

Knowledge, attitude and practice of mothers on prevention and control of intestinal parasitic infection among their preschool children in Sekota town, Waghimra zone, Ethiopia

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Abstract

Background: Intestinal parasitic infection is one of the common communicable diseases across the world. Globally, more than 1.5 billion individuals infected with one or more parasitic agents. Of the victim individuals, 700 and 807 million people were infected by Hookworm and Ascariasis respectively. Intestinal parasites are prevalent in developing countries and to the most in sub-Saharan Africa. The prevalence of helminthiases in Ethiopia range from 27.2% to 85.1%. Particularly, young children have a high infestation rate and they suffer from a substantial burden of *Ascaris lumbricoides*, *Trichuris trichiura*, and *Schistosomiasis*. Therefore, this study was intended to assess mother's knowledge, attitude and practice on prevention and control of intestinal parasitic infection among their pre-school children in Sekota town, Ethiopia.

Methods: A community based descriptive cross-sectional study was conducted on 378 mothers using simple random sampling method, and gave a response rate of 98.4%. The findings are presented in percentage, frequency and tables. In all of the data collection, data analysis, and write up phases, a standard operational procedure was followed. A bivariate covariate analysis were undertaken to assess the correlation of total knowledge, attitude, and practice scores.

Results: The level of good maternal knowledge, positive maternal attitude, and good maternal practice in preventing and controlling intestinal parasitic infection on their preschool children was 45.2% (95% CI, 40.2, 50.5), 55.3% (95% CI, 50.8, 61.1), and 51.1 (95% CI, 46.0, 56.1) respectively. In assessing mothers knowledge, seventy seven (20.4%) of them reported that they knew *Ascaris lumbricoides*, and on the maternal practices in preventing IP infection, 62 (16.4%) mothers wash vegetables, and 252 (66.7%) mothers stated that their children had at least one history of stool examination.

Conclusions: The overall level of good maternal knowledge, positive maternal attitude, and good maternal practice on prevention and control of intestinal parasites was low. Specifically, the level of knowledge was significantly low. Therefore, community awareness about intestinal parasitic infection prevention and control methods should be created.

Introduction

Intestinal parasitic infection (IP) is one of the most common communicable diseases across the world (1). The commonest intestinal parasites are *Giardia intestinalis*, *Entamoeba histolytica*, *Cyclosporacayetanenensis*, and *Cryptosporidium* species. The infection caused by these parasites are known as giardiasis, amoebiasis, cyclosporiasis, and cryptosporidiosis respectively, and they all parasites associated with diarrhea (2). Globally, more than 1.5 billion individuals infected with one or more intestinal parasitic agents. Of these 1.5 billion victim individuals, 700 and 807 million people were infected by Hookworm and Ascariasis respectively (3). Moreover, intestinal parasites have public health importance in developing countries and to the most in sub-Saharan Africa (3, 4). These parasitic infections are the leading causes of morbidity and mortality in the developing countries (4-6). Foreexample, the prevalence of IP in Nigeria was 67.1% (5), 47.1% in western Tajikistan (7), 26.74% in Bangalore (8), and 49.5% in Anambra state (9). Juts like other developing countries, the prevalence of helminthiases in Ethiopia high, and had considerable variability across the different administrative regional states. It vary from 27.2% (10), 47.1% (11), 53.5% (11), 77.9% (12), 83.8 % (13), 84.3% (14), and 85.1% (15). Besides such variability, a study conducted in Motta town which is in nearby to this study setting reported that

children from low educated mothers were had high odds of intestinal parasitic infection (16). The evidence got from Motta town had supported by other studies that reported low maternal education, and lack of health education about intestinal parasite were associated with high prevalence of intestinal parasitic infection (5, 9, 12, 17, 18). In addition to these mentioned factors, young children are the vulnerable group for IP infection, and the highest infestation rate was reported to occur in this age group. Thus children suffer with substantial burden of Ascaris lumbricoides, Trichuris trichiura, and Schistosomes (19). Children who are infected by parasitic infectiou agents are risky to have retarded growth through impaired nutrient utilization (20, 21). If the infection left untreated, it would have other serious consequences such as hepatomegaly, splenomegaly, low immunity system, decrease level of intelligence, and esophageal varices (22, 23). The nature of helminthiasis prevention programs like regular anti-helminthic treatment, improved water supply, sanitation, and health education provoked authors to address maternal KAP (24).

Of the prevention programs, regular mass administration of anthelmintic drugs usually takes place outside the health care settings has been strongly supported by the (WHO). Millions of school aged children have received anti-helmintic treatment (25- 27). However, the control measures have limitation to be fully effective in developing countries due to lack of clean water, poor sanitation, and low coverage of education (28). Since poor sanitation, unsafe drinking water, and lack of toilet facilities are the main factors to the high prevalence of intestinal parasites in the tropical and sub-tropical countries (29).

The assumption of healthiness in a single community influenced by four factors. Knowledge, attitude, and practice are the three dominant and significant factors on the dynamicity of society's level of well-beingness (30). The additional factor for community healthiness is parental characteristics such as level of education, and income (31–33). According to these commencements, mothers' characteristics, knowledge, attitude, and practice towards a certain kind of illness play a major role in either the occurrence or disappearance of a particular disease. Thus, the knowledge, attitude, and practice of mothers play significant role to control or disseminate IP infections. According to European commission report a greater knowledge of the environmental factors and WASH indicators that influence soil transmitted helmentheiasis are issues where further research is required. The report indicated that understanding which WASH improvements are required to stop disease transmission, assessing the impact of WASH services on disease morbidity, analyzing how health education can benefit in disease control; and understanding the environmental factors which affect the control of parasites are very important and need to be studied (34). A study from Egypt also showed that mothers with good knowledge presented a lower prevalence of IP infection (35). There is a researche that indicated majority of the mothers lacked adequate knowledge about prevention and control methods of helminthic infections abroad (36). One research from Ethiopia was also hypothesized that the highest prevalence of IP might be because of low level of knowledge, attitude and practice towards intestinal parasitic infection (37). In which the lack of knowledge about mode of transmission of parasitic infections increases the risk of infections (38).

Hence, a better understanding of the major factors, as well as how social, cultural, behavioral, and community awareness affect the epidemiology and control of intestinal parasites may help to design effective control strategies. Despite the reductions in the prevalence of IP and morbidity have been achieved through chemotherapy, it is accepted that improvements in domestic water supplies, environmental sanitation, health education, access to health services for diagnosis and treatment must be integrated in control and elimination programmers' to assure their effectiveness (39). Thus, periodic deworming certainly can attain a stable reduction in transmission if deworming continues indefinitely. Health education can be provided simply and

economically, and its benefit goes beyond control of helminthes infections (40). For health education activities to be effective they will also need the identification of the target audience and the formulation of clear messages, which take into account local knowledge, and attitudes to bring about behavior change (41). Furthermore, the role played by the target population is of great importance. If the members of the community are aware of the negative effects of intestinal helminthes on the health of their children, they will be more likely to support and sustain uptake of MDA intervention measures. From a study in the coastal region of Kenya, there was evidence that more education and knowledge to the community members improved the uptake of MDA (42). In Ethiopia the main strategies are mass drug administration, and case detection and transmission control. In general, there are relatively sufficient literatures on the prevalence of IP on children but only a few studies have been conducted on KAP about intestinal parasitic infestations control and prevention methods. More importantly, there is no data about KAP on intestinal parasitic infestations control and prevention methods in this study town, Sekota town.

Therefore, this study was intended to assess mothers' knowledge, attitude, and practice about intestinal infestations control and prevention among their preschool children in Sekota town, Ethiopia. The finding of the result will be used to design health education programme that can be further implemented based on the level of maternal knowledge, attitude and practice. Beacuase, a program will be designed to reduce morbidity from soil-transmitted helminthic infections to such levels that these infections are no longer of public-health burden based on the result of maternal KAP. Further, the program will be developed to improve the developmental, functional, and intellectual capacity of the victim children as per the principle of targeted chemotherapy (43). Because, this day there are highly-effective, safe single-dose drugs, such as albendazole, which can be dispensed through healthcare services, school health programs, and community interventions directed at vulnerable groups (4).

Methods

Study area and design

The study was a community-based descriptive cross- sectional study, and carried out on mothers of Sekota town, which is located in the Amhara regional state, Ethiopia. The town, Sekota is the capital city of Waghimra administrative zone. It far 50 km from the rock church, Lalibella, and 655 km from Addis Ababa, the capital city of Ethiopia. The data collection period was from February 15 to March 10/2019. The Sekota town is known for water shortage. The water shortage might be a factor for poor hygiene and sanitation practices. The town, Sekota has two urban kebeles, and both kebeles were included in this study (44).

Sampling and study population

Sample size determination and sampling procedure

The sample size used in this study was 384 mother-child pairs that determined using single population proportion formula. The age of children range from 2 to 5 years. Although, the population proportion formula used for calculation in considering previous study's proportion (P , 52.3%) (45), the power of the sample size is also greater than 85%. In calculating the sample size, 10% none response rate, 95% CI, and 5% margin of error

was taken in to account. Simple random sampling technique with proportional allocation was used to get all the 384 mother child pairs (Figure 1).

Data collection tools

A pretested and structured interview-based questionnaire were developed in the English and then translated to Amharic, and re-translated to English version to record and analyze the demographic data, and data related to knowledge, attitude and practice of mothers by two independent translators. The discrepancy between the two translators was corrected in discussion between the translators and authors of this paper. This back and forth translation was rechecked by research experts and senior researchers to keep the consistency of the questionnaire. All the questions were developed in considering prevention and control methods of intestinal parasitic infestations.

Assessment of maternal knowledge, attitude, and practice

In assessing the KAP of mothers, a validated questionnaires were used. The questionnaires had three sections. The first section was about mother's knowledge. The knowledge questionnaires were 5 and have multiple alternatives to be selected by mothers. Thus, mothers were expected to select at least one correct answer to be knowledgeable for that question. The second and third section of the questionnaire was about mother's attitude, and their practice in preventing and controlling IP infection on their under five years old children. The attitude questioners were 7, and that of the practice questionnaires were 11. In all of these sections, mothers were asked about types of intestinal parasites, mode of transmissions, sign and symptoms of intestinal parasitic infections, methods of prevention and control, and complications of IP. All mothers were interviewed in their local language using closed-ended questions. The data collectors selected from the study area and collected the data under the supervision of the researchers.

Inclusion criteria: mothers with their children, whose age was between 2 and 6 years and lives in Sekota town for at least 6 months were included.

Exclusion criteria: Mother-child pairs who were not lived in Sekota town for 6 months, and mothers who had serious illness were excluded.

Data analysis

The data were entered into epi-data version 4.2.0.0 and transferred to SPSS version 23 software for analysis. Frequency and percentiles were used to summarize the descriptive statistics of the data. The level of maternal knowledge, attitude and practice were reported as percentage and presented in tables and graph. A bivariate correlation were undertaken to assess the relation of total knowledge, attitude, and practice scores. The knowledge questions' scoring methods were performed as per Guttman Scale. While entering and analyzing the data of knowledge, unfavorable options got 1 point if mothers don't know the correct answers, and 0 point was assigned for correct answers according to Guttman scale grading scheme. Those five questions have multiple options. From these multiple options, 1 is for the option "I don't know" and 0 is for all other list of options. Participants who list one and above correct answers among the given alternatives got 0 point. Therefore, the highest and lowest score are 5 and 0 points. The data of attitude was acquired using a questionnaire containing 7 questions where the point were worth 4 if it was "Extremely disagree", 3 points if it

was "Disagree", 2 points if it was "Extremely agree", and 1 point if it was "Agree" (Likert Scale). Thus, the highest score would be 28 points and the lowest score would be 7 points. A group of positive and negative attitude was categorized based on the median value. The data of practice was got using 11 "yes" and "no" ordinary questionnaires where the highest and lowest scores were 11 and 0 points (Ordinal Scale) respectively. The data was recored as 0 when the respondents answer was no, and 1 if otherwise.

Data quality

For every step of data collection, analysis, and management a standard operational procedures (SOP) were followed. The questionnaire was pretested on 5% (20 mothers) of the sample in Woldia town, Amhara region, Ethiopia. The questionnaires used to generate data on the socio-demographic data, knowledge, attitude and practice were validated before the data collection period. The data was checked for its completeness every evening of the data collection day by all investigators and data collectors. The data collectors were taking one-day refreshment training.

Operational definitions

Preschool children: Children whose age was between their first day of year 2, and completed 5 years but not attending their 6 years of birthday.

Intestinal parasites: A microorganism that can infect gastrointestinal tracts of the human body.

Attitude: Mothers' opinion or thought about intestinal parasitic infection, its sign and symptoms, prevention and control methods, complication, and other related factors

Positive attitude: Mothers who responded below the median value for attitude questions, in which the median value was 15 in this study

Negative attitude: Mothers who responded above the median value for attitude questions, in which the median value was 15 in this study

Knowledge: Assessment of what mothers described about intestinal parasitic infections, its prevention and control methods, complications, and other related factors.

Knowledgeable/good knowledge: Mothers who scored below the median value for knowledge questions, in which the median value was 2 in this study

None knowledgeable/poor knowledge: Mothers who scored above the median value for knowledge questions, in which the median value was 2 in this study

Practice: Assessment of mother's actual activities to prevent and control intestinal parasitic infections in their home and out of home.

Good Practice: Mothers who scored above the median value for practice questions, in which the median value was 14 in this study

Poor Practice: Mothers who scored below the median value for practice questions, in which the median value was 14 in this study

Kebelle: The smallest administrative unit of Ethiopia. A kebele is expected to consists at least five hundred families, or the equivalent of 3,500 to 4,000 persons.

Results

Maternal socio-demographic status

Among the 384 mothers, 378(98.4%) mothers were involved in this study. Of the respondents, 374(98.9%) participants were Amhara in ethnicity, 317(83.9%) were a follower of Ethiopian orthodox religion, 157(41.5%) mothers were unable to read and write, 275(72.8%) mothers were a housewife and 330(87.3%) women were married. Majority of the mothers 374 (98.9%) had no both history of abortion and diagnosed diabetic Mellitus during the interview time (Table 1). The mean age of mothers were 29.2 with a standard deviation of 5.7. The minimum and maximum age of mothers was 20 and 42 respectively. The maximum and minimum number of pregnancy among mothers was 8 and 2 respectively The mean age of children involved in the study was 3.15 (Figure 2).

Maternal knowledge, attitude and practice

The knowledge, attitude, and practice of mothers on prevention and control of intestinal parasitic infection among their pre-school children in Sekota town were determined using the median value of total knowledge, attitude, and practice scores. The mean and median value of maternal knowledge was 2.57, and 2.00 respectively. The mean and median value of maternal attitude was 16.03, and 15.00 respectively. Whereas the mean, and median value of maternal practice was 14.77, and 14.00 respectively (Table 2).

Maternal knowledge

In this study 207 (54.8%) of the women were none knowledgeable, whereas 171 (45.2%) of mothers were knowledgeable about intestinal parasitic infections prevention and control methods on preschool children.

Knowledge about intestinal parasites

Majority of the mothers, 77 (20.4%) reported that they knew Ascaris lumbricoides, 41 (10.8%) knew E. histolytic, and 52(13.8%) knew Giardia lamblia (Table 3).

Knowledge about prevention and control of intestinal parasites

From 378 mothers, 62(16.4%) respondents mentioned washing vegetables, 42(11.1%) respondents consider hand washing, 30 (8%) raised latrine utilization as prevention and control methods of IP infections (Table 3).

Knowledge about mode of transmission of intestinal parasites

Among the total respondents, 75(19.9%) considered soil contact, 29(7.7%) mentioned contaminated water, and 65 (17.2%) describe contaminated food as a mode of transmission (Table 3).

Knowledge about sign and symptoms of intestinal parasites

Of the total 378 mothers, 66 (17.5%) listed diarrhea, 38 (10%) indicated abdominal cramp, and 19 (5%) mentioned vomiting as the sign and symptoms of intestinal parasitic infections (Table 3).

Knowledge about the complication of intestinal parasites

Regarding the complication of intestinal parasitic infection, malnutrition was considered by 58 (15.4%) respondents, growth retardation by 20 (5.3%) mothers, and 32(8.4%) mothers were considered both malnutrition and growth retardation are complication of parasitic infestations (Table 3)

Attitude

In this study, 169 (44.7%) mothers had negative attitude, and 209 (55.3%) mothers had positive attitude about intestinal parasitic infections prevention and control methods on their preschool children (Table 4).

Practice

Among the 378 mothers, 193(51.1%) mothers were had good practice, and 185(48.9%) of mothers were had poor practice about intestinal parasitic infections prevention and control methods on their preschool children (Table 5).

Correlation of knowledge, attitude and practice

The KAP questions were sum up together to determine the level of knowledge, attitude, and practice. The total score of knowledge and attitude or practice as well as total score of attitude and practice were run in the covariate model. The model was selected to determine whether the KAP of mothers had correlation or not. The number of family and number of pregnancy were inversely correlated with total score of attitude. Whereas the number of family, number of live birth, and number of pregnancy were had direct correlation with total score of practice. But the total score of knowledge had no any correlation with any of the variables. More importantly, there is no correlation in between total score of knowledge and attitude or practice and total score of attitude and practice (Table 6).

Discussion

Intestinal parasitic infection acquired in any age, but young children are more susceptible disproportionately (19). Though, intestinal parasitic infection is a global problem, it is more devastating in developing countries (3,4), particularly Ethiopia, and the study area, Sekota town in which the study area has water shortage (44). This may contribute for poor hygienic practice, and low level of maternal practice to prevent IP infection. In addition, assessing the knowledge, attitude, and practice of individuals regarding the risk factors, mode of transmission, and intermediate host in the community have a great importance for identifying, designing and implementing effective community-based interventions (46, 47). In this study, the reported level of good maternal knowledge, positive attitude, and good maternal practice in preventing and controlling intestinal parasitic infection on their pre-school children was 45.2% (95% CI, 40.2, 50.5), 55.3% (95% CI, 50.8, 61.1), and 51.1% (95% CI, 46.0, 56.1) respectively. Whereas 54.8% (49.5, 59.8), 44.7% (38.9, 49.2), and 48.9% (43.9, 54.0) of respondents were had poor maternal knowledge, negative attitude, and poor maternal practice. In this study, the total level of mothers'

knowledge was lower than a study that was done in Tigray, Ethiopia in which 94.4% of respondents had good knowledge about intestinal parasitoids prevention (48). This discrepancy might be because of different study population. In our study only mothers who had under five years old children were considered but the referred paper included both males and females irrespective of presence of under five children. The finding of this paper was also lower than a study done in Senbete and Bete towns, north Shoa, Ethiopia that reported 60.3% of respondents were knowledgably (45). This variance might be due to the use of different operational definitions on knowledge. Our study used the median value to categorize as knolagable and none knowledgable but the compared study consider a total score cut off of points. In this study, on each knowledge questionnaire, 75(19.9%) of respondents considered soil contact, and 65 (17.2%) mothers indicated contaminated food as a mode of IP transmission. This is lower than a study conducted in Egypt that reported 41.8% of mothers mentioned contaminated food, and 41.7% state soil as a mode of transmission (35). In this study 62(16.4%) of mothers stated washing vegetables, and 42(11.1%) declared hand washing to prevent IP infection. This finding is also significantly lower than the study conducted in Egypt that washing hands and washing vegetables indicated by 73.3% and 62.2% of the respondents to prevent IP infections respectively (35). The difference might be because of socio-economic status difference between Ethiopia, and Egybt. The finding of this study was agreed with a study done in Wondo Genet in some of knowledge related variabls, in which mothers from Wondo Genet responded that drinking river water, chewing sugar cane, feeding uncooked cabbage to children, and green pepper were associated with intestinal parasitic infections (49). In this study, mothers mentioned diarrhea, abdominal cramp, vomiting, and anorexia as the sign and symptoms of intestinal parasitic infections. This finding was also aligned with the study done in Wondo genet (49). In the current study, mothers mentioned malnutrition, anemia, and growth retardation could occur as a complication of intestinal parasites which was similar with a study that mentioned intestinal parasites could cause serious health problems including growth retardation, and malnutrition unless treated (49). This agreement might be because of similar study design, similar study population, and relatively similar degree of urbanization. In the current study, the overall level of positive attitude was 55.3%, which is similar with a study done in Senbete and Bete towns, Ethiopia that reported 56.1% of mothers had positive attitude, and 43.9% had a negative attitude towards the prevention and control of intestinal parasites (45). The similarity might be due to similar socio-economic status, design and setting, in which both Sekota, and Senbete and Bete towns are medium scale, and dry towns. In this study 35.7% of mothers extremely agree, and 44.4% of mothers agree on the importance of IP treatment. This is lower than a study from Tigray, Ethiopia in which 300(99.7%) of the participants were agree with the importance of medication on treating IP infections (48). This discrepancy might be because of different study area, that might have different health care services including health education, and health extension package coverage. In this study 44.4% of mothers agreed that IP infection can be treated, which is lower than the study conducted in Egypt that (93.4%) of respondents agreed that worms could be treated (35). The difference might be because of socio-economic status difference between Ethiopia, and Egybt. The overall level of good maternal practice in Sekota town about intestinal parasitic infection prevention and control was 51.1%, which was in line with the study done in Astha block (54%) (50). The agreement might be due to having similar socio-economic status, and health care service across the study areas. But the current study had higher good maternal practice than a study done in Ichhawar that reported only 2% of mothers were had good practice (51). This substantial difference might be because of different socio-economic status, health care services, sample size and study area. In this study 66.7% of mothers had routine stool examination for helminthes. This agreed with a study that reported mothers had routine stool examination for helminthes among their preschool children (52). The agreement might be due to health care service availability and governments commitment to control IP through periodic

deworming across the world. In this study 78.0% of mothers wash their children's hand before meal. This finding is lower than a study from Tigray that reported 301(100) respondents wash their hands before meal (48). The disagreement might be due to geographic difference, and availability of water. In the current study, there is considerable water shortage (44) in relative to the reference. On each specific practice questions, 78.0% of the respondents wash their hands, which is higher than a study that was done in Zimbabwe, in which only 42 (24.4%) of children washed their hands some times before eating food (53). In this research 64.3% of mothers wash their children after using latrine. This is higher than a research that reported 29 (16.9%) of children never washed their hands after using toilet, and 69 (40.1%) of children washed their hands sometimes after using toilet (53). The inconsistency might be because of study population difference. In our study, the practice of mothers were assessed but in the compared study from Zimbabwe collected data from children. In this study 52.1% of mothers gave deworming for their children. Which is lower than a study from Tigray that reported 299(99.3%) of respondents took deworming (48). The inconsistence might be because of the health education provided. In our study, there is only a universal health care services than the compared study area, which had special health education as the area is known for shistosomiasis. On the covariate analysis, all of the total score of knowledge, attitude, and practice have no correlation. The reason might be the sample size, or the overall low level of maternal knowledge, attitude, and practice which causes to lack correlation. The low level of knowledge, attitude, and practice might indicate that the study area had no basic and conceptualized awareness about IP. The lack of basic and conceptualized knowledge might be an indication for the absence of correlation between KAP of mothers. In general, this study try to indicated the level of knowledge, attitude and practice of Sekota town's mothers against others' work and other areas level of KAP, although the previous studies were limited on this title, and persuade us to have such a restricted discussion.

Conclusion

The overall level of maternal good knowledge, maternal positive attitude, and maternal good practice on prevention and control of intestinal parasites in Sekota town were significantly low. The level of knowledge was exclusively low in this study. More than half of mothers have a positive attitude and good practice. The total score of knowledge, attitude, and practice had no correlation. This might be because of small sample size, or designs we used. Therefore, community awareness about intestinal parasitic infection prevention and control should be created through community mobilization like weekend campaign or structured training for mothers. In addition a further researche is needed with large sample size, and different methods to asses the relation of KAP, and factors associated with KAP.

Limitation of the Study

Mainly, it is a descriptive study, and the association of knowledge, attitude, and practice were not assessed using logistic regression. Therefore, the impact of knowledge and attitude on practice is not indicated with strong statistical analysis. Even the covariate analysis indicated that the KAP of mothers are not correlated eachother. In addition to this, different factors that may be indicators of knowledge, attitude, and practice are not addressed. This may limit the strength of the conclusion and recommendation forwarded to the community. Yet, some continuous variables were assessed with KAP of mothers using covariate model.

Declarations

Ethics approval and consent to participate

The ethical clearance was obtained from Institutional Review Board of Woldia University (WDU/IRB/0910/2019). A support letter was also obtained from Woldia University, research directorate office. Then after, a subsequent contact was made with the chairmen of the Sekota town administration and each kebeles head offices. A written permission was got from the heads of each kebeles, and Sekota zonal administration. The data collectors get written consent from mothers after explaining the purpos of the study. Mothers 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 compelled to the study.

Consent for publication

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

Availability of data and materials

The data that supports the conclusions of this research could be available to researchers or policy makers, and any others who need the data to be used for non-commercial purposes through requesting one of the authors.

Competing interests

The authors declare that they have no conflicting of interests.

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Authors' contributions

Conceived the title and designed the study: MWK, AMA, BBA, ABZ, and AMK. Field study: MWK, ABZ, AMA, and BBA. Analyzed the data: MWK, AMK, and ABZ. Critically revising the work: MWK, and BBA. Writing the final paper: MWK, AMA, ABZ, and BBA. All authors had read and approved the final version of this manuscript with a consideration of full accountability.

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Abbreviations

IP-Intestinal parasites, SOP-standard operational procedures, SPSS-Statistical package for social science, KAP-knowledge, attitude and practice

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Tables

Table 1: Maternal socio-demographic, behavioral and medical status of the included mothers in Sekota town, Ethiopia, 2018/19 (n=378)

Variables	Categories	Parasite infections		Frequency	Percent
		Negative No (%)	Positive No (%)		
Sociodemographic characteristics	Amhara	265 (70.9)	109 (29.1)	374	98.9
	Tigray	0	4(100)	4	1.1
	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
	Orthodox	228 (71.9)	89 (28.1)	317	83.9
	Muslim	37 (60.7)	24 (39.3)	61	16.1
	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
Education level	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
	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
	Yes	4(100)	0	4	1.1
	No	261 (69.8)	113 (30.2)	374	98.9
	Yes	4(100)	0	4	1.1
Knowledge of helminths	No	261 (69.8)	113 (30.2)	374	98.9

Table 2: The central statistics and variance used to categorize the knowledge, attitude, and practice of mothers in Sekota town, Amhara, Ethiopia, 2019

Descriptive statistics	Sum of knowledge	Sum of attitude	Sum of practice
Mean	2.57	16.03	14.77
Standard deviation	4.20	1.545	2.48
Median	2.00	15.00	14.00
Below the mean (%)	45.2	62.7	48.9
Below the median (% & 95% CI)	45.2 (40.2, 50.5)	55.3 (50.8, 61.1)	48.9 (43.9, 54.0)
Above the mean (%)	54.8	37.3	51.1
Above the median (% & 95% CI)	54.8(49.5, 59.8)	44.7 (38.9, 49.2)	51.1 (46.0, 56.1)

Table 3: Maternal knowledge about intestinal parasitic infestations prevention and control methods in Sekota town, Ethiopia, 2018/19 (n=378)

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

Table 4: Maternal attitude about intestinal parasitic infestations prevention and control method in Sekota town, Ethiopia, 2018/19 (n=378)

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	26	6.9
		Disagree		
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	26	6.9
		Disagree		
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	13	3.4
		Disagree		
5	Uses of soap while washing hand 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	39	10.3
		Disagree		
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	27	7.1
		Disagree		
7	Foods prepared in outdoor are risks for intestinal parasitic infections	Extremely Agree	66	17.5
		Agree	145	38.4
		Neutral	60	15.9
		Disagree	56	14.8
		Extremely	51	13.5
		Disagree		

Table 5: Maternal practices about intestinal parasitic infestations prevention and control mechanisms in Sekota town, Ethiopia, 2018/19 (n=378)

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

Table 6: the association of total knowledge, attitude, and practice scores with predictor continuous variables

Variables	Total knowledge		Total practice		Total attitude	
	Pearson correlation (r)	P-value	Pearson correlation (r)	P-value	Pearson correlation (r)	P-value
Maternal age	0.09	0.073	-0.07	0.19	-0.07	0.19
Number of family	0.04	0.45	0.23**	0.00	-0.18**	-0.00
Number of live birth	0.05	0.32	0.12*	0.021	0.05	0.32
Number of pregnancy	0.05	0.32	0.11*	0.021	-0.21**	0.00
Total knowledge	-	-	-0.02	0.72	0.04	0.47
Total attitude			0.03	0.54	-	-

Correlation is significant at the 0.05 level (2-tailed), & **Correlation is significant at the 0.01 level -tailed).

Figures

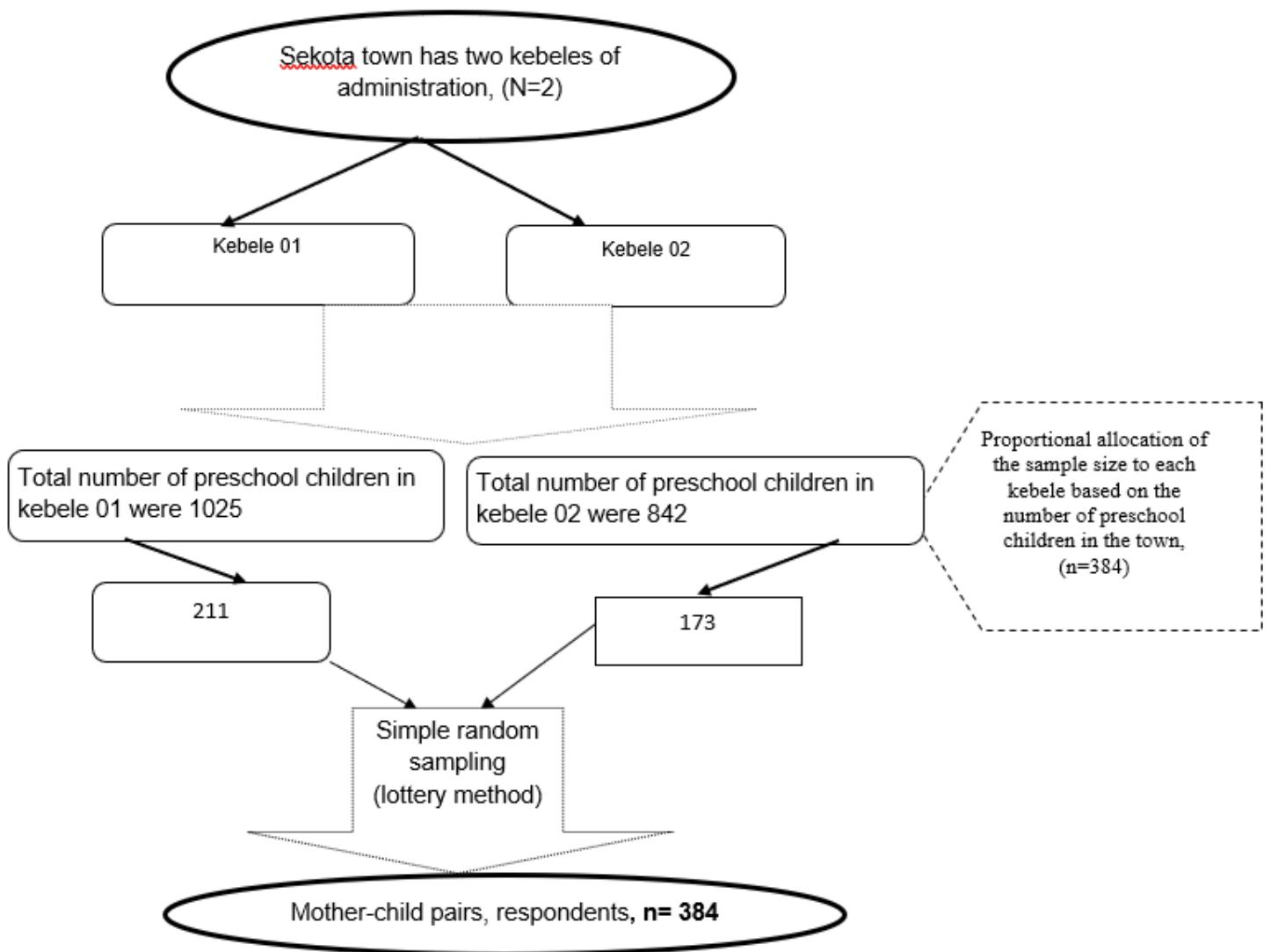


Figure 1

Schematic diagram of the sampling procedure for selecting mothers in assessing their KAP about intestinal parasitic infestations prevention and control methods among their preschool children in Sekota town, Waghimra zone, Ethiopia, 2019.

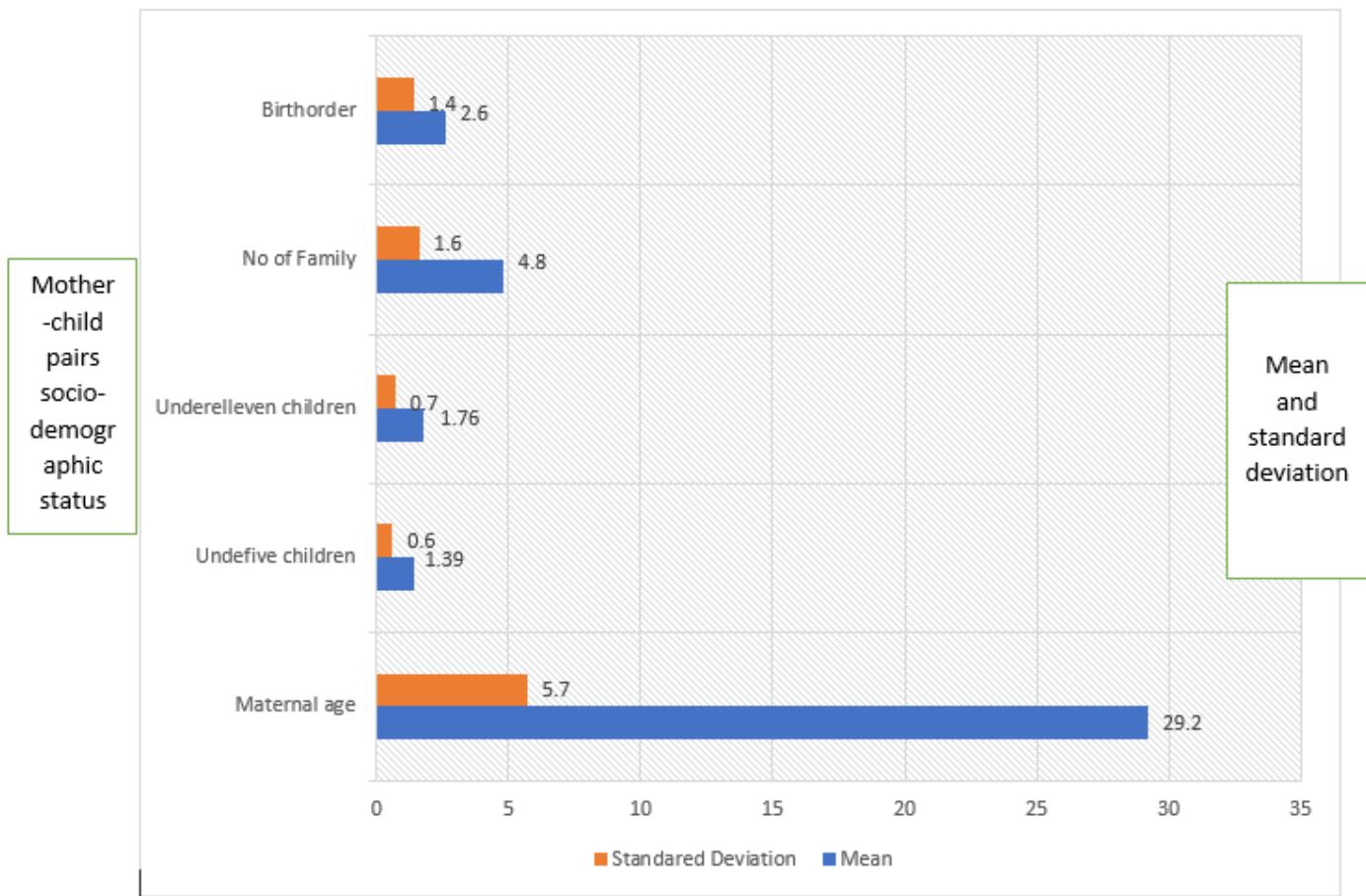


Figure 2

The mean and standard deviation of maternal age, number of family, birth order, and number of children from the households included to the study in Sekota town, Waghimra zone, Ethiopia, 2018/19

Supplementary Files

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