



## Prevalence of Intestinal Schistosomiasis Infection and Associated Risk Factors among School-aged Children in Jebba, Moro Local Government Area, Kwara State, North Central Nigeria

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**ABSTRACT:** Jebba in Moro Local Government Area of north central Nigeria is a fishing community, and due to inadequate sanitation, its population is susceptible to several infections. Hence the objective of this paper was to investigate the prevalence of intestinal schistosomiasis infection and associated risk factors amongst school aged children in the study area. From January to July 2023, stool specimens were collected from two hundred and seventy (276) school-going aged children (125 males and 151 females) for faecal analysis using the Kato-Katz technique. Structured questionnaires were also administered to the participants to ascertain possible transmission risk factors towards the infection. Results show that of the 276 stool specimens examined, 56 (20.1%) were infected with the egg of *Schistosoma mansoni*, with more males 27/125 (21.6%) infected than females 21/151 (19.2%). Pupils who used the bush for defecation had the highest infection rate (47.5%). Pupils who also responded to using rivers as their main source of water were also more infected (48.9%). The result of this study has revealed the presence of intestinal schistosomiasis in Jebba. Immediate treatment by the infected persons to halt the transmission was carried out. Regular deworming, proper health education, provision of basic social amenities is highly advocated in the study area.

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Schistosomiasis is a waterborne snail-transmitted parasitic disease and a major public health problem in sub-Saharan Africa, mostly, affecting populations living in low-resource countries where, water supply and sanitation are poor and inadequate (Saidu *et al.*, 2023). It is considered among the neglected tropical diseases (NTDs) and is one of the diseases targeted for

elimination through global efforts, which involve preventive chemotherapy (Oyeyemi *et al.*, 2023). It is estimated that more than 200 million people worldwide, mostly in tropical and subtropical countries are infected (Lamberti *et al.*, 2021). It is difficult to accurately estimate the disease burden due to schistosomiasis, but recent work suggests a loss of

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3-70 million disability-adjusted life years (DALYs) is attributed to the disease (Saidu *et al.*, 2023). Significant reduction of infection and morbidity has been achieved in some countries of Africa through global efforts to eliminate schistosomiasis and other NTDs by deworming (Feleke *et al.*, 2022; Oyeyemi *et al.*, 2023). However, because of the development of irrigation schemes and other water resources development projects that increase the habitats for snail intermediate hosts, disease distribution and transmission continue to increase in the endemic areas. In Nigeria, several studies have been done on intestinal schistosomiasis, especially in school children where the prevalence in endemic areas ranges from 2.9% to 19.4% (Goselle *et al.*, 2010; Odoya *et al.*, 2021; Ojo *et al.*, 2021)., *Schistosoma mansoni* is a trematode and requires a snail intermediate host for its transmission and is transmitted via skin penetration by the infective larvae (filariform larvae). Intestinal schistosomiasis is a chronic infection and is associated with socio-economic, environmental, and other factors such as poverty, ignorance, over-crowding, limited access to clean water, tropical climate, and low altitude.

According to the United Nations Development Programme report in 2006, 1.1 billion people in developing countries have inadequate access to water while another 2.6 billion lack basic sanitary facilities (Tefera *et al.*, 2020). About 50% of people in developing countries are affected at a point in time by water and sanitation-related health problems (Niyituma *et al.*, 2017). In recognition of the global health importance of intestinal helminth infections, the World Health Organization (WHO) recommends a baseline survey in school-aged children to determine the prevalence and intensity of infections which will be useful in the diagnosis, planning, and implementation of effective and sustained control programs (Oyeyemi *et al.*, 2023). One of the limitations to controlling intestinal schistosomiasis infection in Nigeria is the paucity of standardized national epidemiological data which will be used to justify, plan, support, implement, monitor, and sustain control initiatives.

Therefore, this study will provide baseline information in a previously unstudied area, enrich the knowledge of intestinal schistosomiasis infections in Nigeria, stimulate similar studies in other parts of Nigeria, increase awareness, and prioritize the control of intestinal schistosomiasis infections in Nigeria.

Hence, the objective of this paper was to investigate the prevalence of intestinal schistosomiasis infection and associated risk factors amongst school-aged

children in Jebba, Moro Local Government Area of Kwara State, North central Nigeria.

## MATERIALS AND METHODS

*Description of the Study Area:* Jebba is a community in Moro Local Government Area of Kwara State, north central Nigeria and falls within the Guinea-savanna region of Nigeria. The area is characterized mainly by two seasons: dry (November to March) and rainy (April to October) seasons (Adelakun *et al.*, 2017). The area is characterized by a total annual rainfall ranging between 1270 mm - 1524 mm, with the highest rainfall observed in August. Monthly temperature is highest (about 30°C) in March and lowest (about 25°C) in August (Adelakun *et al.*, 2017).

It lies within the middle belt of Nigeria between the coordinates 4°34'12'' - 4° 43'48''E and latitude 9°10' - 9°55'N. Majority of the inhabitants of the study area are migrant farmers and fishermen mostly Nupes, Busawa, Kemberis and Yorubas. The community is surrounded by River Niger, Jebba dam, Jebba Lake and River Awun (Olawepo, 2006). The study area is basically a rural community where the inhabitants depend on the water bodies surrounding them for drinking, washing, bathing and other domestic purposes. Basic infrastructure like toilet facilities are lacking and so the inhabitants defaecate mainly in nearby bushes.

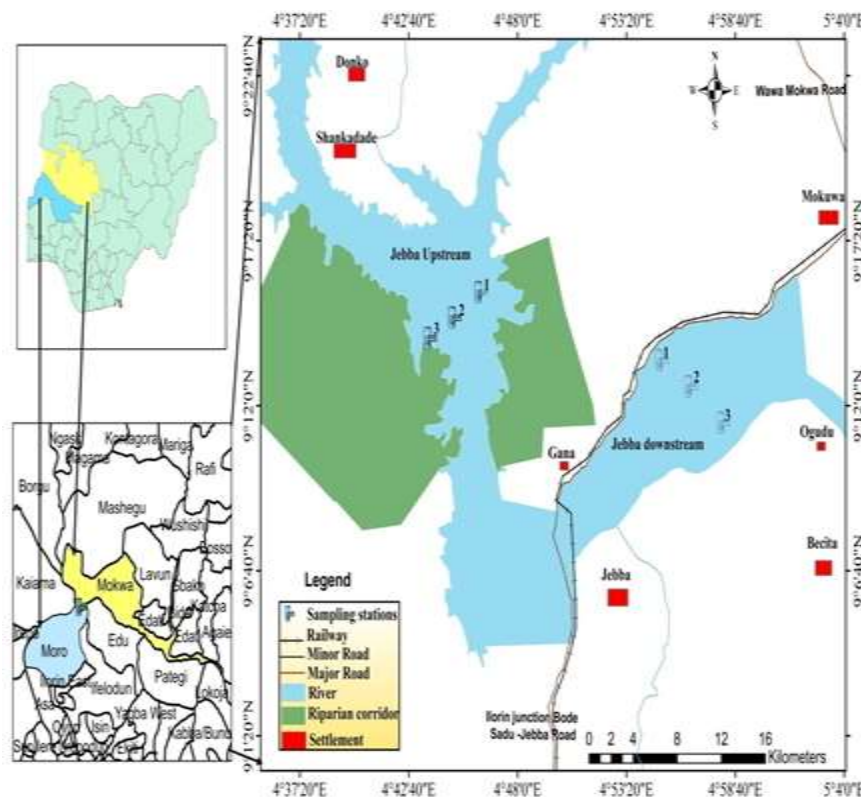
*Study Design and Sample Size:* A school-based cross-sectional survey was conducted to assess the prevalence and factors associated with *S. mansoni* infection among school children in three primary schools in Jebba namely UMCA Idiagbon LGEA Primary School, JEBBA; ST—Theresa LGEA Primary School; and CAC LGEA Primary School, Jebba. The sample size was calculated using the formula of Lindley (1997)

*Sample collection and laboratory procedures:* A single stool specimen of about 5g was collected from each pupil using a clean, dry, and leave-proof plastic container labeled with a unique identification number. The fresh stool was preserved in 10% formalin solution and immediately transported to the laboratory where they were processed using the kato-katz method. The stool sample was agitated to enhance saturation and then passed over a screened mesh to filter out the debris. Thereafter, the stool sample was delivered by kato-katz template onto a clean slide and covered with a cover slip already soaked in freshly prepared glyceride for at least 24 hours. The egg count per slide was converted into eggs per gram of faeces (Epg) by multiplying the number of eggs on a slide by 24. The intensity of infection for individuals was then

expressed as light, moderate, and heavy infection according to WHO (2004) protocol.

**Data analysis:** Statistical analysis was performed using Excel and SPSS (statistical package for social science) version 23.0. Differences in the prevalence

and intensity of infection between ages and sexes were tested using the chi-square ( $X^2$ ). Values are considered statistically significant when p-values are less than 0.05.



**Fig 1:** Map showing the study area  
Source: Oladipo et al., 2018

## RESULTS AND DISCUSSION

A total of two hundred and seventy-six (276) school-going aged children from three primary schools in the Jebba community formed the study population. The age ranged from 5 years to > 14 years (Table 1).

**Table 1:** Demographic characteristics of school-going aged children in Jebba.

Age	frequency(n=276)	(%)
5-7	68	24.6
8-10	78	28.2
11-13	70	25.4
>14	60	21.7

Out of the 276 pupils which were made up of 125 males and 151 females, their fecal sample was examined for the presence of *S. mansoni* egg. Of this number, 56/276(20.1%) were positive for the infection with more males (20.6%) than females (19.2%) infected (Table 2). The highest prevalence occurred in children ages 5-7 years (32.4%) (Table 2). Regarding

hygiene attitude and practice among the school-going children, those who were fond of using the bush for defecation were the most infected (47.5%) (Table 3). The source of water used played in contributory factor to the infection those whose major source of water was river/stream recorded the highest infection rate of (48.9%) (Table 3).

**Table 2:** Prevalence of intestinal schistosomiasis by age and sex among the school-going age children in the study area.

Variables (Age)	Number Examined	Number Positive	n (%)
5-7	68	22	32.4
8-10	78	19	24.3
11-13	70	11	15.7
>14	60	4	6.7
Total	276	56	20.1%
P-Value	0.000		
Sex			
Male	125	27	21.6
Female	151	29	19.2
Total	276	56	20.1%
P-value	0.166		

Schistosomiasis is an important health problem in the study area and its occurrence was common among school-aged children in Jebba, Moro Local Government Area, a riverine community that depended solely on the Jebba River as the only source of water. The present study seeks to determine the prevalence of *S. mansoni* in school-aged children in Jebba. Until now, no information was available on the prevalence of *S. mansoni* amongst school-aged children in the locality. Information on infection prevalence is useful to plan the prevention and control of intestinal schistosomiasis and also to assess progress in ongoing control programs. A prevalence of 20.6% (56/276) observed amongst school children in this study calls for concern and immediate action to halt this public health challenge.

**Table 3:** Hygiene attitude and practice of the surveyed school-going children (n=276)

Practice/Attitude	Frequency (%)
Type of toilet facility	
Open pit	79 (28.6)
Water cistern	56(20.3)
Bush	131(47.5)
Source of drinking water	
Pipe-borne	98(35.5)
Bore-hole	43(15.6)
River	135(48.9)
How often did you visit the river/ stream	
Never	21(7.6)
Occasionally	113(40.9)
Regularly	142(51.4)
Hand washing before eating	
Yes	132(47.8)
No	144(52.2)

The present result is quite higher than the findings in the southwestern part of Nigeria where Ojo *et al.* (2021) recorded a 9% infection rate among school-aged children. A similar trend though lower was observed in South southern part of Nigeria where a 4.2% infection rate was reported (Odoya *et al.*, 2021). In northwest Ethiopia, a 10.7% prevalence was observed by Feleke *et al.*, 2022. However, higher prevalences of 36.4% were reported in Uganda (Lamberti *et al.*, 2021). Bajiro *et al.*, 2016 in southwest Ethiopia reported an infection rate of 24.0%. This is quite close to the result of the present study.

Constant human-water contact by the children for several reasons such as bathing, swimming, fishing, and playing might be attributed to the high infection rate recorded in the study area. The frequency and amount of water contact and the tendency for infected snails to be found in the water body can also influence the high endemicity recorded. This assertion is supported by several reports of intestinal infections both in Nigeria and other African countries (Ukpai and Ahia, 2015; Ojo *et al.*, 2021; Lamberti *et al.*, 2021;

Feleke *et al.*, 2022). The age group 5-7 years was observed to be the most infected in this study. This observation is similar to the findings of Ukpai and Ahia, 2015 in a study in Ehime Mbano in the southeastern part of Nigeria. It has been reported that the infection rate in schistosomiasis is usually highest amongst school-aged children. This age group tends to always explore to find out reasons for everything they observe. More males (21.6%) than females (19.2%) were infected in the present study. This is in agreement with the reports of Kabatereine *et al.*, 2004 in Uganda and Ukpai and Ahia, 2015 in southeastern Nigeria. Other authors, however, reported a higher prevalence among females (Goselle *et al.*, 2010; Tefera *et al.*, 2020). Behavioral and socio-cultural factors that focus on the differences in the water contact pattern between the males and females are generally some reasons for the differences in infection rate. Hygiene attitudes and practices were ascertained in this present study by asking relevant questions using structured questionnaires. The type of toilet system used by the pupils was a risk factor for transmission of infection. Those who defecated in the bush had the highest infection (47.5%). The children reported that it was quite easy and much healthier to defecate in open farmlands and bushes. This showed a low knowledge of health education among the children. The implication of defecating in open lands means that whenever it rains, water run-offs assist in transferring the eggs in the infected stool to suitable environments where they can easily attach to the intermediate host. Subsequently, the intermediate host moves to the water body where the eggs are later picked up whenever there is human water contact, especially in the infected water body. Most parasitic infections like *S. mansoni* depend upon poor environmental conditions like open defecation and low levels of personal hygiene for transmission. The river is the only source of drinking water in the study area and most of them (47.5%) depend on it as a source of drinking water. It was also reported that a majority of the children visited the water body regularly (51.4%). This buttresses regular contact of the children with infected water bodies which predisposes them to the infection (Goselle *et al.*, 2010). Lastly, the children had a low level of personal hygiene, where a greater number (52.2%) reported not practicing hand washing before eating. Generally, the hygiene attitude and practices of the children in this study area greatly expose them to *S. mansoni* infection.

**Conclusion:** The study reveals a high endemicity of *S. mansoni* infection among school children in the study area. For proper control of intestinal schistosomiasis in this study area, infected individuals should be identified and be treated promptly. Proper health

education on the danger of coming in contact with infected water bodies will assist in alleviating the scourge in the area.

*Declaration of Conflict of Interest:* The authors declare no conflict of interest

*Data Availability Statement:* Data are available upon request from the corresponding author.

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