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Original Research Article

The knowledge, causes and transmission of soil transmitted helminths among primary school children in Orlu Imo State, Nigeria

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Abstract
The Knowledge of soil-transmitted helminthiasis was investigated in elementary schools in Orlu, Imo State, Nigeria, from February 2022 to April 2024. Experimental analysis and a cross-sectional survey were the study designs used in this investigation. A total of 750 students were recruited from 15 randomly chosen primary schools. The students, who were in Primary 3, 4, and 5 classes, varied in age from 9 to 16. Following sufficient training, stool samples were taken from the participants every four weeks using a clean specimen bottle. Within 48 hours of collection, stool samples were processed at the Parasitological Unit, Department of Medical Microbiology and Parasitology, Imo State University Teaching Hospital, Umuna Orlu, Imo State. They were kept with 10% formalin. ANOVA and frequency and percentage tables were used to enter and analyse the data. According to the results, men participated at a higher rate than women (420, 56.0%), and participants in class 5 had the greatest participation rate (300, 40.0%) at the 15–16 age range. Equal numbers of students from urban, suburban, and rural schools participated—250, or 33.3%, respectively. It was found that 100.0% of the respondents had heard of infections caused by STHs. With 69.9% of respondents, the hospital, pharmacies, and health workers were the most common source of knowledge. Of those who knew the causes, 78.3% named helminthes as the primary cause of STHs, followed by inadequate cleanliness with 23.9%. Over eighty-eight percent (88.9%) of the participants were aware of how STHs are spread, with contact with contaminated soil accounting for the largest share (42.4%). Furthermore, a mean score of 81.9% indicates that respondents have a positive attitude regarding STH illness. Water is given in their school, according to 592 respondents (78.9%), while 555 respondents (93.8%) claimed it is provided on a regular basis. Students are permitted to drink the water, according to all responses (100.0%). Of those surveyed, 489 (82.6%) believed that the water was safe to drink, while 103 (17.4%) disagreed; 540 (72.0%) said they practiced hygiene frequently, 303 (52.1%) thought it was high, 151 (24.9%) thought it was moderate, and 128 (22.0%) thought it was low. According to the data, the school's primary sources of water are piped water supply 237 (40.0%) and rainfall 217 (36.7%), however the majority of respondents (649, 86.5%) said their schools have systems in place for disposing of sanitary waste. As a result, the study suggests thorough and exacting research that can evaluate the effects of WASH initiatives at the community and school levels statistically.

Keywords: *Knowledge, causes, transmission, soil transmitted helminthes, primary, school children, Orlu.*

Introduction
One of the most prevalent neglected tropical diseases (NTDs) in Nigeria and one of the most prevalent infections globally are soil-transmitted helminth (STH) infections. The most underprivileged and impoverished populations are impacted. It is primarily seen in regions with warm, humid climates with inadequate sanitation and hygiene, including temperate zones in the warmer months. The intestinal nematodes known as soil-transmitted helminths (STH) include the hookworm species Necator americanus, Ancylostoma duodenale, and An. ceylanicum, as well as Ascaris lumbricoides and Trichuris trichiura [1]. More than 1.5 billion people worldwide are afflicted by these species, which are among the

most prevalent illnesses in humans. Light infections caused by STHs typically show no symptoms. Malnutrition, poor absorption, cramping, fatigue, and decreased cognitive and physical development are some of the signs of more severe illnesses. STH's burden has significantly decreased; according to the 2016 Global Burden of Disease survey, between 1990 and 2016, the number of disability-adjusted life years attributed to STH decreased by 43–78%. The direct effects of expanding school- or community-based deworming programs and expanding access to self-treatment are probably reflected in these decreases [2].

Children are most at risk for infection, and those living in rural regions with limited access to clean water and sanitary facilities are most vulnerable. These parasite infections have nutritional impacts as well as impaired cognitive and physical development. Lactose intolerance, poor absorption of vitamin A and other nutrients, and stomach pain are all possible outcomes of A. lumbricoides infections. A severe whipworm infection causes inflammation at the intestinal attachment site, which in turn causes colitis and rectal prolapse. Hookworm infections can cause intestinal blood loss, which can lead to iron-deficiency anaemia. [3]

Children in low-income schools are particularly vulnerable to infections linked to water, sanitation, and hygiene (WASH), including trachoma, soil-transmitted helminths (STH), and bacteria that cause diarrhoeal illnesses [4]. Pupils are more susceptible to illness in crowded, unhygienic settings where viruses might proliferate. In addition to halting the spread of diseases within the school environment, improved access to WASH facilities and adequate behaviour modification may also promote healthy WASH practices at home and throughout life. According to the data that is currently available, just 69% of schools globally have access to sanitary facilities, and only 66% have water. The Sustainable Development Goals contain WASH in schools (WinS) targets and indicators. Evidence of impact has been conflicting, despite WinS treatments' biological plausibility to lower illness and, consequently, school absenteeism. Soil-transmitted helminths (STHs) infect about two billion people globally, with school-aged children having the highest STH morbidity [5]. Faecal exposure, whether by ingesting or skin contact, is directly linked to STH infection. School-aged children's growth and cognitive development can be negatively impacted by persistent, severe infections. Thankfully, periodic chemotherapy, usually with anti-helmintics, can safely and affordably cure a large portion of the morbidity linked to STH infection [6]. Infection rates among untreated children and community members can also be decreased by treating school-aged children, typically through school-based deworming.

In certain situations, school-based hand hygiene and sanitation initiatives can lower STH reinfection among students; however, the effects differ according on the species. In a Chinese experiment, hygiene promotion decreased the frequency and severity of A. lumbricoides and T. trichiura infections, while in Peru, it decreased the severity of A. lumbricoides infections but not those of other species [7]. A trial of school-based WASH interventions in Kenya also revealed that WASH had an effect on A. lumbricoides alone. In contrast, STH among school-aged children, their parents, or siblings under five years old was not decreased by a comprehensive school WASH intervention in Laos PDR. Treatment of STH infections is followed by re-infection, requiring recurrent treatments, if control measures are not implemented to reduce exposure. Efforts to lower environmental exposure to illness through better sanitation and hygiene practices can maintain the effects of such treatment [9]. Global access to water, sanitation, and hygiene (WASH) in schools is poorly understood, despite the fact that the United Nations Children's Fund (UNICEF)/World Health Organisation (WHO) Joint Monitoring Program for Water and Sanitation measures household coverage of WASH [10]. Significant protection against STH infection was linked to the availability and utilisation of sanitary facilities. Humans can contract a class of parasite disorders known as soil-transmitted helminthes, which are brought on by nematode worms and spread by contaminated soil from human faeces. These are some of the most common illnesses among people in countries in sub-Saharan Africa. According to the most recent estimates, about 2 billion people are afflicted with these parasites. The highest frequency is found in places with contaminated water supplies and poor sanitation [7].

Children in low-income schools are particularly vulnerable to infections linked to water, sanitation, and hygiene (WASH), including trachoma, soil-transmitted helminths (STH), and bacteria that cause diarrhoeal illnesses [8]. Unhygienic, crowded environments can encourage the spread of germs and raise the risk of illness for students. In addition to halting the transmission of diseases inside the school domain, improved access to WASH facilities and adequate behaviour modification may also promote healthy WASH practices at home and throughout life [11]. The Sustainable Development Goals now incorporate WASH in Schools (WinS) targets and indicators. The majority of community trials that are currently available have assessed sanitation interventions meant to lessen open defecation. Sanitation measures had varying effects on STH infection, according to three trials. Latrine construction campaigns did not appear to have any protective effects against STH infections, according to trials [12]. However, a lot of parasite infections—particularly those caused by helminths are frequently ignored since they typically show no symptoms or relatively minor ones. According to preliminary research, intestinal parasites are becoming a bigger issue in Nigeria as the country's economy and access to essential services deteriorate [13]. It has been reported that soil-transmitted helminthes are endemic in Imo State. Moreover, medication has been the main focus of disease control [14].

The effects of mass drug administration (MDA) versus MDA in conjunction with WASH have been assessed in other experiments. An integrated program of community MDA and WASH was found to have no further effect on STH infection when compared to MDA alone in the Timor-Leste WASH for Worms experiment [15]. WASH treatments appear to have varying effects depending on the underlying amount of STH infection, with the biggest effects occurring at lower infection levels. This discovery may be explained by the fact that WASH interventions need a longer follow-up period to show results at high levels of illness and environmental contamination the majority of trials have follow-up periods of 1-2 years. The existence and duration of continuing deworming programs may also have an impact. This demonstrates that WASH measures are crucial to preventing infection rebound after deworming is stopped, but they have little short-term effect on STH infections in the context of ongoing deworming programs, particularly community-wide deworming. More focus should be placed on WASH modelling, which makes use of trial data to increase the predictability of model predictions. The knowledge, causes, and transmission of soil-transmitted helminthes among primary school students in Orlu, Imo State, Nigeria, must be investigated because there is a lack of research on the effects of WASH interventions and the administration of chemotherapy and drugs in the control of STH among primary school students, despite the fact that these interventions have been shown to be somewhat effective against STH.

MATERIALS AND METHOD

Study Area

The study was conducted in fifteen (15) primary schools in Orlu Local Government Area, Imo State, Nigeria between February, 2022 and April, 2024. Orlu is the second largest city in Imo State with an estimated population of 420,000.

Ethical Consideration

This study was approved by the Postgraduate Board of the Department of Animal and Environmental Biology (Zoology) Imo State University, Owerri. Permission was obtained from Orlu L.G.A. Health Unit while informed consent was obtained from Traditional Rulers (Ezes) in the study areas and thereafter, the head teachers of schools selected for the study were visited with authorizing letter from the study supervisor(s). The stool samples of the consented pupils were collected after obtaining parental consent through Parents Teachers Association (PTA).

Study Design

A comprehensive checklist of all the public and private primary schools in Orlu was made/collected from Ministry of Education. A two staged sampling method with random sampling was used to select schools. Each school was assigned a number and random selection was made to choose the schools which formed the study area. Schools in this zone were categorized into three (3); Urban, Semi-urban and Rural following SUBEB criteria.

Stage 1: Fifteen (15) schools (5 each from Urban, Semi-urban and Rural) were chosen.

Stage 2: For each categorization, six (6) schools (2 from each of Urban, Semi-urban and Rural) were selected for WASH Intervention while as others non WASH Intervention (Comparison schools) were left out for other intervention. The selection took into consideration the logistic demands and prevalence status of each school based on baseline data.

Procurement of WASH Materials, Distribution and Training of Personnel

Prior to the commencement of the study WASH materials were bought from the market together with other parasitological materials needed for the study. These included toothpastes, toothbrushes, nail choppers, towels/handkerchief, cotton buds, combs, toilet soaps, water storage vessels/buckets, etc.

These materials were distributed to the six WASH Intervention Schools following the results and then selections. This was complemented by active surveillance and follow up surveys after baseline surveys on soil transmitted helminthes prevalence and health education.

Personnels employed to assist as well as school staff used for the study were trained. Also, the medical laboratory Scientists, Nurse and other recruits were trained on the objectives of the study. Those who assisted in questionnaire administration were also trained on the techniques involved.

Baseline Survey

Pupils in primary schools in Orlu Zone were visited and interviewed about WASH techniques. Water handing hygiene and sanitation practices and use of point-of-use water treatment were the indices solicited for while other practices were observed directly by the researcher.

WASH Intervention in Schools

Starting from April 2022, the teachers in WASH intervention selected schools were trained about hand-washing and sanitation and were provided with instructional materials. Thereafter, the pupils were trained. This method involved use of exercises and educational games to teach children about link between personal hygiene and health.

In these schools, water and sanitation facilities were provided near toilets for hand-washing and classrooms for drinking. The water station consisted of 60L plastic buckets with a lid and tap placed on a standing chair. Schools were provided with toilet soaps. School children were adequately taught on hygiene and prevention of water-related diseases. Class-based method was employed to provide knowledge that improved the pupils' knowledge, skills and behaviours related to health and hygiene. Hygiene kits (toothpaste, toothbrush, soaps, towels/ handkerchiefs, nail choppers, combs and cotton buds) were given to pupils. Also, information, education and communication (IEC) materials (posters) were produced and shared to assist in hygiene promotion and learning. Each school was made to form a water and sanitation committee. The membership were; head teacher, one parent-teacher association (PTA) member and a member of the research team who head and oversees all WASH-related activities in the school. They had two days training workshop to improve their skills in pupil hygiene promotion.

Between May 2022 and July 2022, research team visited the intervention schools and a follow up survey was done in August 2022 and February 2023; pupils were interviewed using questionnaires.

WASH Intervention Impact Assessment

The study was carried out between March and August, 2023. In this study, data were collected from six (6) public primary schools or the intervention schools that has completed the WASH intervention. Other schools which had not received the WASH intervention (comparison schools) were to be/forthcoming beneficiary schools. All schools both intervention and comparison schools included boys and girls from classes 3 to 5 (aged 9 to 15 years).

After intervention schools had received WASH intervention for more than 6 months prior to the impact assessment. The impact of WASH intervention within the schools was based on a number of variables such as the status of water and sanitation facilities, hygiene knowledge and behaviour. In addition, pupils' households were selected randomly and visited to assess if WASH intervention in schools had any effect on household members hand-washing attitudes. Observations were equally made about water storage vessels, hand-washing facilities, toilets and stored drinking water.

Study Population/Sample Size

Fifteen primary schools were randomly selected from Orlu between May and July, 2023. The study area was divided into 3 zones (Urban, Sub-Urban and Rural) according to State Universal Basic Education Board (SUBEB) criteria. Five (5) schools were selected from Urban, 5 from sub-urban and 5 from rural areas respectively. A total of 750 pupils were recruited. The pupils' age ranged from 9 to 14 years and included Primary 3, 4 and 5 classes.

A multistage sample technique was employed to determine the population. In the first place, the schools were stratified according to their location i.e. urban, suburban and rural schools. Also, the pupils were classified by their class levels. Then, 5% of each stratum were selected for the study (Nwanna *et al.,* 1981).

Therefore, $\frac{15,012}{1} \times \frac{5}{100} = 750$

Therefore, the sample size of this study equals 750 primary school pupils.

Selection Schools for the Survey

Urban Schools

- Community Primary School, Umuna
- Premier Primary School, Amaifeke
- People's Primary School, Ihioma
- Excel Primary School, Umuna
- IMSUTH Primary School, Orlu

Sub-Urban Schools

- Central School, Umuowa
- Premier School Umuowa
- Central School, Owerre-ebeiri
- Central School, Okporo
- Community School Eziachi

Rural Schools

- Community School Mgbe
- Community School Umutanze
- Community School Umudioka
- Community School Obibi-Ochasi
- State Primary School Ogbueru

Inclusion and Exclusion Criteria

Inclusion Criteria

Primary school children with ages from 9 to 14 years whose parent's/guardians/ school teachers were willing to participate in the study and are living in the communities under study for at least six (6) months were included in the study.

Exclusion Criteria

Primary school children who are seriously ill and not attending school at the time of the study were excluded for the study. Also, preschool-aged children (less than 9 years) and children older than 16 years attending schools in the communities under study were not included in this study.

Data Collection

Water and Sanitation Facilities Survey

This was made in each school following UNICEF and WHO protocol. The protocol included number/condition of toilets, water sources and availability, hand-washing facilities and waste disposal.

Observation of Pupils' Hand-washing

School children hand-washing after toilet use was checked for each school without the knowledge of teachers and heads. They were not informed so that they would not prompt pupils to wash their hands. The researcher stayed motionless at a place and watched how pupils clean their hands after toilet use.

Survey on Hygiene and Sanitation

School children in each class were given a questionnaire, which was explained to them. Also, another set of questionnaire was given to them to give to adult family member to fill and return.

Sample Collection and Parasitological Examination

The stools from the pupils for both WASH intervention and non-intervention (comparison) schools were collected as described during prevalence survey report. The fecal samples were preserved using 10% formalin and taken to the Parasitological Unit Laboratory, Department of Medical Microbiology and Parasitology, Imo State University Teaching Hospital Umuna Orlu, Imo State. Samples were processed within 48hours of collection. Parasitological examination was done by formal ether sedimentation technique.

Statistical Analyses

Data obtained was entered and analyzed using frequency and percentage tables. Descriptive statistics was used to compute prevalence, incidence and impact of WASH Interventions. All analyses were done using standard mean deviation.

Results

The participants' knowledge, causes and transmission of STHs is shown in table 1. From the result, it was revealed that all the participants 750(100.0%) have heard of STHs infection. Obviously, Hospital/Dispensaries/Health workers 524(69.9%) was discovered as the most source of information followed by Family/Friends 203(27.1%) while only 23(3.1%) respondents accessed their information through Radio/TV/Internet.

Also, result showed that587(78.3%) of the respondents claimed knowledge of the cause(s) of STHs infection, however, 447(76.1%) could correctly identify helminthes as aetiologic agents of the infection while 140(23.9%) respondents identified poor hygiene as the cause of STHs infection. The responses to the question of the cause of infection were significantly different, ($p<0.05$).

It was further revealed that most participants 522(88.9%) know the mode of transmission of STHs, only 65(11.1%) do not know. Contact with infected soil was mentioned by 249(42.4%) respondents, eating contaminated soil or food by 149(25.4%) persons, while drinking of contaminated water and bathing in contaminated water were identified by 112(19.1%) and 77(13.1%) respondents respectively. STHs infections were correctly not regarded as sexually transmitted diseases. The difference in the response was statistically significant ($p<0.05$).

Table 1: Knowledge of STHs, causes and transmission among respondents

Variables	Frequency (%)			Total (%)
	Urban (%)	Sub-Urban (%)	Rural (%)	
Have you heard of STHs infection?				
Yes	250(100.0)	250(100.0)	250(100.0)	750(100.0)
No	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Source of information:				
Newspaper/Books/Magazine	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Radio/TV/Internet	15(6.0)	8(3.2)	0(0.0)	23(3.1)
Family/Friends	67(26.8)	59(23.6)	77(30.8)	203(27.1)
Hospital/Dispensaries/Health worker	168(67.2)	183(73.2)	173(69.2)	524(69.9)
Do you know the cause of STHs				
I Know	179(71.6)	195(78.0)	213(85.2)	587(78.3)
I Don't Know	71(28.4)	55(22.0)	39(15.6)	163(21.7)
Cause of the disease				
Protozoa	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Helminths	139(77.7)	148(75.9)	160(75.1)	447(76.1)
Bacteria	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Poor hygiene	40(22.3)	47(24.1)	53(24.9)	140(23.9)
Punishment from God/spiritual	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Do you know the mode of transmission of the diseases				
I Know	161(89.9)	179(91.8)	182(85.4)	522(88.9)
Don't Know	18(10.1)	16(8.2)	31(14.6)	65(11.1)
Mode of transmission of the disease				
Drinking contaminated water	37(20.7)	35(17.9)	40(18.8)	112(19.1)
Contact with infected soil	81(45.3)	89(45.6)	79(37.1)	249(42.4)
Sexual intercourse	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Bathe in river waters	21(11.7)	19(9.7)	37(17.4)	77(13.1)
Eating contaminated soil or food	40(22.3)	52(26.7)	57(26.8)	149(25.4)

The Participants' knowledge of the symptoms of intestinal parasites shown in table 2; the result revealed that abdominal discomfort 176(29.9%) was predominantly identified as symptom of STHs infection, followed by weight loss 156(26.6%), Fever, bloody urine or diarrhea 99(16.9%), skin change 59(10.1%), enlargement of stomach 49(8.3%), Loss of appetite 29(4.9%) while worm expulsion was identified by only 19(3.2%) of the respondents as the least mentioned symptom.

Their knowledge on the preventive method was predominantly identified by most 508(86.5%) of the respondents while the treatment methods shows that all the participants 587(100.0%) were adequately knowledgeable.

Table 2: Knowledge of the symptoms, prevention and treatment of STHs in the study areas

Variables	Frequency (%)			Total (%) N = 587
	Urban N = 179	Sub-Urban N = 195	Rural N = 213	
Symptoms of the disease				
Abdominal discomfort	57(31.8)	53(27.2)	66(30.9)	**176(29.9)**
Worm expels	0(0.0)	4(2.1)	15(7.0)	**19(3.2)**
Enlargement of stomach	14(7.8)	19(9.7)	16(7.5)	**49(8.3)**
Weight loss, weakness	48(26.8)	51(26.2)	57(26.8)	**156(26.6)**
Loss of appetite	7(3.9)	11(5.6)	11(5.2)	**29(4.9)**
Skin change	19(10.6)	30(15.4)	10(4.7)	**59(10.1)**
Fever, bloody urine or diarrhea	34(18.9)	27(13.8)	38(17.8)	**99(16.9)**
Mean Percentage	**14.3**	**14.3**	**14.3**	**14.3**
Do you have knowledge of preventive methods of STHs infection				
Yes	160(89.4)	172(88.2)	176(82.6)	**508(86.5)**
No	19(10.6)	23(11.8)	37(17.4)	**79(13.5)**
Mean Percentage	**50.0**	**50.0**	**50.0**	**50.0**
Do you have knowledge of treatment methods of STHs infection				
Yes	179(100.0)	195(100.0)	213(100.0)	**587(100.0)**
No	0(0.0)	0(0.0)	0(0.0)	**0(0.0)**
Mean Percentage	**50.0**	**50.0**	**50.0**	**50.0**

The attitudes towards STHs among urban participants are shown in table 3. The result showed that an average of 81.9% percentage mean score of the respondents have a good attitude towards STHs infection. Two hundred and five 205(82.0%) respondents agreed that STHs is a serious disease, 31(12.4%) were neutral, 14(5.6%) respondents disagreed.

On the cause of the disease, 179(71.6%) urban respondents agreed that lack of hygiene is the cause of STHs, 250(100.0%) identified defecating in the open air has a role in transmission of the infection, while 167(66.8%) respondents mentioned playing and walking around on bare foot could cause STHs. The respondents 238(95.2%) were in agreement that that health education can reduce the prevalence of STHs; as well as 204(81.6%) noting that use of soap while washing hands or face can prevent the infections. Two hundred and thirty six (94.4%) agreed that raw food consumption is the cause of STHs infestation.

Furthermore, the result showed that 159(63.6%) respondents profess to treat themselves if infected with STHs.

Table 3: Attitudes towards STHs among Urban Participants

Variables	**Urban Participants (%) N = 250**		
	Agree	**Neutral**	**Disagree**
STHs Infection is a serious disease	205(82.0)	31(12.4)	14(5.6)
Lack of hygiene is the cause of STHs infections	179(71.6)	50(20.0)	21(8.4)
Defecating in the open air has a role in transmission of STHs	250(100.0)	0(0.0)	0(0.0)
Playing and walking around on bare footed cause STHs	167(66.8)	44(17.6)	39(15.6)
Health education can reduce the prevalence of STHs infections	238(95.2)	0(0.0)	12(4.8)
Use of soap while washing hands or face can prevent the infections	204(81.6)	25(10.0)	21(8.4)
Raw/undone food consumption is the cause of STHs infestation	236(94.4)	24(9.6)	0(0.0)
If I am infected with STHs infection I can be treated at home	159(63.6)	40(16.0)	51(20.4)
Mean score	**81.9**	**10.7**	**6.9**

The attitudes towards STHs among Sub-urban participants are shown in table 4. The result showed that an average of 85.2% percentage mean score of the respondents have a good attitude towards STHs infection. Most 211(84.4%) respondents agreed that STHs is a serious disease, 24(9.6%) were neutral, while 15(6.0%) respondents disagreed.

On the cause of the disease, 179(71.6%) urban respondents agreed that lack of hygiene is the cause of STHs, all the participants (100.0%) identified defecating in the open air has a role in transmission of the infection, 164(65.6%) respondents agreed that playing and walking around on bare foot could cause STHs. Greater respondents 230(92.0%) were in agreement that that health education can reduce the prevalence of STHs with 224(89.6%) agreeing that use of soap while washing hands or face can prevent the infections. In like manner, 238(95.2%) of the respondents agreed that raw food consumption is the cause of STHs infestation, while 191(76.4%) respondents claim to treat themselves if infected with STHs.

Table 4: Attitudes towards STHs among Sub-Urban Participants

Variables	**Sub-Urban Participants (%) N = 250**		
	Agree	**Neutral**	**Disagree**
STHs Infection is a serious disease	211(84.4)	24(9.6)	15(6.0)
Lack of hygiene is the cause of STHs infections	195(78.0)	33(13.2)	22(8.8)
Defecating in the open air has a role in transmission of STHs	250(100.0)	0(0.0)	0(0.0)
Playing and walking around on bare footed cause STHs	164(65.6)	39(15.6)	47(18.8)
Health education can reduce the prevalence of STHs infections	230(92.0)	12(4.8)	8(3.2)
Use of soap while washing hands or face can prevent the infections	224(89.6)	16(6.4)	10(4.0)
Raw/undone food consumption is the cause of STHs infestation	238(95.2)	18(7.2)	4(1.6)
If I am infected with STHs infection I can be treated at home	191(76.4)	29(11.6)	30(12.0)
Mean score	**85.2**	**8.6**	**6.8**

The attitudes towards STHs among Rural participants are shown in table 5. The result showed that an average of 80.2% percentage mean score of the respondents have a good attitude towards STHs infection. Greater respondents 198(79.2%) respondents agreed that STHs is a serious disease, 22(8.8%) were neutral, while 30(12.0%) respondents disagreed.

On the cause of the disease, 155(62.0%) rural respondents agreed that lack of hygiene is the cause of STHs, 231(92.4%) participants identified that defecating in the open air has a role in transmission of STHs, 147(58.8%) respondents agreed that playing and walking around on bare foot could cause STHs. Most respondents 201(80.4%) agreed that that health education can reduce the prevalence of STHs with 229(91.6%) agreeing that use of soap while washing hands or face can prevent the infections. In the same vein, 232(92.8%) of the respondents agreed that raw food consumption is the cause of STHs infestation, while 211(84.4%) respondents claim to treat themselves if infected with STHs.

Table 5: Attitudes towards STHs among Rural Participants

Variables	**Sub-Urban Participants (%) N = 250**		
	Agree	**Neutral**	**Disagree**
STHs Infection is a serious disease	198(79.2)	22(8.8)	30(12.0)
Lack of hygiene is the cause of STHs infections	155(62.0)	37(14.8)	58(23.2)
Defecating in the open air has a role in transmission of STHs	231(92.4)	8(3.2)	11(4.4)
Playing and walking around on bare footed cause STHs	147(58.8)	40(16.0)	63(25.2)
Health education can reduce the prevalence of STHs infections	201(80.4)	30(12.0)	19(7.6)
Use of soap while washing hands or face can prevent the infections	229(91.6)	13(5.2)	8(3.2)
Raw/undone food consumption is the cause of STHs infestation	232(92.8)	18(7.2)	10(4.0)
If I am infected with STHs infection I can be treated at home	211(84.4)	26(10.4)	13(5.2)
Mean score	**80.2**	**9.7**	**10.6**

Discussion

According to the knowledge, attitude, and practice (KAP) results, the respondents were aware of the disease and possessed a high level of understanding on its causes and route of transmission. Additionally, the respondents knew enough about the signs, prevention, and management of infections caused by soil-transmitted helminthes (STHs). Despite the fact that the questions were by no means comprehensive, these understandings were represented in the sexes, age groups, and academic achievement levels evaluated [16]. The understanding or information about a disease that comes from research or experience, whether it is known by one person or by many, is known as the biology of the disease. Understanding the epidemiological features of tropical diseases is crucial for developing a positive outlook that will guide behaviour related to treatment, prevention, and control [17].

Numerous writers have claimed to have a thorough understanding of the biology underlying STH disorders. In Ibadan, Nigeria, it was found that while the majority of participants (62.6%) are aware of parasitic worms, 88.4% are genuinely unaware of how to prevent contracting worm infections [18]. Additionally, it has been observed that 86.3% of people are aware that poor hygiene might lead to the contracting of STHs, whereas 54.8% of people in the Waghimra Zone of Ethiopia were aware of this [19]. In contrast, [20] found that 76.1% of students in Asmara, Eritrea, do not know enough about the proper way intestinal parasites spread. A useful tool for developing a mitigation program that will benefit communities is the excellent knowledge profile that cuts across demographic characteristics.

According to the study's findings, all respondents (100.0%) knew a lot about STH infections, and 78.3% of them knew what caused them. The most common causes of STHs, according to respondents, were helminthes (76.1%) and inadequate hygiene (23.9%). Although 522 respondents, or 88.9% of the total, are aware of the mode of transmission, the study found that the main ways that STHs are spread are through contact with infected soil (42.4%) and eating contaminated food or soil (25.4%); other ways include bathing in river waters and drinking contaminated water. This outcome is in line with [21], who found that 91% and 75.5% of respondents, respectively, agreed that it is a good idea to dispose of trash at a dump site and refrain from indiscriminately defecating. There have been reports of negative attitudes around hand cleaning after exercise and outside bowel movements. Similarly, information about STH symptoms, prevention, and therapy was made public. Among them, weight loss/weakness (26.6%) and abdominal discomfort (29.9%) were noted as substantial percentages of symptoms. Worm expels, stomach enlargement, appetite loss, skin changes, fever, bloody urine, and diarrhoea are among the other symptoms, which have a mean score of 14.3% overall. Nonetheless, 508 respondents, or 86.5% of the sample, reported knowing how to prevent STHs, and all of them said they knew how to cure them.

The higher knowledge scores found in this study may be the cause of the generally positive attitude. The respondents' agreement that health education can lower the prevalence of intestinal parasite infections is a positive perception that is essential for acceptance of the health program seen. Across all age groups, sexes, and educational levels, there was a generally positive attitude towards intestinal parasites and a lack of particular sentiments. To address the negative views noted, responders would thankfully acknowledge the necessity for proper health education.

The findings showed that, on average, over half (50.0%) of the participants demonstrated a variety of effective strategies for intestinal parasite prevention, control, and therapy. Although this may not directly reflect the improved knowledge and attitude noted in this study, it does demonstrate the beneficial impact of experience and knowledge on the start of sound behaviours. This finding runs counter to a report by [22], which found that college students have a relatively low awareness rate of food-borne parasite diseases but a comparatively high development rate of healthy behaviours and a positive attitude. Additionally, the majority of pupils in research practiced outdoor defecation at home (72.2%) and at school (100%), and a sizable portion did not wash their hands after using the restroom [23].

Conclusion

The findings indicated a significant frequency of soil-transmitted helminthes (STH) in school-aged children, making STH infection a serious public health concern in the research area. Children in the research area were more likely to get STH infections if they followed the practices of not wearing shoes, washing their hands before eating, and being between the ages of 9 and 16. Deworming, when combined with other strategies like health education and better sanitation and hygiene, keeps the level of infection caused by chemotherapy lower and finally helps to eradicate helminth infections in the study region.

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