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Examining the Awareness Level, Prevalence and the Risk Factors that Reinforce the Schistosoma Lifecycle and Its Transmission among Children in the Bosomtwe District, Ghana

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ABSTRACT

Background: Schistosomiasis is prevalent in tropical and subtropical areas, especially in poor communities without access to safe drinking water and adequate sanitation.

Objective: The study aimed at examining the awareness level, prevalence and the risk factors that reinforce the schistosoma lifecycle and its transmission among children in the Bosomtwe District, Ghana.

Methods: The study was conducted cross-sectionally and made used of positivists approach where 333 children were enrolled. These children were made to provide a 10ml urine sample, which was examined microscopically for schistosoma haematobium eggs. Data were collected using the on-line data tool Kobo Collect.

Results: Out of 333 participants, median age was 14 (IQR: 12-15); 50.50% were female. Urinary schistosomiasis prevalence was 30.60%, with main predictor being urinating in fresh water (multivariate analysis). The bivariate analysis revealed that age group 11-14[2.56 (1.01-6.46) 0.047], staying close to a fresh water source [2.95 (1.75-5.00) <0.001], swimming/bathing [11.18 (4.70-26) <0.001], walking barefoot [12.00 (5.05-28.50) <0.001], drinking [4.36 (2.63-7.22) <0.001], urinating [6.36 (3.70- 10.95) <0.001], and fetching from fresh water source [2.11 (1.28-3.44) 0.003] were significantly associated with urinary schistosomiasis. Children urinating in fresh water were 3 times more likely to have schistosomiasis compared to those who did not (aOR=2.93, CI=1.41-6.08, p=0.004). Only 30% were aware, while 69.4% lacked access to clean toilets.

Conclusion: The findings emphasise the urgent need for targeted interventions to raise awareness about safe sanitation practices and to provide access to clean toilet facilities, especially in high-risk areas.

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Introduction

Schistosomiasis is the second most prevalent tropical parasitic disease after malaria, affecting about 200-300 million people world-wide of which 5-6 million people are at risk and this has mainly been associated with river basin projects [1,2]. Globally, schistosomiasis causes an estimated 200,000 deaths a year [3]. Childhood urinary schistosomiasis is a major public health concern in sub-Saharan Africa, affecting over 100 million people (Hotez et al., 2020). Schistosomiasis is prevalent in tropical and subtropical areas, especially in poor communities without access to safe drinking water and adequate sanitation [4]. The highest prevalence rates are found in school-aged children, particularly in rural areas with poor access to clean water and sanitation facilities (WHO, 2020). The disease manifests principally as passage of haematuria, overt (terminal or total) or covert. In endemic regions, there is a high prevalence of haematuria among school age children to the extent that children who do not pass blood in their urine may be regarded as "abnormal" by their peers [5]. The parasite is most commonly found in sub-Saharan Africa, but also lives in parts of South America, the Caribbean, the Middle East and Asia [6].

In children, schistosomiasis can cause anaemia, stunting and a reduced ability to learn, although the effects are usually reversible with treatment [7]. Chronic schistosomiasis may affect people's ability to work and, in some cases, can result in death [6]. Frequent contact with schistosoma infested water causes schistosomiasis. Activities like swimming, fishing, and bathing link people with infected water. School-aged children are more prone to schistosomiasis than other age groups [8].

In Ghana, schistosomiasis is a major water borne parasitic disease associated with poverty in most rural settings [4,9]. The disease is widespread and occurs in all the administrative districts of Ghana [10,11]. The transmission of the disease occurs in urban poor, and peri-urban communities. Prevalence rates are high, over 90% in many endemic communities [6,12]. It is estimated that about 7 million school-age children in Ghana are at risk of infection [13]. Schistosomiasis infected people suffer many health conditions including excretion of blood in urine and stool, kidney malfunction, bladder cancer and diseases of the liver and spleen [6].

It is noted that the prevalence of urinary schistosomiasis in the Bosomtwe District in 2018 and 2019 are 24.3% and 26.8% respectively [14]. The basic exposures and risk factors associated with this case are not clearly emphasized yet control measures such as mass drug (praziquantel) administration (MDA) was implemented [15,16]. Despite this intervention, schistosomiasis continues to be a severe health challenge in the country [17-19].

Studies suggest that in the southern part of the country, prevalence, risk factors, awareness and impacts of the disease have often been underestimated [15,18,20]. For instance, research studies on schistosomiasis in the Densu River basin focused mainly on the prevalence, parasitic egg counts, intensity, environmental factors, and control measures [15,16,20]. Most studies were conducted on epidemiology, control of transmission and diagnosis. By regional stratification, the highest number of studies focus on Greater Accra, while studies are limited or absent for several other regions [10]. In view of this, there was a need for comprehensive investigation to understand the awareness, prevalence and risk factors that reinforce the schistosoma lifecycle and its transmission. This study examined the awareness level, prevalence and the risk factors that reinforce the schistosoma lifecycle and its transmission among children in the Bosomtwe District, Ghana by specifically analysing the level of awareness of childhood urinary schistosomiasis in Bosomtwe District, Ghana; assessing the risk factors that influence childhood urinary schistosomiasis in the Bosomtwe District, Ghana and lastly, determining the prevalence of childhood urinary schistosomiasis in the Bosomtwe District, Ghana.

Methods

Study Site and Participants

The study took place in the Bosomtwe District in the Ashanti Region of Ghana. The district was chosen because in 2015 and 2019 it recorded the highest prevalence of childhood urinary schistosomiasis 24.3% and 26.8% respectively [14]. The study enrolled 333 participants age 6-18years.

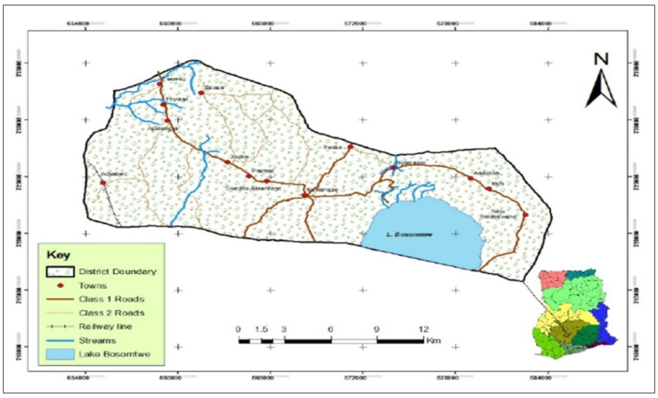

Figure 1: A Map of Bosomtwe District, Ghana
Source: Ghana Statistical Service (2010)

Study Design and Data Source

The study was conducted cross-sectionally and made used of positivists approach to data gathering. The design was adopted because it enables researchers to measure the outcome and the exposures of the study participants at the same time. Further, we were convinced that with this design, we will be able to estimate the awareness, prevalence and the risk factors of the disease cross-sectionally (Setia, 2016). Data were collected from 333 participants from the field with on-line data collection application (Kobo Collect).

Sample Size Determination

The sample size for the study was determined using Cochran's (1977) single proportion formula:

$$n = \frac{Z^2 \times P(1-P)}{d^2}$$

Where:
n = sample size to be determined;
Z = Z-score (reliability coefficient) of 1.96 at a 95% confidence level;
P = estimated proportion of the population of prevalence of 27%, or 0.27) [14]
d represents a margin of error of 5% (i.e., 0.05);
Substituting the figures above into Cochran's (1977) formula gives 303.

In order to deal with non-response, 10% was added to the sample which made it 303 by a non-response rate **of 10% (0.1)** yields about 30 (= 0.1 x 303 = 30.03). Adding 30 to the sample size (n) of 303 gave 333. Hence, the minimum sample size desired for the study was 333.

Sampling Procedure

The study used a multi-stage cluster sampling technique. In the first stage, a simple random sampling technique was employed to select the various schools—the lottery method, to be precise. All the names of the primary and junior high schools were written on pieces of paper, crumpled to seal the names, placed in a jar, and shaken for an even chance of selecting any of them at random. At the end of this, five pieces of paper were taken out of the jar at random. These five randomly selected schools were our focus for the sample collection. In the second stage, classes within each selected school were selected using a systematic random sampling technique. This was done with regards to the study population thus, in school children age 6–18years, selecting classes where the age range can be found, for example, class 2—Junior High School. Since we had 8 classes between classes 2 and 3, our population size was 8, and our sample size was 5, since we were looking to choose just 5 classes amongst our population. With this, the population size of 8 was divided by the sample size of 5, giving 1.6, or approximately 2. This means that after the first class was chosen at random (using the lottery method), the next was each and every other class until five classes were chosen.

In the third stage, participants were selected from each selected class using a simple random sampling technique. The lottery technique was employed here. All student's names were written on pieces of paper, wrapped, and placed in a jar that was well shaken. I picked at random until I reached my desired sample size. 22 students were chosen from 2 classes and 23 from 3 classes to take part in the study, bringing the total to 67 students from each school randomly selected. Since the study population was 333, 67 students were chosen in 3 schools, but 66 in 2 schools.

Inclusion Criteria

This study included children age 6 to 18 years who were in school during the time of study and had agreed to participate in the study.

Exclusion Criteria
The study excluded children who were not in school and might be critically ill and required hospital management at the time of the study and did not assent.

Data Collection Procedure
Data collection took place after the University of Health and Allied Sciences Research Ethical Committee had approved the research protocols. Two research assistants assisted in the data collection. The data collection commenced on 10th January, 2023 and ended on 21st January, 2023. In all, 12 days were used to collect the data. Data were collected with an on-line data collection application (Kobo Collect). Data collectors were trained by the principal investigator for the collection of the data using a structured questionnaire on issues relating to demographic characteristics such as age, level of education, risk factors, and awareness of childhood urinary schistosomiasis. The questionnaire administration was conducted in English and face-to-face but instances where participant could not speak English, Twi was used to administer the questionnaire Each questionnaire took at least 10 minutes to complete. Samples of 10 ml of urine were also collected in plastic containers during the day between 10:00 a.m. and 14:00 p.m. because that was when we assume a high probability of obtaining larger loads of eggs. Urine samples were examined using the microscopy technique for S. haematobium detection.

Data Analysis
The data was extracted from Microsoft Excel. The data was checked and cleaned before analysis began. It was then exported into Stata version 17.0 for further analysis. The data was described using frequencies and percentages. A bivariate analysis was also used to measure the relationships between the dependent and each of the independent variables. A multivariate (i.e., logistic or probit) regression model was used to determine the factors and the extent to which they are, individually and collectively, significantly associated with the prevalence of schistosomiasis in the Bosomtwe District in the Ashanti Region of Ghana. Results were presented as odds ratios (OR) with 95% confidence intervals (CI). The level of statistical significance was set at $p < 0.05$.

Ethical Consideration
The study followed ethical guidelines and sought approval from relevant authorities, including the University of Health and Allied Sciences Research Ethical Committee (with ID UHAS_REC A.10[094] 22.23) and the Bosomtwe Health Directorate and Municipal Assembly. Participants were fully informed of the study procedures, and their participation made to be voluntary. An oral consent was sought before a participant could take part in the study. Their identities were kept confidential through the use of special codes. The data collected was kept secured under lock, and only the principal investigator had access to it. Younger participants were required to seek assent after either parents or teachers have consented on their behalf, and participants had the right to withdraw from the study without any harm. The researchers did have any conflict of interest in the study.

Results
Socio-Demographics Characteristics of Participants
Table 1 shows the demographic characteristics of the study participants. The median age of the study subjects was 14, with an interquartile range (IQR) of 12–15. Nearly fifty-one per cent (50.5%) of the participants were females. More than fifty per cent (54.7%) of the participants were in the 11-14 age group category. All the participants were school-going children, with a little above average (50.5%) in Junior High School.

Table 1: Socio-Demographics Characteristics of Participants

Variable	Frequency (N=333)	Percentage (%)
Age (Median, IQR)	(14, 12-15)	
6-10	38	11.4
11-14	182	54.7
15-18	113	33.9
Sex		
Female	168	50.5
Male	165	49.5
Basic Education		
Junior High	168	50.5
Lower Primary	7	2.0
Upper Primary	158	47.5

Source: Fieldwork (2023). IQR (Inter-Quartile Range)

In our pursuit to ascertain awareness of childhood urinary schistosomiasis in the Bosomtwe District made us to ask questions ranging from Heard about urinary schistosomiasis, source of information and signs and symptoms. The results are presented in Table 2.

Table 2: Awareness of Childhood Urinary Schistosomiasis

Variable	Frequency (N=333)	Percentage (%)
Heard about urinary schistosomiasis		
No	323	97.0
Yes	10	3.0
Source information (n=10)		
Home	1	10
School	9	90
Signs and symptoms*(n=10)		
Diarrhoea	4	40
Painful urination	8	80
Frequent urination at night	5	50
Sleeplessness	2	20

Source: Fieldwork (2023)

It was observed that only 3.0% of the participants had heard about urinary schistosomiasis (see Table 2). Out of the 10 participants attesting to knowing or having heard of schistosomiasis, 9 (90%) confirmed that they heard it from school.

Awareness Level of Participants on Childhood Urinary Schistosomiases
Figure 2 shows participants awareness level of Childhood Urinary Schistosomiases. With a median awareness level score of 1(1-1), only 3% had adequate awareness of childhood urinary schistosomiasis.

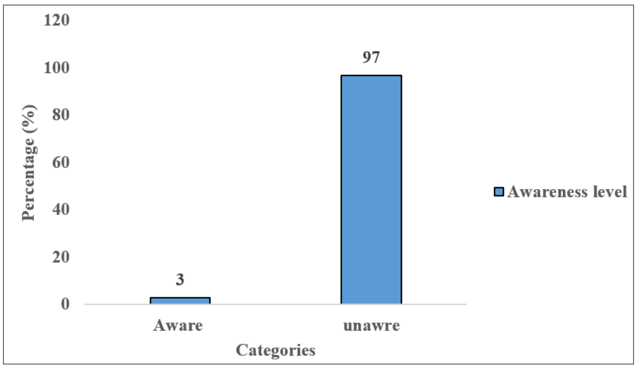

Figure 2: Awareness Level of Participants on Urinary Schistosomiases
Source: Fieldwork (2023).

In Table 3 has risk factors of childhood urinary schistosomiasis. It became necessary to unravel the risk factors of childhood urinary schistosomiasis. Therefore, a lot more questions were asked just to ascertain these factors of urinary schistosomiasis.

Table 3: Risk Factors of Childhood Urinary Schistosomiasis

Variable	Frequency (N=333)	Percentage (%)
Stay close to a fresh water source		
No	134	40.2
Yes	199	59.8
Swimming/bathing		
No	101	30.3
Yes	232	69.7
Walking barefoot		
No	105	31.5
Yes	228	68.5
Drinking		
No	179	53.8
Yes	154	46.3
Urinating		
No	169	50.7
Yes	164	49.3
Defecating		
No	323	97.0
Yes	10	3.0
Fishing		
No	207	62.2
Yes	126	37.8
Washing		
No	159	47.8
Yes	174	52.2
Fetching		
No	149	44.7
Yes	184	55.3
Usage of clean toilet facilities		
No	248	74.5
Yes	85	25.5
Hand washing after defecating/urinating		
No	179	53.8
Sometimes	139	41.7
Yes	15	4.5

Source: Fieldwork (2023).

It was observed that 59.8% of the participants stayed close to a fresh water source (see Table 3). About seventy per cent (69.7%) of the participants indicated that they swam or bath in a fresh water source (see Table 3). It was revealed that 68.5% of the participants walk barefooted in a fresh water source (see Table 3). Out of the 333 participants, 46.3% indicated they drink from a fresh water source. Nearly fifty-one per cent (50.7%) of the participants confirm urinating in a fresh water source while 3.0% said they were defecating in a fresh water source (see Table 3). It was revealed that 62.2% of the participants fish in a fresh water source (see Table 3). For washing in a fresh water source, nearly fifty per cent (47.8%) of the participants answered in affirmative (see Table 3). More than half (55.3%) of the participants reported fetching water from a fresh water source (see Table 3). It was revealed that about seventy-five per cent (74.5%) of the participants were not using a clean toilet facility. More than half (53.8%) of the participants indicated that they do not wash their hands after defecating or urinating (see Table 3).

Prevalence of Childhood Urinary Schistosomiasis
Figure 3 below shows the prevalence of urinary schistosomiasis. Almost close to half of the respondents 102(30.60%) recorded positive cases.

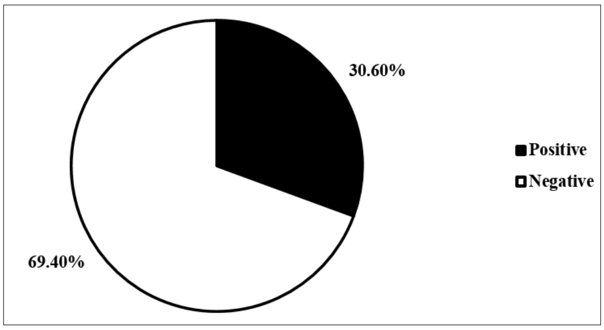

Figure 3: Prevalence of Childhood Urinary Schistosomiasis
Source: Fieldwork (2023).

Table 4 shows risk factors that predict the prevalence of childhood urinary schistosomiasis. Bivariate and multivariate logistic regression were performed to identify these factors. The bivariate analysis revealed that age group, staying close to a fresh water source, swimming/bathing, walking barefoot, drinking, urinating, and fetching from fresh water source were significantly associated with urinary schistosomiasis. However, the multivariate logistic regression revealed that only urinating in fresh water source was the main predictor of urinary schistosomiasis. The children who urinated into fresh water bodies were about 3 times more likely to contract urinary schistosomiasis compared to those who did not (aOR=2.93, CI= 1.41-6.08, p= 0.004).

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Table 4: Binary Logistic Regression between Associated Factors and Urinary Schistosomiasis

Variable	Negative	Positive	cOR (95% CI) p-value	aOR (95% CI) p-value
	n (%)	n (%)		
Age				
6-10	32(84.21)	6(15.79)	**Ref**	
11-14	123(67.58)	59(32.42)	**2.56(1.01-6.46) 0.047**	1.78 (0.65-4.91) 0.230
15-18	76(67.26)	37(32.74)	**2.60(1.00-6.76) 0.051**	1.92(0.66-5.56) 0.230
Sex				
Female	119(70.83)	49(29.17)	**Ref**	
Male	112(67.88)	53(30.63)	1.15(0.72-1.83) 0.559	
Basic Education				
Junior High	112(66.67)	56(33.33)	**Ref**	
Primary	119(72.12)	46(27.88)	0.77(0.48-1.23) 0.281	
Stay close to a fresh water source				
No	110(82.1)	24(17.9)	**Ref**	**Ref**
Yes	121(60.8)	78(39.2)	**2.95 (1.75-5.00) <0.001**	0.68 (0.21-2.18) 0.515
Swimming/bathing				
No	95(94.1)	6(5.9)	**Ref**	
Yes	136(58.6)	96(41.4)	**11.18 (4.70- 26.56) 0.001**	1.28(0.15-11.27) 0.822
Walking barefoot				
No	99(94.3)	6(5.7)	**Ref**	
Yes	132(57.9)	96(42.1)	**12.00 (5.05- 28.50) <0.001**	8.02(0.82-78.68) 0.074
Drinking				
No	149(83.2)	30(16.8)	**Ref**	
Yes	82(53.3)	72(46.7)	**4.36 (2.63-7.22) <0.001**	1.29 (0.67-2.48) 0.450
Urinating				
No	147(87.0)	22(13.0)	**Ref**	
Yes	84(51.2)	80(48.8)	**6.36(3.70- 10.95) <0.001**	2.92 (1.41-6.07) 0.004
Defecating				
No	226(70.0)	97(30.0)	**Ref**	
Yes	5(50.0)	5(50.0)	2.33 (0.66-8.23) 0.189	
Fishing				
No	150(72.5)	57(27.5)	**Ref**	
Yes	81(64.3)	45(35.7)	1.46 (0.91-2.35) 0.117	
Washing				
No	122(76.7)	37(23.3)	Ref	
Yes	109(62.6)	65(37.4)	2.00 (1.21-3.18) 0.006	0.64(0.23-1.77) 0.390
Fetching				
No	116(77.8)	33(22.2)	**Ref**	
Yes	115(62.5)	69(37.5)	**2.11 (1.28-3.44) 0.003**	0.54(0.21-1.41) 0.205
Usage of clean toilet facilities				
No	172(69.4)	76(30.6)	**Ref**	
Yes	59(69.4)	26(30.6)	1.00 (0.58-1.70) 0.992	
Hand washing after defecating/urinating				
No	126(70.4)	53(29.6)	**Ref**	
Sometimes	94(67.6)	45(32.4)	1.14 (0.71-1.84) 0.596	
Yes	11(73.3)	4(26.7)	0.86 (0.26-2.84) 0.810	
Awareness level				
Unaware	222(68.73)	101(31.27)	**Ref**	
Aware	9(90.00)	1(10.00)	0.24 (.031- 1.95) 0.184	

Discussion

Level of Awareness of Childhood Urinary Schistosomiasis

Understanding the level of awareness about this disease among children is crucial for designing effective prevention and control strategies. Per the results of the study, it was noted that, awareness level of children about urinary schistosomiasis in the Bosomtwe District in the Ashanti Region of Ghana was abysmal. For instance, only 3.0% out of 100% reported having an adequate awareness level of the disease. This is a concern hence, low awareness can hinder early detection, treatment, and prevention efforts. This finding is in line with Mustafa Ahmed et al. study that almost all the students (96%) had poor knowledge about urinary schistosomiasis [21]. Further, it was observed that there was a no significant association between awareness of schistosomiasis and the likelihood of testing positive for the disease. Among those with inadequate awareness, 31.27% tested positive for schistosomiasis, while only 1 respondent (10.00%) who reported awareness of the disease tested positive. This stark contrast highlights the importance of education and awareness campaigns in reducing the prevalence of schistosomiasis.

The low prevalence of schistosomiasis among individuals who were aware of the disease (10.00%) compared to those with inadequate awareness (31.27%) suggests that education and awareness programmes can be effective in reducing transmission. This emphasises the need for targeted interventions that not only focus on treatment but also prioritise health education and awareness-raising initiatives within the Bosomtwe District. Increasing awareness about the disease can not only help reduce its prevalence but also empower individuals to take preventive measures and seek early treatment, ultimately contributing to improved public health. This is in line with Markus and Henry's study that a very small proportion of the school children had awareness of urinary schistosomiasis, and no infection was recorded among them [22].

Risk Factors for Urinary Schistosomiasis

The study results provided a valuable insight into the risk factors associated with childhood urinary schistosomiasis. These risk factors were noted to be behavioural and practices that increase the likelihood of exposure to contaminated freshwater sources, which are known to be the primary transmission pathway for the disease. It was emerged that a significant proportion of the participants lived in close proximity to freshwater sources. This proximity increases the chances of regular contact with potentially contaminated water bodies, which is a key risk factor for schistosomiasis transmission. This study corroborates to Nelwan's study that various factors can cause the transmission of schistosomiasis, for example, climate changes and proximity to infested freshwater bodies [23].

The study also brought to light some water-contact activities among the children. For instance, the children graciously cited swimming or bathing, walking barefoot in freshwater sources, and fishing. These activities mostly involve direct exposure to infected water, making the victims more susceptible to schistosomiasis. This finding confirms a study by Angora et al. that swimming and fishing in freshwater by schoolchildren was strongly associated with infection with Schistosoma haematobium [24]. A significant proportion of the children intimated they drink water from freshwater sources which is deemed to have a detrimental effect on them. Hence, the practice directly exposes victims to potentially contaminated water thereby increasing the risk of infection. This finding attests to the fact that these children are not aware of the need to drink from a safer water source. This finding agrees to Secor's study that people become infected when their skin comes into contact with fresh water bodies that contain the parasite [25].

Per the study results, it was revealed that a significant proportion of the participants were not using a clean toilet facility while others too were not washing their hands after defecating or urinating. These practices would often contribute to environmental contamination with schistosome eggs and increase the likelihood of transmission within communities. This finding signifies that, personal hygiene is low among the children in the community. The children might not be observing hygiene protocols due to the fact that they might lack hygiene items thus community- and school-based water, sanitation, and hygiene that could aid personal hygiene practices. This finding corroborates to Phillips, Ower, Mekete et al. study that lack of access to community- and school-based water, sanitation, and hygiene, such as improved drinking water and shared toilet and hand-washing facilities, were linked to an increased risk of infection with soil-transmitted helminths and schistosome parasites [26].

Children defecating in freshwater sources is alarming. This is because it introduces schistosome eggs into the water thereby increasing the risk of infection for those that use the same water sources downstream. For instance, more than half of the sample reported fetching water from freshwater sources. While this is a common necessity, defecating in it can expose these individuals to contaminated water, especially if safe alternatives are not readily available. This finding underscores the importance of targeted interventions to reduce the risk of childhood urinary schistosomiasis in the studied population.

Of all the risk factors assessed in this study, urinating in freshwater stood out as the main predictor of childhood urinary schistosomiasis infection. The results suggest a strong association between urinating in freshwater bodies and the risk of childhood urinary schistosomiasis infection. Specifically, children who reported urinating in freshwater bodies had a higher prevalence of schistosomiasis compared to those who did not engage in this behaviour. The crude p-value ($p < 0.001$) initially indicates a significant association, and this significance remains even after adjusting for potential confounding factors (adjusted $p = 0.004$). These findings highlight the importance of avoiding urination in freshwater bodies as a potential preventive measure for schistosomiasis. However, it's essential to consider other factors that might influence the results, such as age, gender, or region, and further research may be needed to better understand the relationship and causality between urination in freshwater bodies and schistosomiasis. Nonetheless, the study suggests that this behaviour is a relevant risk factor for schistosomiasis transmission in the studied population.

Prevalence of Childhood Urinary Schistosomiasis

The overall prevalence of childhood urinary schistosomiasis was found to be 30.60% [95% CI]. This result is almost similar to a prevalence of 29.7% reported by Asante-Poku et al. in Bosomtwe, a district in the Ashanti Region of Ghana [27]. On the contrary, the prevalence found was higher than a prevalence of 18.4% by Adu-Gyasi et al. [28]. The inconsistency in the above prevalence rates can be attributed to differences in study periods, sample sizes, participants recruited for the study, and geographical location. The findings of the study revealed some interesting patterns in infection prevalence across different age groups. The study stratified the participants into three age groups: 6–10 years, 11–14 years, and 15–18 years. The number of positive cases for childhood urinary schistosomiasis in each age group was as follows: ages 6–10 had 6 positives, ages 11–14 had 59 positives, and ages 15–18 had 37 positives. The most striking observation is the significantly higher number of positive cases among children aged 11–14. This finding is consistent with the well-established fact that schistosomiasis infection tends to increase with age as children have more opportunities for freshwater contact activities, such as swimming, drinking, fishing, walking barefoot, and playing in infested water bodies. This finding confirms Veruska Maia da Costa et al. submission that other studies observed that children under the age of 15 years are more susceptible to infection due to certain play habits, such as fishing or swimming in infested water and lack of hygiene [29]. Such factors include living close to water bodies and having rivers on the way to school.

Further, this group of children is often more adventurous and socially active. The study findings could also be influenced by variations in behaviour among different age groups. For instance, older children (15–18years) may be more aware of the disease and its transmission, leading to more cautious behaviour when interacting with water bodies. The finding conforms to Angora et al. study that children aged 10–14 years were more vulnerable to schistosomiasis during recreational activities, that is, swimming and playing in water, fetching water for household use, or agriculture activities [24].

There seems to be no significant difference (the difference is marginal) in the prevalence rates with regards to gender; prevalence in males is 29.17% and 30.63% in females. Though there is a slight difference, this observation could possibly be because children of the same age group, regardless of gender, mostly involve themselves in similar activities. This finding is not the first of its kind hence, Tetteh-Quarcoo et al. also found similar results that there was no association between gender and childhood urinary schistosomiasis [19].

However, statistically significant association was found between staying around a river or stream and playing at a river or stream bank in the communities in which the study was carried out. The prevalence of schistosomiasis infection among children staying around Lake Bosomtwe outweighs that of those staying far away from the lake. Those staying around recorded a prevalence of 39.2% while those staying far away from the lake recorded 17.9%, a ratio of 13:4, respectively. This finding conforms to Abaka-Yawson et al.'s study that staying around a river or stream, playing at a river or stream, and being an inhabitant of a school child were significantly associated with the prevalence of *Schistosoma haematobium infection*; hence, those staying close to a freshwater source held a higher prevalence rate than those staying away [30]. This finding can be attributed to several interconnected factors. Schistosomiasis, often linked to proximity to freshwater bodies like lakes and rivers explains the fact that those staying close would be at a higher risk than those staying away. Children staying close to the lake has no choice but to drink from the lake since a larger portion of the district lacks safe water sources.

The families of the children staying close to the lake often indulge in fishing, which predisposes them to a greater risk of getting in contact with the freshwater when they escort their parents or even get infected through their parents. This has reestablished the prevalence (35.7%) revealed in the study. This finding confirms the fact that children who bathe or walk barefoot in freshwater accounted for a higher prevalence, as high as 41.4% and 42.1%, respectively.

Conclusion

The prevalence of childhood urinary schistosomiasis infection among the study group is fairly high, with a prevalence of 30.6% among the children. No association was found between gender and childhood urinary schistosomiasis. However, infection is high in middle-aged children (11–14years), who tend to be more active at that stage. Also, infection is high among children whose houses are close to the water source and even more in children who urinate in freshwater sources. There was no association between inadequate awareness and schistosoma infection. However, there was low awareness level of childhood urinary schistosomiasis [31,32].

Recommendation

It is hoped that community-and-school based water, sanitation and hygiene facilities be provided by both community and schools to help ensure hygiene among children in the Bosomtwe District, Ghana.

Hygienic recreational centers be provided in the district by gatekeepers to take the kids away from playing at places that might be contaminated with schistosome eggs.

Declaration

Ethical Approval

Ethical approval (with ID UHAS_REC A.10[094] 22.23)) to conduct the study was taken from the Research Ethics Committee of the University of Health and Allied Sciences, Ho, Ghana.

Consent to Participate in the Study

In the field, verbal consent was taken before a participant could take part in the study.

Consent to Publish

Participants were told that the study was strictly academic and that the results would be published for the purposes of contributing to building academic literature.

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Author Contributions

Elizabeth Anaba: Conceptualise the study, Data Curation, Formal Analysis and Software
Rita Tekpertey: Writing – Original Draft, Software and Proof Reading.
Anthony Edward Boakye: Methodology, Proof Reading and Writing – Review & Editing.

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Availability of Data and Materials

The data is only available to the author hence it was a primary data

Conflicts of Interest

No competing interest existed.

References

1. Aula OP, McManus DP, Jones MK, Gordon CA (2021) Schistosomiasis with a Focus on Africa. Trop Med Infect Dis 6: 109.
2. De Leo GA, Stensgaard AS, Sokolow SH, N'Goran EK, Chamberlin AJ, et al. (2020) Schistosomiasis and climate change. BMJ 371: m4324.
3. Verjee MA (2019) Schistosomiasis: Still a Cause of Significant Morbidity and Mortality. Res Rep Trop Med 10: 153-163.
4. Opoku-Kwabi D, Sevor B, Sarpong EA, Sam PK, Frimpong AA, et al. (2024) Prevalence of schistosomiasis among school children at Esuekyir community in the Central Region of

Ghana. BMC Infect Dis 24: 1004.

5. Aribodor OB, Azugo NO, Jacob EC, Ngenegbo UC, Onwusulu ND, et al. (2024) Assessing urogenital schistosomiasis and female genital schistosomiasis (FGS) among adolescents in Anaocha, Anambra State, Nigeria: implications for ongoing control efforts. BMC Public Health 24: 952.
6. Danso-Appiah T, Immurana M, Manyeh AK, Anyan WK, Gyapong JO (2024) Schistosomiasis. Neglected Tropical Diseases https://link.springer.com/chapter/10.1007/978-3-031-53901-5_13.
7. Sumbele IUN, Otia OV, Francis L, Bopda OSM, Ebai CB, et al. (2021) Confounding influences of malnutrition and Plasmodium falciparum and Schistosoma haematobium infections on haematological parameters in school children in Muyuka, Cameroon. BMC Infect Dis 21: 477.
8. Sékré JBK, Diakité NR, Assaré RK, Kouadio JN, Coulibaly G, et al. (2024) Potential associations between Schistosoma mansoni infection and physico-chemical characteristics and water-related human activities in Côte d'Ivoire: a cross-sectional study. Parasites Vectors. 17: 422.
9. Essien-Baidoo S, Essuman MA, Adarkwa-Yiadom B, Adarkwa D, Owusu AA, et al. (2023) Urinogenital schistosomiasis knowledge, attitude, practices, and its clinical correlates among communities along water bodies in the Kwahu Afram Plains North District, Ghana. PLoS Negl Trop Dis 17: e0011513.
10. Boateng EM, Dvorak J, Ayi I, Chanova M (2023) A literature review of schistosomiasis in Ghana: a reference for bridging the research and control gap. Trans R Soc Trop Med Hyg. 117: 407-417.
11. Ocansey GA, Ametor FH, Shembla SS, Adzogble B, Baffoe S, et al. (2024) Schistosomiasis outbreak in Essuekyir, Cape Coast Metropolis, Ghana, January 2023. Journal of Interventional Epidemiology and Public Health 7: 55.
12. Klohe K, Koudou BG, Fenwick A, Fleming F, Garba A, et al. (2021) A systematic literature review of schistosomiasis in urban and peri-urban settings. PLoS Negl Trop Dis 15: e0008995.
13. Duah E, Kenu E, Adela EM, Halm HA, Agoni C, et al. (2021) Assessment of urogenital schistosomiasis among basic school children in selected communities along major rivers in the central region of Ghana. Pan Afr Med J 40: 96.
14. Asante M, Adjei DN, Amenga-Etego S, Nettey OEA, Amenga-Etego L, et al. (2019) Prevalence and risk factors of Schistosoma haematobium infection among school-aged children in Bosomtwe District, Ghana. Parasites & Vectors 12.
15. Martel RA, Osei BG, Kulinkina AV, Naumova EN, Abdulai AA, et al. (2019) Assessment of urogenital schistosomiasis knowledge among primary and junior high school students in the Eastern Region of Ghana: a cross-sectional study. PloS One 14: e0218080.
16. Nyarko R, Torpey K, Ankomah A (2018) Schistosoma haematobium, Plasmodium falciparum infection and anaemia in children in Accra, Ghana. Trop. Dis. Travel Med. vaccines 4.
17. Kulinkina AV, Walz Y, Koch M, Biritwum MK, Utzinger J, Naumova EN (2018) Improving spatial prediction of Schistosoma haematobium prevalence in southern Ghana through new remote sensors and local water access profiles. PLoS Neglected Trop. Dis 12: e0006517.
18. Kulinkina AV, Kosinski KC, Adjei MN, Osabutey D, Gyamfi BO, et al. (2019) Contextualizing Schistosoma haematobium transmission in Ghana: assessment of diagnostic techniques and individual and community water-related risk factors. Acta Trop 194: 195-203.
19. Tetteh-Quarcoo PB, Attah SK, Donkor ES, Nyako M, Minamor AA, et al. (2013) Urinary schistosomiasis in children — still a concern in part of the Ghanaian capital city. Open J. Med. Microbiol 3: 151-158.
20. Anyan WK, Abonie SD, Aboagye-Antwi F, Tettey MD, Nartey LK, et al. (2019) Concurrent Schistosoma mansoni and Schistosoma haematobium infections in a peri-urban community along the Weija dam in Ghana: a wake-up call for effective National Control Programme. Acta Trop 199: 105116.
21. Mustafa Ahmed GE, Ahmed EYM, Ahmed AE, Hemmeda L, Birier AB, et al. (2024) Awareness towards urinary schistosomiasis and its relation with active infection among primary school pupils and students in North Kordofan state, Sudan 2022. Parasite Epidemiol Control 25: e00346.
22. Markus DA, Henry GB (2024) Prevalence of Urinary Schistosomiasis among School Children in Giwa and Markafi Local Government Areas, Kaduna State, Nigeria. Science World Journal 19: 224-228.
23. Nelwan ML (2024) Risk factors for schistosomiasis. Water Supply 24: 3796-3809.
24. Angora EK, Boissier J, Menan H, Rey O, Tuo K, et al. (2019) Prevalence and Risk Factors for Schistosomiasis among Schoolchildren in two Settings of Côte d'Ivoire. Trop Med Infect Dis 4:110.
25. Secor EW (2014) Water-based interventions for schistosomiasis control. Pathog Glob Health 108: 246-254.
26. Phillips AE, Ower AK, Mekete K, Liyew EF, Maddren R, et al. (2022) Association between water, sanitation, and hygiene access and the prevalence of soil-transmitted helminth and schistosome infections in Wolayita, Ethiopia. Parasites Vectors 15: 410.
27. Asante-Poku A, Asenso-Mensah K, Otchere J, Gyan BA, Osei-Wusu S, et al. (2015) Prevalence of urinary schistosomiasis and malaria in two communities in the Kumasi Metropolis, Ghana. Journal of parasitology research.
28. Adu-Gyasi D, Donkor ES, Etsey PK, Agyemang OS, Adjuik M, et al. (2018) Prevalence of urinary schistosomiasis and associated risk factors among individuals in selected communities of the Pru District, Ghana. Parasites & Vectors 11: 329.
29. Costa VMD, Barbosa PVDS, Varela IBF, Santos ATD, Gomes JAL, et al (2022) Urinary schistosomiasis outbreak in Cabo Verde: the first description in the country, May-June, 2022. PAMJ-One Health 13.
30. Abaka-Yawson A, Hotorvi C, Oduro EA, Tawiah PA, Quarshie SS, et al. (2019) Prevalence and associated factors of urinary schistosomiasis among basic school children in the Akyemansa District, Ghana. African Journal of Medical and Health Sciences 15: 1-10.
31. Gabaake KP, Phaladze NA, Lucero-Prisno III DE, Thakadu OT (2022) Assessment of awareness and knowledge of schistosomiasis among school-aged children (6–13 years) in the Okavango Delta, Botswana. Global Health Research and Policy 7: 1-11.
32. Maseko TS, Mkhonta NR, Masuku SK, Dlamini SV, Fan CK (2018) Schistosomiasis knowledge, attitude, practices, and associated factors among primary school children in the Siphofaneni area in the Lowveld of Swaziland. Journal of microbiology, immunology and infection 51: 103-109.