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Original Article

Prevalence of Schistosomiasis and Soil-transmitted helminth infections among residents of Gabi and Duma communities, Lapai Local Government Area, Niger State, Nigeria

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ABSTRACT

Schistosomiasis and Soil-Transmitted Helminth (STH) infections remain major public health concerns in many rural communities of Nigeria, where poor sanitation and inadequate access to safe water facilitate transmission. This study determined the prevalence of schistosomiasis and STH infections among residents of Gabi and Duma communities in Lapai L.G.A. A cross-sectional study was conducted among 230 participants comprising 126 individuals from Gabi and 104 from Duma. Stool and urine samples were collected and examined using standard parasitological techniques, including fecal flotation and urine sedimentation methods. Data obtained were analyzed using SPSS, with statistical significance set at $p < 0.05$. The findings revealed an overall intestinal parasite prevalence of (47.39%), with a significantly higher prevalence in Gabi (57.14%) than in Duma (35.58%) and it statistically significant at ($\chi^2 = 3.97$, $p = 0.046$). *Ancylostoma spp*. (17.46% in Gabi; 14.56% in Duma) was the most prevalent parasite, while *Entamoeba spp.* showed a significantly higher prevalence in Gabi (13.49%) than in Duma (4.85%) ($p = 0.028$). Other parasites detected included *Ascaris lumbricoides* (10.32% in Gabi; 7.77% in Duma), *Strongyloides stercoralis* (10.32% in Gabi; 3.88% in Duma), *Taenia saginata* (5.56% in Gabi; 2.91% in Duma), *Trichuris trichiura* (0.97%), and *Schistosoma mansoni* (0.97%). *Schistosoma haematobium* infection was detected only in Duma, with a prevalence of (2.91%, $p = 0.029$). The study concludes that schistosomiasis and STH infections remain endemic in the study communities. Strengthening mass drug administration, improving sanitation and access to safe water, and promoting health education are recommended to reduce the burden of these infections.

Keywords: STH, Prevalence, Schistosomiasis, NTDs, Lapai, *Ascaris lumbricoides*.

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INTRODUCTION

Neglected Tropical Diseases (NTDs) are a group of infectious diseases that mostly impact impoverished populations, especially in tropical and subtropical region in Nigeria [13]. Schistosomiasis and STH infections are among the most common NTDs, and they remain major public health issues in sub-Saharan Africa [12]. Schistosomiasis is caused by trematode parasites of the genus *Schistosoma spp*, while STH infections are primarily caused by hookworms, *Trichuris trichiura*, and *Ascaris lumbricoides* [2]. These infections are associated with chronic morbidity, such as Anaemia, malnutrition, impaired cognitive development, decreased productivity among affected populations, and reduced educational achievement [9,13]. Nigeria bears one of the highest burdens of schistosomiasis and STH infections globally [11]. The pooled prevalence of STH infections among Nigerian children was estimated to be almost 54% in a comprehensive review by [10], highlighting the continuous burden of these diseases despite the ongoing control program. Similar prolonged transmission has been associated to environmental contamination, poor sanitation, and limited access to clean water, according to studies carried out in North-Central Nigeria [1]. Although mass drug administration (MDA) is still the mainstay for controlling schistosomiasis and STH, reinfection commonly occurs in endemic populations where behavioral and environmental risk factors continue to exist [14]. Consequently, accurate and current epidemiological data are required to guide effective intervention strategies. This study therefore assessed the prevalence of schistosomiasis and soil-transmitted helminth infections among residents of Gabi and Duma communities in Lapai L.G.A, Niger State, Nigeria.

MATERIALS AND METHODS

Study Area

The study was conducted in two distinct locations (Duma and Gabi) within the Lapai L.G.A of Niger State, Nigeria. The Lapai L.G.A is positioned within the Guinea Savannah belt, between latitudes 8°30' and 9°01' North and longitudes 6°30' East [8]. It has a tropical continental climate with distinct dry and wet seasons and is situated in the northeastern part of Niger State [8] (Figure1).

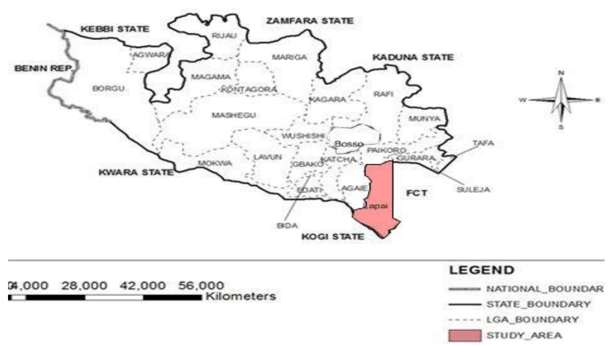

Figure: 1. Map of Niger State showing Lapai LGA (Source: [3])

Study Design

This study employed a cross-sectional descriptive research design to evaluate the impacts of selected Neglected Tropical Diseases (Schistosomiasis and Soil-Transmitted Helminths) in lapai, Niger State.

Ethical Consideration

Ethical approval was obtained from the ministry of health, Minna, Niger State. Ref No: STA/951/T.3/172 Written informed consents were sought from participants, and all data were anonymized to ensure confidentiality.

Sample Collection

A total of 230 participants were collected comprising 126 residents from Gabi and 104 residents from Duma community. Stool samples were analyzed using the fecal flotation technique following [5] guidelines, while urine samples were examined using sedimentation methods as described by [4].

Data analysis

Data was analyzed using SPSS. Descriptive statistics were used to determine prevalence rates, while Chi-square tests were used to assess associations between variables. Statistical significance was set at $p < 0.05$.

RESULTS

The overall prevalence of intestinal parasites detected in stool samples from Gabi and Duma communities.

A total of 72 individuals tested positive for at least one parasite out of the 126 samples analyzed in Gabi, yielding an overall prevalence of 57.14%. In contrast, Duma found 37 positive cases out of 104 samples, indicating a 35.58% prevalence. Combined, the two communities yielded 109 positive cases out of 230 participants, resulting in an overall prevalence of (47.39%). Overall stool parasite prevalence is significantly higher in Gabi with over (57.14%) (p=0.046), but this is mainly driven by *Entamoeba* spp. In Gabi community, *Entamoeba* spp. accounted for (13.49%) infections, while *Ancylostoma* spp was slightly more common with a prevalence of (17.46%). Duma recorded comparable *Ancylostoma* spp infections (14.56%), whereas *Entamoeba* prevalence was considerably low at (4.85%). Other parasites identified include *Ascaris lumbricoides*, *Strongyloides stercoralis*, and *Taenia saginata*, all of which show higher occurrence in Gabi than in Duma. For instance, *A. lumbricoides* had a prevalence of (10.32%) in Gabi compared to (4.85%) in Duma, while *S. stercoralis* is (10.32%) in Gabi and (3.88%) in Duma, respectively. *T. saginata* was detected in (5.56%) samples in Gabi and (2.91%) in Duma. Less frequently encountered parasites included *Trichuris trichiura*, which was found only in Duma (0.97%), and *Schistosoma mansoni*, also detected solely in Duma at (0.97%) (Table 1).

Table 1: Distribution of Intestinal Parasitic Infections among Residents of Gabi and Duma

	Gabi		Duma	
Parasite	**Number Positive**	**Prevalence (%)**	**Number Positive**	**Prevalence (%)**
Entamoeba spp.	17	13.49	5	4.85
Ancylostoma spp.	22	17.46	15	14.56
Ascaris lumbricoides	13	10.32	8	7.77
Strongyloides stercoralis	13	10.32	4	3.88
Taenia saginata	7	5.56	3	2.91
Trichuris trichiura	0	0	1	0.97
Schistosoma mansoni			1	0.97
Total	72	57.14	37	35.58

Total Sample Size (N) For Gabi = 126 and Total Sample Size (N) For Duma = 104 = 230.

Overall prevalence (%) = 109 (47.39), χ^2= 3.97, p value = 0.046

Gender-specific prevalence of intestinal parasitic infections in Gabi and Duma.

In Gabi, a total of 75 males were examined, out of which 45 tested positive, giving a prevalence of 35.71%, while 34 (26.10%) were uninfected. Among females, 51 participants were assessed, and 27 (21.42%) were infected whereas 20 (15.90%) were not. Although the prevalence among males was slightly higher than that of females, the difference was not statistically significant (p = 0.27). In Duma, 56 males participated in the survey, with 21 individuals (20.19%) testing positive for at least one intestinal parasite and 35 (33.70%) remaining uninfected. A total of 48 females were examined, and 16 (15.38%) were infected while 32 (30.77%) were uninfected. Like Gabi, the difference in infection rates between males and females in Duma was modest and statistically non-significant (p = 0.81). The findings from both communities indicate that males recorded slightly higher infection rates than females however, these differences is not statistically significant. This suggests that gender may not be a major determinant of intestinal parasite distribution in the study population (Table 2).

Table 2: Gender based prevalence of intestinal parasites in Duma and Gabi

Gender	No Examine	No Infected (%) Gabi	No Uninfected (%)	p-value	No Examine	No Infected (%) Duma	No Uninfected (%)	p-value
Male	75	45 (35.71)	34 (26.10)	0.27	56	21 (20.19)	35 (33.70)	0.81
Female	51	27 (21.42)	20 (15.90)		48	16 (15.38)	32 (30.77)	
Total	126	72 (57.17)	54 (42.86)		104	37 (35.58)	67 (64.42)	

Association Between Communities and Intestinal Parasitic Infection

In Gabi, 126 stool samples were examined, and 72 individuals (57.14%) tested positive for intestinal parasites, while 54 (42.85%) had no infection. On the other hand, Duma recorded 37 positive cases out of 104 participants, representing a prevalence of (35.58%), whereas 67 individuals (64.42%) were not infected(Table 3) . The chi-square test revealed a statistically significant association between community of residence and infection status ($\chi^2 = 3.97$, $p = 0.046$). This suggests that the two communities had various possibilities of intestinal parasite infection, with Gabi having a larger infection load than Duma. Overall, the results point to the possibility that community-specific environmental or socioeconomic factors may be responsible for the observed variations in infection prevalence.

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Table 3: Association Between Communities and Intestinal Parasitic Infection

Community	N	Stool Parasite Present (%)	Stool Parasite Absent (%)	χ^2	p-value
Gabi	126	72 (57.14)	54 (42.85)	3.97	0.046
Duma	104	37 (35.58)	67 (64.42)		

Prevalence of Urinary Parasites Found in the Two Study Communities.

In Gabi, no cases of parasite were recorded, resulting in a prevalence of (0%) however, Duma showed detectable infections, with 3 participants (2.91%) testing positive for *S. haematobium*, and 21 individuals (20.39%) presenting with unidentified urinary worms. The observed differences between the two communities was statistically significant ($p = 0.029$), indicating that urinary parasitic infections were more prevalent in Duma than in Gabi (Table 4). The presence of both *S. haematobium* and unidentified worms solely in Duma suggests potential differences in water contact patterns, sanitation, or exposure to contaminated water bodies between the two locations.

Table 4 prevalence of parasite found in urine for both communities

Community ¤	No positive *Schistosoma haematobium*	Prevalence %	No positive Unidentified worms	Prevalence %	P-Value
Gabi	0	0	0	0	0.029
Duma	3	2.91	21	20.39	

DISCUSSION

The overall prevalence (47.39%) of the parasitic infection observed in this study indicates that intestinal parasites remain widespread in the study area. This finding is consistent with reports from other rural communities in Nigeria where inadequate sanitation and poor access to safe water continue to sustain transmission [10,1]. The substantially higher prevalence observed in Gabi (57.14%) as compared to Duma (35.58%) indicates that the two communities' environmental and behavioral exposures differ. In endemic environments where sanitation and hygiene standards vary significantly, similar community-level variations have been documented [12]. *Ancylostoma spp*. was observed to be the most predominant parasite in both communities. This agrees with previous studies conducted in Guinea Savannah region, where hookworm is mostly transmitted by frequent contact with soil that is contaminated. This contact maybe during activities like farming and walking barefoot [7,1]. The significantly higher prevalence of *Entamoeba spp.* in Gabi comminity may be as a result of environmental conditions that are conducive for the transmission of this parasite, such as poor sanitation and fecal contamination of water and food sources. *Schistosoma haematobium*, on the other hand, is only found in Duma community, indicating localized transmission linked to contact with contaminated water bodies that sustain intermediate snail hosts. This pattern has been documented in schistosomiasis-endemic areas in Nigeria [13]. The need for integrated interventions that combine safe water availability, improved sanitation, preventive chemotherapy, and health education is emphasized by the persistence of these illnesses despite continuous control efforts, highlighting the drawbacks of depending only on chemotherapy [6,11].

CONCLUSION

The study demonstrated schistosomiasis infections and soil-transmitted helminths continue to be serious threats to public health in Gabi and Duma communities. The Gabi community's considerably greater burden and the overall incidence of 47.39% indicate ongoing exposure to infectious sources and prolonged transmission. To reduce the burden of these diseases and establish sustainable control, integrated control techniques comprising frequent mass drug administration, better sanitation, a safe water supply, and community health education are required.

DECLARATION

This research was originally carried out by the authors and was not copied from anywhere.

AUTHOR'S CONTRIBUTIONS

SF conceptualized and designed the study. SF, ORL, ME, and RDE participated in fieldwork, data collection and performed the data analysis which was reviewed and interpreted together with ICJ. All authors contributed to the development of the final manuscript and approved its submission.

CONFLICT OF INTEREST

The authors decleared no conflict of interest.

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