

**ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE,
SCHOOL OF GRADUATE STUDIES, DEPARTMENT OF
MICROBIOLOGY, IMMUNOLOGY, AND PARASITOLOGY**



**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.**

By

Moges Lewetegn

November, 2015

ADDIS ABABA, ETHIOPIA

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Ethiopia.**

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ABBREVIATIONS AND ACRONYMS

AAU: Addis Ababa University

AOR: Adjusted Odds Ratio

COR: Crude Odds ratio

EPG: Eggs Per gram of Stool

EPHI: Ethiopian Public Health Institution

IP: Intestinal Parasite

KAP: Knowledge, Attitude and Practice

MoH: Ministry of Health

SAFE: Surgery, Antibiotics, Facial cleanliness and Environmental Improvement

STH: Soil Transmitted Helminths

WHO: World Health Organization

ABSTRACT

Background: Intestinal Parasites (IPs) which consist of protozoa and helminths mostly infect gastro-intestinal tract of human. Generally, most intestinal protozoa and helminths are transmitted by contaminated food, water, and unhygienic conditions. In developing countries where parasitic infections are widespread, preventive chemotherapy is the key strategy for morbidity control. However, there is poor understanding of the local knowledge, attitude, and practices (KAP) towards parasitic infections, although such information is required for prevention and sustainable control.

Objective: To assess prevalence of intestinal parasites among preschool children, maternal knowledge, attitude and practice on prevention and control of intestinal parasites in Senbete and Bete towns North shoa zone, Ethiopia.

Methods: Cross-sectional study was conducted on 214 preschool children in Senbete and Bete towns in July 2015. Stool specimens was collected and analysed for intestinal parasites using Kato-Katz and formol-ether concentration technique. Mother's knowledge, attitude, and practice data were collected using a pre-tested structured questionnaire. Data were analyzed descriptively and inferentially with SPSS-20 statistical software and P values of <0.05 were considered as significant.

Result: Out of 214 preschool children stool samples examined in Senbete and Bete towns the overall prevalence of intestinal parasite was 52.3%. In our finding the predominant parasites were *Hymenolepis nana* (23.8 %), followed by *Giardia lamblia* (19.6%). Maternal education level, open field defecation and playing with soil were significantly associated with intestinal parasite infections. On the other hand, 19% mothers had knowledge and 41% of them had fair knowledge on prevention and control of intestinal parasites based on knowledge scoring on selected questions. Beside that 56.1% of the respondent had positive attitude on the prevention and control of intestinal parasites.

Conclusion and recommendation: High prevalence of intestinal parasite infections was found. There is a need for long term control measures to health education program focusing the improvement of KAP of parents to control intestinal parasitic infections and mass treatment for the effective control.

Key words: preschool children, intestinal parasite, Maternal Knowledge, attitude and practice

1. INTRODUCTION

1.1 Background

Intestinal parasites are cause of gastro-intestinal tract infections on human, other animals and have adverse consequence in health of human being. Parasitic protozoa are single-celled microorganisms that possess one, rarely two nuclei. Two most prevalent intestinal protozoa among preschool children are, *Entamoeba histolytica* lives in side the intestine as a trophozoite that means vegetative stage of protozoa showing motility and the ability to grow, feed, and reproduce. It produces resistant cysts by which it is transmitted. The other one is flagellates possesses at some stage of their life cycle one or more long hair-like flagella for locomotion. They reproduce asexually by binary fission. *Gardia lamblia* is an intestinal flagellate that is bilaterally symmetrical having two nuclei, two axonemes, and four pairs of flagella. Motile trophozoites can be found in faeces and also cysts by which *G. lamblia* is transmitted (Kayser, 2005).

Parasitic helminths include the nematodes (roundworms), trematodes (flukes) and the cestodes (tapeworms). Representatives of each of these groups are important parasites for preschool children. The adult worms, that inhabit the intestine, discharge their eggs or larvae in faeces. Nematode infections transmitted through soil contaminated by human faces, are causes for anaemia, vitamin A deficiency, stunted growth, malnutrition, intestinal obstruction and impaired mental development (WHO, 2004; 2015).

Intestinal parasites have their own characteristics; have different morphological and biochemical mechanisms to infect humans and animals. They are usually classified as protozoa and helminths (Mekete G, 2003). The most important intestinal protozoan pathogens are *Entamoeba histolytica*, *Cryptosporidium* species, *Giardia intestinalis* (*lamblia*), *Cystoisospora* (*Isospora*) *belli*, *Cyclospora cayetanensis*, and members of the phylum Microsporidia. The predominant intestinal helminths are *Ascaris lumbricoides*, *Trichuris trichiura*, *Schistosoma mansoni*, hookworm, *Hymenolepis nana*, *Enterobius vermicularis* and *Strongyloides stercoralis* (WHO, 2004; Cheesbrough, 2009).

Over 1.5 billion people are infected with one or more intestinal parasites, there are 700 million people infected with hookworm and 807 million people infected with ascariasis according to World Health Organization (WHO) estimates (WHO,2015). Intestinal parasites are more

predominant in the developing countries mostly in sub-Saharan Africa including Ethiopia (WHO, 2001). Though affect all population, children are the most risk group. Intestinal parasite causes weight loss, intestinal obstruction and cognitive impairment (Mathers *et-al.*, 2007). In Ethiopia intestinal parasitic infections are prevalent in varying magnitude among under-five children, school aged children and other age group. Toilet utilization , hand washing , and waking bare foot has impact in the prevalence of intestinal parasites (Abate *et al.*,2013), in addition mother's knowledge on the transmission of intestinal parasites play role in disease prevention and control (Nyantekyi *et al.*,2010).

Intestinal parasite infections are common among preschool children. There are different causes for the prevalence such as playing with soil, sucking fingers and defecation in open field. Maternal awareness for the prevention and control of intestinal parasite has its own impact on the prevalence. Ethiopia is affected by more prevalence of intestinal parasites that responsible for the major share of morbidity and mortality where there is poor sanitation, poor personal hygiene and absence of potable water. To reduce the impact of intestinal parasites increasing access to safe water, sanitation and health education are necessary (WHO, 2001) and WHO recommends preventive chemotherapy, which is a periodic administration of antihelminthic medicines albendazole or mebendazole as a public health intervention (WHO,2015).

Therefore the objective of this study focused on the prevalence of intestinal parasite and maternal Knowledge, attitude and practice on the prevention and control of intestinal parasites. As a result the study gives information on one of the venerable groups with intestinal parasites and the understanding, thought and exercise of mothers on the prevention and control of intestinal parasitic infections.

1.2 Prevalence and predisposing factor of intestinal parasites.

Both protozoan and helminths affect pre-school children globally as illustrated by various articles. Intestinal parasite most of the time occurs in a single infection, some time they may occur in double or multiple infections. In case of double or multiple infections the impact of the infections gets worse. A study conducted among pre-school children in Sangkhlaburi, a rural district in the west of Thailand reported that *G.lamblia* and *Cryptosporidium* species are most frequently identified parasites followed by *Ascaris lumbricoides* and *Blastocystis hominis*. In this study, multiple infections were found in 3.8% of the participants (Wongstitwilairoong *et al.*, 2007). The other cross sectional survey in Lucknow, North India reported that the prevalence of *Ascaris lumbricoides* 11.9%, *Giardia lamblia* 5.8% and double infection occurred in two of the preschool children (S. Awasthi and V.K. Pande, 1997). Other study conducted in Matanzas city, Cuba also showed that the overall prevalence of intestinal parasite among under five children were 71.1% and 45.2% of the children were poly-parasitized (Canete Roberto *et al.*, 2012). The above findings indicate that multiple parasitic infections are one of the causes of illness and sever form of parasitic disease for preschool children.

There are many reports of intestinal parasite infections in different African countries. It is clear that unsanitary conditions, unclean water utilization and low health education service are common in many African countries. The idea supported by a study conducted in Democratic Republic of Congo, shows the burden of intestinal parasite among pre-school children, an overall prevalence of intestinal parasite infections were 43%. According to their report the prevalence of intestinal parasitic infection was higher among children aged between 1 and <5 years than those aged <1 year this might be to the exposer of neonate to contaminated food and water (Kandala *et al.*, 2013). According to Tina *et-al.*, (2013) report the prevalent parasite among under five years children in Senegal were 26.2%, the predominant parasite form their finding were *Giardia intestinalis* 15.6%. However, *Hymenolepis nana* 1.9%, *Ascaris lumbricoides* 0.4%, *Enterobius vermicularis* 0.4%, and *Trichuris trichiura* 0.1% contribute to the total intestinal parasites prevalence. A study conducted in Zanzibar infants also showed that prevalence of geohelminth infection was 26.5%. Between five and nine months of age the mean prevalence was 9.4%, while at 10 and 11 months of age the mean prevalence was 43.4% the finding of the study indicated

that, even five month age child infected with intestinal parasite unless his mother give care the child (Goodman *et al.*, 2007).

As described in the above paragraphs intestinal parasites also infect school age children; there are many studies on school age children and intestinal parasites prevalence. It is clear that school age children have close contact with preschool children; this might contribute to the prevalence increments. Some of the reports such as a study conducted on prevalence of intestinal parasite infections among school children in a tropical rainforest community of South-eastern Nigeria showed that, out of the 340 children examined the total prevalence of intestinal parasite 75.7% were reported. The common helminthic parasites like hookworms (33.9%), *Trichuris trichura* (34.5%), *Ascaris lumbricoides* (22.7%) and the rarely identified parasite *Strongyloides stercoralis* (3.6%) were observed among schoolchildren according to Wosu and Onyeabor, (2014) report. Another study conducted in two Mexican states showed that the prevalence of multiple infection among school children were 52% (Quihui *et-al.*, 2006). The findings showed that how intestinal parasites affect children throughout the world.

A diverse prevalence level of intestinal parasite among preschool children also reported in different parts of Ethiopia. For instance on a study conducted in Shesha Kebele, Wondo Genet, Southern Ethiopia, reported that the overall prevalence of intestinal parasites were 85.1%. The study also indicated that the prevalence of each protozoan and helminths parasite, *Giardia lamblia* and *Entamoeba histolytica/dispar* 13.2% and 0.35%, were reported protozoan parasites respectively and *Strongyloides stercoralis*, *Trichuris trichiura*, *Schistosoma mansoni* and *Ascaris lumbricoides*, hookworm, and *Hymenolepis nana* 0.69% 74.7%, 37.2%, 25.7%, 5.9%, and 4.5%, respectively were identified helminths (Nyantekyi *et al.*, 2010). In the study conducted among under-five children living in Wonji Shoa Sugar Estate Ethiopia 10.4%, 8.8%, 4.6%, 2.9%, 1.6% and 0.8% of the children were infected with *Hymenolepis nana*, *Schistosoma mansoni*, *Ascaris lumbricoides*, *Trichuris trichiura*, *Enterobius vermicularis* and hookworm respectively. In this study 6.4% of the children had double infections and 0.54% of the children had triple infections (G/hiwot Y *et-al.*, 2014). In both studies there is over lap of similar parasitic infections, this indicate that the same parasite can cause infection to preschool children, even if the geographical location is deferent. This shows that the living environment and social habit such as personal hygiene affect the prevalence of parasitic disease.

Like other countries school age children are risk group for intestinal parasitic infections in many parts of Ethiopia. Different prevalence data were reported by many articles. The overall prevalence of intestinal parasites among school children in Arba Minch town, Southern Ethiopia was 27.7% as reported by Haftu et-al., 2014. A Cross-sectional study at the University of Gondar Community School also reported that 34.2% of the children were infected with one or more parasites (Gelaw et al., 2013). Other similar study conducted in Babile town, eastern Ethiopia reported that overall intestinal parasites among school children were 27.2% (Tadesse, 2005).

Parasitological studies indicate that intestinal parasites are not only common in preschool children and school age children but also they are widespread in general population. A study conducted in Teda Health Centre Northwest Ethiopia, reported that the total prevalence of intestinal parasites in general population were 62.3%. The individual prevalence for each parasite was *Ascaris lumbricoides* was the most predominant parasite 23.2% followed by *Giardia intestinalis* 12.4%, *Entamoeba histolytica/dispar* 4.6%, *Schistosoma mansoni* 8.9%, hookworm 6.6%, *Hymenolepis nana* 1.5%, *Enterobius vermicularis* 0.4% , and *Strongyloides stercoralis* 0.2% (Abate et al., 2013).

The predisposing factor for intestinal parasites depends on many reasons including habit sucking finger or nail bite of the infected children (Canete Roberto et al., 2012) and Personal and environmental hygiene (Wosu and Onyeabor, 2014). Child hands washing before and after using toilet were associated with intestinal parasitic infections (Abate et al., 2013). According to Haftu et al., (2014) children who did not wash their hands before eating were more likely to acquire intestinal parasites infection than children who wash their hands before meal regularly (Haftu et al., 2014). Intestinal parasite cysts, eggs or infective stage of larvae excreted through faeces. Those stages survive in external environments for several days or Weekes and can infect child through contaminated food and water. As a result of that absence of toilet (Abate et al., 2013) or types of toilet facility were significantly associated with intestinal parasitic infections as described by Kandala and his colleagues (Kandala et al., 2013). The finding of Quihui et-al., (2006) also shows that defecation in open areas was also a high risk factor for infection (OR 2.4, 95% CI 2.0–3.0, 2006). Larva of *Schistosoma mansoni* and hookworm can penetrate skin; there for fewer shoes wearing habits had a significant prevalence of those parasites (Abate et al., 2013).

1.3 Mothers knowledge, attitude and practice to intestinal parasites.

Mother's knowledge, attitude and practice on the intestinal parasites play a significant role on the disease prevention and control. Several studies explained KAP and maternal educational level relationship with intestinal parasitic infections. The findings of different studies showed that majority of mothers respond worms are harmful and having good knowledge of intestinal parasites reduce the prevalence of infections (Tripura *et al.*, 2013; Curtale *et-al.*, 1998). For example, a cross-sectional study conducted to assess mother's knowledge and practice towards worm infection of their under five children a north eastern state of India, reported that 19% of the respondent knowing of round worm and 26.8% of thread worms. In this study abdominal pain, vomiting and perianal itching are signs and symptoms listed by respondents (Tripura A *et al.*, 2013). On another study conducted on knowledge, perceptions and behaviour of mothers toward intestinal helminths and weight loss, pallor and anal itching were listed as major signs of worm infection according to Curtale *et-al.*, (1998) report (Curtale *et-al.*, 1998).

Previous knowledge, attitude and practice studies shows that consuming contaminated food, eating soil, eating with unwashed hands and food are reported by mothers as major source of infection for intestinal parasites (Tripura *et al.*, 2013; Curtale *et-al.*, 1998). According to Curtale *et-al.*, (1998) report hand washing practice after defecation associated with a significant reduction in risk of infection (O.R. =0.81; 95% C.I. 0.66-0.99). Furthermore according to Tripura *et-al.*, (2013) study finding 58.12% of mother reported that hand washing after defecation of self and children are preventive for intestinal parasite infection. 57.27% of mothers regularly use foot wares and 83% of mothers maintained food hygiene and 40.17% use sanitary latrine to prevent worm infection of their children. Other studies findings support the response of mothers. Haftu *et al.*, (2014) finding showed that, children who had dirty materials in their fingers were two times more likely to acquire intestinal parasitic infections than their counter parts that had no dirty materials. Schmidlin *et al.*, (2013) reported that place of defecation and hand washing behaviour showed statistically significant associations with intestinal parasitic infections.

However, study findings showed that there is a knowledge, attitude and practice gap with in the community. A cross-sectional study showed that 28.8% of the participants have no knowledge on the transmission, 29.3% of them showed sign and symptoms and 16.3% of the participant on the prevention (Nasr *et al.*, 2013). According to Schmidlin *et al.*, (2013) result in their study 98.6 %

of the participant practice washing their hand regularly; almost all of the respondent have the habit of washing their hands before meal and after meal. Majority of the respondent wash their hands after defecation. Some of the respondents have traditional habit of practicing open defecation but most people said that they need a latrine. They also believe that open defecation is a cause for infection (Schmidlin *et al.*, 2013). Children exposed to intestinal parasitic infection while they are moving bare foot, there is significantly lower prevalence of intestinal parasitic infections among children who wear shoes than those who did not (Nasr *et al.*, 2013).

Educational status is one of the significant factors for the prevention and control of intestinal parasitic infections (Nasr *et-al.*, 2013). Maternal education level was significantly associated with intestinal parasitic infection (Kandala *et al.*, 2013). A result of articles shows this association by different figures. For instance the children of uneducated women are more vulnerable to parasitic infections than those who had higher educational level (Haftu *et-al.*, 2014) and children who had less educated mother showed higher risk of parasitism (OR 6.0, 95% CI: 1.6–22.6; OR 4.5, 95% CI 2.5–8.2; OR 3.3, 95% CI 1.5–7.4 respectively) (Quihui *et al.*, 2006). Risk of parasitism cause diarrheal diseases which affect the growth of the child, children whose mothers did not attend any formal education were 89% more likely to develop diarrhoea (APR = 1.89; 95% CI: 1.35, 2.53) compared to children whose mothers attended formal education (Mohammed *et al.*, 2014).

Health education is one of the prevention mechanisms for intestinal parasites. Community based intervention increase the knowledge of the intestinal parasites. The finding of Acka *et al.*, (2010) showed after community-based interventions, three-quarters of household interviewees knew about intestinal schistosomiasis. Another study conducted to evaluate the impact of intervention program showed that before the intervention 7% of study participant were reported to have helminthic infection and 30% of them protozoan infection. Nevertheless, after the intervention four percent of the participant infected with intestinal helminths and 13.4% of the participant infected with the protozoan infection. This is due to the improvement of participant knowledge and attitudes towards hygiene and sanitation (Gelaye *et al.*, 2014).

In south Gonder after implementing the SAFE strategy, enhanced outreach services, and Health Extension Program , there is statistically significant increases in household latrine ownership, use of an improved water source. As a result this the prevalence of disease caused by lack of hygiene and latrine are dramatically decreased. Prevalence of *Ascaris lumbricoides*, hookworm, and

Trichuris trichiura was 9.9% (95% confidence interval (CI) 7.2–12.7%), 9.7% (5.9–13.4%), and 2.6% (1.6–3.7%), respectively. The prevalence of *S. mansoni* was 2.9% (95% CI 0.2–5.5%) but infection was highly focal (range by community from 0–52.4%). The prevalence of any of these helminth infections was 24.2% (95% CI 17.6–30.9%) compared to 48.5% as found in a previous study in 1995. The pathogenic intestinal protozoa *Giardia intestinalis* and *Entamoeba histolytica*/*E. dispar* were found in 23.0% (95% CI 20.3–25.6%) and 11.1% (95% CI 8.9–13.2%) of the surveyed children, respectively (King *et al.*, 2013).

Although there are some studies on the Prevalence of Intestinal Parasites among Preschool Children and Maternal Knowledge, Attitude and Practice on Prevention and Control of Intestinal Parasites in some parts of Ethiopia, there is gap of information in Senbete and Bete Towns, North Shoa. So, in an attempt to answer this question the current study was conducted to evaluate Prevalence of Intestinal Parasites among Preschool Children and Maternal Knowledge, Attitude and Practice on Prevention and Control of Intestinal Parasites Senbete and Bete Towns, North Shoa, Ethiopia.

In order to assess the prevalence of intestinal parasites after collection of stool sample the laboratory diagnosis is performed. Main methods are Direct wet mount, formol-ether concentration (FEC), and Kato-Katz techniques are used for the detection of intestinal parasites. All the three methods have their own importance and draw back. The wet mount method mostly used to diagnose fresh specimens to find out cysts, ova, larva and motile trophozoites. Formol-ether concentration (FEC) mostly used for preserved samples. This for transportation of samples from the field to the laboratory. It is used for detection of cysts, eggs, larvae and to make easier to detect small number of parasites. The Kato-Katz techniques mainly developed for detection of *Schistosoma* species but it is also used for detection of other intestinal helminths. One of the advantage of Kato-Katz techniques is the prepared slides can be transported to other places (WHO,2003; Cheesbrough,2009).

2. STATEMENT OF THE PROBLEM

Intestinal parasites are major public health problems in several developing countries. More than a billion people suffer from both protozoan and helminths parasitic infections. In Ethiopia it is estimated highest burden of intestinal parasites, the overall national prevalence of any helminths infection was 29.8% with variable degree of prevalence among regions (FDRE/MOH, 2013).

Intestinal parasite cause most morbidity and mortality outcome of human disease. The diseases results stunted growth, underweight, low school performance and anaemia. The severity of the diseases increases for preschool children due to their body resistance to parasitic lode. In preschool children intestinal parasitic infection is the causes of impaired childhood growth and cognitive development. More than half of all deaths from communicable diseases globally occur in children under 14 years of age, intestinal parasites also contribute for deaths as children are more venerable (WHO, 2009).

The prevention and control mechanism for intestinal parasites are mass drug administration, health education, sanitation and clean water supply. Globally in 2013, more than 266 million preschool-aged and 609 million school-aged children were estimated in need of preventive chemotherapy for soil transmitted helminths in 106 countries. In Africa more than 13.8 million preschool- aged children in need of treatment were treated. (WHO,2015).

In Ethiopia main strategies are mass drug administration, case detection and transmission control. Information on the prevalence and distributions is incomplete and not updated periodically. There is lack of information on the prevalence of intestinal parasite and knowledge, attitude and practice of their mother on prevention and control in the present study area.

We hypothesized that knowledge, attitude and practice of mothers on prevention and control of intestinal parasites have impact on intestinal parasitic infections of preschool children. The prevalence of intestinal parasites among preschool children and maternal understanding, thought and practice on the prevention and control of intestinal parasites assessed in Senbete and Bete towns, North Shewa zone.

3. SIGNIFICANCE OF THE STUDY

The study gives baseline information on prevalence of intestinal parasite among preschool children, factors associated with intestinal parasites infections assessed and maternal knowledge, attitude and practice on the prevention and control of intestinal parasites. The finding is also important for those who are working on the prevention and control of intestinal parasitic infections among the stated age groups, in the study area and other similar geographical areas. In addition this study could help for those who want to work on the association of mothers' KAP and child health status for intestinal parasite infection as baseline information in the similar settings of the country and elsewhere.

4. OBJECTIVES

4.1 General Objective

To assess prevalence of intestinal parasites among preschool children and maternal knowledge, attitude and practice on prevention and control of intestinal parasite in Senbete and Bete towns, North Shoa zone, Ethiopia.

4.2 Specific Objective

- To determine the prevalence of intestinal parasites in preschool children.
- To assess maternal knowledge on the prevention and control of intestinal parasite.
- To assess maternal attitude on the prevention and control of intestinal parasite.
- To assess maternal practice on the prevention and control of intestinal parasite.

5. METHODS AND MATERIALS

5.1 Study design and period

A community based cross- sectional study was conducted in July 2015. The study make use of questionnaires to volunteer mothers and collected stool sample from their under five children.

5.2 Study Area

Senbete and Bete towns are towns of Jile timuga woreda which is located 10°02'&10°25' N 39°55' &40°24' E . The towns located in the North Showa zone, is one of the 105 woredas in the Amhara region of Ethiopia. Senbete town is 270 km north of Addis, in North Shoa, between Shoa Robit and Kombolcha. Senbete and Bete towns are on the road from Debre Berhan to Dessie. The climate in Senbete and Bete towns are with an annual average temperature ranging from 24 - 30°C and annual rainfall is of approximately 500-700 mm. The area has altitudinal ranges of 1000 to 1450 m.

Approximately total population in Senbete towns according to Jile timuga woreda health office 7,047 from the population 908 of them were in 6-59 months age group. Bete town relatively smaller rural town approximately population size in the town 2,105, around 271 of them are preschool children (6-59 months age).

5.3 Population

5.3.1 Source population

The source population were all preschool children and their mother living in Senbete and Bete towns.

5.3.2 Study population

The study population were all preschool children and their mothers who have been living in Senbete and Bete towns that full fill the inclusion criteria and willing to participate.

5.4 Sample size

The sample size calculated for preschool children and their mothers.

Sample size for preschool children

The sample size (n) calculated using the single population proportion.

Formula = $Z^2 p (1-p) / d^2$.

- Where P = proportion of intestinal parasites from previous similar study.
- Z = standard score corresponds to 1.96.
- d = margin of error 0.05
- The proportion (p) of intestinal parasites from previous study done in Shesha Kekele, Wondo Genet, Southern Ethiopia (85.1%) (Nyantekyi *et al.*, 2010).
- For the calculation, a 95% confidence interval and a 5% margin of error were used.
- Based on this the sample size was 194.6
- 10% contingency 19.4
- The total sample size was **214 preschool children and 214 of their mothers.**

5.5 Sampling technique

First we allocate population proportion in each town then by simple random sampling technique using lottery method. We select preschool children for stool sample one child from one family simultaneously their mothers were selected for KAP questions.

In Jillil Temuga wereda there is 21 towns where health facilities were found. Two towns were selected randomly. It is clear that in both towns there is homogenous population, almost similar location and distribution of infrastructures.

- In both towns there is total of 1179 (6-59 months) children.
- If we assume all are preschool.
- Senbete (908/1179) 77% of the population.
- Bete (271/1179) 23 % of the population
- Based on this simple population proportion
- From Senbete (147/214) preschool children and their mothers were selected, which is 69% of our study population.

- From Bete (67/214) preschool child and their mothers were included which is 31% of our study population.

5.6 Eligibility Criteria

5.6.1 Inclusion criteria

- Mothers willing to participate in the study.
- Mother who have less than five year children living in Senbete and Bete towns at least for 1 year.
- Child 1-5 years old.

5.6.2 Exclusion Criteria

- Children who took standard intestinal parasite treatment on treated previous month.
- Children who has seriously diseases.
- Child attained primary school.

5.7 Variables

5.7.1 Dependent variable

- Intestinal parasitic infections

5.7.2 Independent variable

- Child Age
- Child sex
- Maternal knowledge
- Maternal attitude
- Maternal practice
- Maternal educational status
- Taking medication

5.8 Data and Sample collection, handling and transport

5.8.1 Data collection

Trained health extension workers in Senbete and Bete towns collected the data after explaining about the study for the participant. Socio-demographic data and mother's knowledge, attitude and practice were collected with a structured questionnaire prepared using local official language.

5.8.2 Sample collection, handling and transportation

Stool specimens were collected by mothers after explaining volunteer mothers to collect about 2g fresh stool sample of their own preschool child using clean, dry and well labelled specimen cup. Then samples were transport to Bete town health centre laboratory. In health centre laboratory a portion of the sample was processed by Kato-katz method using a template delivering a plug of 41.7 mg of stool (As described by Nyantekyi L, 2010). (Method described in annex IV Part II kato-katz technique).

The remaining sample was placed in test tube containing 10% formalin. All preserved samples and Kato- katz slides were transported to Ethiopian Public Health Institute (EPHI) parasitology laboratory for examination. Second examination was performed using the formol-ether concentration technique. (Method described annex IV formol-ether concentration technique). Two lab technologists read each prepared slides, one is blinded for recheck purpose.

5.9 Statistical analyses of data

The collected data was entered into Microsoft excel sheet and mistakes was corrected after revising the original questionnaire and cleaned through phase by phase screening and exporting data to the SPSS-version 20 Statistical Package for the Social Sciences. Analyzed using a computer program SPSS-20. Frequencies and cross tabulations was used to summarize descriptive statistics of the data. Tables and graphs were formed for the data presentation. Variables that were found to have an association with the dependent variable(s) was then be analyzed by multivariate regressions for controlling the possible effect of confounders and finally the variables and their significance association was identified employing the OR, with 95% CI and P-value(<0.05).

5.10 Quality control

For each steps Standard operational procedure (SOP) was followed. Microscopic reading was examined by senior laboratory technologists. Data quality was assured by prior training of data collectors about the objective of the study and data collection procedure. In addition quality control performed with daily checking.

5.11 Ethical consideration

Ethical approval was obtained from Research and Ethics Committee of the Department of Microbiology, Immunology and Parasitology, School of Medicine (DREC), College of Health Science, Addis Ababa University. Official letter of co-operation was written to Jile timuga woreda by department of Medical Microbiology, Immunology and Parasitology, College of Health Science, Addis Ababa University. The aim of the study was explained for all mothers. Informed consent was obtained from each child's mother, after explaining about the research work, its confidentiality, protection and anonymity of data. The results were communicated with their health extension workers and health centres for better management of the patients. Child with intestinal parasitic infection treated with appropriate drug and dose by health personnel in Senbete and Bete health centres. Drugs were taken from EPHI and given for schistosomiasis and *Hymenolepis nana* infection.

6. OPERATIONAL DEFINITIONS

Attitude: assessment of mothers opinion, thought about intestinal parasite prevention and control.

Positive attitude: mothers who responded below the mean (<9.2)

Negative attitude: mothers who respond above the mean (>9.2).

Our questioner prepared using Likert scales for attitude questions. Calculation was based on maximum score scaling to include all responses. The maximum response is 5 and the minimum response 20. The mean response of respondent was 9.2. If all questions reposes are strongly agree, the score will be 5 and strongly disagree the will be 20 (range is between 5-20). The order is 1 for strongly agree, 2 for agree, 3 for disagree and 4 for strongly disagree on the questionnaire.

Knowledge: assessment of, what mothers understanding, about intestinal parasites prevention and control.

The following definitions were used to score the level of understands about intestinal parasite prevention and control, the scoring method adapted from (Abera H, and Tebeje B. 2009).

Knowledgeable: scoring of 80% -100% from knowledge measuring questions about IP prevention and control. If the mother answered > 7 knowledge measuring questions.

Fairly knowledgeable: scoring from 50%-79% of knowledge measuring questions. If the mother answered 5-7 knowledge measuring questions.

Non-knowledgeable: scoring < 50% of knowledge measuring questions. If mother answered <5 knowledge measuring questions.

Practice: assessment of mother's exercises on the prevention and control of intestinal parasite.

Preschool Children: all children between the age of 1 and 5 years who are not yet attending (primary) school (FDRE/MOH, 2013).

Prevalence: the number of intestinal parasite case identified on examination during the study period in the study population.

7. RESULT

7.1 Maternal and children socio-demographic status

A Total of 214 volunteer mothers whose children are able to produce stool samples were included in this study and complete response was obtained from all (100%) participants. Mean age of mothers was 27.5 (SD 5.5) years old. Majority of mothers 145 (67.8%) were in the age group 20-29 years. Almost all 199 (93%) of study participants were married. More than three forth (79%) of the mothers did not attained formal education. The majority of study participants' family size (74.3%) was between 4-6. A total of 214 children were enrolled to our study of which half of them were male 104 (48.6%) and the remaining 110 (51.4%) were female. The mean ages of the children were 3.4 (SD 1.1) years old. Socio-demographic profiles of mothers and child shown in table 1.

Table 1: Maternal and children socio-demographic status Senbete and Bete towns 2015.

Parameters	Category	Frequency	Percent
Maternal Age	<20	15	7%
	20-29	145	67.8%
	30-39	52	24.3%
	>40	2	1%
	Total	214	100%
Marital status	Single	14	6.5%
	Married	199	93%
	Divorced	1	0.5%
	Total	214	100%
Child sex	Male	104	48.6%
	Female	110	51.4%
	Total	214	100%
Maternal education status	Unable to write and read	169	79%
	Read and write	27	12.6%
	Primary	10	4.7%
	Secondary	8	3.7%
	Total	214	100%
Maternal occupation	House wife	207	96.7%
	Government employee	5	2.3%
	Student	2	0.9%
	Total	214	100%
Family size	1-3	39	18.2%
	4-6	159	74.3%
	>7	16	7.5%
	Total	214	100%

7.3 Prevalence of intestinal parasites in Senbete and Bete towns.

Among 214 preschool children whose stool samples were examined 112 (52.3%) were infected with one or more intestinal parasites. The major protozoan parasites identified were *Giardia lamblia* (19.6%) and *Entamoeba histolytica/E.dispar* (8.4%). *Isospora belli* (0.5%) was also identified from one child. On the other hand the prevalence of *Ascaris lumbricoides*, *Enterobius vermicularis*, *Hymenolepis nana* and *Schistosoma mansoni* was 5.6%, 1.9%, 23.8% and 4.2% respectively as determined by Kato-katz and formol-ether concentration methods. Moreover, 88 (41.2%) of the children were infected at least with one intestinal parasites, 24 (11.2%) with two intestinal parasites and 1(0.5%) was infected with three intestinal parasites. Accordingly the prevalence of intestinal protozoa and helminths was 29% and 32.7%, respectively.

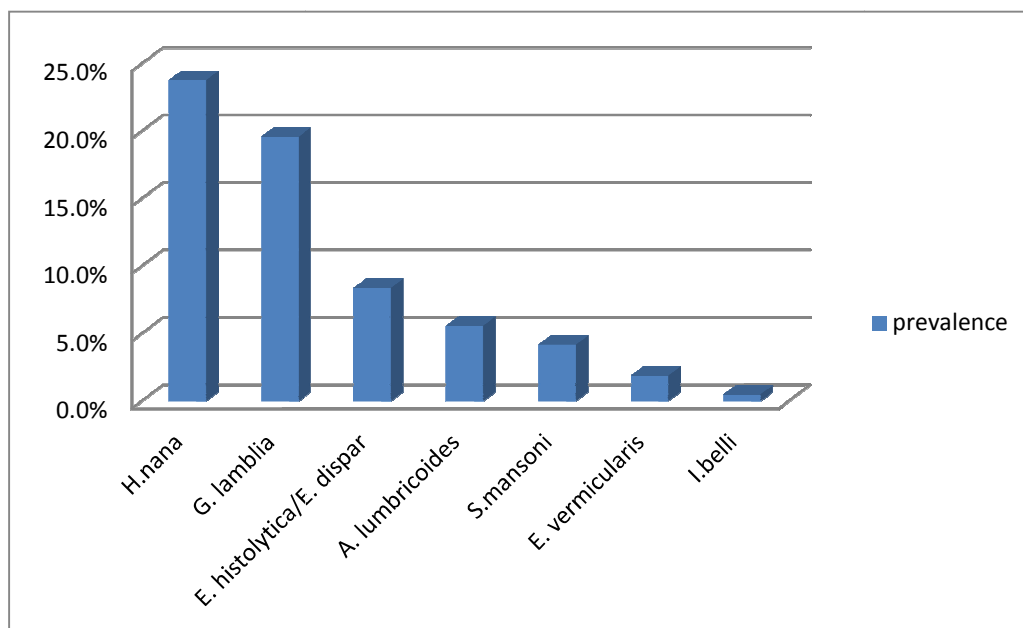


Figure 1: Prevalence of intestinal parasites in Senbete and Bete towns 2015.

Prevalence of intestinal parasites detected by Kato-katz result and intensity of infections.

Using kato-katz method from stool samples three helminths were detected the most frequently identified parasites were *H.nana* (14.5%). The intensity of infection estimated from, multiplying the number of eggs on slides by 24 as described on methodology. Kato-katz template deliver a plug of 41.7 mg of stool this gives number of eggs per gram of faece (epg). Among 9 *S.mansoni* detected seven children had *S.mansoni* light infection and two moderate *S.mansoni* infections were detected.

Table 2: Prevalence of intestinal parasites found out by Kato-katz techniques in Senbete and Bete towns 2015.

Parasite name	Frequency	Present
<i>H.nana</i>	31	14.5%
<i>A.lumbricoides</i>	4	1.4%
<i>S.mansoni</i>	9	4.2%
No ova/parasite seen	170	79.4%
Total	214	100%

Table 3: Intensity of helminths infections among under-five children in Senbete and Bete towns 2015

Organisms	Light	Moderate	Infection status threshold*
<i>A.lumbricoides</i> (n=4)	1	0	Light(1- 4999EPG) Moderate (5000- 49999)
<i>S.mansoni</i> (n=9)	7	2	Light (1-99EPG) Moderate (100-399EPG0)

* EPG: Eggs per gram of Stool, Schistosomiasis and STH, (light, moderate and heavy) based on WHO threshold (WHO, 2002).

Table 4: Prevalence of intestinal parasites detected by formol-ether concentration techniques in Senbete and Bete towns 2015.

Types of parasites	Frequency (%)
Protozoa	
<i>E. histolytica/E. dispar</i>	14(6.5)
<i>G. lamblia</i>	32(15)
Helminths	
<i>H.nana</i>	29(13.6)
<i>A. lumbricoides</i>	8(3.7)
<i>E. vermicularis</i>	4(1.9)
<i>S.mansoni</i>	3(1.4)
Mixed infection	
<i>H.nana and G. lamblia</i>	9(4.2)
<i>E. histolytica/E. dispar and H.nana</i>	3(1.4)
<i>H.nana and A. lumbricoides</i>	3(1.4)
<i>I. belli and H.nana</i>	1(0.5)
<i>S. mansoni and H.nana</i>	1(0.5)
<i>E. histolytica/E. dispar and S.mansoni</i>	1(0.5)
<i>no o/p</i>	106(49.5)
<i>Total</i>	214(100)

7.4 Knowledge on the prevention and control of intestinal parasites.

Among 214 interviewed mothers 129 (60.3%) had knowledge on prevention and control of intestinal parasites based on knowledge scoring selected questions. The remaining of the respondent 85(39.7%) have not knowledge on prevention and control of intestinal parasites. Table 3 and figure 2 shows that the response and mothers knowledge level.

Table 5: Mothers response on selected questions about intestinal parasites prevention and control in Senbete and Bete towns 2015.

Knowledge Variables	Yes n (%)	No n (%)
Do you know what intestinal parasites are?	170(79.4)	44 (20.6)
Eating contaminated food	151 (70.6)	63 (29.4)
Transmission		
Walking bare foot	49 (22.9)	165 (77.1)
Lack of hygiene	132 (61.7)	82 (38.3)
Sign and symptom		
Abdominal pain	130 (60.7)	84 (39.3)
Diarrhea	74(34.6)	140(65.4)
Wight loss	32(15)	182(85)
Prevention and control		
Washing hand before eating Prevent IP	152(71)	62(29)
Taking de worming drug	115(53.7)	99(46.3)
Using clean toilet	116(54.2)	98(45.8)

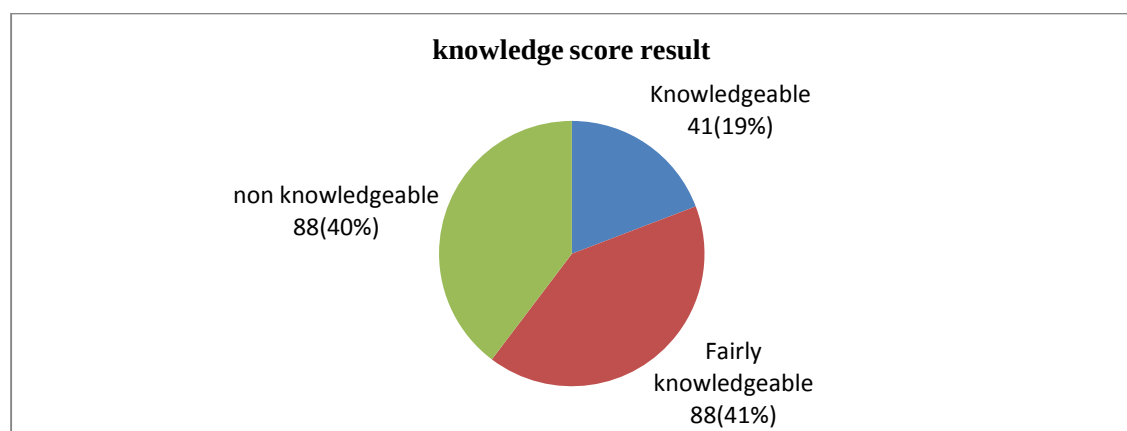


Figure 2: Knowledge score on the IP prevention and control among mothers.

7.5 Attitude of mothers towards prevention and control of intestinal parasites.

Among the interviewed mothers 120(56.1%) of the respondent had positive attitude on the prevention and control of intestinal parasites. The remaining 94(43.9%) of the respondent had negative attitude towards IPs prevention and control. This classification is based on the mean of the total response.

Almost half of interviewed mothers 104 (48.6%) strongly agreed that lack of hygiene is the cause of infection with intestinal parasites. Ninety five (44.4%) of the mother have strongly agree attitude toward using soap when washing hand is preventive for intestinal parasite infection. (See table 4)

Table 6: Attitude of mothers towards prevention and control of intestinal parasites in Senbete and Bete towns 2015.

variable	Strongly Agree n (%)	Agree n (%)	Strongly Disagree n (%)	Disagree n (%)	Total
Lack of hygiene is cause for IPs.	104 (48.6)	75 (35)	4 (1.9)	31 (14.5)	214
We can prevent and treat IPs disease?	93 (43.5)	85 (39.7)	6 (2.8)	30 (14)	214
Health education can reduce IPs prevalence?	102 (47.7)	78 (36.4)	5 (2.3)	29 (13.6)	214
If IPs untreated, it can transmit to other family member and cause growth retardation.	99 (46.3)	71 (33.2)	7 (3.3)	37 (17.3)	214
Uses soap when washing hands is preventive for IPs.	95 (44.4)	89 (41.6)	6 (2.8)	24 (11.2)	214

7.6 Mothers' practice on the prevention and control of intestinal parasites

In addition of knowledge and attitudes towards transmission and control of intestinal parasites, we explored mothers practice on the prevention and control of IP infections. Accordingly, half of the mothers (50.5%) had children infected with intestinal parasites at least one time in their life. 95(44.4%) of the mothers used toilet or a container to dispose their children's faeces. Moreover, 186(86.9%) mothers gave drug for their child to prevent intestinal parasite.

Table7: Mothers' practice on the prevention and control of intestinal parasites Senbete and Bete towns 2015.

Practice	Yes n (%)	No n (%)	Total
Child infected with intestinal parasite	108 (50.5)	106 (49.5)	214
Child who had any stool examination previously	117 (54.7)	97 (45.3)	214
Use of toilet or container for thier child defecation	95 (44.4)	119 (55.6)	214
Wash fruit before consuming it	158 (73.8)	56 (26.2)	214
Cut nail when it grow	155 (72.4)	59 (27.6)	214
Wash children hand after defecation	141 (65.9)	73 (34.1)	214
Using chimerically treated, boiled or taps water.	161 (75.2)	53 (24.8)	214
Using drugs for prevention of intestinal parasite.	186 (86.9)	28 (13.1)	214

7.7 Factors associated with total prevalence of intestinal parasites.

Factors of intestinal parasite were identified by bivariate followed by multivariate logistic analysis. Those variables with $P < 0.2$ were included in the regression model.

Among socio-demographic variables, child sex, mothers educational status, use of toilet or container for child defecation and chemically treated or tap water were compared with intestinal parasite prevalence. Only mothers educational status ($P = 0.01$) was found to be associated with intestinal parasitic infections. Accordingly mothers who can read and write were less likely to have a child infected with parasitic infections. (OR-0.25 95%CI-0.08-0.72) compared to mothers who are unable read and write.

Table 8: Factors associated with total prevalence of intestinal parasites.

Variable	Character	IP prevalence		COR(95%CI)*	AOR(95%CI)*	Sig
		YES(%)	NO(%)			
Child sex	Male	48(46)	56(53)	0.62(0.36-1.06)	1.6(0.92-2.86)	0.09
	Female	64(58)	46(41)	1.000	1.000	
Maternal education	Unable to write	80(47)	89(52)	1.000	1.000	
	Read and write	22(81)	5(18)	0.2(0.74-0.5)	2.5(0.08-0.72)	0.01
	Primary	7(70)	3(30)	0.38(0.1-1.54)	3.6(0.08-1.46)	0.15
	Secondary	3(37)	5(62)	1.5(0.35-6.47)	2.2(0.47-10.2)	0.31
Using toilet or container.	Yes	56(58)	39(41)	0.62(0.35-1.06)	0.7(0.4-1.32)	0.3
	No	56(47)	63(52)	1.000	1.000	
Using chemically treated, boiled water.	Yes	79(49)	82(50)	1.71(0.9-3.23)	1.46(0.72-2.91)	0.29
	No	33(62)	20(37)	1.000	1.000	

* COR= Crude odds ratio and AOR= Adjusted odds ratio

7.8 Factors associated with intestinal helminths infections.

In bivariate analysis educational status, having knowledge on meaning of intestinal parasite , using toilet or container for their child defecation, mothers who wash fruit before consume it, mothers who cut their child nail when it grows and using chemically treated, boiled or tap water were associated with intestinal helminths having ($P < 0.2$).

By controlling confounder in multivariate logistic regression (p-value < 0.05) maternal education level and using toilet or container for their child defecation were significantly associated with intestinal helminths prevalence.

The maternal education level who can write and read were preventive for intestinal helminths compared to those without any education (OR-0.27 95% CI 0.11-0.68). Mothers who did not use toilet or container for their child defecation had two fold of having a chance of affected by intestinal helminths of their preschool child compare to the mother who use toilet or container for their child defecation.

Table 9: Factors associated with intestinal helminths infections.

Variable	Character	Helminths		COR(95% CI)	AOR(95% CI)	sig
		Yes(%)	No(%)			
Educational status	Unable to read	50(29)	119(70)	1.000	1.000	
	Read and write	17(36)	10(37)	0.25(0.1-0.58)	0.28(0.11-0.69)	0.006
	Primary	2(20)	8(80)	1.7(0.34-8.2)	1.8(0.36-9.2)	0.45
	Secondary	1(12)	7(87)	2.9(0.35-24.5)	4.5(0.52-39.5)	0.16
Having knowledge what IP means	Yes	55(32)	117(68)	1.18(0.58-2.4)	1.2(0.58-2.82)	0.54
	No	15(35)	17(64)	1.000	1.0000	
Use toilet or container.	Yes	39(41)	56(58)	1.000	1.000	
	No	31(26)	88(73)	1.9(1.11-3.5)	1.85(1.02-3.34)	0.041
Wash fruit	Yes	56(35)	102(64)	0.61(0.3-1.2)	0.75(0.25-2.23)	0.609
	No	14(25)	42(75)	1.000	1.0000	
Cutting their child nail	Yes	55(35)	100(64)	0.62(0.3-1.2)	0.72(0.26-2.02)	0.53
	No	15(25)	44(74)	1.000	1.000	1.000
Using chimerically treated, boiled water	Yes	48(29)	113(70)	0.6(0.31-1.14)	1.21(0.75-2.82)	0.27
	No	22(41)	31(58)	1.000	1.000	

7.9 Factors associated with intestinal protozoan infections.

Mothers who washed fruit before eating, child who have habit of playing with soil and cutting nail when it grow were associated with intestinal protozoa in bivariate analysis (p-value <0.2).

In multivariate logistic regression, children who had habit of playing with soil had two times higher odds of being infected with intestinal protozoa compare those without such habits (OR-2.01 95% CI 1.04-3.8).

Table 10: Determinants of protozoan intestinal parasitic infections.

Variable	Character	Protozoa		COR(95%CI)	AOR(95%CI)	p-value
		Yes (%)	No (%)			
Washing fruit before eating	Yes	39(24)	119(75)	2.13(1.17-4.04)	2.44(0.89-6.73)	0.08
	No	23(41)	33(58)	1.000	1.000	
Habit of playing with soil	Yes	37(25)	107(74)	1.6(0.86-2.9)	2.01(1.04-3.83)	0.04
	No	25(35)	45(64)	1.000	1.000	
Cutting child nail regularly	Yes	40(25)	115(74)	1.7(0.90-3.23)	1.06(0.40-3.15)	0.91
	No	22(37)	37(62)	1.000	1.000	

8. DISCUSSION

The result of our finding shows that the overall of prevalence of intestinal parasitic infection among preschool children in Senbete and Bete towns were 52.3%. *Hymenolepis nana* was the most prevalent helminths and *Giardia lamblia* was the most prevalent protozoan parasite indentified. We also found that maternal education level, use of open field for defecation of their child and playing with soil was significantly associated with intestinal parasite. On the other hand, 19% mothers had knowledge and 41% of them had fair knowledge on prevention and control of intestinal parasites based on knowledge scoring on selected questions. Beside that 56.1% of the respondent had positive attitude on the prevention and control of intestinal parasites.

Our prevalence result is relatively higher than similar studies done elsewhere in Ethiopia and other African country. A study in Gamo area, south Ethiopia found a prevalence of 29.4%, (Wegaheyu *et al.*, 2013) while Haftu *et al.* (2014) reported a 27.9% prevalence in Arbaminch-town, Southern Ethiopia and 25.6% reported from Kenya (Mbae *et al.*, 2013). However, our report is lower when compared with a study done in Shesha Kekele, Wondo Genet, in Southern Ethiopia that reported a prevalence rate of 85.1% (Nyantekyi *et al.*, 2010).

Variations in prevalence rates of intestinal parasites from different Ethiopian communities could be related to several factors including the educational level of the study population, personal and environmental hygiene and probably social habits such as use of toilet for children. In addition, some ecological factors such as temperature, relative humidity, rainfall could be responsible for observed differences in prevalence between communities.

Among the 214 preschool children participated in the current study, 41.2% of the children had single infection, 11.2% had double infection and only one of them had multiple infections were lower, except for single infections, than reported from the other study done in Shesha Kebele, Wondo Genet, in Southern Ethiopia where 34.5%, 33.3% and 23.2% had single, double and multiple parasitic infections, respectively (Nyantekyi *et al.*, 2010). The prevalence of single infections was higher but the difference was small and it was very low when compared with the study done in highland and lowland dwellers in Gamo area, South Ethiopia who reported single infection in 83.9% of preschool children. (Wegaheyu *et al.*, 2013). However our finding is in agreement with a study done in Senegal where triple infection was reported from one child (Tine *et al.*, 2013).

This study also revealed that among protozoan parasites, *Giardia lamblia* (19.6%) was frequently observed followed by *Entamoeba histolytica/E. dispar* (8.4%). Similarly other studies reported comparable results. In the aforementioned studies, the prevalence of the two parasites were 4.2% and 12.9%, respectively from the study in Arbaminch (Haftu *et al.*, 2014) and 10.6% and 11.4%, respectively from the study in Gamo area (Wegaheyu *et al.*, 2013).

In our study, identified predominant helminthic intestinal parasites were *Hymenolepis nana* (23.8%) and *Ascaris lumbricoides* (5.6%). A study done in Gondar, North West Ethiopia reported prevalence rate of *Hymenolepis nana* (13.8%) and *Ascaris lumbricoides* (5.9%) (Gelaw *et al.*, 2013). Though the prevalence of *Ascaris lumbricoides* is similar, our study reported a higher prevalence of *Hymenolepsis nana* than the previous study. The most frequently identified protozoan parasite were *Giardia lamblia* (19.6%) our finding is in agreement with the previous study done in other country (Quihui *et al.*, 2006) and the prevalence of *H.nana* was predominant in the previous studies (Tadesse 2005;. Curtale *et-al.*, 1998). However, the prevalence of *Giardia lamblia* is lower than that of Quihui *et al.* (2006) finding. The observed differences might be from differences in sample size determinations, study population and the methods used for diagnosis could attribute to this observed difference in detections of various parasites. Additional factors could be attributed to socio-demographic factors, climatic, geographic as well as study time differences in the study areas.

In our finding 73.4% of mothers reported that they took training on prevention and control of intestinal parasites. However, 60.3% mothers had knowledge on prevention and control of intestinal parasites. Our finding is comparable to the previous study done by Nyantekyi *et al.* (2010). However, in contrast to a previous study conducted in rural Malaysia the present study revealed higher knowledge response from the study participant (Nasr *et al.*, 2013). This difference could be due to the study population, the analysis method used and the previous study focused only on soil-transmitted helminths but the current study on both helminths and protozoan parasites.

In our study half of the mothers responded that their child is infected by intestinal parasite at least ones in his/her life time. However forty four percent of the mothers responded that they use toilet or a container to dispose their children's faeces and 86.9% mothers gave drug for their child to

prevent intestinal parasite. Using toilet is preventive for intestinal parasites and deworming program by the government also contribute for the response of mothers.

Even though there is no significant association between intestinal parasitic infections with socio-demographic status of participating mothers or children, maternal education level were important predicting factor for intestinal parasitic infections in children in general and intestinal helminthic infections in this study (OR 0.27 P = 0.006). Accordingly educated mothers are more aware and capable of preventing parasitic infections in their children than those with no education. The better the educational level of the mothers, the lower the parasitic infection rate in children was also observed. The other study done in Mexican rural areas also indicated that less educated mothers had higher risk of intestinal parasites (OR 3.3, 95% CI 1.5–7.4) (Quihui *et al.*, 2006).

Another important finding of the current study was the association of open defecation and increased risk for helminths infections. Accordingly, those families who practiced open defecation were two times more vulnerable for intestinal helminths. (OR 2.01 95%CI 1.02-3.34). This finding is also supported by other studies that found defecation in open areas as a risk factor for infection (Quihui *et al.*, 2006). This study reported that properly functioning toilets installed inside houses reduced helminths infections. The current study also demonstrated that children who have habits of playing with soil had increased risk to be infected by protozoan parasites that contaminate soil.

The limitation of this study using only single specimen collected during sample collection this might be increase missing of low intensity infection, we did not perform wet mount technique this might influence as to depend on cysts of the parasite. Other limitation it was hard to find related articles with scoring the KAP level of mothers with intestinal parasite prevention and control. However our study has its own strength like we are trying to investigate one of the venerable populations. Kato-katz and formol-ether concentration technique were used for detection of parasites, this increased detection rate of infections.

9. CONCLUSION

We found that intestinal parasitic infections were a common health problem among preschool children in Senbete and Bete towns. Our finding also showed that maternal educational level, use of toilet or container for child defecation and habit of playing with soil were closely associated with the prevalence of intestinal parasitic infections. While the former two protects the children from infection, the latter predispose them.

10. RECOMMENDATION

We recommend that long term control measures to improve preschool children health and growth condition including mass treatment for the effective control of intestinal parasitic infections in the study area and increasing health education related to intestinal parasitic infections prevention and control to the community.

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ANNEXES

Annex I Information to participant

Information to participant and consent

I am coming from Addis Ababa University, medical faculty, microbiology immunology and parasitology department. To study on prevalence of intestinal parasites among preschool children and maternal knowledge, attitude and practice on prevention and control of intestinal parasite. In Senbete and Bete towns, North Shoa Ethiopia.

This study will be involved administering questionnaires on Socio-demographic data from mothers and preschool child and fresh stool sample. There will be clear explanation for every question and sample collection method. You can ask any question.

The information you provide will be used to improve control and treatment for intestinal parasites. Your participation is voluntary. Your answers or your child lab result will not be released to anyone and will remain secret. Your name will not be written on the questionnaire. After the laboratory result child with any intestinal parasite will be announced for concerned body to get treatment and care.

Consent form

I _____ here by giving my consent for me or my child to participate in the mentioned study. I understand that this study will be used to improve control and treatment of intestinal parasite. I also trust that at the end of study, the results will be shared with the concerned body or the local health bureau and Ministry of health.

Signature_____ **Date**_____

Data collector

Name _____ signature _____

Thank you for Your Participation.

Annex II Questionnaire

Dear respondents:-

This questionnaire is prepared to collect data, prevalence of intestinal parasite among preschool children and maternal knowledge, attitude and practice on prevention and control of intestinal parasite in Senbete and Bete towns. Your participation is **purely voluntary**.

- Don't write your name on this paper.
- If you need any explanation on the questions you can ask.
- Write response according to the instruction given.

Did you stay in Senbete and Bete towns more than six month?

Code _____ District name _____ wereda _____

Table 1 socio- demographic data for mothers

Sr.no	Question	Answer	Skips
101	Age	_____ year	
102	How many year living in this town?	_____	
103	Marital status	1. Married 2. Single 3. Divorced 4. Widowed	
104	Education status	1. Unable to write and read 2. Read and write 3. Primary 4. Secondary 5. Above secondary	

105	Occupation	1. House wife 2. Government employee 3. Private 4. Merchant 5. Student 6. Other	
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Table 2: For preschool child data

Sr.No	Question	Answer	Skip
201	Child's Age	_____ year and month	
202	Sex	1.male 2.female	
203	Birth order	_____	
204	Number of family.	_____	
205	Does your child have the habit of playing with soil ?	1.yes 2.No	
206	Did you check your child health status ?	1. yes 2. No	

Table 3: Mothers Knowledge on the prevention and control of intestinal parasite

R.B -For question 303 to 305 circle after reading for the mother one by one.

Sr.No	Question	Answer	Skip
301	Do you know what intestinal parasites are?	1.Yes 2.No	
302	Do you have any training on intestinal parasite prevention and control?	1. Yes 2. No	
303	Do you know the following are transmission of intestinal parasite?	1. Eating contaminated food 2. Eating raw meat 3. Drinking contaminated water 4. Playing with soil 5. Not cutting nails regularly 6. Eating soil (geophagy) 7. Swimming in river 8. Walking barefooted 9. Lack of hygiene 10. I don't know	
304	What are signs and symptoms for intestinal parasite?	1. Abdominal pain 2. Abdominal cramp 3. Diarrhea 4. Dysentery 5. Vomiting 6. Loss of appetite 7. Weight loss 8. Itching of Anal area 9. Don't know	
305	What are the methods prevention and control?	1. Washing of hands before eating 2. Wearing shoes 3. Cutting nail 4. Taking de-worming drugs	

		5. Using clean toilet 6. Don't know	
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Table 4: Attitude of mothers to ward intestinal parasite prevention and control.

Sr.No	Question	Answer	Skip
401	Lack of hygiene is cause for intestinal parasite.	1. Strongly Agree 2. Agree 3. Strongly disagree 4. Disagree	
402	We can prevent and treat intestinal parasite disease ?	1. Strongly Agree 2. Agree 3. Strongly disagree 4. Disagree	
403	Health education can reduce intestinal parasite prevalence ?	1. Strongly Agree 2. Agree 3. Strongly disagree 4. Disagree	
404	If intestinal parasite untreated, it can transmit to other family member and cause growth retardation?	1. Strongly Agree 2. Agree 3. Strongly disagree 4. Disagree	
405	Uses soap when washing hands is preventive for intestinal parasite?	1. Strongly Agree 2. Agree 3. Strongly disagree 4. Disagree	

Table 5. Mothers practice on the prevention and control of intestinal parasite

Sr.No	Question	Answer	Skip
501	Have your child infected with intestinal parasite?	1. Yes 2. No	
502	Does your child have any stool examination previously?	1. Yes 2. No	
503	Do you use toilet or container for your child defecation?	1. Yes 2. No	
504	Do you wash fruit before consuming it?	1. Yes 2. No	
505	Do you Cut your child nail when it grows?	1. Yes 2. No	
506	Do you wash your child hand after defecation?	1. Yes 2. No	
507	Do you use chimerically treated or tap water to prevent intestinal parasitic infection?	1. Yes 2. No	
508	Did you give drug for your child for prevention of intestinal parasite ?	1. Yes 2. No	

ለተሳታፊዎች መረጃ መስጫ እና መስማሚ ቅፅ

አላማው፡ እኛ የመጣነው ከ አዲስ አበባ ዩንቨርሲቲ፣ጤና ሳይንስ ፋካልቲ፣ ማይከሮባይሎጂ፣ኢሚኖሎጂ ና ፓራሳይቶሎጂ ዲፓርትመንት ሲሆን ፡፡ የአንጀትን ትላትሎች (ኢንተስታይናል ፓራሳይት) በሽታ ለትምህርት ባልደረሱ እፃናት ላይ ያለውን ስርጭት እና የእናቶቻቸው በሽታውን ለመከላከልና ለ መቆጣጠር ያላቸውን እውቀት፣አመለካከት እና ልምድ ለመገምነው፡፡

ተሳትፎ ፡- ሙሉ በሙሉ በገዛ ፈቃድዎ በዚህ ጥናት እርሶም ሆነ ልጅ እንዲሳተፉ በትህትና እንጠይቃለን፡፡ጥናቱ በፅሁፍ በተዘጋጀ መጠይቅ እርሶን ለ 10 ደቂቃ በመጠየቅ እና ከልጅ የሰገራ ናሙና በመውሰድ ይከናወናል ፡፡ የጥናቱ ጥያቄዎች እንዲሁም ናሙና አወሳሰዱ በደነንብ ይበራራል፡፡

ጉዳቶች እና ጥቅሞች ፡- ይህ ጥናት በእርሶም ሆነ በልጅ ላይ ምንም ጉዳት የለውም፡፡እርሶ የሚሰጡን መረጃ በአንጀት ትላትሎች የሚከሰት በሽታን ለመከላከል እና ለመቆጣጠር የረዳል ፡፡በሽታው የተገኘባቸው እፃናት በትክክለኛው መድሀኒት እና መጠን እክምና ይደረግላቸዋል፡፡

ሚስጥራዊነት፡- በጥናቱ ውስጥ እርስዎ የሚሰጡን ማንኛውንም መረጃ እና የልጅ የላብራቶሪ ውጤት ሚስጥራዊነቱ የተጠበቀ ነው፡፡ በመጠይቁ ላይ ስሞት አይፃፍም፣ መለያ ቁጥር ብቻ ይቀመጣል፡፡ በመሆኑ የእርስዎን ማንነትም በጥናቱ ውጤት ላይም ይሁን በማንኛውም ሁኔታ አይገለጽም፡፡

የጥናቱን ውጤት ስለማካፈል፡- የጥናቱ አባላት የጥናቱን ውጤት ለሚመለከታቸው አካላት ገለጻ እናደርጋለን፣ሪፖርቱ የእርስዎን የግል ጉዳይ እንደማይነካ እናረጋግጥልዎታለን፣ የእርስዎን መረጃ ለሪፖርት እና ጥናቱን ለማሳተም እንድንጠቀምበት ፍቃድ እንዲሰጡን እንጠይቅዎታለን፡፡

በጥናቱ ያለመሳተፍ መብት፡- በዚህ ጥናት መሳተፍ የእርስዎን ሙሉ ፈቃድ እንደ መጠየቁ መጠን በማንኛውም ጊዜ በጥናቱ አለመሳተፍ መብትዎ የተጠበቀ ነው፡፡

የመስማማያ ቅፅ

እኔ ወ/ሮ ወ/ት _____ ሆነ ልጄ በጥናቱ ለመሳተፍ ፈቃደኛ መሆኔን በፊርማዬ አረጋግጣለሁ፡፡ ጥናቱ የአንጀት ትላትሎች (ኢንተስታይናል ፓራሳይት) በሽታ ለመከላከል እና ለመቆጣጠር እንደሚጠቅም ተረድቻለሁ፡፡ የዚህ ጥናት ውጤት በጥናቱ መጨረሻ ለሚመለከታቸው አካላት ለጤና ጥበቃ ሚኒስትር እና ለክልሎቹ የጤና ቢሮዎች እንደሚሰራጩ እምነት አለኝ፡፡

ተሳታፊ ስምና ፊርማ _____

ቀን _____

መረጃውን የወሰደው ባለሙያ

ስም _____

ፊርማ _____

በጥናቱ በመሳተፍ እናመሰግናለን ፡፡

ውድ ተሳታፊዎችን

ይህ መጠይቅ የአንጀት ትላትሎች (ኢንተስታይናል ፓራሳይት) በሽታ ለትምህርት ባልደረሱ እፃኝት ላይ ያለውን ስርጭት እና የእናቶቻቸው በሽታውን ለመከላከልና ለ መቆጣጠር ያላቸውን እውቀት፣አመለካከት እና ልምድ ለማወቅ ይረዳል። **ሙሉ በሙሉ በገዛ ፈቃድዎ** በዚጥናት በመሳተፍ በሽታውን በመከላከል ረገድ ለሚያደርጉት አስተዋፆ እናመሰግናለን።

- ስሞትን መፃፍ አይጠበቅብትም
- ማብራሪያ ከፈለጉ መጠየቅ ይቻላል
- መልሶትን በማብራሪያው መሰረት ይስጡን

መለያ ቁጥር _____ ወረዳ _____ የቤት ቁጥር _____

ሠንጠላዥ 1: የማህበራዊ ሁኔታ ጥያቄዎች

ተ.ቁ	ጥያቄ	መልስ	ይዘለል
101	ዕድሜ	_____	
102	የቤተሰብ አባል ቁጥር		
102	የትዳር ሁኔታ	1. ያላገባ 2. ያገባ 3. የፈታ 4. በሞት የተለየ	
103	የትምህርት ሁኔታ	1. ማንበብና መጻፍ የማይችል 2. ማንበብና መጻፍ 3. መጀመሪያ ደረጃ 4. ሁለተኛ ደረጃ 5. ከሁለተኛ ደረጃ በላይ	
104	የስራ ሁኔታ	1. የቤት እመቤት 2. የመንግስት 3. የግል 4. ነጋዴ 5. ተማሪ 6. ሌላ	

ሰንጠረዥ 2 ስለ ልጅ መረጃ			
ተ.ቁ	ጥያቄ	መልስ	ይዘላል
201	የልጅ ዕድሜ	_____ አመት እና ወር	
202	ፆታ	1. ወንድ 2. ሴት	
203	ስንተኛ ልጅ ነው	_____	
204	ልጅ በአፈር የመጫወት ልምድ አለው	1. አዎ 2. አይጫወትም	
205	የልጅዎን ጤና በየጊዜው ወደ ባለሙያ እየወሰዱ ይከታተላሉ	1. አዎ 2. ሲያመው ብቻ	

ሰንጠረዥ 2፡ በኢንተርኔት ይገኛል ፓራላት መከላከልና መቆጣጠር ላይ የእናቶች እውቀት			
ተ.ቁ	ጥያቄ	መልስ	ይዘለል
301	የአንጀት ትላትል በሽታ ምን እንደሆነ ያውቃሉ ?	1. አዎ 2. አላውቅም	
302	ስለ አንጀት ትላትሎች በሽታ መከላከል ና መቆጣጠር ስልጠና ወስደው ያውቃሉ ?	1. አዎ 2. አላውቅም	
303	ከተዘረዘሩት ውስጥ አንጀት ትላትሎች በሽታ መተላለፊያ የሆነው የቱ ነው ?	1. የተበከለ ምግብ መመገብ 2. ጥሬ ሥጋ መብላት 3. የተበከለ ውሃ መጠጣት 4. በአፈር መጫወት 5. የእጅ ጥፍርን አለመቁረጥ 6. አፈር መብላት 7. ወንዝ ላይ መዋኘት 8. በባዶ እግር መሄድ 9. የንህፅና ጉድለት 10. አላውቅም	
304	የአንጀት ትላትሎች በሽታ ምልክቶች የትኞቹ ናቸው ?	1. የሆድ ህመም 2. የሆድ ቁርጠት 3. ማስቀመጥ 4. ደም የተቀላቀለበት ተቅማጥ 5. ማስመለስ 6. የምግብ ፍላጎት አለመኖር 7. የሰውነት ክብደት መቀነስ 8. የሰገራ መውጫ ማሳከክ 9. አላውቅም	

305	የአንጀት ትላትሎች በሽታን ለመከላከል እና ለመቆጣጠር የሚረዱ ዘዴዎች የትኞቹ ናቸው ?	1. እጅን መታጠብ 2. ጫማ ማድረግ 3. ጥፍርን መቆረጥ 4. መድሀኒት መጠቀም 5. ፅዱ መጸዳጃ ቤት መጠቀም 6. አላውቅም	
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ሰንጠረዥ 3፡ በኢንተስታይናል ፓራሳት መከላከልና መቆጣጠር ላይ የእናቶች አመለካከት			
ተ.ቁ	ጥያቄ	መልስ	ይዘለል
401	የንህጻንና ጉድለት የአንጀት ትላትሎች በሽታ መተላለፊያ መንገድ ነው፡፡	1. በጣም እስማማለሁ 2. እስማማለሁ 3. በጣም አልስማማም 4. አልስማማም	
402	የአንጀት ትላትሎች በሽታን መከላከልና ማከም ይቻላል ፡፡	1. በጣም እስማማለሁ 2. እስማማለሁ 3. በጣም አልስማማም 4. አልስማማም	
403	የጤና ትህምርት የአንጀት ትላትሎች በሽታን ስርጭት ይቀንሳል ፡፡	1. በጣም እስማማለሁ 2. እስማማለሁ 3. በጣም አልስማማም	

		4. አልስማማም	
404	የአንጀት ትላትሎች በሽታ ካልታከመ ወደ ሌላ ቤተሰብ ሊተላለፍ እና የልጁን እድገት ሊገታ ይችላል ::	1. በጣም እስማማለሁ 2. እስማማለሁ 3. በጣም አልስማማም 4. አልስማማም	
405	እጅን በሳሙና መታጠብ የአንጀት ትላትሎች በሽታን ለመከላከል ይረዳል ::	1. በጣም እስማማለሁ 2. እስማማለሁ 3. በጣም አልስማማም 4. አልስማማም	

ሰንጠረዥ 4 የአንጀት ትላትሎች በሽታን መከላከል ና መቆጣጠር ላይ የእናቶች ልምድ			
ተ.ቁ	ጥያቄ	መልስ	
501	ልጅ በአንጀት ትላትሎች በሽታ ተይዞ ያውቃል?	1. አዎ 2. አያውቅም	
502	ልጅ ታሞ የሰገራ ምርመራ አድርጎ ያውቃል?		
503	ለልጅ የመፀዳጃ ህቃ ወይም ቤት ይጠቀማሉ ?	1. አዎ 2. አልጠቀምም	
504	ለልጅም ሆነ ለራሱ አትክልት ከመመገብ በፊት አጥበው ነው የሚመገብት ?	1. አዎ 2. እንዲሁ	
505	የልጁን ጥፍር ሲያድግ ይቆርጡታል ?	1. አዎ 2. አላጥበውም	
506	ልጅ ከተጽዳዳ በኋላ እጁን በሳሙና ያጥቡታል ?	1. አዎ 2. አልሰጠውም	
507	ለልጅም ሆነ ለራሱም የሚጠቀሙት ውሃ በኬሚካል የታከመ ወይም የፈላ ነው ?	1. አዎ 2. አይደለም	
508	በአንጀት ትላትሎች በሽታን ለመከላከል ለልጅ መድሀኒት ይሰጡታል ?	1. አዎ 2. አልሰጠውም	

Annex III Procedures for Sample Collection and data analysis.

Part I collection of faecal specimen

1. SCOPE AND APPLICATION

Faecal specimens are examined for the presence of protozoa and helminth larvae or eggs.

The stage of protozoa found in stool is trophozoites and cysts. The stage of helminths usually found in stool is eggs and larvae. Though whole adult worms or segments of worms may be seen.

2. METHOD SUMMARY

Faecal sample will be collected in order to see the structure of parasite eggs, larvae, trophozoites and cysts for identification of parasite.

3. HEALTH AND SAFETY WARNINGS.

Stool samples should be treated as biohazards and Wear protective glove during sample collection.

4. INTERFERENCES.

Use specimen containers that are leak-proof, clean, dry, and free from traces of antiseptics and disinfectants.

It is important to make sure glass microscope slides and cover glasses are completely clean.

Urine and dirty should be excluded.

(WHO,1991; Cheesbrough,2009).

5. MATERIAL AND REAGENT

Stool cup, paper, marker and transport container

6. Method

1. Give well labeled plastic cup (specimen cup) for the mothers.
2. Tell the mother to pass stool specimen from her preschool child directly in to the container, or pass the stool on a piece of paper and transfer it to the container. Stool must be transfer immediately to the specimen container.
3. Specimen must reach the laboratory soon (i.e within half an hour) after passage. If not possible, the specimen must be treated with preservative.

4. The container with the specimen should be labeled clearly with the following information :

Childs number (code)

Date of collection

Time of collection

5. The stool specimen must be large enough for satisfactory examination (WHO,1991).

6. Quality control

Have the specimen brought to laboratory as soon as it is passed to prevent deterioration of protozoa and alteration in the morphology of protozoa and helminths .

Care must be taken not to report as parasites those structures that can be normally found in faeces such as muscle fibres, vegetable fibres, starch cells (stain blue-black with iodine), pollen grains, fatty acid crystals, soaps, spores, yeasts, and hairs.

Part II KATO-Katz technique

1. PRINCIPLE AND APPLICATION

In the Kato-Katz technique faeces are pressed through a mesh screen to remove large particles. A portion of the sieved sample is then transferred to the hole of a template on a slide. After filling the hole, the template is removed and the remaining sample is covered with a piece of cellophane soaked in glycerol (glycerine). The glycerol 'clears' the faecal material from around the eggs. The eggs are then counted and the number calculated per gram (g) of faeces. This technique has proved efficient means of diagnosis of intestinal schistosomiasis and intestinal helminths. Cellophane thick- smear slide can be prepared in field, stored in microscopic slide boxes and transported greater distance . (WHO,1991; Cheesbrough,2009).

2. HEALTH AND SAFETY WARNINGS.

Use glove and wash hand after finalizing the procedure.

3. INTERFERENCES.

- Time depend the visibility
- *Trichuris trichura* and *Ascaris lumbricoides* eggs are visible at any time.
- Hookworm are visible for up to 30minutes after preparation.

- The ideal time for schistosoma eggs is 24 hours after preparation but in bright sunlight the slide clear rapidly and a 24-hour delay may not be necessary.

4. MATERIAL AND REAGENT

- Kato-set
- (Template with hole, screen, nylon or plastic, plastic spatula)
- Or Applicator sticks, wooden
- Newspaper or glazed tile
- Forceps
- Toilet paper or absorbent tissue
- Microscope slides
- Cellophane as cover slip, soaked in Glycerol-malachite green solution at least for 24 hour
- Or methylene blue
- Gloves

5. Procedure

1. Prepare the layer or Glazed tile or newspaper .
2. Place a small mount of faecal material on newspaper or scrap paper and press the small screen on top of the faecal material so that some of the faeces will be sieved through the screen and accumulate on top of the screen.
3. Scrape the flat-sided spatula across the upper surface of the screen so that the sieved faeces accumulate on the spatula.
4. Place template with hole on the centre of a microscope slide and add faeces from the spatula so that the hole is completely filled. Using the side of the spatula, pass over the template to remove excess faeces from the edge of the hole (the spatula and screen may be discarded or, if carefully washed, may be reused again).
5. Remove the template carefully from the slide so that the cylinder of faeces is left completely on the slide. Cover the faecal material with the pre-soaked cellophane strip. The strip must be very wet if faeces are dry and less so with soft faeces (if excess glycerol solution is present on upper surface of cellophane, wipe the excess with toilet paper). In dry climates, excess glycerol will retard but not prevent drying.

6. Invert the microscope slide and firmly press the faecal sample against the hydrophilic cellophane strip on another microscope slide or on a smooth hard surface such as a piece of tile or a flat stone. With this pressure, the faecal material will be spread evenly between the microscope slide and the cellophane strip.
7. The smear should be examined in a systematic manner and the eggs of each species reported. Kato-Katz template delivers 41.7 mg of faeces. The number of eggs observed is multiplied by 24 to obtain the number of eggs per gram of faeces. (WHO,2003).

Part III FORMALIN-ETHER CONCENTRATION METHOD

1. PRINCIPLE AND APPLICATION

The stool specimen is treated with formaldehyde, which preserves any parasites present. Lumpy residues are removed by filtration. Fatty elements of the faecal suspension are separated by extraction with ether (or ethyl acetate), followed by centrifugation, which sediments any parasites present. Sedimentation methods use centrifugation to concentrate the protozoa, helminth ova and larva in the bottom of the tube. Ether is used as an extractor of debris and fat from the feces (WHO,2003;MSH/TML,2000).

2. HEALTH AND SAFETY WARNINGS.

Ether is highly flammable, It is now common practice to perform all the above steps in a biological safety cabinet. If the extraction system of the cabinet is not fireproof, the steps involving ether should be done outside the cabinet. Ethyl acetate provides a less flammable alternative to ether.

3. INTERFERENCES

- avoid contamination of sediment
- Too much (> 0.5mL) or too little (<0.25mL) sediment will result in an ineffective concentration.

4. MATERIAL AND REAGENT

- Microscope
- Microscope slides
- Coverslips

- Centrifuge
- Test-tubes
- Test-tube rack
- Centrifuge tubes
- Wooden applicators
- Brass wire filter, 40 mesh (425mm), 7.2 cm diameter (nylon coffee strainers provide an inexpensive alternative)
- Small porcelain or stainless steel dish or beaker
- Pasteur pipette
- Formalin, 10% solution (100 ml of formaldehyde, 37% solution in 900 ml of distilled water)
- Ether (or ethyl acetate).

5. Method

- 1) Using a wooden applicator, remove a small amount (approximately 0.5 g) of faeces from both the surface and the inside of the stool specimen.
- 2) Place the sample in a centrifuge tube containing 7 ml of 10% formalin.
- 3) Emulsify the faeces in the formalin and filter into the dish.
- 4) Wash the filter (with soapy water) and discard the lumpy residue.
- 5) Transfer the filtrate to a large test-tube. Add 3ml of ether (or ethyl acetate).
- 6) Stopper the tube and mix well.
- 7) Transfer the resulting suspension back to the centrifuge tube and centrifuge at 2000g for 1 minute.
- 8) Loosen the fatty plug with an applicator and pour the supernatant away by quickly inverting the tube.
- 9) Allow the fluid remaining on the sides of the tube to drain on to the deposit and then mix well. Using the pipette, transfer a drop on to the slide and cover with a coverslip.
- 10) Use the x10 and x 40 objectives to examine the whole of the coverslip for ova and cysts.

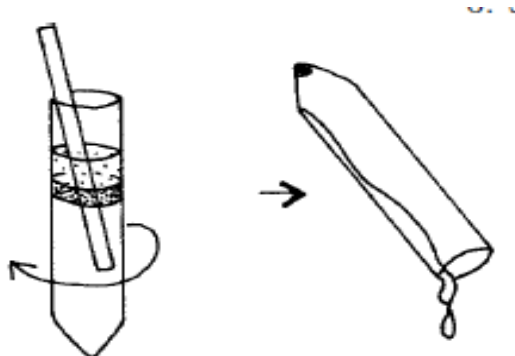


Fig. 3 After centrifuging the suspension, loosen the fatty plug and discard the supernatant (WHO,2003)

Quality control for concentration procedure

1. Select a fully representative sample of stool for concentration
2. Prepare well mixed suspension of faeces and water or saline.
3. Use the appropriate quantities of materials.
4. Use the correct centrifuge speed and time'
5. Prepare and examine mounts carefully as described for direct wet mounts.
6. Do not discard the tube containing the concentrated material until you have completed your examination. You may need to make another mount.

Part IV preservation of specimens

1. Label with code then fill the vial about half full with 10% formalin .
2. With an applicator stick, pick up a portion of the stool to include areas from the inside and edges of the sample and mix with the 10% formalin. Be sure to mix very well. use enough, but not too much, stool so that the mixture will occupy about $\frac{2}{3}$ to $\frac{3}{4}$ of the vial (test tube).
3. Screw the cap of vials securely . pack the vials carefully in a box or shipping container.

Laboratory result recording format

Intestinal parasites among pre-school children in Senbete and Bete town, 2015.

Sr.No	Child Name	Lab. Id	Kato-katz technique Observed parasite	Concentration technique observed parasite	Remark

Declaration

I, the undersigned declare that this thesis is my original work in partial fulfilment of the requirement for the master of medical parasitology. I also declare that it has never been presented in this or any other university and that all resource and materials in the proposal have duly acknowledged.

Sudent name _____

Signature _____

Place of submission _____

Date of submission _____

This thesis has been submitted for examination with my approval as a university advisor.

Advisor Name _____

Signature _____

Date of submission _____

Advisor Name _____

Signature _____

Date of submission _____