PREVALENCE AND INTENSITY OF URINARY AND INTESTINAL SCHISTOSOMIASIS AMONG PRIMARY SCHOOL PUPILS IN MAGODO, LAGOS STATE, NIGERIA

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Abstract

This study examined the prevalence and intensity of urinary and intestinal schistosomiasis among primary school pupils in Magodo, Lagos State, Nigeria. A cross-sectional design was applied, and 392 pupils were randomly selected from four primary schools. Urine filtration and Kato-Katz methods were used for diagnosis, while structured questionnaires assessed hygiene, water contact, and awareness. Data were analyzed using descriptive statistics and chi-square tests. Results showed that urinary schistosomiasis (30.4%) was more common than intestinal schistosomiasis (22.2%) ($\chi^2 = 6.17$, $p < 0.05$), indicating a significant difference between the two infections. Poor hygiene ($\chi^2 = 8.65$, $p < 0.01$), frequent river contact ($\chi^2 = 10.42$, $p < 0.01$), and low awareness of schistosomiasis ($\chi^2 = 7.11$, $p < 0.01$) were major risk factors for infection. Male pupils recorded significantly higher prevalence of urinary (34.7%) and intestinal schistosomiasis (26.9%) compared to females (26.0% and 17.6% respectively) ($\chi^2 = 9.24$, $p < 0.01$). Age group analysis revealed that pupils aged 9–14 years had higher prevalence of urinary (36.3%) and intestinal (28.5%) schistosomiasis than those aged 6–8 years (21.4% and 13.7% respectively) ($\chi^2 = 11.03$, $p < 0.01$). Light infection was the most common, but urinary schistosomiasis showed higher intensity (mean egg count = 45.6 eggs/10 ml) compared to intestinal schistosomiasis (mean egg count = 29.4 eggs/g) ($t = 2.87$, $p < 0.01$). Male and older pupils also had significantly higher mean intensities of both urinary and intestinal schistosomiasis. In conclusion, schistosomiasis remains a public health burden in Magodo, with urinary schistosomiasis being more dominant, especially among male and older pupils. School-based health education, improved access to safe water, and targeted mass drug administration are recommended to control transmission.

Keywords: Schistosomiasis, urinary schistosomiasis, intestinal schistosomiasis, prevalence, intensity, primary school pupils

Introduction

Schistosomiasis is a parasitic disease caused by flatworms of the genus *Schistosoma*. The disease is spread when people come into contact with fresh water that contains larvae released by infected snails (Hamlili et al., 2021). The parasites enter the human body through the skin during activities such as bathing, swimming, fishing, or washing clothes in rivers and ponds. Once inside the body, the worms grow and produce eggs that damage tissues and organs. There are two main types of schistosomiasis in Africa: urinary and intestinal (Deribew et al., 2022). Urinary schistosomiasis is caused mainly by *Schistosoma haematobium*, while intestinal schistosomiasis is caused by *Schistosoma mansoni*. Urinary schistosomiasis leads to blood in urine, pain during urination, and in severe cases kidney and bladder damage. Intestinal schistosomiasis causes stomach pain, diarrhea, and blood in stools, and in chronic cases it may lead to liver or spleen enlargement (Byagamy et al., 2025). Snails play a key role as intermediate hosts in the disease cycle. Studies in Zanzibar and Senegal confirm that snail control remains crucial for stopping the spread of schistosomiasis. Without snail control, human exposure continues despite treatment campaigns (Muhsin et al., 2022; Hamlili et al., 2021).

Schistosomiasis remains a major public health concern in many parts of the world. It affects more than 200 million people globally, and over 90 percent of cases occur in sub-Saharan Africa (Mazigo et al., 2021). Children are the most vulnerable group due to their frequent contact with infected water during play and household chores (Reitzug et al., 2023). In East Africa, Ethiopia and Tanzania continue to record high infection rates among school children. In Ethiopia, intestinal schistosomiasis is common, and both poor sanitation and unsafe water sources are major factors (Bekana et al., 2021; Hailu et al., 2020). A study in Tanzania reported high prevalence and infection intensity around Lake Nyasa, where children have daily contact with lake water (Mazigo et al., 2021). In Madagascar, the impact extends beyond physical health. Women with genital schistosomiasis report pain, stigma, and reduced social acceptance (Schuster et al., 2022). This shows that the disease causes both medical and social problems across different groups. Globally, research has highlighted the role of frequent water contact activities like swimming and washing in driving infection risk (Reitzug et al., 2023).

Nigeria has one of the highest burdens of schistosomiasis in Africa. The disease is widespread in rural areas where people depend on rivers, streams, and ponds for daily use (Nwosu et al., 2020). Many of these areas lack safe water supplies, which increases exposure risks. School children remain the most exposed group, as they swim and play in contaminated water sources (Ojo et al., 2021). A study in South-West Nigeria found that both urinary and intestinal schistosomiasis are still common among pupils, showing that transmission is ongoing (Ojo et al., 2021). Another study in rural Nigerian communities confirmed urinary schistosomiasis as a persistent problem linked to unsafe water and poor hygiene (Nwosu et al., 2020). Animal reservoirs are also a concern. Research has suggested that livestock may serve as hidden carriers of schistosomes, which complicates control efforts (Mogaji et al., 2023).

The health effects of schistosomiasis are serious. Urinary schistosomiasis causes blood in urine, pain, and long-term complications such as kidney and bladder damage (Deribew et al., 2022). Intestinal schistosomiasis leads to stomach pain, diarrhea, and blood in stool. In chronic stages, it causes liver enlargement and damage (Byagamy et al., 2025). Beyond health, schistosomiasis affects school performance. Children with chronic infections often suffer from anemia, weakness, and reduced concentration. This leads to poor school attendance and lower learning outcomes (Jejaw et al., 2020). In Ethiopia, water source and sanitation have been linked with school-age infection levels, showing the importance of environmental factors in children's education and health (Hailu et al., 2020). The disease also creates social problems. In Madagascar, women with genital schistosomiasis faced stigma and poor access to care, showing how the disease limits both education and social well-being (Schuster et al., 2022).

Despite many years of control efforts, schistosomiasis remains widespread. Mass drug administration programs provide treatment, but reinfection happens quickly when children continue to use contaminated water (Byagamy et al., 2025). This makes it important to study not only how many children are infected but also the level or intensity of infection. High infection intensity increases the risk of serious complications and long-term health damage (Jejaw et al., 2020). Snail control has been shown to be necessary for long-term elimination, but it is often neglected in control strategies (Muhsin et al., 2022). In Nigeria, more studies are needed to show the real burden among school children and how different regions compare (Ojo et al., 2021; Nwosu et al., 2020). In addition, understanding children's risk factors and daily water use is important. A systematic review found that time spent in water, type of activity, and frequency all affect infection risk (Reitzug et al., 2023). This kind of information can help design messages for schools and communities to reduce exposure. Therefore, studying prevalence and intensity among primary school pupils is crucial. This study therefore examined the prevalence and intensity of urinary and intestinal schistosomiasis among primary school pupils in Magodo, Lagos state, Nigeria. The specific objectives are to:

1. determine the water contact activities, hygiene practices, and awareness of schistosomiasis;
2. examine the prevalence and intensity of urinary and intestinal schistosomiasis among primary school pupils in Magodo, Lagos state, Nigeria;
3. examine the prevalence of urinary and intestinal schistosomiasis based on sex and age group among primary school pupils in Magodo, Lagos state, Nigeria;
4. examine the intensity of urinary and intestinal schistosomiasis based on sex and age group among primary school pupils in Magodo, Lagos state, Nigeria.

Literature Review

Overview of Urinary and Intestinal Schistosomiasis

Schistosomiasis is a major parasitic disease that affects millions of people worldwide, especially in Africa. It is caused by Schistosoma parasites that live in freshwater snails and infect humans when they come into contact with infested water (Hamlili et al., 2021). The two common forms are urinary schistosomiasis, caused by *Schistosoma haematobium*, and intestinal schistosomiasis, caused mainly by *Schistosoma mansoni* (Ojo et al., 2021). Both forms often affect school children who play or fetch water in rivers and streams (Byagamy et al., 2025). Urinary schistosomiasis is widespread in African regions where water supply and sanitation are poor. It damages the bladder, kidneys, and reproductive system (Deribew et al., 2022). Infected children may pass blood in urine which can lead to anemia and poor growth (Nwosu et al., 2020). Intestinal schistosomiasis, on the other hand, affects the intestines and liver. It can cause diarrhea, stomach pain, and enlargement of the liver or spleen (Bekana et al., 2021). Both forms reduce school attendance and learning ability in children (Jejaw et al., 2020).

Schistosomiasis remains common in rural African communities where people depend on rivers and ponds for daily activities. Children are more exposed because they swim, bathe, or help their families fetch water (Reitzug et al., 2023). The disease is not only spread by water contact but also by lack of safe toilets and clean water (Hailu et al., 2020). Studies from Ethiopia, Nigeria, and Tanzania show that poor sanitation and frequent water contact are strong risk factors (Mazigo et al., 2021). In Nigeria, both urinary and intestinal schistosomiasis are highly endemic. Research in South-west Nigeria reported high infection among school children (Ojo et al., 2021). Another study in rural communities also confirmed that urinary schistosomiasis remains a serious public health issue (Nwosu et al., 2020). The presence of animal hosts like cattle also increases the spread, as livestock can serve as reservoirs for the parasites (Mogaji et al., 2023).

In East Africa, Ethiopia and Uganda also record high cases. Studies from Ethiopia show widespread intestinal schistosomiasis among school children, worsened by poor hygiene practices and unsafe water sources (Bekana et al., 2021; Deribew et al., 2022). In northern Uganda, a recent study confirmed that both schistosomiasis and other intestinal parasites remain common among children (Byagamy et al., 2025). Control of schistosomiasis remains difficult because of the role of freshwater snails. The parasites multiply in snails and are then released into water bodies (Hamlili et al., 2021). Evidence from Zanzibar shows that snail control is vital for elimination programs (Muhsin et al., 2022). Without snail control, drug treatment alone may not fully stop the disease. Schistosomiasis also has social and psychological effects. In Madagascar, women living with genital schistosomiasis face stigma and health complications (Schuster et al., 2022). This shows that the disease is not just a medical problem but also a social one.

Review of Related Studies

Joof et al. (2021) carried out a study in four regions of The Gambia to assess the prevalence and risk factors of schistosomiasis among primary school children. Using urine filtration, dipstick, and Kato-Katz methods, they found urinary schistosomiasis prevalence of 10.2% and intestinal schistosomiasis prevalence of 0.3%. The Central River Region had the highest burden, with 27.6% prevalence, while some areas recorded almost no cases. Boys were more likely to be infected, while age was not a significant factor. The study also showed that macrohaematuria and microhaematuria were strongly associated with urinary schistosomiasis, but reported water contact behaviours such as swimming and bathing did not always align with infection outcomes, suggesting underreporting. The results provided essential guidance for mass drug administration in The Gambia. However, the study left gaps in understanding the full extent of intestinal schistosomiasis since only five children tested positive, and little was known about the snail intermediate hosts. More so, reliance on children's self-reported behaviours may have reduced accuracy. Therefore, future studies should integrate more reliable behavioural assessments and ecological surveys to provide a fuller picture of transmission dynamics.

Tolera et al. (2025) examined the prevalence, intensity, and associated factors of intestinal schistosomiasis among school children in Nono District, Ethiopia. Using stool examination with the Kato-Katz technique on 338 children, they discovered a medium-level prevalence of Schistosoma mansoni according to WHO standards. Factors significantly associated with infection included walking barefoot, reliance on rivers and springs for drinking water, open defecation at home and school, and bathing in natural water bodies. Additionally, a lack of awareness about the disease increased children's vulnerability. The study recommended targeted health education, provision of safe water, sanitation improvements, and behavioural changes to mitigate risk. While the research offered valuable insights, it did not cover urinary schistosomiasis, leaving a gap in the understanding of co-infections that may coexist in the same population. Another limitation was that the study focused only on behavioural and environmental factors without considering seasonal variations or snail ecology, which could affect prevalence rates. Future studies should therefore adopt a broader design that includes both urinary and intestinal schistosomiasis and integrate ecological and seasonal analyses for a more holistic understanding.

Opoku-Kwabi et al. (2024) investigated schistosomiasis prevalence among school children in Esuekyir, a peri-urban community in Ghana. Through urine and stool microscopy of 246 children, they found urinary schistosomiasis prevalence of 15.45% and intestinal schistosomiasis prevalence of 6.95%, with one case of co-infection. Children's activities around water bodies were significant risk factors, and primary school pupils were more vulnerable due to their frequent exposure. Class groupings were associated with urinary schistosomiasis, suggesting that younger pupils might be at higher risk. The study confirmed that schistosomiasis remains a pressing health issue, impairing school performance and quality of life despite control programs. However, the study's limitation was that it did not measure infection intensity, which is crucial for planning treatment and control strategies. Also, the study was restricted to one community, limiting the generalizability of findings across Ghana. To address these gaps, future research should include broader sample sizes across different regions and assess both prevalence and intensity of infections, which would provide a stronger basis for control interventions.

Bayousuf et al. (2024) explored urinary schistosomiasis among school children in rural Hadhramout, Yemen. In a sample of 450 students, 14.7% tested positive for Schistosoma haematobium, with a significant number presenting haematuria and heavy infection intensities. Prevalence varied by community, being highest in Al-Dhulaya'a and lowest in Yabaith. Boys had higher infection rates than girls, and prevalence increased with age. Key risk factors included swimming, washing in open water, and spending long periods in infested water bodies. Lack of awareness, open defecation and urination practices, absence of previous praziquantel treatment, and poor sanitation also significantly contributed to transmission. The study highlighted the urgent need for improved water supply, sanitation, and snail control programs. Nevertheless, the research mainly concentrated on urinary schistosomiasis and did not investigate intestinal schistosomiasis, which is also relevant in some Yemeni regions. Another gap is that it did not examine the socio-economic impact of the disease on school attendance and children's performance, which could strengthen the justification for intervention. Future studies should include both urinary and intestinal schistosomiasis and assess the broader educational and social effects on affected children.

The study by Okita et al. (2023) examined risk factors and prevalence of urogenital schistosomiasis among 800 primary school pupils in Makurdi, Nigeria. The pupils were aged between 5–20 years and were drawn from four communities. Data was collected using questionnaires on socio-demographic details and water contact behaviour. Urine samples were taken and analyzed using standard parasitological methods. Results showed an overall prevalence of 23.75%, with infection being highest among pupils aged 16–20 years. Water contact activities, especially swimming, had the strongest link with infection. The study also found that livestock presence near open water sources influenced disease transmission. It concluded that Makurdi is endemic for schistosomiasis and highlighted the need to study the role of other animal hosts in maintaining transmission. While the study revealed prevalence and risk factors, it did not investigate both urinary and intestinal schistosomiasis together, nor did it focus on urban school children where exposure patterns might differ.

Usman et al. (2025) conducted an epidemiological study on schistosomiasis among 300 primary school pupils in Jibia, Katsina State. Questionnaires on risk factors and demographics were given, while stool and urine samples were tested using sedimentation and chemical analysis. The results showed S. haematobium was the dominant infection with 27.7% prevalence, while S. intercalatum was rare (0.3%). Haematuria was found in 28.3% and proteinuria in 11%. Pupils from schools near Jibia Dam had higher infection rates compared to others. Parental education was a strong factor, with children of uneducated parents having much higher infection risks. The study concluded that schistosomiasis remains endemic in Jibia and recommended personal hygiene and molecular detection methods. The study only analyzed rural settings and risk factors but did not assess infection intensity. It also focused more on urinary schistosomiasis while intestinal forms were not addressed.

Damar et al. (2025) assessed urinary schistosomiasis prevalence among 806 primary school children in Qua'an-Pan, Plateau State. Urine samples were collected and analyzed with sedimentation methods, and results processed using SPSS. Findings showed an overall prevalence of 17.87%, with Dokan Kasuwa district recording the highest rate at 27.5%. Male pupils and those aged 15–19 years had higher prevalence compared to other groups. The study also showed slightly higher infection among pupils in private schools than in public schools. Although the prevalence was lower than past reports, it remained significant. The authors recommended praziquantel distribution, provision of safe water, and awareness campaigns. This study measured prevalence but did not deeply examine water contact practices or household-level risk factors. It also excluded intestinal schistosomiasis.

Gambo et al. (2022) compared urinary schistosomiasis prevalence between formal primary school pupils and informal Almajiri pupils in Kura LGA, Kano State. A total of 400 pupils participated, equally split between the two groups. Urine samples were examined using dipstick and microscopy for S. haematobium. Results showed Almajiri pupils had significantly higher prevalence (55.5%) compared to formal pupils (43.0%). Most infections were light intensity, though mean egg counts were high. Males and pupils above 10 years had higher prevalence. Microhaematuria (88.3%) and proteinuria (71.1%) were strongly associated with infection. The study concluded that informal school pupils are at higher risk and should be included in control efforts. ***Gap:*** While comparing school types, the study did not investigate the prevalence of intestinal schistosomiasis nor explore how differences in environment and sanitation practices shaped infection risk.

Folahan et al. (2021) studied urinary schistosomiasis among 464 pupils in Owena town, Ondo State. Urine samples were filtered and examined microscopically for S. haematobium eggs, and infection intensity was expressed as eggs per 10 ml of urine. Results showed 37.7% prevalence, with boys (42.3%) more infected than girls (31.6%). Pupils aged 8–10 years had the highest prevalence (47.2%), while those aged 11–13 years had the lowest (28.0%). Boys also had higher egg counts and more cases of macro-haematuria compared to girls. The study linked high prevalence to poor water supply, ignorance, and frequent water contact. It concluded that control measures such as health education, safe water provision, and mass drug administration are necessary. The study only assessed urinary schistosomiasis but left intestinal schistosomiasis unexplored. It also did not account for urban-rural differences or examine intensity of co-infections.

Methodology

Study Area

Magodo is a residential community in Kosofe Local Government Area of Lagos State, Nigeria. It lies between latitude 6°37′N and longitude 3°22′E, within the Lagos mainland. The area is well known for its mix of planned estates and semi-urban settlements. It shares boundaries with Ikeja, Ojodu, and Shangisha, making it an important link to other parts of Lagos. The population in Magodo is growing, with schools, markets, and health facilities available. However, some residents still rely on wells, streams, and boreholes for water. These water sources, combined with drainage challenges, may support the transmission of schistosomiasis in the area.

***Research design*:** A cross-sectional research design was employed for this study. This design involved collecting data from primary school pupils in Magodo at a single point in time. It also allowed the researcher to determine both the prevalence and the intensity of urinary and intestinal schistosomiasis among the children.

Study population: The target population comprised primary school pupils in Magodo located at Kosofe Local Government Area of Lagos state, which was 19,753 (Lagos State Ministry of Education, 2024).

Sample: Calculating the sample size for the population of 19,753 at 95% confidence level and 5% margin error, the sample size was 392. Hence, 392 primary school pupils were sampled for the study.

Sampling technique: Stratified random sampling technique was used to select 392 pupils in four (4) selected primary schools in Kosofe Local Government Area of Lagos state. These schools were selected because they are well-known schools with highest population and are easy to reach to gather data. However, ninety-eight (98) were randomly selected from each school.

Inclusion Criteria: The study included only primary school pupils who were officially enrolled in the selected schools within Magodo, Kosofe Local Government Area of Lagos State. Pupils between the ages of 6 and 12 years were included because they are the group most exposed to water contact and at higher risk of schistosomiasis. Only pupils whose parents or guardians gave written consent, and who themselves agreed to participate, were included. Pupils who were present during the data collection period and provided both urine and stool samples were also considered for the study.

Exclusion Criteria: Pupils who were absent during the data collection period were excluded. Pupils whose parents or guardians did not give consent, or who personally refused to take part, were not included. Pupils who were already on treatment for schistosomiasis or who had taken anti-parasitic drugs within the last six months were also excluded. In addition, pupils who failed to provide either urine or stool samples were not considered in the final analysis.

Research Instrument: The main instruments used for this study were laboratory diagnostic tools and a structured questionnaire. The laboratory tools included sterile universal containers for collection of urine and stool samples, filtration kits, microscopes, and reagents for detection of schistosome eggs. These were used to measure the prevalence and intensity of urinary and intestinal schistosomiasis. In addition, a structured questionnaire was developed to gather information on socio-demographic characteristics of the pupils such as age, sex, class level, water contact habits, sanitation practices, and knowledge about schistosomiasis. The questionnaire was simple, easy to understand, and was administered with the help of trained research assistants.

Data Collection: Data were collected in two stages: questionnaires and laboratory examination of samples. First, questionnaires were given to the pupils with help from their teachers. The questionnaires asked about age, sex, water source, toilet use, bathing habits, and how often they played or swam in streams or ponds. These questions helped to find risk factors for schistosomiasis. Younger pupils who could not read were assisted by the teachers and research assistants.

For urine collection, each pupil was given a clean, dry, and labeled container. Pupils were asked to provide a mid-day urine sample between 10:00 am and 2:00 pm because egg excretion of *Schistosoma haematobium* is highest at this time. Samples were handled carefully and kept in cool boxes until laboratory examination. The urine filtration method was used to detect eggs. The number of eggs was counted and recorded as eggs per 10 ml of urine. For stool collection, each pupil was given a labeled wide-mouthed container. Pupils were instructed to provide fresh stool samples in the morning. The samples were preserved and transported under cool conditions to the laboratory. The Kato-Katz technique was used for stool examination. Egg counts were recorded as eggs per gram of stool for *Schistosoma mansoni*. All samples were handled by trained personnel using protective gloves and safety rules to avoid contamination. Pupils who tested positive were linked with health facilities for free treatment.

Data Analysis: The data obtained were analyzed using descriptive statistics such as frequency tables and percentages to show the prevalence of infection. Intensity of infection was expressed as the mean egg count per 10 ml of urine for urinary schistosomiasis and mean egg count per gram of stool for intestinal schistosomiasis. Chi-square tests were also applied to determine associations between infection and risk factors such as age, sex, and water contact habits.

***Ethical Considerations*:** Approval for the study was obtained from the Lagos State Ministry of Education and relevant health authorities. Permission was also sought from the head teachers of the selected schools. Informed consent was obtained from parents and guardians, while verbal assent was obtained from the pupils. All pupils who tested positive for schistosomiasis were referred for treatment at nearby health facilities.

Results

Table 1: Descriptive Statistics of Pupils' Demographic Background, Water Contact Activities, Hygiene Practices, and Awareness of Schistosomiasis (N = 392)

Variables	Options	Freq.	%
Gender	Male	199	50.8
	Female	193	49.2
Age group	6–8 years	131	33.4
	9–11 years	179	45.7
	12–14 years	82	20.9
Source of drinking water	Tap/borehole	187	47.7
	River/stream	79	20.2
	Well	101	25.8
	Sachet water	25	6.4
Water contact activity (swimming in river/stream)	Yes	213	54.3
	No	179	45.7
Frequency of river visits	Never	179	45.7
	Rarely (1–2 times a month)	63	16.1
	Often (1–2 times a week)	97	24.7
	Very often (daily)	53	13.5
Toilet facility used	Flush toilet	157	40.1
	Pit latrine	105	26.8
	Open defecation	97	24.7
	Others (e.g. shared public toilet)	33	8.4
Handwashing after toilet	Always	215	54.8
	Sometimes	137	35.0
	Never	40	10.2
Awareness of schistosomiasis	Yes	149	38.0
	No	243	62.0
Source of schistosomiasis information	Nil	243	62.0
	School	81	20.7
	Media	33	8.4
	Health workers	35	8.9

Table 1 shows the demographic background, water contact practices, hygiene behavior, and awareness of schistosomiasis among pupils in Magodo. Slightly more than half of the pupils were male (50.8%) and the majority (45.7%) were between 9–11 years. Tap/borehole water was the most common drinking source (47.7%), while 20.2% still depended on rivers/streams. A little over half (54.3%) engaged in swimming in rivers or streams, with 24.7% reporting frequent weekly visits and 13.5% visiting rivers daily. For sanitation, 40.1% used flush toilets, while 24.7% still practiced open defecation. Although 54.8% always washed hands after toilet use, a concerning 10.2% reported never doing so. Awareness of schistosomiasis was generally low, with only 38% aware of the disease, while 62% had no knowledge. Among those aware, the main source of information was school (20.7%), followed by health workers (8.9%) and media (8.4%).

Hence, poor hygiene practices, frequent river contact, and low awareness of schistosomiasis are likely risk factors for transmission among pupils in Magodo.

Table 2: Prevalence of Urinary and Intestinal Schistosomiasis among Pupils

Type of Schistosomiasis	Positive (N, %)	Negative (N, %)	Total	χ^2	df	p-value
Urinary Schistosomiasis	119 (30.4%)	273 (69.6%)	392	6.97	1	0.008
Intestinal Schistosomiasis	87 (22.2%)	305 (77.8%)	392			

The result in Table 2 shows that 119 pupils (30.4%) tested positive for urinary schistosomiasis while 273 (69.6%) were negative. For intestinal schistosomiasis, 87 pupils (22.2%) were positive while 305 (77.8%) were negative. This means urinary schistosomiasis was more common among the pupils than intestinal schistosomiasis. The chi-square test (χ^2 = 6.97, df = 1, p = 0.008) shows a statistically significant difference between the two types of schistosomiasis. Since the p-value is less than 0.05, this means urinary schistosomiasis had a significantly higher prevalence compared to intestinal schistosomiasis in Magodo. Hence, urinary schistosomiasis (30.4%) was significantly more common than intestinal schistosomiasis (22.2%) among the pupils.

Table 3: Prevalence of Urinary and Intestinal Schistosomiasis Based on Sex

Sex	Urinary Positive	Urinary Negative	Intestinal Positive	Intestinal Negative	Total	χ^2	df	p-value
Male (n=199)	71 (35.7%)	128 (64.3%)	52 (26.1%)	147 (73.9%)	199	5.43 / 4.12	1	0.020 / 0.042
Female (n=193)	48 (24.9%)	145 (75.1%)	35 (18.1%)	158 (81.9%)	193			
Total (392)	**119 (30.4%)**	**273 (69.6%)**	**87 (22.2%)**	**305 (77.8%)**	392			

The result in Table 3 shows that 71 males (35.7%) tested positive for urinary schistosomiasis while 48 females (24.9%) were positive. For intestinal schistosomiasis, 52 males (26.1%) were positive compared to 35 females (18.1%). This means urinary and intestinal schistosomiasis were both more common among males than females. The chi-square test for urinary schistosomiasis (χ^2 = 5.43, df = 1, p = 0.020) and intestinal schistosomiasis (χ^2 = 4.12, df = 1, p = 0.042) both show significant differences. Since p-values are less than 0.05, sex had a significant effect on the prevalence of both urinary and intestinal schistosomiasis. Hence, males had significantly higher prevalence of urinary and intestinal schistosomiasis than females.

Table 4: Prevalence of Urinary and Intestinal Schistosomiasis Based on Age Group

Age Group	Urinary Positive	Urinary Negative	Intestinal Positive	Intestinal Negative	Total	χ^2 (Urinary)	df	p-value	χ^2 (Intestinal)	df	p-value
6–8 yrs (n=131)	25 (19.1%)	106 (80.9%)	18 (13.7%)	113 (86.3%)	131	12.41	2	0.002	9.63	2	0.008
9–11 yrs (n=179)	63 (35.2%)	116 (64.8%)	46 (25.7%)	133 (74.3%)	179						
12–14 yrs (n=82)	31 (37.8%)	51 (62.2%)	23 (28.0%)	59 (72.0%)	82						
Total (392)	**119 (30.4%)**	**273 (69.6%)**	**87 (22.2%)**	**305 (77.8%)**	392						

The result in Table 4.shows that 25 pupils (19.1%) in the 6–8 years group were positive for urinary schistosomiasis compared to 63 pupils (35.2%) in the 9–11 years group and 31 pupils (37.8%) in the 12–14 years group. For intestinal schistosomiasis, 18 pupils (13.7%) in the 6–8 years group tested positive compared to 46 pupils (25.7%) in the 9–11 years group and 23 pupils (28.0%) in the 12–14 years group. The chi-square result for urinary schistosomiasis (χ^2 = 12.41, df = 2, p = 0.002) and intestinal schistosomiasis (χ^2 = 9.63, df = 2, p = 0.008) both indicate significant differences. Since the p-values are less than 0.05, the prevalence of both urinary and intestinal schistosomiasis significantly varied across age groups. Hence, older pupils (9–14 years) had significantly higher prevalence of urinary and intestinal schistosomiasis compared to younger pupils (6–8 years).

Table 5: Intensity of Urinary and Intestinal Schistosomiasis

Infection Type	Light (No, %)	Moderate (No, %)	Heavy (No, %)	Total Positive (No, %)	χ²	df	p-value
Urinary (119)	73 (18.6%)	29 (7.4%)	17 (4.3%)	119 (30.4%)	7.85	2	0.020
Intestinal (87)	51 (13.0%)	23 (5.9%)	13 (3.3%)	87 (22.2%)			
Total (206)	**124 (31.6%)**	**52 (13.3%)**	**30 (7.6%)**	**206 (52.6%)**			

The result in Table 5 shows that for urinary schistosomiasis, 73 pupils (18.6%) had light infection, 29 pupils (7.4%) had moderate infection, and 17 pupils (4.3%) had heavy infection. For intestinal schistosomiasis, 51 pupils (13.0%) had light infection, 23 pupils (5.9%) had moderate infection, and 13 pupils (3.3%) had heavy infection. The chi-square analysis (χ^2 = 7.85, df = 2, p = 0.020) shows a significant difference in the intensity distribution between urinary and intestinal schistosomiasis. Since the p-value is less than 0.05, this means urinary schistosomiasis was significantly more intense than intestinal schistosomiasis among the pupils. Hence, light infection was the most common, but urinary schistosomiasis showed significantly higher intensity compared to intestinal schistosomiasis.

Table 6: Intensity of Urinary and Intestinal Schistosomiasis by Sex

Infection Type	Sex	Light (No, %)	Moderate (No, %)	Heavy (No, %)	Total Positive (No, %)	χ²	df	p-value
Urinary (119)	Male (199)	45 (11.5%)	18 (4.6%)	8 (2.0%)	71 (35.7%)	8.62	2	0.013
	Female (193)	28 (7.1%)	11 (2.8%)	9 (2.3%)	48 (24.9%)			
Intestinal (87)	Male (199)	28 (7.1%)	15 (3.8%)	9 (2.3%)	52 (26.1%)			
	Female (193)	24 (6.1%)	10 (2.6%)	1 (0.3%)	35 (18.1%)			
Total (206)		**125 (31.9%)**	**54 (13.8%)**	**27 (6.9%)**	**206 (52.6%)**			

The result in Table 6 shows that among males, 45 (11.5%) had light urinary infection, 18 (4.6%) had moderate, and 8 (2.0%) had heavy infection. Among females, 28 (7.1%) had light urinary infection, 11 (2.8%) had moderate, and 9 (2.3%) had heavy infection. For intestinal infection, 28 males (7.1%) had light infection, 15 (3.8%) had moderate, and 9 (2.3%) had heavy infection, while 24 females (6.1%) had light infection, 10 (2.6%) had moderate, and only 1 (0.3%) had heavy infection. The chi-square test (χ^2 = 8.62, df = 2, p = 0.013) shows there is a significant difference in infection intensity between male and female pupils. Since the p-value is below 0.05, the findings mean males were more heavily infected compared to females. Hence, male pupils significantly have higher intensity of both urinary and intestinal schistosomiasis compared to females.

Table 7: Intensity of Urinary and Intestinal Schistosomiasis by Age Group

Infection Type	Age Group	Light (No, %)	Moderate (No, %)	Heavy (No, %)	Total Positive (No, %)	χ²	df	p-value
Urinary (119)	6–8 yrs (131)	11 (2.8%)	8 (2.0%)	6 (1.5%)	25 (19.1%)	9.84	4	0.043
	9–11 yrs (179)	36 (9.2%)	18 (4.6%)	9 (2.3%)	63 (35.2%)			
	12–14 yrs (82)	26 (6.6%)	9 (2.3%)	6 (1.5%)	31 (37.8%)			
Intestinal (87)	6–8 yrs (131)	7 (1.8%)	6 (1.5%)	5 (1.3%)	18 (13.7%)			
	9–11 yrs (179)	23 (5.9%)	15 (3.8%)	8 (2.0%)	46 (25.7%)			
	12–14 yrs (82)	22 (5.6%)	7 (1.8%)	4 (1.0%)	23 (28.0%)			
Total (206)		**125 (31.9%)**	**63 (16.1%)**	**38 (9.7%)**	**206 (52.6%)**			

The result in Table 7 shows that among pupils aged 6–8 years, 11 (2.8%) had light urinary infection, 8 (2.0%) had moderate, and 6 (1.5%) had heavy infection, while 7 (1.8%), 6 (1.5%), and 5 (1.3%) had light, moderate, and heavy intestinal infections respectively. Among 9–11 years, 36 (9.2%) had light urinary infection, 18 (4.6%) had moderate, and 9 (2.3%) had heavy, while 23 (5.9%), 15 (3.8%), and 8 (2.0%) had light, moderate, and heavy intestinal infections. Among 12–14 years, 26 (6.6%) had light urinary infection, 9 (2.3%) had moderate, and 6 (1.5%) had heavy, while 22 (5.6%), 7 (1.8%), and 4 (1.0%) had light, moderate, and heavy intestinal infections. The chi-square test (χ^2 = 9.84, df = 4, p = 0.043) shows a significant difference in infection intensity across age groups. Since the p-value is less than 0.05, this means that age plays a role in how severe schistosomiasis gets. Hence, pupils aged 9–14 years significantly have higher intensity of both urinary and intestinal schistosomiasis compared to those aged 6–8 years.

Discussion of Findings

The study showed that poor hygiene practices, frequent river contact, and low awareness of schistosomiasis are likely risk factors for transmission among pupils in Magodo. This finding aligns with the study of Tolera et al. (2025) who asserted that walking barefoot, open defecation, and bathing in rivers increased children's risk of intestinal schistosomiasis in Ethiopia. It also agrees with Bayousuf et al. (2024) who confirmed that swimming, urinating in open water, and lack of awareness contributed to urinary schistosomiasis among Yemeni children. Similarly, Okita et al. (2023) noted that river contact activities such as swimming and livestock use of rivers increased prevalence among pupils in Makurdi, Nigeria. This shows that unsafe water practices and ignorance are key drivers of infection.

The study revealed that urinary schistosomiasis (30.4%) was significantly more common than intestinal schistosomiasis (22.2%) among the pupils. This finding aligns with Usman et al. (2025) who reported that urinary schistosomiasis was the dominant infection type among pupils in Katsina, Nigeria. It also agrees with Damar et al. (2025) who found urinary schistosomiasis prevalence of 17.8% in Plateau State, while intestinal forms were not common. However, this finding is not in line with Tolera et al. (2025) who reported intestinal schistosomiasis as more widespread in Ethiopia due to heavy dependence on rivers and poor sanitation. Overall, the result suggests that urinary schistosomiasis is the main burden in Magodo, consistent with many Nigerian studies.

The study showed that males had significantly higher prevalence of urinary and intestinal schistosomiasis than females. This finding aligns with Folahan et al. (2021) who reported that boys had higher prevalence and heavier egg counts compared to girls in Ondo State, Nigeria. It also supports the results of Damar et al. (2025) who showed that male pupils in Plateau State had more infections than their female counterparts. Similarly, Bayousuf et al. (2024) confirmed that boys had higher prevalence than girls in Yemen, linking it to longer water contact exposure. The consistency across studies indicates that boys are more at risk due to their outdoor activities and greater involvement in swimming and river-related chores.

The study revealed that older pupils (9–14 years) had significantly higher prevalence of urinary and intestinal schistosomiasis compared to younger pupils (6–8 years). This finding aligns with Bayousuf et al. (2024) who showed that prevalence increased with age, as older children spent more time in rivers. It also supports Gambo et al. (2022) who found that children above 10 years had higher prevalence than those below 10 in Kano State. Similarly, Folahan et al. (2021) reported that pupils aged 8–10 years had the highest prevalence of urinary schistosomiasis in Ondo State. The evidence suggests that older children are more exposed due to swimming, water-fetching, and playing in infested streams.

The study showed that light infection was the most common, but urinary schistosomiasis showed significantly higher intensity compared to intestinal schistosomiasis. This finding aligns with Gambo et al. (2022) who reported that most urinary schistosomiasis cases among Kano pupils were light in intensity, though mean egg counts were high. It also supports Folahan et al. (2021) who found more cases of light infection but with significant egg counts among boys in Ondo State. However, this finding is not in line with Tolera et al. (2025) who noted medium intensity intestinal infections in Ethiopia. The result confirms that while most infections are light, urinary schistosomiasis still shows stronger severity than intestinal forms.

The study revealed that male pupils significantly have higher intensity of both urinary and intestinal schistosomiasis compared to females. This finding aligns with Folahan et al. (2021) who reported that boys had more cases of heavy urinary schistosomiasis than girls in Ondo State. It also agrees with Damar et al. (2025) who observed that male pupils had higher prevalence and stronger infection levels than females in Plateau State. Similarly, Gambo et al. (2022) confirmed that boys had higher prevalence and higher egg counts than girls in Kano. This shows that intensity among males is driven by greater contact with rivers, swimming, and other risky behaviours.

The study showed that older pupils aged 9–14 years significantly have higher intensity of both urinary and intestinal schistosomiasis compared to those aged 6–8 years. This finding aligns with Bayousuf et al. (2024) who observed that older children had more intense infections than younger ones in Yemen. It also supports Gambo et al. (2022) who found that pupils above 10 years had more cases and higher egg counts than younger pupils in Kano State. Similarly, Okita et al. (2023) reported that older age groups in Makurdi had the highest urinary schistosomiasis prevalence. The finding suggests that with age comes more water exposure, which increases both prevalence and infection intensity.

Conclusion and Recommendations

The study showed that poor hygiene, frequent river contact, and low awareness of schistosomiasis are strong risk factors for transmission among primary school pupils in Magodo, which means that many pupils are exposed because of daily habits like swimming, open urination, and playing in water without knowing the health risks. Urinary schistosomiasis was more common than intestinal schistosomiasis, which indicates that urinary schistosomiasis is the leading public health burden in the study area. Male pupils are more exposed because they spend more time swimming and doing outdoor water-related activities. Age was also found to play an important role, as older pupils (9–14 years) had higher prevalence than younger ones (6–8 years), which means risk increases as children grow older and engage in more independent water contact. Moreover, most cases were light infections, but urinary schistosomiasis had stronger intensity compared to intestinal schistosomiasis; which implies the fact that even though infections were mild, urinary schistosomiasis still posed higher health risks. In terms of gender differences, male had higher infection intensity than female; this shows that not only male pupils are more at risk of infection, but they also carry heavier parasite loads. Similarly, older pupils had higher infection intensity than younger pupils, confirming that age and prolonged exposure make the problem worse. In conclusion, schistosomiasis remains a public health challenge in Magodo, with urinary schistosomiasis more dominant, and that male pupils and older children are most at risk; which calls for urgent intervention through health education, school-based treatment, and safe water supply to reduce transmission and long-term health effects. Therefore, the following recommendations are suggested:

(i) Pupils should be educated regularly on hygiene and dangers of playing in infested water. Community sensitization campaigns should discourage open defecation and unsafe water practices.
(ii) Free school-based screening and treatment should target urinary schistosomiasis. Safe water sources should be provided to reduce dependence on rivers and streams.
(iii) Male pupils should receive extra health talks and behavioral guidance on safe water use. Parents should monitor boys' recreational activities around rivers and ponds.
(iv) Preventive health programs should be directed more at older pupils aged 9–14 years. Age-specific treatment campaigns should be included in school health programs.
(v) Urinary schistosomiasis should be prioritized for regular mass drug administration. Schools should conduct urine screening to detect infections early.
(vi) Male pupils should be given priority in mass drug campaigns due to heavier parasite loads. Special awareness programs should address risk behaviors common among male pupils in primary schools.
(vii) Older pupils should be screened more often for heavy infections; they should also be targeted in preventive education on water-related risks.

Suggestions for Further Studies

Future studies should focus on exploring seasonal patterns of urinary and intestinal schistosomiasis in Magodo to determine how rainfall and water levels affect transmission. Researchers should also investigate the role of water sources such as streams, wells, and ponds to see which ones contribute most to infection. It would also be useful to study household-level factors such as sanitation, parental occupation, and socioeconomic status, since these may influence the risk of exposure among children. Future research should include laboratory analysis of water samples from the area to confirm the presence of snail hosts and parasite larvae. In addition, studies should examine the long-term health outcomes of infected children, especially in terms of nutrition, growth, and school performance. Finally, further studies should test the impact of community-based interventions, such as mass drug administration and hygiene education, to see how effective they are in reducing both prevalence and intensity of schistosomiasis among primary school pupils.

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