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Occurrence of Intestinal Helminths Among Children Attending Primary Schools in Yorro and Zing Local Government Areas of Taraba State

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Abstract

Intestinal helminthic infections (IHIs) remain a major public health concern, particularly among school-aged children in resource-limited settings. This study examines the occurrence, risk factors, and socio-demographic determinants of IHIs among primary school children in Yorro and Zing Local Government Areas (LGAs) of Taraba State, Nigeria. A cross-sectional survey was conducted with 500 randomly selected pupils, and stool samples were analyzed using standard parasitological techniques. The overall prevalence of intestinal helminths was 75.7%, with Yorro LGA recording a higher rate (78.8%) than Zing LGA (72.7%). No statistically significant difference was observed between boys (76.4%) and girls (74.8%) ($p > 0.05$). The high prevalence underscores the urgent need for strengthened public health measures, including regular mass deworming, improved sanitation facilities, access to safe drinking water, and targeted health education for schoolchildren, parents, and teachers to reduce transmission and reinfection rates.

Keywords: Intestinal Helminths; Prevalence; Primary School Children; Public Health Intervention; Taraba State

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INTRODUCTION

Intestinal helminthic infections are one of the biggest socioeconomic and medical problems. Epidemiological studies show that helminthic infections are among the most common infections and one of the biggest health problems of society worldwide. Surveys on the prevalence of various intestinal helminthic infections in different geographic regions are a prerequisite for developing appropriate control strategies. Research carried out in different countries has shown that the socioeconomic situation of individuals is an important cause of the prevalence of intestinal helminths (Jamaiah and Rohela, 2020).

Two epidemiological factors distinguish helminthic diseases from other infections. The first factor is the high prevalence of these infections so helminthic infection prevalence is estimated to be about 3–3.5 billion people, which causes 450 million deaths every year (Lai, 2021; WHO, 2021; Markell *et al.,* 2018). The second factor is the high rate of incidence in poor and disadvantaged communities which is especially seen in school-aged children (Nematian *et al.,* 2020). These infections cause serious damage to children's development in non-developed countries and are related to failure to thrive, reduced physical activity, and learning power.

As described before, children at school age have the highest rate of morbidity because of intestinal helminths as compared with other ages (Nematian *et al.,* 2021). Statistics show that by treating these children, the disease burden in the total population is reduced to 70% which is significant (Lai, 2021). The main symptoms of the diseases are related to Intestinal. It may also cause anemia, physical and mental problems such as delayed growth in children, weight loss, fatigue, and itching or rash around the anus and vulva. Several studies have been carried out to find the prevalence of intestinal helminths among children and based on the geographical and health status of the study setting the findings differ. In this study, the prevalence of intestinal helminths among children attending primary school in Yorro and Zing Local Government Area of Taraba State.

Intestinal helminths are helminths that inhabit the gastro-intestinal tract of human and other animals. They can live in the body but most of them prefer the intestinal wall. An intestinal helminths can sicken the host. The major groups of parasites include Helminths and protozoans. The protozoans are organisms having one cell which consists of sporozoa, sarcodina, mastigophora, and ciliophora. While the helminths consist of cestodes, trematodes, and nematodes. Each of these helminths can affect the digestive tract, and

sometimes two or more cause infection (Luka *et al.,* 2020). Intestinal tract helminths are a group of worms that use the body lumens of the gut as normal locations for their adult forms. These helminths include the roundworms, hookworms, and whipworms which cause high morbidity and mortality in both human and domestic animals (Ganga *et al.,* 2020). Intestinal tract helminths infections are of enormous public health importance and as such have been rated among the most widespread infections globally. Helminths diseases are frequent in developing countries and constitute a major public health challenge as a result of their high prevalence rate as well as their consequence on both the nutritional and immune status of the population (Ikon and Useh, 2018).

In Africa, infections with parasitic helminthes are Known as one of the focal public health predicaments because in the world 2,200 million inhabitants are prone to this infection, there existed 2,000million helminthes infections with 15million Nigerians suffering from Ascariasis alone while there are quite a lot of people with Strongyloidiasis, Trichuriasis, Enterobiasis, Hookworm, and tapeworm infections (Adabara *et al.,* 2018). Among the parasitic infections helminths infection is the most common in the northern part of Nigeria. Helminthiasis is common in regions where poverty and poor sanitary conditions prevail (Adabara *et al.,* 2018). Intestinal helminths are well known as a major reason and origin of morbidity and mortality throughout the globe for the most part of underdeveloped countries (Odu *et al.,* 2022a; Odu *et al.,* 2018). Intestinal helminths are also acknowledged asone of the most universal illness in human beings particularly in tropical and sub-tropical countries (Awolaju and Morenikeji, 2021; Odu *et al.,* 2022b; Odu *et al.,* 2018). Intestinal helminthic infections remain a severe public health menace in countless developing countries particularly owing to fecal pollution of water and food (Jimenez-Gonzalez *et al.,* 2021; Odu *et al.,* 2022a; Odu *et al.,* 2018). Transmission of agents that cause diarrhea is usually by the fecal-oral route, which includes the ingestion of faecal contaminated water or food, person-to-person contact, and direct contact with infected faeces (Andu *et al.,* 2019). Epidemiological studies of diarrhoea have been reported from several African countries including South Africa (Household *et al.,* 2018), Gabon (Presterl *et al.,* 2019), Egypt (Omudu *et al.,* 2021). It ranks second only to respiratory diseases and is a major cause of morbidity among notifiable diseases in some part of the world (Coker *et al.,* 2020). Thus, by addressing the prevalence of intestinal helminths, this research has the potential to contribute to broader educational goals and socioeconomic development in Yorro and Zing LGAs.

METHODS

Study Areas

This cross-sectional study was carried out in Yorro and Zing Local Government Area of Taraba State. Yorro is a Local Government Area in Taraba State, Northeast, Nigeria. Its headquarters is in the town of Kpantisawa. The local government is dominated by Mumuye people which is the largest tribe in Taraba State. It has an area of 1,275 km2 and a population of 89,410 at the 2020 census. The Local Government have the following major towns and communities: Kpantisawa, Pupule, Lankaviri, Kassa, Nyaja, Dila, Kajong, Kayya, Donkin, Gadda-Lasheke, Boboto, Nyaladi, Nyalapa, Dandikulu, Manang-kopo, Bolisabo, Jika, Manang-lakware, Kpantinapo, Mika, Santewa, Garin Malam Audu etc. Zing is a Local Government Area in Taraba State, Nigeria. Its headquarters are in the town of Zing. It has an area of 1,030 km2 and a population of 127,363 as at the 2020 census. Zing is predominantly Mumuye. There are 12 Mumuye clans. The name 'Zing' will be given (renamed) after Lion which will be "Zingang" before for clear and easy pronunciation, still many are but it can still be referred to 'Zina' which is a blessing to Mumuye Kingdom and its ancient culture. The Place Zing was an area where Lions base before the Mumuye came and conquered the Lion and occupied the Land, that is why you can see the status of Lion in the Kpanti's Palace. Koyunvoba 2021, Background of Lion in Zing Local Government.

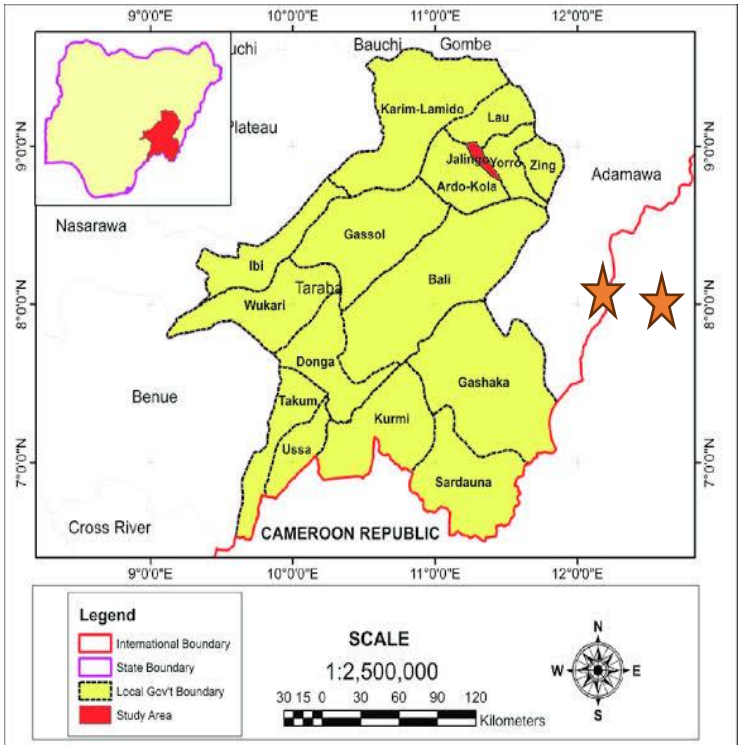

Figure 1: Map of Taraba State showing Yorro and Zing Local Government Area

Sample Size determination

The sample size was estimated using the statistical formula ($n=4\ p\ q\ /\ L^2$) where:

n= sample size,

p=the positive character (prevalence),

q=100 – p and

L= the allowable error.

Since the overall prevalence rate (p) of intestinal helminths was not known for study area, p was taken to be 16.6% based on the results of previous study in Jalingo 2021. The calculated sample size was 500.

Sampling procedure

Stratified random sampling, stratification was done for sex, grade of study and area, Yorro and Zing Local Government Area were divided into two regions according to the Ministry of Education, schools were selected randomly from each region.

Data collection and research instruments

A plastic container marked with an identification code and number (using permanent marker). Instructions about how to properly deliver a stool sample (uncontaminated) was explained to the participants. An informational document about the study, including how to supply a stool specimen were given to each participant for their family.

Collection of clinical samples

Fresh stool samples were collected from each participating school children for laboratory analysis. The samples were first inspected macroscopically for the presence of helminths. Then the samples were examined microscopically by direct methods.

Kato-katz

The Kato-katz method relies on a fixed volume of stool being spread onto a slide using a template, then cleared with glycerol, allowing visualization of helminth eggs under a microscope. Cellophane were soaked in glycerol-malachite green solution overnight to clear the fecal matter and stain the background. A small amount of stool was placed on a plastic sheet. The Kato-Katz template was used to collect a standardized amount of feces. The template was placed on a microscope slide and the hole was filled with the fecal sample.

Excess stool was removed from the template, leaving a thin layer of feces. After 30–60 minutes (to allow hookworm eggs to clear), the slide was examined under a light microscope using 10× and 40× objectives (WHO, 2020).

Ethical considerations

Permission was obtained from the director of Primary Health Care, and the Educational Secretary (ES) of Yorro and Zing Local Government Area. Additional permission was sought from the village heads of the communities selected. Children were informed of their rights to refuse to participate in the study and to withdraw at any time during the study without jeopardizing their rights.

Data Analysis

The data generated from this study was analysed using SPSS 28.0. For qualitative variables ratio and rate were used. To compare the qualitative variables, Chisquare test was used to determine level of significance set at 95%.

RESULTS

Table 1 presents the occurrence of intestinal helminths among primary school children in Zing and Yorro LGAs. The overall occurrence was 75.7% (281/371 children infected). Yorro LGA had a higher infection rate 78.8% (145/184) compared to Zing LGA 72.7% (136/187). The highest occurrence in Zing was at Nurul Islam with 83.0% (39/47) and least in Sabon gari 52.1% (25/48), while in Yorro, Lankaviri had the highest 80.9% (38/47) and least been kassa with an occurrence of 75.0% (33/44). The chi-square test ($\chi^2 = 19.869$, $P < 0.05$) indicates a significant difference in the occurrence of the infection between schools (Table 1).

Table 2 compares infection rates between male and female children attending schools in Zing and Yorro LGA of Taraba State, Nigeria. The tables shows that Males had a slightly higher prevalence 77.4% (168/217) than females 73.4% (113/154). The chi-square test ($\chi^2 = 0.801$, $P > 0.05$) indicates no significant difference in the occurrence of the disease between sexes (Table 2).

Table 1: Occurrence of intestinal helminths among primary school children of Zing and Yorro LGA of Taraba State, Nigeria

Location (LGA)	School	Intestinal Helminthes	
		No. Examined	Occurrence (%)
Zing	Sabon gari	48	25 (52.1)
	Ibrahim Sambo	45	38 (84.4)
	Kagong	47	34 (72.3
	Nurul Islam	47	39 (83.0)
Sub-total		187	136 (72.7)
Yorro	Kpanti-Sawa	45	37 (82.2)
	Kassa	48	37 (77.1)
	Mabang	44	33 (75.0)
	Lankaviri	47	38 (80.9)
Sub-total		184	145 (78.8)
Overall Total		371	281 (75.7)

(χ^2=19.869; P<0.05)

Table 2: Sex-related occurrence of intestinal helminths among primary school children of Zing and Yorro LGA of Taraba State, Nigeria

Sex	Intestinal Helminthes	
	No. Examined	Occurrence (%)
Male	217	168 (77.4)
Female	154	113 (73.4)
Total	371	181 (75.7)

(χ^2=0.801; P>0.05)

DISCUSSION

Intestinal helminth infections remain a significant public health concern, particularly among primary school children in Nigeria. The study conducted in Zing and Yorro Local Government Areas (LGAs) of Taraba State revealed an overall incidence of 75.7% among the sampled children, with Yorro LGA exhibiting a slightly higher prevalence (78.8%) compared to Zing LGA (72.7%). These findings align with several studies across Nigeria that have documented high prevalence of intestinal helminth infections among school-aged children. For instance, a study in Abua/Odual LGA of Rivers State by Living-Jamala *et al.* (2018) reported a prevalence of 70.51% among 434 examined stool samples, with *Trichuris trichiura* being the most prevalent helminths (52.30%), followed by *Ascaris lumbricoides* (19.81%). Similarly, in a study conducted in Abayi, Osisioma Ngwa LGA, Abia State by Ukpai *et al.* (2024), found a prevalence of 43.36% among 648 pupils, with *Ascaris lumbricoides* (40.8%) and *Entamoeba coli* (38.9%) being the

most common parasites identified. These studies, including the current one in Zing and Yorro LGAs, highlight the persistent burden of intestinal helminth infections among Nigerian school children. However, some studies have reported lower prevalence rates. For example, a study in Wukari LGA of Taraba State observed a prevalence of 36.5% among 1,123 stool samples, with Hookworm (26.5%) and *Entamoeba coli* (19.1%) being the most prevalent parasites (Ede *et al.*, 2014). Another study in Akpo Community, Anambra State by Aribodor *et al.* (2013), reported a prevalence of 46% among 200 school-aged children, with *Ascaris lumbricoides* (19%) and *Trichuris trichiura* (13%) being the predominant parasites. These variations in prevalence rates could be attributed to differences in environmental conditions, socioeconomic status, hygiene practices, and access to healthcare services across different regions. The significant difference in infection rates between schools in the current study ($\chi^2 = 19.869$, $P < 0.05$) suggests that localized factors, such as sanitation facilities, availability of clean water, and health education programs, may influence the prevalence of infections. This finding is consistent with other studies that have identified similar risk factors. For instance, a study in Gwagwalada, Abuja, identified lack of handwashing after defecation, multiple sources of drinking water, and consumption of unwashed fruits and vegetables as significant predictors of intestinal helminth infections among children (Oguche *et al.*, 2016).

Sex-related occurrence of intestinal helminths among primary school children in Zing and Yorro Local Government Areas (LGAs) of Taraba State, Nigeria, revealed a slightly higher prevalence in males (77.4%) compared to females (73.4%) albeit not significant. This pattern of higher prevalence in males, aligns with findings from several other studies conducted in Nigeria. For instance, Ukam *et al.* (2020) conducted a study in Calabar, Cross River State, where they reported an overall prevalence of intestinal helminths at 18.5% among school-aged children. In this study, males exhibited a higher infection rate (22.1%) compared to females (14.0%), with the difference being statistically significant ($P = 0.031$). Similarly, Oyibo-Usman *et al.* (2023) investigated the prevalence of helminth infections among primary school children in Gusau LGA, Zamfara State, and found a higher prevalence in males (59.3%) than in females (47%), with the difference also being statistically significant ($P = 0.000$). These studies suggest a trend of higher susceptibility or exposure to helminth infections among male children in certain regions of Nigeria. Contrastingly, some studies have reported no significant difference in helminth infection rates between sexes. For example, Aribodor *et al.* (2013) conducted a study in

Akpo Community, Anambra State, and found an overall prevalence of 46% among school-aged children, with males having a prevalence of 52.5% and females 47.5%. The study did not report a statistically significant difference between the sexes, aligning with the findings from Zing and Yorro LGAs. The observed variations in sex-related prevalence of intestinal helminths may be attributed to several factors, including behavioral differences, environmental exposures, and cultural practices. Male children may engage more frequently in outdoor activities that increase their contact with contaminated soil or water, thereby elevating their risk of infection. Additionally, differences in personal hygiene practices between males and females could contribute to the varying prevalence rates. However, the lack of statistical significance in some studies, including the current one, suggests that while there may be a trend toward higher prevalence in males, it is not a consistent finding across all settings.

CONCLUSION

The findings of this study highlight the persistent challenge of intestinal helminthic infections among school-aged children in Yorro and Zing LGAs of Taraba State. The high prevalence of infections, particularly among children from low-income families, emphasizes the impact of inadequate sanitation, poor hygiene, and limited access to healthcare. While gender did not significantly influence infection rates, factors such as parental education and occupational background were observed to play a role. Addressing this issue requires a multi-faceted approach, integrating health education, periodic deworming, and improvements in sanitation infrastructure. Efforts to reduce the burden of intestinal helminths must be sustained to ensure better health outcomes and educational attainment for affected children.

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