Research Article

Prevalence of Intestinal Schistosomiasis and Associated Factors among School Children in Wondo District, Ethiopia

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Background. Human schistosomiasis is one of the neglected tropical diseases caused by Schistosoma mansoni. Children in the developing countries live in areas with poor sanitation and most often spend time swimming or bathing in the water bodies contaminated with cercariae, the infective stages of schistosomiasis, which results in growth retardation and poor school performance. Thus, having effective control of the disease requires assessment of prevalence and risk factors.

Objective. This study was aimed at assessing the prevalence of S. mansoni and its associated factors among primary schoolchildren in Wondo district, West Arsi Zone, Ethiopia, 2018.

Methods. A cross-sectional study was carried out between January and March 2018. Stool samples from 298 schoolchildren, who were selected by simple random sampling, were examined for the ova of S. mansoni using Kato–Katz technique. Information on sociodemographic factors and other risk factors was obtained using questionnaires. The data were cleaned, coded, and entered into SPSS 22.0 statistical software and analyzed. Bivariable and multivariable logistic regression analysis was done to identify factors associated with S. mansoni infection. Adjusted odds ratio (AOR) with 95% confidence interval (CI) was calculated, and the level of significance was declared at p value < 0.05. The result was presented using tables, figures, and text form.

Result. A total of 298 study participants were involved in this study resulting in a response rate of 96.4% (298/309). The prevalence of S. mansoni infection was 11.4% (34/298). The prevalence was 8% (12/140) among males while it was 13% (22/158) among females. Swimming in rivers or ponds (AOR: 9.592; 95% CI: 1.972–46.655; P < 0.005), latrine availability at household level (AOR: 0.075; 95% CI: 0.13–0.422; P = 0.003), and awareness about schistosomiasis (AOR: 0.058; 95% CI: 0.004–0.409; P < 0.007) were the factors independently associated with S. mansoni infection at p value < 0.05.

Conclusion. The prevalence of S. mansoni was moderate as per the World Health Organization standard, since it was in the range of 10%–50%. This implies that schistosomiasis is still among major health problems. Additionally, biannual mass drug administration with praziquantel is required according to the WHO standard.

1. Introduction

Human schistosomiasis, otherwise called bilharzia, is a fresh water snail transmitted intravascular debilitating disease that results from infection by trematode worms known as Schistosoma, which lives in the bloodstream of humans [1]. It is one of the neglected tropical parasitic diseases (NTDs) and causes severe morbidity and mortality among susceptible segments of the population. In tropical and subtropical countries, it has high public health importance and socioeconomic impacts [2, 3].

Schistosomiasis is mainly caused by three different species of blood-dwelling fluke worms of the genus Schistosoma, namely, S. haematobium, which causes urinary schistosomiasis, and S. mansoni and S. japonicum, which cause intestinal schistosomiasis. Clinical manifestations of schistosomiasis are associated with the species-specific ova and the burden of infection [4]. Among the three species, S.
schistosomiasis is the chief cause of clinical abnormalities such as hepatomegaly, splenomegaly, and periportal fibrosis in various sub-Saharan African countries. In Ethiopia, *S. mansoni* is transmitted mainly by *Biomphalaria sudanica* (*B. sudanica*) and *Biomphalaria pfeifferi* (*B. pfeifferi*) snail intermediate hosts. *B. sudanica* is distributed in few water bodies in southern part of the country, whereas *B. pfeifferi* has a wider geographical distribution in Ethiopia [5].

Humans are usually infected by cercarial invasion through the skin when they come into contact with contaminated fresh water during daily life. In the endemic areas, children, women, fishermen, and farmers in irrigation channels are often infected with schistosomiasis [6]. Children in the developing countries live in areas with poor sanitation and most often spend time swimming or bathing in the water bodies contaminated with cercariae, the infective stages of schistosomiasis. The nonhygiene and playing behavior in water bodies increase the risk of being infected by *S. mansoni* [4].

Though schistosomiasis is rarely fatal, it causes long-term morbidity such as anaemia which results from bleeding from the urinary and intestinal tracts due to worm invasion and movements; iron deficiency is also an outcome of this disease. In this regard, it is similar to nutritional impairment such as nutrient malabsorption and digestive disorder. This chronic inflammatory process is associated with long-term schistosomiasis and contributes to anaemia and undernutrition, which, in turn, can lead to growth stunting, learning disabilities, school absenteeism and higher dropout rates, poor school performance, poor work productivity, and continued poverty [7].

The prevalence and morbidity of schistosomiasis is highest among school-age children due to high exposure to infested water bodies. Growth retardation and poor school performance are adverse effects of the disease besides its clinical manifestation and complication [8]. On top of that, its negative impact on school performance and the debilitation it causes when not treated demoralize both social and economic development in endemic areas [4]. Reasons for the persistence of the disease in spite of prolonged control and preventive efforts include wide distribution of the intermediate host, migration, the dependency of many poor populations in both rural and urban areas on *Schistosoma*-infested water sources for their domestic, occupational and recreational needs, lack of sanitation, scarcity of portable water, and deficiencies in preventive and curative health services [9]. In the past, the preventive measures of schistosomiasis were largely focused on decreasing or interrupting transmission of the infection; however, such measures have not been continued due to high operation cost/difficult implementation logistics [4].

Even though schistosomiasis is a public health problem in Ethiopia, estimates of its prevalence vary widely and the reports about *S. mansoni* occurrence vary and lack consistency. Thus, there is need for updated information on the extent of disease burden in the community and factors associated with schistosomiasis infection at the district and subdistrict level to facilitate effective prevention and control programs at the local level. Hence, this study assessed the situation of the intestinal schistosomiasis among school-children of Wondo district, West Arsi Zone, Southern Ethiopia.

2. Materials and Methods

2.1. Study Design and Setting. A cross-sectional study was conducted between January and March 2018 among students of three primary schools, namely, Busa, Intaye, and Shasha in Wondo district, West Arsi Zone, Oromia Regional State, Ethiopia. The district is located 07°05'35"N and 038°36'66"E about 271 km away from the capital city of the country and 19 km away from Shashamane town. The district is located at an altitude ranging from 1700 to 2300 m above sea level.

It is generally characterized by warm climate with a mean annual maximum temperature of 19°C and a mean annual minimum temperature of 17°C. The annual average rainfall is 1244 mm. In the district, there are different water sources which the population frequently use for domestic purposes and thus could be potential risk factors for infection with *S. mansoni*. The total population of the district was 112128 out of which 55503 (49.5%) were male and 56625 (50.5%) were female, and there were 11 primary schools (one per kebele) with a total number of 10494 (5264 male and 5230 female) students enrolled during 2018.

2.2. Study Participants. All children enrolled to primary schools during 2018 academic year in the selected three schools of Wondo district, whose age was 5–19 years and who were in school during the study period, were included in this study. However, schoolchildren who were clinically ill at the time of recruitment were excluded.

3. Sample Size Determination

The sample size was calculated using a single proportion formula with the following assumptions: at 95% confidence interval *(Zα/2 = 1.96)*, an expected prevalence of 24% taken from Manna district of Jimma with similar geographical characteristics with the study area [2, 3], 5% marginal error, and a possible nonresponse rate of 10%. Accordingly, \( n = \frac{Z^2}{(1 - p)} \times \frac{(1 - p)}{d^2} \times n = (1.96/0.05)^2 \times 0.24 \times (1 - 0.24) = 280.29 \). Adding nonresponse rate, final sample size, 9, was 309.

4. Sampling Technique and Procedure

The study area, Wondo district, has 11 subdistricts known as kebeles in Ethiopia. This study was conducted in three of these kebeles which were purposively selected because of the presence of intestinal schistosomiasis as evidenced by activity reports from health institutions of the district. Then, the total sample, 309, was proportionally allocated to the primary schools found in the selected kebeles, namely, Busa, Intaye, and Shasha primary schools. Finally, an individual student was selected by simple random sampling technique using tables of random number from sampling prepared using students’ record of each school (Figure 1).
5. Data Collection Tools/Instruments

A structured questionnaire was developed from review of various related literatures in English. It consists of the parts that address sociodemographic information, hygiene and sanitation, water contact behaviour, and awareness about schistosomiasis. It was translated into Afan Oromo, a local language of the study area. It was retranslated to English to check for consistency of the two versions. It was pretested before the actual data collection on 5% of the total sample size, and modifications were made. Interview data on sociodemographic information, hygiene and sanitation, water contact behaviour, and awareness about schistosomiasis were collected using a questionnaire through a face to face interview. Then, the study participants were linked to laboratory personnel for provision of stool sample at the end of the interview.

6. Data Collection Methods

Stool samples were examined using Kato–Katz technique. Materials used were Kato set (template with holes, screen, nylon or plastic, and plastic spatula), newspaper or glazed tile, microscope slides, cellophane as cover slip, soaked in glycerol malachite green solution, fresh stool, and gloves [10].

A plastic sheet and applicator stick were given to the study participants to bring sizable stool. The slides were labelled using the identification number of the participants and the school code. A single Kato–Katz thick smear per stool sample was prepared from a single stool using a template delivering 41.7 mg of faeces, and stool microscopy was done systematically by the experienced laboratory technician. A multiplication factor of 24 was used to estimate the number of eggs per gram of stool. The intensity of S. mansoni infections was categorized as light, moderate, or heavy-infection intensities based on the number of egg counts as per the cut offs described by the WHO [11].

To assure the quality of laboratory procedure, all the reagents, chemicals, and kits were checked before processing and examination of samples by laboratory technicians who have considerable experience in preparing Kato–Katz smears and microscopy of stool samples. The samples were checked for labelling immediately as submitted by the participants, and 10% of the slides were randomly selected and reexamined by a laboratory technician who did not previously examine the slides. The interview data were checked for completeness or misclassification, and corrective measures were taken immediately before leaving the study sites.

7. Data Processing and Analysis

Data were cleaned, coded, entered, and analyzed using SPSS 22.0 software. Descriptive statistics was used to give a clear picture of background variables. The frequency distribution of both dependent and independent variables was presented. Factors associated with infection of S. mansoni were analyzed using binary and multiple logistic regressions to determine independent risk factors. Adjusted odds ratio and its 95% confidence interval were used to present the result regarding association. A P value of less than 0.05 was considered to declare the level of statistical significance.

8. Ethical Consideration

Ethical approval was obtained from the Ethical Review Board of Oromia Regional Health Bureau under the research ethical clearance code no. ORHB/ERB-108/2018. Before starting the
actual data collection, permission to conduct the study was obtained from both district health office and education office. Verbal consent was obtained from students before collecting stool specimens. Additionally, after explaining the importance of the study, informed written consent was obtained from the study participants’ parents/guardians, and those children who were positive for *S. mansoni* were linked to district health office for treatment according to the national protocol with a single dose of praziquantel (40 mg/kg body weight).

9. Results

9.1. General Characteristics of Study Population. Two hundred and ninety-eight schoolchildren (47% males and 53% females) aged between 7 and 19 years, with a mean age of 11.49 and standard deviation of 2.39 have participated in this study. Among these, 150 (50.3%) were from Busa, 40 (13.4%) from Shasha, and 108 (36.2%) from Intaye kebele. The majority of the study participants’ (63.1%) age falls between 10- and 14-year age groups.

One out of five children’s parents had no formal education, while the rest have primary to tertiary level educational status. More than 70% of children’s parents were farmers, whereas 17%, 2%, and 7% were businessperson, government employee, and daily labourer, respectively. Three out of four students’ parents had access to pipe water supply while the rest got drinking water from other unprotected sources.

All schools and the majority of students’ households had latrine; only 9% HHs lack latrine, and the students of those HHs use neighbours’ latrine and field to defecate. In these kebeles, seven local flowing rivers were identified, and almost 93% schoolchildren had contact experience to these rivers; 70% of them had three times per week for playing and swimming in the water streams and pools (Table 1).

10. Prevalence and Risk Factors of Schistosomiasis

Thirty-four (11.4%) students were found infected with *S. mansoni*; mean intensity of infection was 25.79 eggs/gram of stool. The prevalence was highest in students from Shasha (15.0%), followed by Intaye (13.0%) and Busa (9.3%) (Table 2).

High prevalence of infection detected among females than males (13.9% vs 8.6%) (Figure 2). However, the difference was not statistically significant ($\chi^2 = 2.104; \text{df} = 1 \ P = 0.147$). Similarly, the prevalence was higher among the age ranges of 10–14 years (12.3%) followed by age 5–9 years (10.5%) and 15–19 years (8.8%), but found statistically not significant (Table 3).

The highest prevalence and intensity of infection with the disease was observed among students who reported swimming experience (14%), followed by those who reported going to rivers for wash (9%) and herd cattle in the water fields. Students whose parents were farmers were found to have a high prevalence of infection and intensity of infection (Table 4).

Though some of the interviewed students were aware of the disease, most of them did not know about schistosomiasis or its transmission mode. In the result, the disease was found to be higher among the group who had awareness on disease cause and transmission (34.8%) than those who had no any awareness on the disease with 9.5%. High prevalence (27.3%) was found among those who use rivers as water source than other sources followed by spring (12.8%), pipe water (11.2%), and deep well (4.2%).

| Table 1: Sociodemographic characteristics of schoolchildren in three primary schools of Wondo district, West Arsi Zone, South Ethiopia, 2018 ($n = 298$). |
|------------------|------------------|------------------|
| Characteristics  | Number (%)       | Number (%)       |
| Sex             |                  |                  |
| Male            | 140 (47.0)       | 158 (53.0)       |
| Female          | 158 (47.0)       | 140 (53.0)       |
| Age groups (years) |                |                  |
| 5–9             | 75 (25.5)        | 103 (34.5)       |
| 10–14           | 187 (63.1)       | 101 (34.5)       |
| 15–19           | 33 (11.4)        | 25 (8.1)         |
| Residency       |                  |                  |
| Busa            | 149 (50.3)       | 151 (51.0)       |
| Shasha          | 39 (13.4)        | 41 (13.8)        |
| Intaye          | 107 (36.2)       | 88 (29.9)        |
| Parents’ education level |              |                  |
| Noneducated     | 56 (19.1)        | 142 (48.1)       |
| Primary level   | 195 (65.8)       | 133 (44.9)       |
| Secondary level | 32 (11.1)        | 29 (9.8)         |
| College level   | 11 (4.0)         | 18 (6.1)         |
| Parents’ occupational status |          |                  |
| Farmer          | 219 (73.5)       | 69 (22.9)        |
| Businessman     | 51 (17.1)        | 58 (19.5)        |
| Civil servant   | 5 (1.7)          | 10 (3.4)         |
| Daily laborer   | 23 (7.7)         | 11 (3.8)         |
| Main source of drinking water |          |                  |
| Piped water     | 224 (75.2)       | 74 (24.8)        |
| Well water      | 24 (8.1)         | 274 (91.9)       |
| Spring water    | 39 (13.1)        | 259 (86.9)       |
| River water     | 11 (3.7)         | 287 (96.3)       |
| Story water contact |              |                  |
| Yes             | 277 (93.0)       | 21 (7.0)         |
| No              | 21 (7.0)         | 276 (93.0)       |
| Frequency of water body contact days per week | |                  |
| 3 and less time | 206 (69.1)       | 92 (30.9)        |
| 4 and greater time | 92 (30.9)       | 206 (69.1)       |
| Have awareness about schistosomiasis |          |                  |
| Yes             | 23 (7.7)         | 305 (92.3)       |
| No              | 275 (92.3)       | 23 (7.7)         |
| Household latrine |            |                  |
| Have            | 271 (90.9)       | 27 (9.1)         |
| Have no         | 27 (9.1)         | 271 (90.9)       |

| Table 2: Prevalence of *S. mansoni* infection among schoolchildren in three primary schools of Wondo district, West Arsi Zone, South Ethiopia, 2018 ($n = 298$). |
|--------------------------|--------------------------|--------------------------|
| School                    | No. examined | No. infected (%) | No. uninfected (%) |
| Busa                      | 150          | 14 (9.3%)        | 136 (90.7%)        |
| Shasha                    | 40           | 6 (15.0%)        | 34 (85.0%)         |
| Intaye                    | 108          | 14 (13.0%)       | 94 (87.0%)         |
| Total                     | 298          | 34 (11.4%)       | 264 (88.6%)        |
On the other hand, those who use unsafe sources for drinking water have high prevalence of *S. mansoni* (12.2%) than those drink pipe water (11.2%). Additionally, those living in the HHs without latrine have high prevalence (33.3%) compared to those with latrine (9.2%) (Table 5).

Results of the bivariate analysis for the association of schistosomiasis showed that water contact experience, swimming, awareness about diseases, and lack of latrine are associated with *S. mansoni* prevalence (Table 5).

![Figure 2: Sex distribution of *S. mansoni* among Wondo district schoolchildren who participated in this study (n = 298).](image)

### Table 3: Age distribution of *S. mansoni* among Wondo district schoolchildren who participated in this study (n = 298).

| Age   | No. examined | No. infected (%) | No. uninfected (%) |
|-------|--------------|------------------|--------------------|
| 5–9   | 76           | 8 (10.5%)        | 68 (89.5%)         |
| 10–14 | 188          | 23 (12.3%)       | 165 (87.7%)        |
| 15–19 | 34           | 3 (8.8%)         | 31 (91.2%)         |
| Total | 298          | 34 (11.4%)       | 264 (88.6%)        |

### Table 4: Intensity of schistosomiasis among Wondo district schoolchildren who participated in this study (n = 298). *S. mansoni*.

| Intensity of infection | N | % Mean (epg) |
|------------------------|---|--------------|
| Light 1–99             | 33| 11.1         |
| Moderate 100–399       | 1 | 0.3          |
| Heavy >399             | 0 | 0            |
| Overall                | 34| 11.4         |

*According to the WHO. ep10 mg. number of eggs per 10 mg of faeces. epg. number of eggs per gram of faeces [12].

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Results of the bivariate analysis for the association of schistosomiasis showed that water contact experience, swimming, awareness about diseases, and lack of latrine are associated with *S. mansoni* prevalence (Table 5).

The risk factors swimming practice in rivers/ponds (AOR = 9.592; 95% CI: 1.972–46.655; P = 0.005), household latrine (AOR = 0.075; 95% CI: 0.13–0.422; P = 0.003), and awareness about schistosomiasis (AOR = 0.058; 95% CI: 0.004–0.409; P = 0.007) were independent predictors for *S. mansoni* infection (P value < 0.05) (Table 6).

### 11. Discussion

The prevalence of *S. mansoni* was determined by collecting stool from schoolchildren and looking for ova of parasites by using Kato–Katz technique. Despite the limitation in its sensitivity, the Kato–Katz technique was a widely used and cost-effective method for both diagnostic and survey. Additionally, only this technique is available and practiced in the study area. Accordingly, the prevalence of *S. mansoni* infection in this study was found (11.4%). The finding of this study was much lesser than a prevalence (81.3%) of *S. mansoni* infection observed among Demba Girara primary schoolchildren of Damot Woide district, Wolaita Zone [5] and primary schoolchildren in Sanja area (82.8%), Amhara region [8], Ethiopia. In a cross-sectional study carried out in Zarima town, Northwest Ethiopia among 319 elementary schoolchildren revealed a higher prevalence of 37.9% *S. mansoni* infection [13]. The low prevalence of *S. mansoni* in the present study might be due to presence of potable water in the study area. Inhabitants of the area largely depend on public pipelines, for indoor and outdoor consumptions. On the other hand, this finding was higher than reports from previous investigations conducted in Ethiopia including Tigray (5.95%) [14] and Jimma (2.1%) [15]. The difference might be due to long time endemcity of the parasite in these study areas with the altitude differences.

As indicated in this study, the prevalence of *S. mansoni* was found to be higher among the girls than their counterparts. This study also showed that the mean intensity of infection was higher in girls compared to boys and significantly higher infection rates among females have been also reported elsewhere in Kenya and Zanzibar [16]. However, contrary with the findings conducted in some parts elsewhere in Africa [4, 17, 18], these studies imply higher infection rates and infection intensities in girls. This may be because of high contact of girls with water during fetching and washing clothes. The snail transmitting cercaria prefers to live in fresh water which is mostly utilized for washing clothes and drinking. Moreover, in the present study, highest prevalence and intensity of *S. mansoni* infection were found in the age group 10–14 years. These findings are similar to studies conducted in Jiga, northwestern Ethiopia [8, 13] and Nigeria [19]. High prevalence in this age group may be
| Variables                        | No. examined | S. Mansoni | OR (95% CI) | P     |
|---------------------------------|--------------|------------|-------------|-------|
|                                 |              | Positive   | Negative    |       |
| Sex                             |              |            |             |       |
| Male                            | 140          | 12         | 128         | 0.59 (0.276, 1.219) | 0.150 |
| Female                          | 158          | 22         | 136         | 1     |
| Age                             |              |            |             |       |
| 5–9                             | 76           | 8          | 68          | 1.216 (0.302, 4.897) | 0.784 |
| 10–14                           | 188          | 23         | 165         | 1.44 (0.407, 5.092) | 0.571 |
| 15–19                           | 34           | 3          | 31          | 1     |
| Parents’ education level        |              |            |             |       |
| Noneducated                     | 57           | 6          | 51          | 0.235 (0.054, 1.022) | 0.053 |
| Primary level                   | 196          | 23         | 173         | 0.266 (0.074, 0.952) | 0.042 |
| Secondary level                 | 33           | 1          | 32          | 0.062 (0.006, 0.639) | 0.019 |
| College level                   | 12           | 4          | 8           | 1     |
| Parents’ occupation             |              |            |             |       |
| Farmer                          | 219          | 27         | 192         | 0.938 (0.261, 3.367) | 0.921 |
| Businessman                     | 51           | 4          | 47          | 0.567 (0.116, 2.771) | 0.484 |
| Civil servant                   | 5            | 0          | 5           | 0.000 (0.000, 0.000) | 0.999 |
| Daily laborer                   | 23           | 3          | 20          | 1     |
| Anthelminthic treatment         |              |            |             |       |
| Yes                             | 28           | 3          | 25          | 0.925 (0.264, 3.244) | 0.903 |
| No                              | 270          | 31         | 239         | 1     |
| Water source                    |              |            |             |       |
| Piped water                     | 224          | 25         | 199         | 0.335 (0.083, 1.346) | 0.123 |
| Well water                      | 24           | 1          | 23          | 0.116 (0.010, 1.280) | 0.079 |
| Spring water                    | 39           | 5          | 34          | 0.392 (0.077, 1.992) | 0.259 |
| River water                     | 11           | 3          | 8           | 1     |
| Water contact experience        |              |            |             |       |
| Have                            | 277          | 26         | 251         | 0.168 (0.064, 0.444) | 0.001* |
| Have no                         | 21           | 8          | 13          | 1     |
| Water contact frequency         |              |            |             |       |
| 3 and less days/week            | 206          | 21         | 185         | 0.69 (0.329, 1.446) | 0.325 |
| 4 and more days/week            | 92           | 13         | 79          | 1     |
| Swimming                        |              |            |             |       |
| Yes                             | 172          | 24         | 148         | 8.351 (1.931, 36.114) | 0.004* |
| No                              | 105          | 2          | 103         | 1     |
| Cloth washing                   |              |            |             |       |
| Yes                             | 205          | 20         | 185         | 1.189 (0.458, 3.089) | 0.722 |
| No                              | 72           | 6          | 66          | 1     |
| Water fetching                  |              |            |             |       |
| Yes                             | 133          | 12         | 121         | 0.921 (0.41, 2.070) | 0.842 |
| No                              | 144          | 14         | 130         | 1     |
| Cattle herding                  |              |            |             |       |
| Yes                             | 146          | 16         | 131         | 1.489 (0.651, 3.408) | 0.346 |
| No                              | 131          | 10         | 121         | 1     |
| Travel to school                |              |            |             |       |
| Yes                             | 179          | 15         | 164         | 0.723 (0.319, 1.643) | 0.439 |
| No                              | 98           | 11         | 87          | 1     |
| Awareness on schistosomiasis    |              |            |             |       |
| Have                            | 23           | 8          | 15          | 1     |
| Have no                         | 275          | 26         | 249         | 0.196 (0.076, 0.5050) | 0.001* |
| Household latrine               |              |            |             |       |
| Have                            | 271          | 25         | 246         | 1     |
| Have no                         | 27           | 9          | 18          | 4.92 (2.001, 12.098) | 0.001* |

OR, odds ratio. CI, confidence interval. *Significant association (P, 0.025).
related to playing and swimming interests in those age
groups. Most of early adolescents have swimming habit than
any other age groups.

In the present study, the absence of a functioning toilet
in the house was significantly associated with the prevalence
of schistosomiasis, revealing children whose family has no
latrine were almost ten times more likely exposed to the
infection than who had latrine. Thus, open defecation is still
contributing to transmission of infection and provide in-
formation for enhancing open defecation free. With regard
to awareness on the infection, it was found the odd of having
infection among those who had awareness on the trans-
mission was 38% less likely than that of counterparts.

In the finding, it was also revealed that children who swim
in rivers had almost 10 times more likely of being infected
with S. mansoni than those who did not have a swimming
habit. This result was higher as compared to a study carried
out at two primary schools in Saja, which is 3.2 times higher
exposure in swimming practice [11]. The increased result
might be obtained at Wondo due to the presence of many
rivers in the locality. The result also supports that those rivers
are infected with the cercaria, which gives the clues for district
health education and awareness creation focus. Majorities of
infection intensities and the mean intensity of infection were
low. Meanwhile, this study revealed that S. mansoni infections
were predominantly light (11.1%) followed by moderate
(0.3%) and no heavy infections in the study population.

The infection intensity in the study indicated low in-
fection levels comparable with findings from Timuga and
Waja from Tigray [11], Wollega [20] in Ethiopia that had
moderate infection intensities. These differences in the
prevalence of S. mansoni may be ascribed to altitude dif-
fences, availability of streams, rivers, or ponds, the fre-
quency of students’ contact with water bodies, and playing
habits of schoolchildren.

This study employed Kato–Katz technique which is less
sensitive in identifying ova of Schistosoma, but it is the only
available technique in the area and currently utilized for
diagnostic purpose.

The prevalence of S. mansoni among schoolchildren in
the study district was classified under moderate prevalence
under the WHO Schistosoma Endemicity Classification. In
particular, the disease was higher among the age groups of
10–14 years though all age groups of participants infected
showed that more attention is needed for this age group. This
is an indication that younger children were more exposed to
the source of infection through engagement of activities such
as open-field defecation and exposure activities such as
washing, swimming, and bathing in the water bodies that
favored transmission of schistosomiasis. As the WHO
recommended for moderate prevalence, the West Arsi Zone
health office and Wondo district health office shall carry
out a biannual MDA with praziquantel.

There was a statistically significant association between
the prevalence of schistosomiasis, water contact practice,
and lack of latrine. The district health office and water and
sanitation office shall come up with strategies for ensuring
that the community uses safe water for domestic use and
latrine utilization in the area.

Awareness about diseases also has association with the
prevalence of the diseases. This may be due to prior exposure
to the infection, which helps to improve health seeking
behavior and early treatment. Wondo district health office
and respective health facilities should provide regular health
education for students and community at large on the mode
of transmission, prevention, and control of schistosomiasis
infection.

Data Availability
The SPSS output data used to support the findings of this
study are available from the corresponding author upon
request.

Conflicts of Interest
Authors have no conflicts of interest.

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