Research Paper

Prevalence and distribution of schistosomiasis and other intestinal parasites in nasarawa state

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ABSTRACT

This study assessed the current prevalence and distribution of Schistosoma haematobium and Schistosoma mansoni infections in Nasarawa State, Nigeria, with emphasis on variations across Local Government Areas (LGAs), age groups, and gender. It also identified co-existing intestinal parasites. A total of 900 participants from Nasarawa, Doma, and Akwanga LGAs were sampled. Urine and stool specimens were examined using standard filtration and Kato-Katz techniques. The overall prevalence of schistosomiasis was 11.3%, with S. haematobium (9.3%) more prevalent than S. mansoni (2.0%). Males had a significantly higher infection rate (16.7%) compared to females (5.4%), and the highest prevalence was recorded among children aged 10–14 years (16.5%). Other intestinal parasites identified included Entamoeba coli, Entamoeba histolytica, Giardia intestinalis, hookworms, Ascaris lumbricoides, and Trichuris trichiura. These findings confirm that schistosomiasis and other parasitic infections remain significant public health issues in Nasarawa State, stressing the need for integrated and targeted control strategies.

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1. INTRODUCTION

Schistosomiasis, a water-borne parasitic disease caused by Schistosoma species, remains a critical public health concern in sub-Saharan Africa, with Nigeria among the most endemic countries globally. It ranks second only to malaria in terms of socioeconomic and public health impact in tropical and subtropical regions [1]. Globally, more than 240 million people are affected, with over 85% of cases occurring in Africa [2]. The disease disproportionately affects impoverished rural populations who rely on freshwater bodies for daily activities such as bathing, fishing, and farming, exposing them to infested waters harboring the intermediate snail hosts Bulinus for S. haematobium and Biomphalaria for S. mansoni [3].

In Nigeria, over 20 million people require preventive chemotherapy for schistosomiasis annually, and prevalence rates among school-age children can exceed 70% in hyperendemic areas [4]. Previous national surveys revealed a wide range of prevalence across states, with Nasarawa State reporting moderate endemicity but showing spatial variation due to differences in ecological and socioeconomic conditions [5].

Despite efforts like the National Schistosomiasis Control Programme and mass drug administration (MDA), significant gaps remain in identifying high-risk groups, tracking prevalence in under-surveyed areas, and understanding co-infections with other parasites [6], [7]. Nasarawa State, with its proximity to multiple water bodies and poor access to potable water, remains particularly vulnerable. Local reports cite poor sanitation, low hygiene awareness, and high dependence on untreated surface water as major contributors to the disease burden [8].

Furthermore, infections often co-occur with other intestinal parasites such as Ascaris lumbricoides, Trichuris trichiura, and Entamoeba histolytica, compounding health challenges and complicating treatment strategies [9], [10]. Understanding the age, gender, and location-specific prevalence patterns as well as the spectrum of intestinal co-infections is vital for designing effective, integrated control programs. The main objective of the study is to determine the current prevalence of S. haematobium and S. mansoni infections across selected LGAs in Nasarawa State, analyze variations across demographic groups, and document other co-endemic intestinal parasites. Based on this, the following research questions guided the study;

1. What is the prevalence of Schistosoma haematobium and Schistosoma mansoni infections in Nasarawa State, Nigeria, across different Local Government Areas?
2. How does the prevalence of schistosomiasis vary across age groups and gender in Nasarawa State?
3. What other intestinal parasites were identified during the study, and what are their prevalence rates?

2. RELATED WORK

Schistosomiasis, a parasitic disease caused by blood flukes of the genus Schistosoma, remains one of the most pressing neglected tropical diseases (NTDs) worldwide. It ranks only behind malaria in terms of global public health importance in tropical and subtropical regions [1]. More than 240 million people are infected globally, with over 700 million at risk, predominantly in poor, rural communities where contact with infested freshwater bodies is part of daily life [2]. Africa bears more than 85% of the global burden of the disease, with children and young adults disproportionately affected [11], [12].

Globally, schistosomiasis is endemic in 76 countries, with active transmission reported in 67 of them [1]. An estimated 207 million people are infected, of which approximately 120 million are asymptomatic, and 20 million suffer from severe clinical manifestations such as liver fibrosis, hydronephrosis, bladder cancer, and anemia [13], [14]. The disease is transmitted via freshwater snails (Bulinus spp. and Biomphalaria spp.), which release infectious cercariae into the water [15]. In the African region, the burden of disease is most profound in sub-Saharan countries where infrastructure is poor, and safe water access is limited. The WHO notes that school-age children (5–14 years) account for the highest prevalence due to behavioral patterns and developmental exposure [12]. Research in [16], [17] demonstrates a consistent trend of hyper-endemicity in regions with irrigation systems, water reservoirs, and perennial rivers.

Nigeria is ranked as the most endemic country for schistosomiasis globally, with an estimated 20 million people needing treatment each year [18]. Prevalence rates vary significantly across geopolitical zones, from below 1% in some southern states to over 70% in parts of the North [19]. A study in [8] reported a urinary schistosomiasis prevalence of 16.3% among secondary school children in Lafia, Nasarawa State. Similarly, high prevalence rates in the region have been attributed to limited sanitation, poor hygiene practices, and the use of rivers and streams as primary water sources [20], [21]. Although mass drug administration (MDA) campaigns have reduced prevalence in some regions, focal studies in Nasarawa State still show moderate transmission levels. The Carter Center's 2013 survey laid the groundwork for ongoing MDA in affected LGAs, yet significant infection rates persist [22]. This suggests that environmental, behavioral, and demographic factors continue to influence transmission dynamics in the region.

The life cycle of Schist soma species necessitates specific ecological conditions, including the presence of snail intermediate hosts and human-water contact [12], [23]. Nasarawa State's extensive water networks rivers, streams, ponds, and irrigation channels offer ideal conditions for transmission. The presence of vector snails such as Bulinus in many of these aquatic habitats contributes to sustained transmission of S. haematobium [22], [24].

Communities depending on such water bodies for domestic use are at constant risk. Risk factors for schistosomiasis are multifaceted. Behaviors like swimming, fishing, and laundry in open water increase the risk of infection, especially in males and children [25]. The WHO also emphasized that the level and frequency of water contact are proportionally related to infection risk, which explains the higher burden in riverine and agrarian communities [14].

Age is a critical factor in schistosomiasis epidemiology. Numerous studies, including [6], [26], have reported that the 10–14 age group shows the highest prevalence. This age group is developmentally more active, engaging in water-related activities such as swimming and fishing.

Their immune systems may also be less capable of resisting chronic parasitic infections, and they often have limited awareness of disease prevention. Gender-based differences are equally evident. Boys are more likely to be infected due to their increased exposure to infested water bodies. Studies in [27], [28] found that prevalence among males was significantly higher than among females. This is attributed to cultural norms and recreational patterns, with boys participating more in outdoor and water-contact activities. This was also confirmed in [8], where higher male infection rates (18.7%) compared to females (8.1%) were reported.

In endemic regions, schistosomiasis often coexists with other intestinal parasites such as hookworms, Ascaris lumbricoides, Trichuris trichiura, and protozoans like Entamoeba histolytica and Giardia intestinal is [15], [29]. These co-infections are associated with compounded health issues, including malnutrition, anemia, impaired cognitive development, and increased susceptibility to other diseases. According to [30], the prevalence of intestinal helminths remains alarmingly high in Nigerian school children, especially in areas with poor waste disposal and open defecation practices.

The transmission routes of these parasites primarily fecal-oral and soil-mediated, often overlap with those of schistosomiasis, necessitating integrated control strategies. In Nasarawa State, the prevalence of hookworm and protozoan infections such as Entamoeba coli has been reported alongside S. haematobium and S. mansoni. Such findings underscore the need for multi-parasite surveillance and treatment interventions. The WHO recommends combining deworming programs for helminths with schistosomiasis MDA to enhance impact and reduce costs [28].

While there is abundant literature on schistosomiasis in Nigeria, several knowledge gaps persist. Many studies focus exclusively on S. haematobium, neglecting the epidemiology of S. mansoni, which also contributes significantly to the disease burden. Moreover, most surveys target school-aged children, overlooking high-risk groups such as farmers, fishermen, and women involved in domestic water use [17]. In addition, there is insufficient LGA-level data disaggregation, which hampers localized intervention planning. Another limitation is the heavy reliance on parasitological diagnostic tools like Kato-Katz and urine filtration. While these are cost-effective and widely used, they have reduced sensitivity, particularly in low-intensity infections. This may lead to underestimation of true prevalence.

More sensitive diagnostic techniques, including PCR, are recommended to detect light or prepatent infections and monitor control programs more accurately. Efforts to control schistosomiasis in Nigeria have primarily focused on preventive chemotherapy through MDA, guided by the WHO's NTD roadmap. However, MDA coverage often fluctuates and is not sufficient in isolation. The reinfection cycle remains rapid in areas where environmental conditions and risky behaviors persist [1]. The WHO recommends an integrated control strategy combining MDA with improved sanitation, snail control, clean water provision, and health education [28].

3. METHODOLOGY

3.1 Study Area

This study was carried out in Nasarawa State, located in North-Central Nigeria between latitudes 7°45'N and 9°25'N and longitudes 7°E and 9°E. The state shares borders with Kaduna to the north, Plateau to the east, Benue and Taraba to the south, and Kogi and the Federal Capital Territory to the west. The investigation focused on three LGAs namely Nasarawa, Doma, and Akwanga.

These LGAs were selected based on previously reported schistosomiasis prevalence and their proximity to perennial water bodies, which serve as conducive habitats for the intermediate snail hosts responsible for transmitting Schist soma spp. [21].

3.2 Study Design

A descriptive cross-sectional survey was adopted to assess the prevalence of Schist soma haematobium and Schist soma mansoni infections, as well as co-infections with other intestinal parasites. The study also examined infection distribution across demographic factors such as age, gender, and geographical location.

3.3 Population and Sampling Technique

The study population comprised individuals aged 4 to 24 years living in the selected LGAs. Participants were recruited through community sensitization campaigns conducted in partnership with local health officials and community leaders. A multistage random sampling technique was employed to ensure representativeness and minimize selection bias.

Sample size determination followed the formula provided [28], using a 95% confidence interval, an assumed prevalence (p) of 75%, and a margin of error set at 5%. Based on this calculation, a minimum of 300 participants were sampled from each of the three LGAs, giving a total sample size of 900 respondents.

3.4 Data Collection Tools and Procedures

A structured, pre-tested questionnaire was administered to gather sociodemographic data, including age, sex, source of drinking and bathing water, sanitation conditions, and water contact behaviors. The instrument also captured knowledge, attitudes, and practices regarding schistosomiasis. The questionnaire was administered in both English and the local languages with assistance from trained interviewers.

3.5 Specimen Collection

Participants were provided with sterile, leak-proof containers for urine and stool sample collection. Midstream urine samples were collected between 10:00 a.m. and 2:00 p.m., which is the peak period for the excretion of S. haematobium eggs [28]. Stool samples were collected on the same day to ensure consistency and minimize degradation.

3.6 Parasitological Examination

Urine specimens were first screened for macro- and micro-haematuria using reagent dipsticks (Combi-9®), a recognized proxy for S. haematobium infection [24]. Subsequently, urine filtration was performed using 10 mL syringes and Whatman No. 1 filter paper. The filters were then stained with iodine and examined microscopically under ×10 and ×40 objectives for the presence of S. haematobium eggs.
Stool samples were analyzed using the Kato-Katz thick smear technique, as recommended by the World Health Organization [30]. Egg counts were recorded as eggs per gram (EPG) of feces to assess the presence

and intensity of S. mansoni and other helminths. Infections were classified into light, moderate, or heavy intensities according to WHO guidelines [30].

3.7 Snail Intermediate Host Survey

To complement the parasitological data, freshwater bodies in proximity to the study communities were surveyed for intermediate snail hosts. Snails were collected using long-handled scoop nets and manual techniques. Collected snails were identified based on shell morphology and examined for cercarial shedding to determine infectivity [20].

3.8 Data Analysis

Data were summarized using frequencies and percentages to determine the prevalence and intensity of Schist soma haematobium and S. mansoni infections across LGAs, age groups, and gender. Infection intensity was categorized based on WHO guidelines. Mixed infections and other intestinal parasites were described using frequency distributions.

4. RESULTS AND DISCUSSION

4.1 Prevalence of Schistsoma Haematobium and Schistsoma Mansoni across Lgas

A total of 900 participants were examined for schistosomiasis across three LGAs in Nasarawa State. The overall prevalence was 11.3%, with S. haematobium more prevalent (9.3%) than S. mansoni (2.0%). Mixed infections were detected in 0.4% of cases.

Table 1. Prevalence of Schistosomiasis by Local Government

Category	Akwanga	Doma	Nasarawa	Total
Number Examined	300	300	300	900
Number Infected	23 (7.7%)	37 (12.3%)	42 (14.0%)	102 (11.3%)
S. haematobium	20 (6.7%)	31 (10.3%)	33 (11.0%)	84 (9.3%)
S. mansoni	3 (1.0%)	6 (2.0%)	9 (3.0%)	18 (2.0%)
Mixed Infection	1 (0.6%)	0 (0.0%)	3 (1.0%)	4 (0.4%)

Table 1 shows that schistosomiasis remains endemic across all surveyed LGAs in Nasarawa State. Nasarawa LGA had the highest overall prevalence of 14.0%, followed by Doma (12.3%) and Akwanga (7.7%). Notably, S. haematobium infections were highest in Nasarawa (11.0%), aligning with its overall highest burden, and lowest in Akwanga (6.7%). S. mansoni infections, although generally lower, followed a similar pattern with Nasarawa (3.0%) leading. Mixed infections were also most frequent in Nasarawa (1.0%), indicating more intense transmission in that locality.

Table 2. Prevalence and Intensity of S. Haematobium by Local Government

Category	Akwanga	Doma	Nasarawa	Total
Number Examined	300	300	300	900
Number Infected	20 (6.7%)	31 (10.3%)	33 (11.0%)	84 (9.3%)
Low Intensity	20 (6.7%)	29 (9.7%)	32 (10.7%)	81 (9.0%)
Moderate Intensity	0 (0.0%)	2 (0.7%)	1 (0.3%)	3 (0.3%)
Mixed Infection	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Table 2 provides detailed information on the intensity of S. haematobium infection of the 84 individuals infected, 96.4% had light infections, while only 3 cases (0.3%) showed moderate intensity. No heavy infections were recorded. This suggests that while prevalence is notable, the worm burden per individual is relatively low. Nasarawa had the highest number of both low (10.7%) and overall infections (11.0%).

Table 3. Prevalence and Intensity of S. Mansoni by Local Government

Category	Akwanga	Doma	Nasarawa	Total
Number Examined	300	300	300	900
Number Infected	3 (1.0%)	6 (2.0%)	9 (3.0%)	18 (2.0%)
Low Intensity	3 (1.0%)	6 (2.0%)	9 (3.0%)	18 (2.0%)
Moderate Intensity	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
High Intensity	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Table 3 shows that all 18 cases of S. mansoni infection recorded were of low intensity, further reinforcing the finding that intestinal schistosomiasis is less severe in this population than urinary schistosomiasis. Nasarawa again had the highest prevalence (3.0%), which mirrors its pattern in S. haematobium. No moderate or heavy intensity infections were reported in any LGA.

4.2 Age and Gender-Specific Prevalence

Table 4. Age-Specific Prevalence of Schistosomiasis in Nasarawa State

Category	<9	10–14	15–19	20–24	Total
Number Examined	178	254	245	193	900
Number Infected	8 (4.5%)	47 (16.5%)	35 (14.3%)	12 (6.2%)	102 (11.3%)
S. haematobium	5 (2.8%)	42 (14.8%)	28 (11.4%)	9 (4.7%)	84 (9.3%)
S. mansoni	3 (1.7%)	5 (1.8%)	7 (2.9%)	2 (1.6%)	18 (2.0%)
Mixed Infection	1 (0.6%)	2 (0.7%)	1 (0.6%)	0 (0.0%)	4 (0.4%)

The data in Table 4 illustrate that school-aged children (10–14 years) are the most at-risk group, with a prevalence rate of 16.5%. This is followed closely by adolescents aged 15–19 years at 14.3%. These age groups also had the highest rates of S. haematobium and S. mansoni infections. Children under 9 years had the lowest prevalence (4.5%).

Table 5. Gender-Specific Prevalence of Schistosomiasis in Nasarawa State

Category	Male	Female	Total
Number Examined	472	428	900
Number Infected	79 (16.7%)	23 (5.4%)	102 (11.3%)
S. haematobium	65 (13.8%)	19 (4.4%)	84 (9.3%)
S. mansoni	14 (3.0%)	4 (0.9%)	18 (2.0%)
Mixed Infection	3 (0.6%)	1 (0.2%)	4 (0.4%)

Table 5 reveals a significantly higher prevalence among males (16.7%) compared to females (5.4%), with both S. haematobium (13.8%) and S. mansoni (3.0%) more common in males. Mixed infections were also more frequent in males (0.6%) than females (0.2%).

4.3 Other Intestinal Parasites Identified

In addition to schistosomiasis, the study documented a total of 156 cases of other intestinal parasites, indicating a high burden of polyparasitism in the study population. Among helminths, hookworm was the most prevalent, accounting for 39.1% of the total non-schistosomal infections. This was followed by Ascaris lumbricoides (10.9%) and Trichuris trichiura (7.7%).

Protozoan infections were also present in notable proportions. Entamoeba coli had the highest protozoan prevalence (17.9%), while Entamoeba histolytica (7.1%) and Giardia intestinalis (4.5%) were also identified.

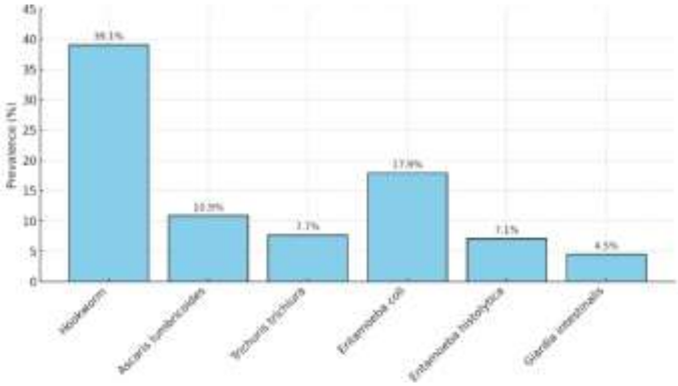

Figure 1. Prevalence of other Intestinal Parasites Identified

Figure 1 reveled the substantial presence of other intestinal parasites alongside schistosomiasis in Nasarawa State. Hookworm infection, which leads at 39.1%, is especially concerning due to its strong association with iron-deficiency anemia and malnutrition, particularly in children. A. lumbricoides and T. trichiura, both soil-transmitted helminths, further reflect poor environmental sanitation and widespread fecal contamination. The protozoan infections, especially E. coli (17.9%), which is considered non-pathogenic but indicative of fecal-oral transmission.

The results of this study affirm that schistosomiasis continues to pose a moderate public health burden in Nasarawa State, with an overall prevalence of 11.3%. Although this figure is lower than some previously reported rates, it still reflects active transmission in the region. For instance, a previous study conducted in Lafia reported a higher prevalence of 16.3% among secondary school students [21], while other states in Nigeria such as Niger (26.1%), Kebbi (21.9%), and the Federal Capital Territory (20.3%) have recorded even higher rates [18]. The current finding, however, aligns closely with those from Katsina (11.3%) and Jigawa (11.4%), suggesting that Nasarawa State falls within a moderate endemicity threshold for schistosomiasis as categorized by the World Health Organization [28].

The predominance of Schist soma haematobium (9.3%) over S. mansoni (2.0%) in this study is consistent with ecological patterns in Northern Nigeria, where Bulinus snails the intermediate host of S. haematobium are more commonly found than Biomphalaria snails, the host for S. mansoni [20]. Infections were primarily clustered around rivers and natural water bodies, highlighting the role of untreated water sources in transmission. Similar observations have been reported in related studies [5], [8]. A significant gender-based disparity was observed, with males showing a higher prevalence (16.7%) compared to females (5.4%).

This pattern echoes the findings of earlier studies [11], [26], where male students had substantially higher infection rates. This disparity is largely attributed to behavioral factors, as males are more likely to engage in outdoor water-contact activities such as swimming, fishing, and irrigation, which increases their risk of exposure [1]. On the other hand, sociocultural and religious norms may limit the extent of female interaction with open water sources in these communities [25].

Age distribution also played a critical role in infection prevalence. The highest infection rates were noted among participants aged 10–14 years (16.5%), followed by those aged 15–19 years (14.3%). This age group has previously been identified as the most vulnerable due to their adventurous nature and greater physical engagement in water-related activities [27], [6]. Such trends are also consistent with findings in other parts of Nigeria [14], [12], reinforcing the notion that targeted intervention for this demographic is essential. The detection of co-endemic intestinal parasites, particularly hookworm (39.1%), Ascaris lumbricoides (10.9%), and Entamoeba coli (17.9%), points to poor sanitation and hygiene standards in the study area. These findings align with earlier reports on soil-transmitted helminths and intestinal parasitic infections in Nigeria [4], [7].

The co-occurrence of these infections underscores the need for an integrated parasitic disease control strategy that simultaneously addresses schistosomiasis and soil-transmitted helminths through improved water, sanitation, and hygiene (WASH) infrastructure, alongside mass drug administration

(MDA) campaigns [15], [28]. Despite ongoing deworming programs and MDA interventions, schistosomiasis and other parasitic infections remain prevalent in Nasarawa State. Continued exposure to infested water bodies, especially among adolescent males, underscores the urgent need for sustainable, community-based WASH interventions, regular MDA, and robust health education programs aimed at changing risk-related behaviors [19], [28].

5. CONCLUSION

This study provides a comprehensive assessment of the current prevalence and distribution of Schist soma haematobium and Schist soma mansoni infections across three LGAs in Nasarawa State. With an overall prevalence of 11.3%, the findings confirm that schistosomiasis remains a moderate-risk public health challenge in the region. S. haematobium was more dominant than S. mansoni, suggesting a stronger ecological presence of Bulinus snails in local water bodies.

The prevalence was significantly higher among males and school-aged children (10–14 years), who are more likely to engage in water-contact activities such as swimming, fishing, and irrigation. These demographic patterns revealed the behavioral and environmental drivers of transmission. Furthermore, the co-detection of other intestinal parasites including hookworm, Ascaris lumbricoides, and protozoans like Entamoeba coli, indicates the widespread impact of poor sanitation and inadequate access to clean water.

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Authors Contributions Statement

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Rabiu Suleiman	✓	✓	✓		✓	✓		✓	✓	✓	✓		✓	✓
Amuga Aduk Gideon	✓	✓		✓			✓		✓	✓		✓	✓	
Yako Andrew Bmibmitawuza	✓	✓		✓			✓		✓	✓		✓	✓	

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

Conflict of Interest Statement

No actual or potential conflicts of interest with respect to the research.

Informed Consent

Informed consent was secured from all participants or from parents/guardians in the case of minors. Participant confidentiality and anonymity were rigorously maintained throughout the study.

Ethical Approval

Ethical clearance was obtained from the Nasarawa State Ministry of Health Ethical Review Committee.

Data Availability

Data are available on request.

REFERENCES

[1] M. K. Abdullahi, S. E. Bassey, and T. I. Oyeyi, 'The epidemiology of Schistosoma haematobium infections in the 44 Local Government Areas of Kano State, Nigeria," Niger', J. Parasitol, vol. 32, no. 1, pp. 19-24, 2011.

[2] R. A. Adekoya, Prevalence and factors associated with urinary schistosomiasis among school-aged children in Lafia Local Government. Nasarawa State, Nigeria, 2016.

[3] J. Ajanusi, N. M. Usei, A. Sani, K. A. N. Esievo, and J. U. Umoh, 'Index of potential contamination for urinary schistosomiasis in five settlements near River Kubanni in Zaria', Niger. J. Parasitol, vol. 24, no. 60, pp. 23-25, 2001.

[4] G. A. Amuga, 'Schistosomiasis: Epidemiological factors enhancing transmission in Nigeria', Glob. Res. J. Public Health Epidemiol, vol. 8, no. 7, pp. 23-32, 2020.

[5] B. Barnabas, M. B. Aliyu, M. Gbate, U. P. Obi, and A. A. Attairu, 'Survey of schistosomiasis and other intestinal helminthiases among school-aged children in Bida, Niger State, Nigeria', J. Pharm. Biomed. Sci, vol. 15, pp. 1-2, 2012.

[6] A. B. Bello and L. D. Edungbola, 'Schistosoma haematobium: A neglected common parasitic disease of children', Acta Paediatr, vol. 1, no. 8, pp. 601-604, 1992. http://doi.org/10.1111/j.1651-2227.1992.tb12309.x

[7] S. Brooker, A. C. Clements, and D. A. Bundy, "Global epidemiology, ecology and control of soil-transmitted helminth infections," Adv. Parasitol., vol. 62, pp. 221-261, 2009. http://doi.org/10.1016/S0065-308X(05)62007-6

[8] D. A. P. Bundy, 'Epidemiology and transmission of intestinal helminths', in " in Enteric Infection, vol. 2, I. Helminths, M. J. G. Farthing, G. T. Keusch, and D. Wakelin, Eds. Chapman & Hall Medical, 1995, pp. 5-24.

[9] L. Cnops, 'Real-time PCR targeting the Dra1 sequence for Schistosoma haematobium detection', Acta Trop, vol. 128, no. 3, pp. 542-547, 2013.

[10] S. G. Cowper, "Bilharziasis (schistosomiasis) in Nigeria," Trop. Geogr. Med., vol. 25, pp. 105–118, 1973.

[11] C. B. Eke, 'Prevalence of intestinal helminthiasis among school children in Anambra State, " Ann', Ann. Trop. Med. Public Health, vol. 10, pp. 95-100, 2017.

[12] M. Ezhim, 'The prevalence of urinary schistosomiasis among primary school children in a northern Nigeria population', Int. J. Adv. Res, vol. 3, no. 11, pp. 511-519, 2015.

[13] I. M. K. Gadzama and R. F. Apkiri, 'Eosinophiluria in diagnosis of urinary schistosomiasis in Zaria', Best J, vol. 6, no. 2, pp. 85-88, 2009.

[14] A. Isma'il, M. I. K. Gadzama, and S. P. Bako, 'Bat roosts and associated nuisance in public primary and secondary schools in Zaria, Nigeria: A problem worth addressing'. [Online]. Available: https://www.ijern.com/journal/2016/January-2016/04.pdf.

[15] K. C. Kosinski, 'Diagnostic accuracy of urine filtration and dipstick tests in Ghanaian schoolchildren', Acta Trop, vol. 118, no. 2, pp. 123-127, 2011. doi.org/10.1016/j.actatropica.2011.02.006

[16] U. Ladan, 'Gender-specific prevalence of urinary schistosomiasis near a dam in Zamfara State, Nigeria', J. Parasitol, vol. 32, pp. 57-60, 2011.

[17] O. A. Morenikeji and I. E. Eleng, 'Renal-related disorders in concomitant Schistosoma haematobium-Plasmodium falciparum infection among children in a rural community of Nigeria', J. Infect. Public Health, vol. 9, no. 2, pp. 136-142, 2016. doi.org/10.1016/j.jiph.2015.06.013

[18] F. O. Nduka, 'Prevalence of schistosomiasis in Nigeria: Mapping across states, " Glob', Glob. Health J, vol. 4, no. 2, pp. 88-97, 2019.

[19] I. H. Nock, A. Duniya, and M. Galadima, "Geohelminth eggs in the soil and stool of pupils of some primary schools in Samaru, Zaria, Nigeria," Niger. J. Parasitol., vol. 24, pp. 115-122, 2003. http://doi.org/10.4314/njpar.v24i1.37814
[20] I. O. Okonko, 'Urinary tract infections in pregnant women in southwestern Nigeria', Afr. J. Biotechnol, vol. 8, no. 23, pp. 6649-6657, 2009.
[21] V. A. Pam, 'Prevalence of urinary schistosomiasis among pupils in Keffi', J. Med. Trop, vol. 18, no. 2, pp. 121-125, 2016.
[22] S. Pukuma and H. Musa, 'Bulinus species and the epidemiology of schistosomiasis in Northern Nigeria', Niger. J. Parasitol, vol. 28, pp. 123-129, 2007. http://doi.org/10.4314/njpar.v28i2.37877
[23] T. Rine, J. A. Isa, and G. A. Amuga, 'Prevalence of urinary schistosomiasis among secondary school students in Lafia, Nasarawa State, Nigeria', J. Parasitol, vol. 34, no. 2, pp. 165-171, 2013.
[24] W. Wang, L. Wang, and Y.-S. Liang, 'Susceptibility or resistance of praziquantel in human schistosomiasis: a review', Parasitol. Res., vol. 111, no. 5, pp. 1871-1877, Nov. 2012. doi.org/10.1007/s00436-012-3151-z
[25] World Health Organization, Various reports and fact sheets on schistosomiasis and neglected tropical diseases. Geneva, 2001.
[26] Report of the WHO informal consultation on the use of praziquantel during pregnancy/lactation and albendazole/mebendazole in children under 24 months. Geneva: WHO Press, 2007.
[27] World Health Organization, Working to overcome the global impact of neglected tropical diseases: First WHO report on neglected tropical diseases. Geneva: WHO Press, 2010.
[28] World Health Organization, "Schistosomiasis: Key facts," 2020. [Online]. Available: https://www.who.int/news-room/fact-sheets/detail/schistosomiasis
[29] M. Cheesbrough, District Laboratory Practice in Tropical Countries: Part 1. Cambridge, U.K.: Cambridge Univ. Press, 2005. doi.org/10.1017/CBO9780511581304
[30] F. Sarmukaddan and S. Garad, Sample Size Estimation in Medical Studies. Bangalore, India: Bangalore Medical Publishers, 2006.

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