Science World Journal Vol. 21(No 2) 2026
www.scienceworldjournal.org
ISSN: 1597-6343 (Online), ISSN: 2756-391X (Print)
Published by Faculty of Science, Kaduna State University
https://dx.doi.org/10.4314/swj.v21i2.52

Full Length Research Article

PARASITE INTENSITY OF URINARY SCHISTOSOMIASIS IN COMMUNITIES IN BIASE LGA

Nkanu Uno Ekpe, Emmanuel Ogban, and Emmanuel Chukwunenye Uttah*

Department of Animal and Environmental Biology, Faculty of Biological Sciences, University of Cross River State, Calabar, Nigeria

*Corresponding Author Email Address: drecuttah@yahoo.com

ABSTRACT
Schistosomiasis remains a significant public health challenge in many rural communities in Nigeria, particularly where dependence on natural freshwater sources sustains transmission. This study investigated the intensity of urinary schistosomiasis among residents of selected communities in Biase Local Government Area, Cross River State, Nigeria. A community-based cross-sectional study was conducted among 915 participants, comprising 405 adults and 510 school-aged children, selected through multistage sampling. Mid-day urine samples were collected and examined for Schistosoma haematobium eggs using the standard filtration technique. Infection intensity was expressed as eggs per 10 ml of urine and classified according to World Health Organization (WHO) guidelines. The overall mean intensity was 47.15 ± 20.68 eggs/10 ml urine, indicating moderate transmission. Significant variations in infection intensity were observed among communities ($p < 0.01$), with Abini (56.45 ± 24.30 eggs/10 ml) and Adim (54.84 ± 22.95 eggs/10 ml) recording the highest intensities, while Betem (15.17 ± 7.92 eggs/10 ml) recorded the lowest. Children had significantly higher infection intensity than adults (49.31 ± 21.85 vs. 43.97 ± 19.42 eggs/10 ml; $p < 0.05$), and 48% of infected children harboured heavy infections. Infection intensity declined progressively with age. The findings reveal persistent hotspots of schistosomiasis transmission in Biase LGA and underscore the need for targeted mass drug administration, improved water and sanitation facilities, and continuous surveillance to support elimination efforts.

Keywords: Schistosomiasis, Schistosoma haematobium, infection intensity, children, Biase LGA, Nigeria.

INTRODUCTION

Schistosomiasis affects about 250 million people worldwide, with over 700 million at risk of infection in endemic areas across many countries (Ekpo *et al.,* 2008). The disease is endemic in 78 countries, 51 of which require preventive drug administration to control moderate-to-severe transmission (Kura *et al.,* 2022). An estimated 120 million people suffer severe consequences of the infection, with an estimated annual mortality rate of about 20,000 globally (WHO, 1998). About 30 million people need treatment for the disease annually (Anosike *et al*., 2003). In most endemic areas, the highest infection intensities are found in children aged 5-15 years (WHO, 1998). It is the second most important source of human morbidity and mortality after malaria (WHO, 2022).

Of the estimated 192 million cases in sub-Saharan Africa (SSA), Nigeria alone accounts for 29 million (Steinmann et al., 2006). The disease DALYs in SSA are estimated at 1.6–4.2 million, accounting for 93% of the estimated global DALYs (Hotez & Kamath, 2009). Among these estimates, Nigeria ranked highest. Urinary schistosomiasis accounts for more than 90% of all schistosomiasis cases in Nigeria, suggesting that the DALYs were mainly from urinary schistosomiasis. Schistosomiasis continues to pose a major public health challenge in Nigeria. Although national control programs have implemented mass drug administration (MDA) with praziquantel, coverage remains inconsistent, and reinfection rates are high due to continued exposure to contaminated water. Nigeria has the highest number of schistosomiasis cases worldwide, with over 20% of global cases requiring chemotherapy (Emanghe *et al*., 2023).

In Cross River State, recent surveys have shown declines in schistosomiasis prevalence, but transmission persists in rural LGAs like Biase (Oparah *et al.,* 2021). There have been reports of hematuria and other clinical manifestations suggestive of endemic urinary schistosomiasis. The absence of localized epidemiological data for Biase LGA hinders effective control. Without information on prevalence, intensity, snail host abundance, and water-contact behavior, interventions cannot be tailored to local transmission dynamics. This gap perpetuates transmission and undermines Nigeria's efforts to meet the World Health Organization's (WHO) target of eliminating schistosomiasis as a public health problem by 2030.

This study will provide baseline epidemiological data on schistosomiasis in Biase LGA. The findings will guide control programs such as MDA with praziquantel and identify high-risk communities and water bodies, thereby informing public health policy. This study will also advance scientific knowledge on snail intermediate host diversity and infection rates in the region, and also support the WHO's roadmap for the elimination of schistosomiasis as a public health problem by 2030. This study assessed the intensity of schistosomiasis among communities in Biase LGA.

MATERIALS AND METHODS

Study Area

The study was conducted in the Biase Local Government Area (LGA) of Cross River State, Nigeria. Biase Local Government Area (LGA) is one of the eighteen LGAs in Cross River State, located in the South–South geopolitical zone of Nigeria. Biase lies approximately between latitudes 5°30'N and 6°05'N and longitudes 8°00'E and 8°30'E, with a total population of 253778 in 2026 (Uttah *et al*., 2023). The LGA is situated within the Cross River basin and forms part of the humid tropical rainforest belt of southern Nigeria. Biase LGA is characterized by undulating lowland topography interspersed with river valleys, floodplains, and swampy depressions.

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The vegetation is typical of tropical rainforest, consisting of evergreen trees, secondary forest regrowth, oil palm groves, and riparian vegetation along watercourses. Aquatic macrophytes and submerged vegetation are abundant in streams and ponds, providing ideal microhabitats for freshwater snails, particularly *Bulinus* species, which are the intermediate hosts of *Schistosoma haematobium*.

The climate of Biase is tropical humid, with two major seasons: a long rainy season (March–October) and a short dry season (November–February). Annual rainfall ranges between 2,000 mm and 3,000 mm, peaking between June and September. Mean daily temperatures range from 24°C to 32°C, while relative humidity often exceeds 75% throughout the year.

Biase LGA has a predominantly rural population distributed across several communities, including Akpet, Adim, Abini, Umon, Betem, Erei, Iwuru, and Agwagune. The inhabitants are largely of the Ejagham ethnic group, with farming and fishing as the principal occupations. Subsistence agriculture (cassava, yams, maize, cocoyams and oil palm) and artisanal fishing are common livelihoods that require frequent contact with rivers and wetlands.

Healthcare services are delivered through primary healthcare centers, health posts, and a limited number of private clinics. However, diagnostic facilities for parasitological confirmation of schistosomiasis may be inadequate in some rural settings, potentially leading to underdiagnosis and underreporting. Mass drug administration (MDA) campaigns with praziquantel may have been conducted periodically, but coverage and compliance can vary between communities.

Study Population

The study population consisted of residents aged ≥5 years in selected communities. Particular emphasis was placed on school-aged children (5–15 years), who constituted the highest risk group for schistosomiasis. Adults engaged in frequent water-contact occupations were included. Inclusion criteria also included residency in the community for ≥ 6 months, age> 5 years, and informed consent (and assent for minors). Exclusion criteria included taking praziquantel within the past 3 months, being seriously ill, and refusal to provide consent.

Sample Size Determination

Sample size was calculated using Cochran's formula for prevalence studies:

Where:

$n_0 = Z^2 p(1-p) / d^2$

Z = 1.96 (95% confidence level)

P = 0.5 (assumed prevalence due to variability)

D = 0.05 (precision level)

The calculated minimum sample size was 384. After applying finite population correction and adjusting for 10% non-response, the final sample size was 405 participants.

A multistage sampling technique was used to select eligible participants. First, communities were ranked into large, medium, and small. Three communities were randomly selected from each category, for a total of 9 communities. The sampling population for each category was determined as follows: 50, 45, and 40 adults, and 65, 55, and 50 children for the large, medium, and small communities, respectively. These brought the population size to 405 adults and 510 children. Among the large communities, the selected communities were Akpet Central, Abini, and Betem. From the medium stratum, Akparavuni, Adim, and Ibogo were selected, while Egbor, Etana, and Umuolor were selected from the small-category communities. Within each community, households were identified through systematic household visits. Eligible participants were recruited consecutively until the required sample size for each community was attained.

Data Collection Procedures

Parasitological Assessment: Urine Sample Collection

Participants were provided with sterile vials for mid-day urine samples (10:00 am–2:00 pm). Approximately 10–20 ml urine samples were collected in sterile, labeled universal containers and transported to the laboratory in insulated cool boxes containing ice packs. Where immediate examination was not possible, samples were refrigerated at 4°C and processed within 24 hours using the urine filtration technique to detect Schistosoma haematobium eggs.

Laboratory Examination

Urine samples were processed using the filtration technique. Ten milliliters of urine were filtered through a polycarbonate membrane filter and examined microscopically for *Schistosoma haematobium* eggs. The filter membrane/sediment was examined microscopically using a light microscope. The entire preparation was initially scanned under the 10× objective lens (100× magnification), and suspected Schistosoma haematobium eggs were confirmed under the 40× objective lens (400× magnification) based on their characteristic oval shape and terminal spine.

Egg counts were expressed as eggs per 10 ml of urine. Intensity was classified using WHO classification criteria into light infection (<50 eggs/10 ml) and heavy infection (≥50 eggs/10 ml).

Statistical Analysis

Infection intensity was expressed as mean egg counts. The Student's t-test was used to compare mean egg counts between two groups, whereas one-way ANOVA was used for comparisons involving multiple groups. All statistical analyses were conducted at the 95% confidence level, and p-values < 0.05 were considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Faculty of Biological Sciences Ethics Committee (TETFund/UNICROSS/25/037). Written informed consent was obtained from adults in line with best practices. For minors, parental consent and child assent were obtained. Confidentiality was maintained. Infected individuals were treated with praziquantel according to WHO guidelines. In all, community sensitization was conducted prior to data collection.

RESULTS

A total of 915 participants were examined across nine communities in the Biase Local Government Area. These comprised 405 adults (194 males and 211 females) and 510 school-aged children (254 males and 256 females), indicating a relatively balanced gender distribution across both population groups.

At the community level, the number of participants examined was largely uniform, with most communities contributing between 90 and 115 individuals. The highest number of participants (115) was

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recorded in Akpet Central, Abini, and Betem, while the least (90) was observed in Egbor, Etana, and Umuolor. This relatively even distribution enhances comparability of prevalence across communities.
The overall mean intensity was 47.15 ± 20.68 eggs/10 ml urine, indicating moderate transmission. Significant variations in infection intensity were observed among communities ($p < 0.01$), with Abini (56.45 ± 24.30 eggs/10 ml) and Adim (54.84 ± 22.95 eggs/10 ml) recording the highest intensities, while Betem (15.17 ± 7.92 eggs/10 ml) recorded the lowest. Children had significantly higher infection intensity than adults (49.31 ± 21.85 vs. 43.97 ± 19.42 eggs/10 ml; $p < 0.05$), and 48% of infected children harboured heavy infections.

Parasite Intensity
The overall mean intensity of infection was 47.15 ± 20.68 eggs/10 ml urine. The intensity of Schistosoma eggs among adults in the community is presented in Table 1. The highest AMI (54.88 ± 23.85 eggs/10 ml urine) was recorded at Abini, followed by (51.31 ± 21.70 eggs/10 ml urine) recorded at Adim. The least mean intensity (9.50 ± 5.84 eggs/10 ml urine) was recorded at Betem. In all, four of the nine communities, representing 44.44%, had higher mean intensity than the overall mean. There was a statistically significant difference in mean intensities across communities ($F = 4.72$, df = 8, 58, $p < 0.001$). Post hoc Dunn's test with Bonferroni correction revealed that communities with high mean intensities (Abini, Adim, Ibogo, and Umuolor) had significantly higher infection intensities than low-intensity communities such as Betem and Akpet ($p < 0.05$). However, no significant differences were observed within the high-intensity group, indicating clustering of transmission hotspots. Some communities have more cases of infection as well as heavier parasite burdens, indicating higher transmission intensity or repeated exposure. This suggests localized hotspots of transmission and higher exposure levels.

Table 1: Intensity of Schistosoma eggs among adults in relation to the communities

Community	Number sampled	Number positive	Parasite count	Mean intensity
Akpet Central	50	3	35	11.67 ± 6.42
Abini	50	17	933	54.88 ± 23.85
Betem	50	2	19	9.50 ± 5.84
Akparavuni	45	4	71	17.75 ± 8.63
Adim	45	13	667	51.31 ± 21.70
Ibogo	45	9	452	50.22 ± 20.81
Egbor	40	5	156	31.20 ± 14.76
Etana	40	6	238	39.67 ± 16.82
Umuolor	40	7	331	47.29 ± 19.31
Total	405	66	2902	43.97±19.42

The intensity of infection among children is shown in Table 2. The AMI was highest in Abini (57.44 ± 24.76 eggs/ 10 mL urine), followed by Adim (57.39 ± 24.12 eggs/ 10 mL urine), and least in Betem (18.00 eggs/ 10 mL urine) and Akpet Central (18.43 ± 9.21 eggs/ 10 mL urine). There is a statistically significant difference in mean infection intensities among children across communities (Kruskal-Wallis $H = 23.9$, df = 8, $p < 0.01$). The intensities in Abini, Adim, and Ibogo indicate pronounced transmission hotspots among children.
Comparing infection intensity between children and adults
Children carried significantly heavier parasite burdens than adults. Using the Mann-Whitney U test, there was a statistically significant difference in intensity between children and adults ($U = 2720$, $Z = 2.12$, $p < 0.05$). Based on the WHO classification, both children and adults exhibited predominantly light-intensity infections (<50 eggs/10 ml). However, the mean intensity among children approached the heavy-infection threshold, suggesting a higher proportion of heavy infections in this group than in adults.

Table 2: Intensity among children

Community	Number Examined	Number Positive	Parasite Count	Mean intensity
Akpet Central	65	7	129	18.43 ± 9.86
Abini	65	27	1551	57.44 ± 24.76
Betem	65	4	72	18.00 ± 9.21
Akparavuni	55	4	118	29.50 ± 14.27
Adim	55	18	1033	57.39 ± 24.12
Ibogo	55	14	749	53.50 ± 22.63
Egbor	50	8	386	48.25 ± 20.35
Etana	50	8	391	48.88 ± 20.94
Umuolor	50	7	354	50.57 ± 21.63
Total	510	97	4783	49.31±21.85

The infection intensity among adults and children is pooled.
The intensity of infection among adults and children, pooled together, in relation to their communities, is presented in Table 3. The overall pooled AMI was 47.15 ± 20.68 eggs/10 ml urine. The highest pooled AMI (56.45 ± 24.30 eggs/10 ml) was from Abini, followed by 54.84 ± 22.95 eggs/10 ml from Adim. The least pooled AMI (15.17 ± 7.92 eggs/10 ml) was from Betem, followed by 16.40± 8.75 eggs/10 ml from Akpet Central. The AMI differences between communities were statistically significant (Kruskal-Wallis H test: $H = 24.8$, df = 8, $p < 0.01$). Transmission was heterogeneous, with clear community-level hotspots. Five communities, namely Abini, Adim, Ibogo, Umuolor, and Etana, were high-intensity (hotspots) communities. Two communities (Betem and Akpet Central) were low-intensity, and two (Akparavuni and Egbor) were intermediate-intensity.
Assessment of heavy infections among children and adults is presented in Table 4. In all, 48% (almost half) of infected children had heavy infections (≥ 50 eggs/10 mL urine). Adults had a substantially heavier infection burden, but that was lower than that of children.

Table 3: Intensity among adults and children pooled together

Community	Number Examined	Number Positive	Parasite Count	Mean Intensity
Akpet Central	115	10	164	16.40± 8.75
Abini	115	44	2484	56.45± 8.75
Betem	115	6	91	15.17± 7.92
Akparavuni	100	8	189	23.63± 11.45
Adim	100	31	1700	54.84± 22.95
Ibogo	100	23	1201	52.22± 21.88
Egbor	90	13	542	41.69± 18.34
Etana	90	14	629	44.93± 19.12
Umuolor	90	14	685	48.93± 20.47
Total	915	163	7685	47.15± 20.68

 https://dx.doi.org/10.4314/swj.v21i2.52

Table 4: Assessment of heavy infections among children and adults in Biase

Community	Number Examined	Number Positive	Parasite Count
Children	49.31 ± 21.85	48.00%	High burden
Adults	43.97 ± 19.42	31.00%	Moderate burden

Intensity of schistosomiasis in relation to age
Intensity of schistosomiasis in relation to age is presented in Table 5. The highest AMI was recorded in the < 10 years age group (53.04 ± 22.84 eggs/10 mL urine), followed by the 11-20 years age group (50.76 ± 22.84 eggs/10 mL urine). The lowest AMI was in the oldest age group, ≥ 61 years (37.25 ± 16.84 eggs/10 mL urine). There was a statistically significant difference in mean intensity across age groups (Kruskal-Wallis Test, H = 13.7, df = 6, $p < 0.05$).

Table 5. Intensity in relation to age

Age group (years)	Positive	Count	Mean intensity
<10	26	1379	53.04 ± 22.84
11–20	71	3604	50.76 ± 21.63
21–30	11	439	39.91 ± 17.36
31–40	13	595	45.77 ± 19.24
41–50	29	1162	40.07 ± 17.83
51–60	9	357	39.67 ± 17.28
≥61	4	149	37.25 ± 16.84
Total	163	7685	47.15±20.68

DISCUSSION
The present study investigated the intensity of urinary schistosomiasis among residents of selected communities in Biase Local Government Area of Cross River State, Nigeria. The overall mean intensity of 47.15 eggs/10 ml urine indicates moderate transmission according to World Health Organization (WHO) criteria. Although the overall mean intensity remained below the threshold for heavy infection (≥50 eggs/10 ml urine), several communities exceeded this threshold, indicating active transmission foci and persistent public health significance.
The moderate intensity observed in this study suggests that schistosomiasis transmission remains established within the study area despite ongoing national control efforts. Similar findings have been reported in several endemic regions of Nigeria, where praziquantel-based control programmes have reduced prevalence but have not completely interrupted transmission, as environmental and behavioural risk factors remain unchanged (Hotez *et al.,* 2014; WHO, 2022). The persistence of moderate-to-high infection intensities is particularly important because infection intensity is a stronger predictor of morbidity than prevalence alone (Gryseels *et al*., 2006; Colley *et al*., 2014).

The observed intensity pattern further supports the notion that repeated exposure to cercaria-infested water bodies persists among residents of Biase communities. Individuals who frequently engage in fishing, farming, bathing, swimming, and domestic water-contact activities are repeatedly exposed to infective cercariae, resulting in cumulative parasite acquisition and increased worm burden (Steinmann *et al*., 2006). Such repeated exposure has been identified as a major determinant of schistosomiasis transmission in rural African communities where dependence on natural freshwater sources remains high (Emanghe *et al*., 2023).

One of the most significant findings of this study was the marked heterogeneity in infection intensity among communities. Abini, Adim, Ibogo, Umuolor, and Etana emerged as high-intensity transmission hotspots, while Betem and Akpet Central exhibited relatively low infection intensities. Statistical analysis confirmed significant differences in mean intensities among communities, demonstrating that schistosomiasis transmission is not uniformly distributed throughout the study area.
The existence of transmission hotspots is consistent with the focal nature of schistosomiasis epidemiology. Previous studies have shown that schistosome transmission is highly dependent on localized ecological conditions that favour the survival of intermediate host snails and facilitate human-water contact (Woolhouse *et al.,* 1997; Sturrock, 2001). Communities situated near slow-moving streams, ponds, marshes, and flood-prone areas often experience higher transmission than communities with better access to improved water sources.
The particularly high infection intensities recorded in Abini and Adim may be attributable to greater dependence on rivers and streams for domestic and occupational activities. Frequent exposure associated with artisanal fishing, irrigation, laundry, bathing, and recreational swimming may increase the probability of repeated infection. Similar community-level heterogeneity has been reported in other endemic areas of Nigeria, Ghana, Tanzania, and Cameroon, where transmission intensity varies with local ecological and behavioural factors (Ekpo *et al*., 2008; Tchuem-Tchuenté *et al*., 2012; Opara *et al*., 2021).
The identification of hotspot communities has important public health implications. Current WHO guidelines emphasize the need for targeted interventions in high-transmission communities to maximize the impact of control programmes (WHO, 2022). Such interventions may include intensified mass drug administration (MDA), snail control measures, improved water supply infrastructure, health education, and behavioural modification programmes.

A major finding of this study was that children harboured significantly higher infection intensities than adults. The overall AMI among children was 49.31 eggs/10 ml urine compared with 43.97 eggs/10 ml urine among adults. Furthermore, approximately 48% of infected children carried heavy infections compared with 31% of infected adults.
This finding agrees with the classical epidemiological pattern of schistosomiasis, in which school-aged children typically harbour the highest parasite burdens (Woolhouse, 1998; Colley *et al*., 2014). Numerous studies conducted throughout Africa have consistently demonstrated that infection intensity peaks during childhood and early adolescence (Kabatereine *et al*., 2011; Sacolo *et al*., 2018).
Several factors may explain the heavier parasite burden among children. First, children generally engage in more frequent and prolonged water-contact activities than adults. Swimming, playing, fishing, and crossing streams expose them repeatedly to cercarial-infested waters (Steinmann *et al.,* 2006). Secondly, children may have limited awareness of transmission risks and therefore are less likely to adopt protective behaviours. Thirdly, acquired immunity against schistosome infection develops gradually over years of exposure and may be less developed in younger individuals

(Mutapi *et al*., 2013).
The high proportion of heavy infections among children is particularly concerning because heavy-intensity infections are strongly associated with increased morbidity, including haematuria, anaemia, growth retardation, reduced cognitive performance, and impaired educational achievement (King *et al*., 2005; Colley *et al.,* 2014). Consequently, school-aged children remain the primary target group for preventive chemotherapy and other schistosomiasis control interventions.

The age-specific analysis revealed a declining trend in infection intensity with increasing age. The highest AMI was recorded among children younger than 10 years (53.04 eggs/10 ml urine), followed closely by those aged 11–20 years (50.76 eggs/10 ml urine). Thereafter, infection intensity progressively declined across older age groups, with the lowest intensity observed among participants aged 61 years and above.
This age-intensity profile is characteristic of endemic schistosomiasis and has been documented extensively in epidemiological studies across Africa, Asia, and South America (Anderson & May, 1991; Woolhouse, 1998). The observed pattern reflects an interaction between exposure rates and the gradual acquisition of partial immunity. Younger individuals generally experience more intense water contact and consequently acquire higher worm burdens. As individuals age, exposure often decreases due to changes in behaviour, occupation, and lifestyle. In contrast, repeated exposure to parasite antigens may induce partial protective immunity that limits the intensity of subsequent infection (Mutapi *et al*., 2013).
The gradual decline observed among adults in the present study supports previous findings suggesting that immunity against schistosome infection is acquired slowly over many years rather than developing rapidly after a single infection episode (Hagan *et al.,* 1991). Nevertheless, the persistence of moderate infection intensities among adults indicates that exposure continues throughout life in endemic communities, particularly among individuals engaged in farming and fishing activities.

An important observation from this study was the substantial proportion of individuals with severe infections, particularly among children. Heavy infections are epidemiologically significant because they contribute disproportionately to environmental contamination through egg excretion. According to WHO (2024), parasite populations are typically aggregated within host communities, whereby a relatively small proportion of individuals harbour the majority of parasites and contribute most of the transmission potential.
The findings of this study support this aggregation model. Communities with high AMIs not only had more infected individuals but also had individuals with heavier parasite burdens. Such heavily infected individuals serve as major reservoirs of infection, continuously contaminating freshwater habitats with schistosome eggs that subsequently infect intermediate-host snails.
This phenomenon has important implications for disease control because successful interruption of transmission requires not only reducing prevalence but also reducing infection intensity among highly infected individuals. Targeting these high-risk groups through repeated MDA and enhanced surveillance may substantially reduce the potential for transmission within endemic communities (WHO, 2022).

Implications for Schistosomiasis Control
The findings of this study have important implications for schistosomiasis control and elimination efforts in Cross River State and Nigeria as a whole. The persistence of moderate-to-high infection intensities indicates that transmission remains active despite previous interventions. This suggests that chemotherapy alone may be insufficient to achieve sustainable interruption of transmission.
Integrated control approaches are therefore required. Such approaches should combine regular praziquantel administration with improved water, sanitation, and hygiene (WASH) infrastructure, health education, behavioural change interventions, and environmental management to reduce snail populations (Rollinson *et al*., 2013; WHO, 2022). Particular attention should be directed toward hotspot communities such as Abini, Adim, Ibogo, Umuolor, and Etana, where transmission intensity remains highest. School-based intervention programmes should remain a priority because children represent the most heavily infected population group. Periodic monitoring of infection intensity should also be incorporated into surveillance activities since intensity provides a more sensitive indicator of transmission dynamics and morbidity than prevalence alone (WHO, 2022).

The limitation of this study was that although urine filtration followed by microscopy is the WHO-recommended reference method for diagnosing urinary schistosomiasis in epidemiological surveys, its sensitivity decreases substantially in areas of low transmission and among individuals with light infections. Consequently, some infected individuals may have been misclassified as uninfected. More sensitive diagnostic techniques, such as PCR-based assays or antigen detection methods, were not available for this study because of financial and laboratory constraints.

Conclusion
The present study demonstrates that urinary schistosomiasis remains an important public health problem in Biase LGA, with moderate overall infection intensity and substantial community-level heterogeneity. High-intensity transmission hotspots were identified, particularly in Abini, Adim, Ibogo, Umuolor, and Etana. Children carried significantly heavier parasite burdens than adults, and infection intensity declined progressively with age, reflecting the classical age-intensity profile of schistosomiasis. The substantial proportion of heavy infections among children underscores the need for strengthened, multisectoral control measures. The Cross River State Ministry of Health, in collaboration with the Federal Ministry of Health and relevant local government health authorities, should sustain and expand school- and community-based mass drug administration (MDA) with praziquantel, particularly in high-transmission communities such as Abini and Adim. The Biase Local Government Council, working with the Cross River State Rural Water Supply and Sanitation Agency and development partners, should improve access to safe water supplies and sanitation facilities to reduce dependence on cercariae-infested water bodies. The Cross River State Ministry of Education should integrate schistosomiasis education into school health programmes to promote behavioural change and reduce risky water-contact activities among school-aged children. Environmental health authorities, in collaboration with local communities, should implement environmental management measures, including vegetation clearance around transmission sites, improved drainage where feasible, and periodic

https://dx.doi.org/10.4314/swj.v21i2.52

malacological surveillance to monitor populations of intermediate-host snails. Sustainable elimination of schistosomiasis in Biase will require the coordinated implementation of these interventions through a One Health, multisectoral approach, supported by continuous surveillance, community engagement, and periodic programme evaluation.

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