

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Mesfin Wudu Kassaw<sup>1</sup>  
Ayele Mamo Abebe<sup>2</sup>  
Biruk Beletew Abate<sup>1</sup>  
Alemu Birara Zemariam<sup>1</sup>  
Ayelign Mengesha Kassie<sup>1</sup>

<sup>1</sup>Department of Nursing, College of Health Science, Woldia University, Woldia, Ethiopia; <sup>2</sup>Department of Nursing, College of Health Science, Debre Berhan University, Debre Berhan, Ethiopia

**Background:** Intestinal parasites (IP) are a major public health problem in several developing countries. It accounts for 1.5 billion infections with one or more intestinal parasitic agents. The prevalence of helminthiases in Ethiopia is 29.8% with variable degree of prevalence among the different regions. Young children have a high infestation rate and suffer a substantial burden of *Ascaris lumbricoides*, *Trichuris trichiura*, and *Schistosomes*. Intestinal parasitic infections have serious consequences for human health; such as hepatomegaly, splenomegaly, esophageal varices, and delay in physical development. Therefore, this study was intended to assess mothers' knowledge, attitude, and practice on prevention and control of intestinal parasitic infestations.

**Methods:** A cross-sectional study was carried out on 378 mothers who had under six and over two year old children. Although 384 mothers were selected using sample size calculation, the data were collected from 378 mother-child pairs using a face to face interview-based questionnaire. The level of maternal knowledge, attitude, and practice are presented in the form of percentage, frequency, and tables. In order to ensure the quality of data, in all of the data collection, data analysis, and write up, a standard operational procedure was followed.

**Results:** The overall level of good maternal knowledge, positive attitude, and good practice in preventing and controlling intestinal parasitic infection concerning pre-school children in Sekota town was 45.2%, 55.3%, and 51.1% respectively. Seventy-seven (20.4%) respondents reported that they knew about *A. lumbricoides*, and 62 (16.4%) participants washed vegetables as a means of intestinal prevention.

**Conclusion:** The overall level of optimum knowledge, attitude, and practice of mothers on prevention and control of intestinal parasites is significantly low. Therefore, community awareness about intestinal parasitic infestation prevention and control should be created through campaigns or structured training.

**Keywords:** knowledge, attitude, practice, parasites, infestation, mothers, children, Sekota, Ethiopia

## Introduction

Intestinal parasites (IP) are a major public health problem in several developing countries. It accounts for 1.5 billion infections with one or more intestinal parasitic agent. Of these, 700 million people were infected with hookworm and 807 million people were infected with *Ascariasis*.<sup>1</sup> Particularly, intestinal parasites were more predominant in developing countries and particularly in sub-Saharan Africa.<sup>2</sup> The

Correspondence: Mesfin Wudu Kassaw  
Department of Nursing, College of Health Science, Woldia University, PO Box 400, Woldia, Ethiopia  
Tel +251 96 264 9062  
Email mesfine12a@gmail.com

prevalence of helminthiasis in Ethiopia is 29.8% with a variable degree of prevalence among the different regions.<sup>3</sup> Young children have a high infestation rate and suffer a substantial burden of *Ascaris lumbricoides*, *Trichuris trichiura*, and *Schistosomes*.<sup>4</sup> These parasitic infections cause reduced growth through impaired nutrient utilization, which hinders children from using their full potential in physical performance and education.<sup>5,6</sup>

Helminthiasis prevention is based on regular anti-helminthic treatment, improved water supply, and sanitation and health education.<sup>7</sup> However, the control measures are difficult to implement in developing countries due to lack of clean water, poor sanitation, and low coverage of education.<sup>8</sup> Intestinal parasitic infestations have serious consequences on human health; such as hepatomegaly, splenomegaly, esophageal varices, and delay in physical development. Parasitic infestations also lower the immune system, decrease the level of intelligence, and decrease labor productivity.<sup>9,10</sup> The societal level of healthiness is influenced by four factors. Knowledge, attitude, and practice are the most dominant and significant factors in the dynamicity of society's level of healthiness.<sup>11</sup> The additional factor for community healthiness is parental characteristics such as level of education, and income.<sup>12–14</sup> Accordingly, mothers' characteristics, knowledge, attitude, and practice toward a certain kind of illness play a major role in the occurrence or disappearance of a particular disease. Thus, this study was conducted to assess mothers' knowledge, attitude, and practice about intestinal infestation control and prevention methods in Sekota town, Ethiopia.

## Methods

### Study Area and Design

The study was a community-based cross-sectional study, carried out on mothers of Sekota town, which is located in the Amhara region. The actual data collection period was from February 15 – March 10, 2019. Sekota town is known for a shortage of water, which is a cause of poor hygiene and sanitation practices. Sekota town has two urban kebeles, and both kebeles were included in this study.

### Sampling and Study Population

#### Sample Size Determination and Sampling Procedure

The sample size, which was 384, was determined using single population proportion formula:  $[n = Z^2_{\alpha/2} * (P(1-P)/d^2)]$ . The population proportion used for

calculation from the previous study was ( $p=52.3\%$ ).<sup>15</sup> While calculating the sample size, 10% none-response rate, 95% CI and 5% margin of error was considered. Simple random sampling technique with proportional allocation was used to include 384 mothers, who had children aged between 2 and 6 years old from both urban kebeles of Sekota town.

### Data Collection

A pretested and structured interview-based questionnaire was developed in English and then translated to Amharic (local African dialect), and re-translated to English to record and analyze the demographic data, and data allied with knowledge, attitude, and practice of mothers. All the questions were developed considering prevention and control methods of intestinal parasitic infestations.

### Maternal Knowledge, Attitude, and Practice

Mothers who had children greater than or equal to 2 years and less than six years were interviewed using 5 knowledge, 7 attitude, and 11 practice questions. The knowledge questions' scoring methods were performed as per Guttman Scale. The attitude questions were prepared in Likert scale type of questioning and reported in such fashion. But the practice questions were formulated in ordinal scale, weighted out of 11. In all of these sections, mothers were asked about types of intestinal parasites, modes of transmission, symptoms of intestinal infestations, methods of prevention and control, and infestation complications. Each mother was interviewed in their local language using closed-ended questions. The data collectors were selected from the study area and collected the data under the supervision of the researchers.

**Eligibility criteria:** mothers with children aged 2 to 6 years who have been living in Sekota town for at least 6 months were included. Mother-child pairs in which children have taken standard treatment for intestinal parasites in the last 6 months and mothers who had seriously ill children were excluded.

### Data Analysis

The questionnaires were entered into epi-data version 4.2.0.0 and transferred to SPSS version 23 software for analysis. Frequency and cross-tabulation were used to summarize descriptive statistics of the data. The level of

maternal knowledge, attitude, and practice was reported as percentage and presented in tables.

## Data Quality

For each step standard operational procedures (SOP) were followed. The socio-demographic questionnaire was pre-tested on 5% (20 mothers) of the sample in Woldia town. The measurement techniques used for the data of knowledge, attitude, and practice were also validated and pre-tested before the actual data collection in Woldia town. The interview guide was edited accordingly for actual data collection. The data were checked for completeness and missing information at each point by all investigators and data collectors. The data collectors also received one-day refresher training.

## Operational Definitions

- Pre-school children: children whose age was between the first day of year 2 and before their 6th birthday.
- Intestinal parasites: parasites that can infect gastrointestinal tracts of the human body.
- Attitude: assessment of mothers' opinion or thoughts about intestinal parasitic infestations, its prevention and control methods,
- Positive attitude: mothers who responded below the median value for attitude questions, that was 15 in this study.
- Negative attitude: mothers who responded above the median value for attitude questions, that was 15 in this study.
- Knowledge: assessment of how mothers described intestinal parasitic infestations, its prevention and control methods.
- Knowledgeable: mothers who scored above the median value for knowledge questions, that was 2 in this study.
- Non-knowledgeable: mothers who scored below the median value for knowledge questions, that was 2 in this study.
- Practice: assessment of the mothers' actual exercises to prevent and control intestinal parasitic infestations.
- Good practice: mothers who scored above the median value for practice questions, that was 14 in this study.
- Poor practice: mothers who scored below the median value for practice questions, that was 14 in this study.

## Results

### Maternal Socio-Demographic Status

A total of 378 mothers were interviewed and yielded a 98.4% response rate. Six of the mothers were excluded

because of involuntariness, and absenteeism during data collection after revisiting of the missed houses. Of the participants, 98.9% were Amhara in ethnicity, 83.9% followed orthodox religion, 41.5% of the mothers were unable to read and write, 72.8% of the mothers were housewives and 87.3% of the women were married. Majority of the mothers, 98.9%, had no history of abortion and diagnosed diabetic mellitus during the interview time (Table 1).

The mean age of mothers was 29.2 years with a standard deviation of 5.7, ( $\mu_x \pm sd$ ) ( $29.2 \pm 5.7$ ). The minimum and maximum age of mothers was 20 and 42 respectively. The average number of under-five and under-eleven children in the study town was 1.39 and 1.76 respectively. The maximum and minimum number of pregnancies among mothers were 8 and 2 respectively (Figure 1).

## Maternal Knowledge

The data regarding knowledge were collected using a questionnaire containing 5 questions. While entering and analyzing the data of knowledge, unfavorable questions got 1 point if it was incorrect and 0 point if it was correct according to Guttman Scale grading. Those five questions had multiple options. From these multiple options, 1 was for the option "I don't know" and 0 was for all other options. The participants listed at least one correct answer among the alternatives to get 0. Therefore, the highest and lowest score would be 5 and 0 points. The median and mean were calculated: 2.00 and 2.60 respectively. After the calculation of the central tendency, a group of knowledgeable and non-knowledgeable categorizations was made based on the median. The results were considered as knowledgeable if the actual score was lower than the median, and categorized as non-knowledgeable if the calculated score was higher than the median. According to the median value, 54.8% of the women had above the median value and were considered as non-knowledgeable, and 45.2% of mothers had below the median value and were considered knowledgeable about intestinal parasite prevention and control methods in Sekota town.

## Knowledge of Intestinal Parasites

Mothers of children were asked about common parasites they knew of. Majority of the mothers, 77 (20.4%), reported that they knew about *Ascaris lumbricoides*, 41 (10.8%) knew about *Entamoeba histolytica*, and 52 (13.8%) knew about *Giardia lamblia* (Table 2).

**Table 1** Maternal Sociodemographic Status, Behavioral and Medical Profiles Found in Sekota Town, Ethiopia, 2018/19

Variables	Categories	Parasite Infections		Frequency	Percent
		Negative No (%)	Positive No (%)		
Ethnicity	Amhara	265 (70.9)	109 (29.1)	374	98.9
	Tigray	0	4 (100)	4	1.1
Marital status	Single	0	4 (100)	4	1.1
	Divorced	12 (100)	0	12	3.2
	Married	233 (70.6)	97 (29.4)	330	87.3
	Widowed	20 (62.5)	12 (37.5)	32	8.5
Religion	Orthodox	228 (71.9)	89 (28.1)	317	83.9
	Muslim	37 (60.7)	24 (39.3)	61	16.1
Education	Unable to read and write	97 (61.8)	60 (38.2)	157	41.5
	Read and write	35 (92.1)	3 (7.9)	38	10.1
	Primary	63 (76.8)	19 (23.2)	82	21.7
	Secondary	32 (80.0)	8 (20.0)	40	10.6
	Above secondary	38 (62.3)	23 (37.7)	61	16.1
Occupation	Housewife	188 (68.4)	87 (31.6)	275	72.8
	Government employee	34 (69.4)	15 (30.6)	49	13.0
	Private employee	7 (63.6)	4 (36.4)	11	2.9
	Merchant	36 (83.7)	7 (16.3)	43	11.4
History of abortion	Yes	4 (100)	0	4	1.1
	No	261 (69.8)	113 (30.2)	374	98.9
History of diabetes	Yes	4 (100)	0	4	1.1
	No	261 (69.8)	113 (30.2)	374	98.9

## Knowledge of Prevention and Control of Intestinal Parasites

The knowledge of mothers about prevention and control mechanisms was also assessed. Of the 378 mothers, 62 (16.4%) mentioned washing vegetables, 42 (11.1%) listed hand-washing, 30 (8%) considered latrine utilization as prevention and control methods of IP (Table 2).

## Knowledge of the Mode of Transmission of Intestinal Parasites

Regarding the mode of transmission, nearly 75 (19.9%) mentioned soil contact, 29 (7.7%) mentioned contaminated water, and 65 (17.2%) described contaminated food as a mode of transmission (Table 2).

## Knowledge of Signs and Symptoms of Intestinal Parasites

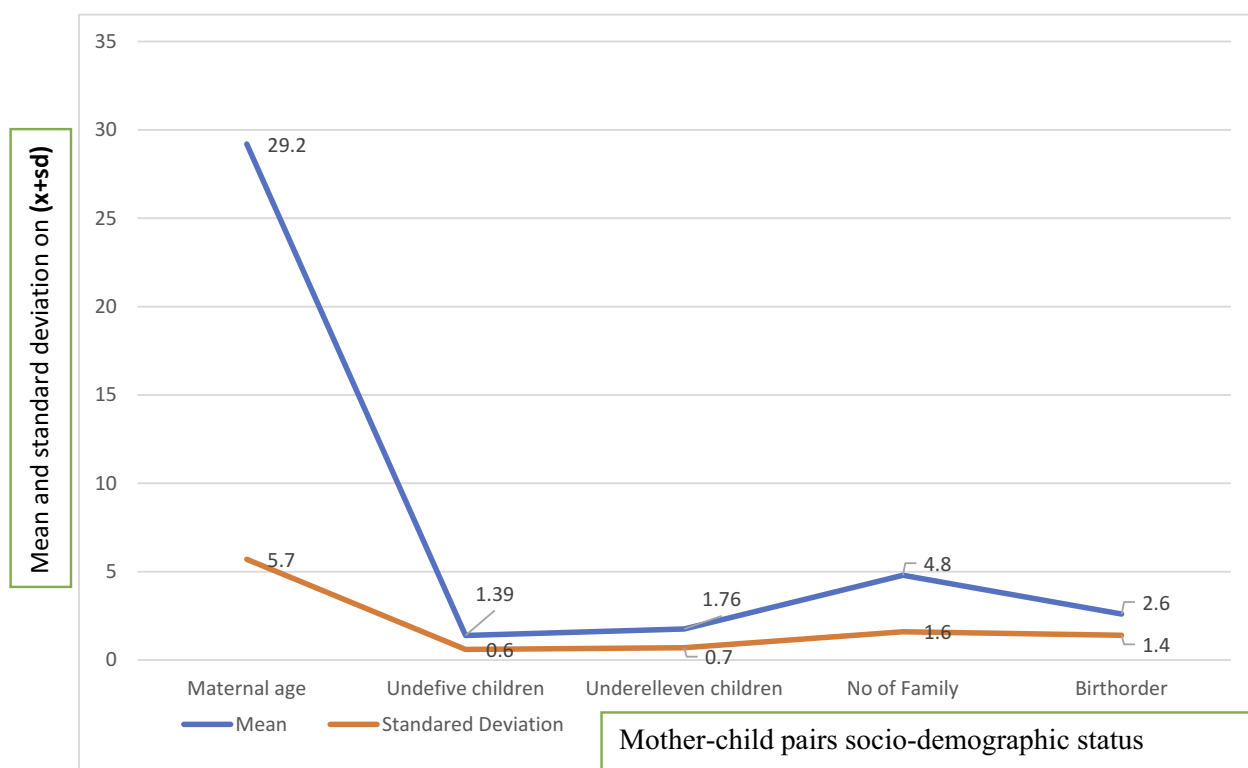
Mothers listed diarrhea, 66 (17.5%), abdominal cramps, 38 (10%), and vomiting, 19 (5%), as signs and symptoms of intestinal parasitic infections (Table 2).

## Knowledge of the Complications of Intestinal Parasites

Regarding the complications of intestinal parasitic infection, malnutrition was mentioned by 58 (15.4%), growth retardation by 20 (5.3%) of the mothers, and 32 (8.4%) mentioned both malnutrition and growth retardation as a complication of parasitic infestations (Table 2).

## Attitude

The data regarding attitude were acquired using a questionnaire containing 7 questions where the answer would be worth 4 points if they chose “Extremely disagree”, 3 points if they chose “Disagree”, 2 points if they chose “Extremely agree”, and 1 point if they chose “Agree” (Likert Scale). Thus, the highest score would be 28 points and the lowest would be 7 points. A group of positive and negative attitudes was categorized based on the median value. The results were considered a positive attitude if the number of the score was lower than the median. On the other hand, negative attitude was



**Figure 1** The mean and standard deviation of maternal age, size of family, birth order, and number of children from the households in Sekota town, Waghimra zone, Ethiopia, 2019/2020.

considered when the number of the score was higher than the median. The mean and median of attitude was 16 and 15 respectively. Based on the median, 44.7% of mothers had above the median and were considered as having negative attitude and 55.3% of mothers had below the level of the median and were considered as having a positive attitude (Table 3).

## Practice

The data regarding practice were acquired using 11 “yes” and “no” questions, where the highest and lowest scores were 11 and 0 points (Ordinal Scale) respectively. A group of good and poor practice was categorized based on the median. The result was considered as a good practice if the score was higher than the median value and considered as a poor practice if the score was lower than the median. The mean and median of maternal practices were 14.8 and 14 respectively. Based on the median value, 51.1% of mothers were above the median and 48.9% of mothers were below the median. Therefore, 51.1% of mothers had good practice and 48.9% of them had poor practice regarding prevention and control methods of intestinal parasitic infestations (Table 4).

## Discussion

According to the median value, 45.2% of the women were considered as knowledgeable and 54.8% of women were non-knowledge about intestinal parasitic infestations prevention and control methods in Sekota town. This is lower than a study which reported the knowledge of mothers as 60.3% regarding prevention and control of intestinal parasites.<sup>15</sup> This might be due to the use of different operational definitions. This study’s operational definition was categorized as knowledgeable and non-knowledgeable but the comparative operationalized as good knowledge, fair knowledge, and poor knowledge. The sum of good knowledge and fair knowledge considered as knowledgeable. This might have deviated from the lower border and increased the level of knowledge.

In this study, contaminated water, contaminated food, uncooked vegetables, and unclean fruits, contaminated food and contaminated water were mentioned as major causes, which is similar to a study done in Wondo genet, in which mothers responded that drinking river water, chewing sugar cane, feeding a child uncooked cabbage and green pepper were responsible for intestinal parasitic infections.<sup>16</sup>

**Table 2** Maternal Knowledge About Intestinal Parasitic Infestation Prevention and Control Methods in Sekota Town, Ethiopia, 2018/19

No	Variables	Categories	Frequency	Percent
1	Which intestinal parasite do you know of (n=378)	<i>Ascaris lumbricoids</i> <i>E. Histolytica/dispar</i> <i>G. Lamblia</i> Hookworm <i>G. Lamblia</i> and <i>E. Histolytica/dispar</i> Hookworm and <i>E. Histolytica/dispar</i> <i>Ascaris Lumbricoids</i> and <i>G. Lamblia</i> I do not know	77 41 52 17 23 9 32 127	20.4 10.8 13.8 4.5 6. 2.4 8.5 33.6
2	Which prevention mechanisms do you know of (n=378)	Hand-washing Using latrine Washing vegetables Avoid food and water contamination Hand-washing and using latrine Washing vegetables and using latrine I do not know	42 30 62 6 29 18 187	11.1 8 16.4 1.6 7.7 4.8 49.5
3	Which modes of transmission do you know of (n=378)	Soil contact Contaminated water Contaminated food Uncooked vegetables and unclean fruits Contaminated food and contaminated water Contaminated food and soil contact Uncooked/unclean vegetables and fruits and soil contact I do not know	75 29 65 17 9 20 15 148	19.9 7.7 17.2 4.5 2.4 5.3 3.9 39.1
4	Which signs and symptoms of IP do you know of (n=378)	Diarrhea Abdominal cramps Vomiting Anorexia Diarrhea and vomiting Abdominal cramps and diarrhea I do not know	66 38 19 9 24 17 205	17.5 10 5 2.4 6.4 4.5 54.2
5	Which complications do you know of (n=378)	Malnutrition Anemia Growth retardation Malnutrition and growth retardation Growth retardation and anemia I do not know	58 12 20 32 7 249	15.4 3.2 5.3 8.4 1.9 65.8

Mothers mentioned diarrhea, abdominal cramps, vomiting, and anorexia as the major sign and symptoms of intestinal parasites, which is similar to a study in which mothers mentioned that intestinal parasites manifested as diarrhea, vomiting, loss of appetite, abdominal discomfort, and an enlarged abdomen.<sup>16</sup>

Mothers mentioned malnutrition, anemia, and growth retardation as the major complications of intestinal parasites, which is similar to a study that mentioned that intestinal

parasites caused serious health problems including growth retardation, and malnutrition unless treated.<sup>16,17</sup>

Mothers mentioned using latrine, washing vegetables, and avoiding food and water contamination as the prevention and control of intestinal parasites, which is similar to a study in which mothers mentioned that intestinal parasites can be prevented and controlled by hand-washing before eating and feeding, washing after defecation (self and children), regular use of footwear



**Table 3** Maternal Attitude About Intestinal Parasitic Infestation Prevention and Control Methods in Sekota Town, Ethiopia, 2018/19

S.No	Variable	Categories	Frequency	Percent
1	Lack of hygiene is the cause of intestinal parasitic infections	Extremely agree	101	26.7
		Agree	164	43.4
		Neutral	44	11.6
		Disagree	51	13.5
		Extremely disagree	18	4.8
2	Intestinal parasites can be prevented and treated	Extremely agree	135	35.7
		Agree	168	44.4
		Neutral	24	6.3
		Disagree	25	6.6
		Extremely disagree	26	6.9
3	Health education can reduce the prevalence of intestinal parasitic infections	Extremely agree	108	28.6
		Agree	173	45.8
		Neutral	37	9.8
		Disagree	34	9.0
		Extremely disagree	26	6.9
4	One of the complications of intestinal parasite is growth retardation	Extremely agree	93	24.6
		Agree	202	53.4
		Neutral	36	9.5
		Disagree	34	9.0
		Extremely disagree	13	3.4
5	Use of soap while washing hands or face can prevent intestinal parasitic infections	Extremely agree	104	27.5
		Agree	173	45.8
		Neutral	24	6.3
		Disagree	38	10.1
		Extremely disagree	39	10.3
6	Raw food consumption is the cause of worm infestation	Extremely agree	75	19.8
		Agree	171	45.2
		Neutral	63	16.7
		Disagree	42	11.1
		Extremely disagree	27	7.1
7	Food prepared outdoors is risk for intestinal parasitic infections	Extremely agree	66	17.5
		Agree	145	38.4
		Neutral	60	15.9
		Disagree	56	14.8
		Extremely disagree	51	13.5

(self and children), maintaining food hygiene and using sanitary latrine to prevent worm infestations in their children.<sup>18</sup>

The overall level of positive attitude of mothers in Sekota town toward intestinal parasite was 55.3%, which is similar to a study done in Senbete and Bete towns which reported that 56.1% of mothers had

**Table 4** Maternal Practices Regarding Intestinal Parasitic Infestation Prevention and Control Mechanisms in Sekota Town, Ethiopia, 2018/19

Variables	Categories	Frequency	Percent
Does your child have any stool examination history?	Yes	252	66.7
	No	126	33.3
Do you wash your child's hands before any meal time?	Yes	295	78.0
	No	83	22.0
Do you wash your child's hands after any meal time?	Yes	286	75.7
	No	92	24.3
Do you cut your child's nails?	Yes	248	65.6
	No	130	34.4
Did you give drugs to your child for prevention of intestinal parasites?	Yes	197	52.1
	No	181	47.9
Do you use chemically treated/tap water to prevent intestinal parasitic infection?	Yes	278	73.5
	No	100	26.5
Do you wash your child's hands after defecation?	Yes	243	64.3
	No	135	35.7
Has your child ever been diagnosed with intestinal parasitic infection?	Yes	94	24.9
	No	284	75.1
Do you use soap to clean utensils?	Yes	243	64.3
	No	135	35.7
Did you wash before cooking meals?	Yes	327	86.5
	No	51	13.5
Do you wash fruits and raw vegetables thoroughly before eating?	Yes	269	71.2
	No	109	28.8

positive attitude and 43.9% had a negative attitude toward the prevention and control of intestinal parasites.<sup>15</sup>

The overall level of good practice among mothers living in Sekota town toward intestinal parasitic infestation prevention and control was 51.1%, which is in line with the study done in Astha block (54%)<sup>19</sup> and higher than a study done in Ichhawar (2%).<sup>20</sup> In general, this study indicated the level of knowledge, attitude, and practice of Sekota's mothers compared to others' work and other areas level of KAP, even the previous studies were limited on this title, cause to have restricted discussion.

## Limitation of the Study

Since it was a descriptive study, the association of knowledge, attitude, and practice was not assessed. Therefore, the impact of knowledge and attitude on practice was not indicated in this study. In addition to this, different factors that may be indicators of knowledge, attitude, and practice were not addressed. This may limit the strength of the conclusion and recommendation forwarded to the community.

## Conclusion

The overall level of knowledge, attitude, and practice of mothers on prevention and control of intestinal parasites in Sekota town is significantly low. In particular, the level of knowledge was exclusively low in this study. Based on the median parameter, mothers greater than 50% had a positive attitude and good practice but the number of knowledgeable mothers was lower than 50%. Therefore, community awareness about intestinal parasite prevention and control should be created through community mobilization like weekend campaigns or structured training for mothers. This study did not assess the degree of associations between independent variables and knowledge, attitude or practice. In addition, it did not address the association between knowledge or attitude with practice. Therefore, a further study with large sample size is needed to assess the association of knowledge or attitude with practice. The association of maternal, environmental, socio-economical, and other variables with maternal knowledge, or attitude or practice also needs to be determined.

## Abbreviations

IP, intestinal parasites; SOP, standard operational procedures; SPSS, statistical package for social science; KAP, knowledge, attitude and practice.

## Ethics Approval and Consent to Participate

The ethical clearance was obtained from the Institutional Review Board of Woldia University. A support letter was also obtained from Woldia University, research directorate office. Then, subsequent contact was made with the chairmen of the Sekota town administration and each kebele. Written permission was obtained from the heads of each kebele, Sekota zonal health department, and Sekota town health office. Written informed consent was obtained from mothers who were involved in the study after explaining

the aim of the study. Anonymity and confidentiality were maintained by allowing opposition and or discontinuation of the interview and omitting the name and personal identification of respondents, because it was not relevant to the study.

## Availability of Data and Materials

The raw materials supporting the conclusions of this research could be made available to researchers or policy makers, and any others who need the data for non-commercial purposes through request to the corresponding author.

## Consent for Publication

Participants were informed and gave their written consent to publish the findings. The consent for publication was received together with the consent to participate in the study.

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## Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors report no conflicts of interest in this work.



## References

1. World Health Organization (WHO). Soil-transmitted helminthiasis: number of children treated in 2013. *Weekly Epidemiol Rec.* **2015**;10(90):89–96.
2. World Health Organization (WHO). *Prevention and Control of Schistosomiasis and Soil Transmitted Helminthiasis*. Geneva: Report of WHO expert committee; **2002**.
3. Federal Democratic Republic of Ethiopia, Ministry of Health. *National Master Plan for Neglected Tropical Diseases (NTDs) 2013–2015*. Addis Ababa, Ethiopia; **2013**. Available from: [https://ntdenvision.org/sites/default/files/docs/national\\_ntd\\_master\\_plan\\_ethiopia\\_2013-2015\\_1.pdf](https://ntdenvision.org/sites/default/files/docs/national_ntd_master_plan_ethiopia_2013-2015_1.pdf). Accessed November 28, 2019.
4. Albonico M, Allen H, Chitsulo L, Engels D, Gabrielli AF, Savioli L. Controlling soil-transmitted helminthiasis in pre-school-age children through preventive chemotherapy. *PLoS Negl Trop Dis.* **2008**;2:e126. doi:10.1371/journal.pntd.0000126
5. Awasthi S, Bundy DAP, Savioli L. Helminthic infections. *BMJ.* **2003**;19:885–888.
6. Kvalsvig JD, Cooppan RM, Connolly KJ. The effects of parasite infections on cognitive processes in children. *Ann Trop Med Parasitol.* **1991**;85:551–568. doi:10.1080/00034983.1991.11812608
7. Belayhun Y, Medhin G, Amberbir A. Prevalence and risk factor for geohelminthic infestations in infants in Butajera Ethiopia, a population-based study. *BMC Public Health.* **2010**;10:21. doi:10.1186/1471-2458-10-21
8. Steinmann P, Keiser J, Bos R, Tanner MU. Schistosomiasis and water resources development and estimates of people at risk. *Lancet Infect Dis.* **2006**;6(7):411–425. doi:10.1016/S1473-3099(06)70521-7
9. WHO. *Working to Overcome the Global Impact of Neglected Tropical Diseases. First WHO Report on Neglected Tropical Diseases*. Geneva: WHO; **2010**. Available from: [http://whqlibdoc.who.int/publications/2010/9789241564090\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241564090_eng.pdf). Accessed November 14, 2019.
10. USAID's Neglected Tropical Diseases Program. Soil transmitted Helminthiasis; **2014**. Available from: [https://www.neglecteddiseases.gov/target\\_diseases/soil\\_transmittedhelminthiasis/](https://www.neglecteddiseases.gov/target_diseases/soil_transmittedhelminthiasis/). Accessed November 14, 2019.
11. Notoatmodjo S, editor. *Promosi Kesehatan Teori Dan Aplikasi*. Jakarta: Rineka Cipta; **2005**.
12. Omoigberale A, Airauhi L. Aspects of the epidemiology of intestinal parasitosis (IP) in children: knowledge, practice and perceptions of mothers. *Niger J Clin Pract.* **2006**;9(2):109–113.
13. Ferrer RL, Palmer R, Burge S. The family contribution to health status: a population-level estimate. *Ann Fam Med.* **2005**;3(2):102–108. doi:10.1370/afm.266
14. Kattula D, Sarkar R, Ajampur SSR, et al. Prevalence and risk factors for soil transmitted helminth infestations among school children in South India. *Indian J Med Res.* **2014**;139(1):76–82.
15. Lewetegn M. Prevalence of intestinal parasites among preschool children and maternal knowledge, attitude and practice on prevention and control of intestinal parasites in senbete and Bete Towns, North Shoa, Ethiopia. Addis Ababa University Research catalog. **2015**.
16. Nyantekyi LA, Legesse M, Belay M, et al. Intestinal parasitic infections among under-five children and maternal awareness about the infections in Shesha Kekele, Wondo Genet, Southern Ethiopia. *Ethiop J Health Dev.* **2011**;24. doi:10.4314/ejhd.v24i3.68383
17. Curtale F, Pezzotti P, Sharbini A, et al. Knowledge, perceptions and behavior of mothers toward intestinal helminthes in Upper Egypt: implications for control. *Health Policy Plan.* **1998**;13:423–432. doi:10.1093/heapol/13.4.423
18. Tripura A, Reang T, Tripura K, Roy A. A study of knowledge and practice on intestinal helminthiasis among rural tribal mothers of under five children in Mohanpur block, west district of Tripura: a north eastern state of India. *J Evol Med Dent Sci.* **2013**;2(47):9081–9087. doi:10.14260/jemds
19. Bhattacharya M, Joon V, Jaiswal V, Handling W. Sanitation practices in rural community of Madhya Pradesh: a knowledge, attitude and practice study. *Indian J Prev Soc Med.* **2011**;42(1):94–97.
20. WHO. *Guidelines for the Evaluation of Soil-Transmitted Helminthiasis and Schistosomiasis at Community Level, WHO/CTD/SIP/98.1*. Geneva: WHO; **1998**.

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