



## INTESTINAL HELMINTH INFECTIONS AMONG PRIMARY SCHOOL AGED PUPILS IN AWKA NORTH LOCAL GOVERNMENT AREA, ANAMBRA STATE, NIGERIA

Ikeh, M.I.<sup>1</sup>, Ishar, C.O.<sup>2\*</sup>, Okoro, B.B.<sup>3</sup>, Okonkwo, V.O.<sup>4</sup>, Okeke, O.A.<sup>5</sup>,  
Nnatuanya, I.O.<sup>6</sup>, Benedict, A.G.<sup>7</sup>

<sup>1</sup>Public Health and Environmental Research Group (PUHEREG)

<sup>2-6</sup>Department of Zoology, Faculty of Biosciences, Nnamdi Azikiwe University, Awka

<sup>7</sup>Department of Science Technology, Waziri Umaru Federal Polytechnic, Birnin Kebbi

\*Corresponding Author's Email: [co.ishar@spgs.unizik.edu.ng](mailto:co.ishar@spgs.unizik.edu.ng); Tel.: +2348036164318

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**ABSTRACT:** *This study was conducted to determine the prevalence of helminthiasis in primary school children in Awka North Local Government Area of Anambra State, Nigeria. A total of 172 faecal samples were collected and analyzed using Kato-Katz technique. Other pieces of information concerning demography were obtained through structured questionnaires. Data was analyzed using chi-square test and  $P < 0.05$  were considered significant. Overall, 45 (26.16 %) of the samples were infected while 127 (73.84 %) were negative. Among the schools sampled, Community Primary School, Amowere recorded the highest infection prevalence of 58.18% while no infection was recorded in Umuoji Primary School, Ebenebe (0.00 %). In relation to class, pupils in class four were the most infected 12 (31.58 %) while class one children had the least prevalence 5 (12.19 %). Gender-wise, males recorded the highest prevalence of 28.43 % with female children having a lower prevalence of 22.86 %. In terms of age, children between the age bracket of 7–9 years were most infected 31 (30.09 %) with the least prevalence occurring in the 4–6 years age group. In total, four helminth parasites were found in the stool samples of the children, *A. lumbricoides* 35 (20.59 %), Hookworm 7 (4.16 %), and *T. trichiura* 5 (2.19 %). Among the predisposing factors studied, school and type of parasite were found to be statistically significant ( $P < 0.05$ ). Mass deworming of primary school children should be undertaken regularly by health officers as well as enlightenment programs of pupils on proper hygiene practices and sanitation.*

**KEYWORDS:** Helminths, Prevalence, Infection, Primary school Pupils, Anambra State, Nigeria.



## INTRODUCTION

Infections due to intestinal helminths are among the most common infections affecting majority of the world population, especially developing countries, and are among the leading causes of diseases in adults and young people especially school children worldwide (Nzeukwu *et al.*, 2024; Ekpenyong & Eyo, 2008). Although infections due to helminth parasites have a global distribution, they are more predominant in under-developed countries of sub-Saharan Africa, Asia, and Latin America where more than 1.5 billion people are infected yearly with one or more helminths parasites (Assefa *et al.*, 2023). The most frequently observed worm species by various scholars include Hookworm (*Ancylostoma duodenale* and *Necator americanus*), *Ascaris lumbricoides*, *Taenia spp*, *Trichuris trichiura* and *Strongyloides stercoralis* (Nzeukwu *et al.*, 2024; Bia *et al.*, 2022; Oyindo *et al.*, 2017). The high prevalence of intestinal helminths has been associated with poverty, poor environmental hygiene, lack of adequate facilities for water supply and sanitation, ignorance, and impoverished health services (Albonico *et al.*, 1999), lack of access to health care, overcrowding (WHO 2002). Additionally, the habits of walking barefooted on sand and eating unwashed fruits and vegetables also encourage the transmission of helminthic infection (Kelechi *et al.*, 2015). Studies have suggested that all these factors should be evaluated as a whole when ascertaining the prevalence of intestinal helminth parasites in any given population, taking into account the parasite-host-environment relationship (Soriano *et al.*, 2001). This is because, in developing prevention and control strategies, as well as for the empirical treatment of intestinal helminths, knowledge of the most likely causative agents, the possible risk factors and status of soil contamination are essential (Serkadis *et al.*, 2013).

The health implications of Helminthic infection on growing children is enormous and ranges from malnutrition, anaemia, impaired growth and poor school performance due to its high morbidity, others such as *Ascaris lumbricoides* has been associated with intestinal obstruction or even pancreatitis in children (Ukibe *et al.*, 2018). There is also decreased productivity, poor cognitive ability, school absenteeism, diarrhea and vitamin and iron deficiencies (Hussein *et al.*, 2022; Aribodor *et al.*, 2018). According to WHO (1987), between 500 million and one billion people are estimated to be infected yearly. However, recent estimates suggest that 819 million people globally are infected with *A. lumbricoides*, 465 million with *T. trichiura*, 439 million with hookworm while neglected worms like *S. stercoralis* are also highly prevalent in the tropics and subtropics with about 100 million people infected (Abe *et al.*, 2019). In Nigeria, the occurrence of human intestinal helminthiasis is high due to the poor housing conditions, poor environmental sanitation, poor water supply and poor hygiene practices. The preponderance of helminthic infection in school-aged children makes this subgroup a good target for helminth control programmes in the general population and schools provide good opportunities for the implementation of control programmes. Thus, this study was conducted to ascertain the prevalence of helminth infection in three primary schools in Awka North L.G.A of Anambra State.



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## **MATERIALS AND METHOD**

### **Study Area**

The study was conducted in three public primary schools in Awka north Local government area of Anambra State. Awka north is one of the twenty-one (21) local government areas in Anambra state, south east Nigeria. Awka lies between latitude 6°12'45.68"N and longitude 7°04'19.16"E. the town is located in the rainforest zone of southern Nigeria and is about 12,007 hectares in dimension (Oyindo *et al.*, 2011). The town is known for wood carving and black smith, however becoming the capital of the state brought about an influx of civil servants (Okafor *et al.*, 2020).

### **Study Population**

The study population was primary school age children within Class one to four attending Community primary School Amowere, Eziogbo primary school Amansea and Umuoji primary school Ebenebe, all in Awka north local government area of Anambra state.

### **Study Design**

The study was a cross sectional school-based study conducted in randomly selected schools in Awka North Local Government area of Anambra State.

### **Ethical Approval**

Ethical approval for this study was obtained from the Anambra State Ministry of Education and was assigned reference number: MOE/SCHD/1583/T<sup>7</sup>/197.

### **Enrolment of Schools/Consent**

Preliminary visits were made to the schools and a detailed explanation of the study was given to them. Consent was obtained from the school headteachers. Parents were also informed and only children whose parents consented were recruited in the study. Schools were considered based on size and no deworming treatment in the last 3 months.

### **Sample Collection**

Properly labelled plastic containers with tight lids bearing the name, sex, class and age of each pupil were provided to each child who were then instructed to bring a small amount of stool sample with the help of their class teacher. Stool samples were arranged in an ice-packed cooler box and transported to the Zoology Laboratory of Nnamdi Azikiwe University, Awka for parasitological analysis.

### **Questionnaires**

Pre-tested questionnaires were administered to pupils for the overall assessment of risk factors of intestinal helminths infection. Basic demographic information such as age, sex, class of pupils were obtained through the questionnaires.



## Laboratory Examination

The stool samples were first examined macroscopically for the presence of blood, colour, pus and consistency. The samples were then processed using the Kato-Katz concentration technique according to the manufacturer's instructions. The processed samples were viewed microscopically using 10x and 40x objectives for presence of helminth parasites (Katz, 1972).

## Statistical Analysis

Data obtained was subjected to statistical analysis using SPSS v21. Results were presented in tables using simple percentages. Chi-square was used to test for differences among the variables and probability values equal or less than 0.05 were considered significant.

## RESULTS

Out of the 172 pupils examined, 45 (26.16 %) were infected with intestinal helminths. Community Primary School, Amowere recorded the highest prevalence of infection, 32 (58.18 %) while Emuoji Primary School had no infection, 0 (0.00 %) (Table 1).

**Table 1: Prevalence of Intestinal Helminth Infection according to Schools**

School	Number examined	Number infected (%)
Community Primary School, Amowere	55	32 (58.18)
Eziogbo Primary School, Amansea	52	13 (25)
Umuoji Primary School, Ebenebe	65	0 (0.00)
Total	172	45 (26.16)
<b>Pearson Chi-square(<math>\chi^2</math>):38.58</b>		<b>Df:2</b>
		<b>P-value:0.02</b>

According to classes, pupils in class four (4) were the most infected (31.58 %) followed by class three (3) 30.95 % while the least infection occurred in class one (1) (Table 2).

**Table 2: Prevalence of Intestinal Helminth Infection according to Classes**

Class	Number examined	Number infected (%)
Class one (1)	41	5 (12.19)
Class two (2)	51	15 (29.41)
Class three (3)	42	13 (30.95)
Class four (4)	38	12 (31.58)
Total	172	45 (26.16)
<b>Pearson Chi-square(<math>\chi^2</math>):4.07</b>		<b>Df:3</b>
		<b>P-value:0.1</b>

Based on gender, male pupils revealed the highest prevalence of infection 28.43 % while females had 22.86 %, P=0.10 (Table 3).

**Table 3: Prevalence of Intestinal Helminth Infection with Respect to Sex**

Sex	Number examined	Number infected (%)
Male	102	29 (28.43)
Female	70	16 (22.86)
Total	172	45 (26.16)
<b>Pearson Chi-square (<math>\chi^2</math>):0.49</b>		
<b>Df:1</b>	<b>P-value:0.9</b>	

In respect to age, children between 7–9 yrs had the highest prevalence (30.09 %) while age group 4–6 yrs was the least infected (17.02 %, P=0.9) (Table 4).

**Table 4: Prevalence of Intestinal Helminth Infection according to Age**

Age	Number examined	Number infected (%)
4–6 yrs	47	8 (17.02)
7–9 yrs	103	31 (30.09)
>10 yrs	22	6 (27.27)
Total	172	45 (26.16)
<b>Pearson Chi-square (<math>\chi^2</math>):2.12</b>		<b>Df:2</b>
<b>P-value:0.10</b>		

With respect to parasites, *Ascaris lumbricoides* was the most predominant parasite (20.59 %) while *Trichuris trichiura* had the least prevalence 2.19 % (Table 5).

**Table 5: Prevalence according to Type of Intestinal Helminth Parasite**

Parasite	Number found	Infection prevalence (%)
<i>A. lumbricoides</i>	35	20.59
Hookworm	7	4.16
<i>T. trichiura</i>	5	2.19
Total	47	27.32
<b>pearson chi-square(<math>\chi^2</math>):74.62</b>		<b>Df:2</b>
<b>P-value:0.001</b>		



## DISCUSSION

The findings of this study reveal an overall prevalence of 26.16 % of intestinal helminth infection. This prevalence is low compared to another study that reported a higher prevalence of 42 % among primary school children in Nnewi, Nnewi north L.G.A also of Anambra State (Ukibe *et al.*, 2018), 33.5 % in Lafia, Nasarawa State (Abe *et al.*, 2019) and 28.9 % at Igbo-Eze South L.G.A of Enugu State (Ekpenyong & Eyo, 2008). However, the result is much higher than the prevalence of 10.18 % reported in Nnewi South LGA of Anambra State (Oyindo *et al.*, 2017). In other parts of Africa, the overall prevalence of 26.16 % in our study is far lower compared to the 50.0 % and 36.5 % reported in Ethiopia by Hussein *et al.* (2022) and Assefa *et al.* (2023). On the bases of school type and location, Community Primary School, Amowere recorded the highest prevalence rate of 58.18 % with a significant  $P < 0.05$ . This might be due to variation between the schools with regard to factors that contribute for the transmission of helminth parasites including socioeconomic status, shoe wearing habit, safe water supply at home and school, personal hygiene, environmental sanitation of the school compound, waste disposal system within the school, type of toilet accessible at home, and availability of clean and sufficient number of toilet facilities at school, which have been observed in the present study. This result is similar to the work of Serkadis *et al.* (2013) that reported a higher prevalence of 57.04 % in pupils from public primary schools in Ethiopia.

The result of class prevalence showed that children in class four were the most infected (31.58 %) while least infection was seen in class one (12.19 %). This can be attributed to the fact that children within this class were more involved in excessive play around the school environment, thus increasing their chances of infection in the course of their interaction with other pupils and the unhygienic surroundings. Gender related prevalence of intestinal helminth infection proved that male pupils had the most infection rate (28.43 %). This result is in line with Hussein *et al.* (2022) that also reported a higher infection prevalence (51.2 %) in male pupils. This finding however contradicts the studies of Oyindo *et al.* (2017) that reported females with the highest infection rate of 17.65 %. The high prevalence observed in the male children could be as a result of the more adventurous and a little carefree nature of the male gender. The decrease in prevalence observed in females can be attributed to their psychosocial development into adolescents, becoming more self-conscious of their personal hygiene and outward appearance to attract the opposite sex (Kelechi *et al.*, 2015). According to Ukpong and Agamse, (2018), a decrease in female prevalence is also due to the more reserved nature of girls with indoor activities like reading, house chores and plaiting while a higher involvement in outdoor activities like fishing swimming, playing barefooted, plucking and handling fruits exposed male children to infection. For the different age groups, children of 7–9 years recorded the highest prevalence of 30.09 % compared to the 17.02 % observed in the 4–6 years age group. This finding agrees with Hussein *et al.* (2022) that also documented age group 11–14 years as having the highest infection prevalence of 50.6%. The high prevalence recorded in this age group can be as a result of their obviously daring and indiscriminate playing habit with unrestricted adventurous attempts with materials and edibles, walking barefooted, and less attention to personal hygiene due to ignorance (Serkadis *et al.*, 2013). The low prevalence observed within the 4–6 years age bracket can be due to the high level of attention given to them by their parents due to their tender age, who monitor and restrict their movement and contact with dirt, sand and objects as well as the regular deworming of children by parents and guardians. (Oyindo *et al.*, 2017).



Of the various intestinal helminth parasites implicated in this study, *Ascaris lumbricoides* was the most predominant parasite (20.59 %) followed by Hookworm (4.16 %) while the least was *Trichuris trichiura* (2.19 %). The prevalence of 20.59 % *A. lumbricoides* infection in this study is higher than the 13 % and 4.9 % *A. lumbricoides* infection reported in Nasarawa State (Abe *et al.*, 2019) and Enugu State (Ekpenyong & Eyo, 2008). On the contrary, the 7.5 % prevalence of *T. trichiura* infection recorded by Abe *et al.* (2019) is far higher than the 2.19 % *T. trichiura* infection prevalence recorded by our study. Our findings contradict the work of Bia *et al.* (2022) that reported hookworm as the most predominant helminth (65 %) in south central Timor region in Indonesia compared to 31 % prevalence for *A. lumbricoides*. Although there is an agreement in the predominant nature of *A. lumbricoides*, our findings are in contrast with the work of Aribodor *et al.* (2023) in terms of prevalence rates having reported lower prevalences of 16.9 %, 1.4 % and 0.5 % for *A. lumbricoides*, *T. trichiura* and Hookworm respectively in Anaocha Local Government Area also in Anambra State. This might be due to differences in environmental factors like climate, topography (Brooker *et al.*, 2003), surface temperature, altitude, soil type, rainfall and the type of microorganisms dominant in the area, all of which have a great impact on the distribution of intestinal helminth parasites (Serkadis *et al.*, 2013). Factors such as simple life cycle of parasites, high reproductive potential of female worms, long eggs survival period, few predators and high resistance of the ova to both chemical and physical conditions play key roles in the abundance of these helminth parasites globally (Nzeukwu *et al.*, 2024). Infections due to helminth parasites especially among children constitute a serious health issue worldwide. This is also evidenced in the findings of this study and other studies conducted in different parts of the world by various scholars. Thus, all hands must be on deck by relevant health stakeholders to ensure effective prevention and control of these infections.

## CONCLUSION

Intestinal helminth parasite infection is endemic in the study area and Nigeria in general and is a major public health problem. The overall prevalence of infection in the study was 26.16 %. The class and gender of pupils was demonstrated to be predictors of intestinal helminth infection. Strict environmental sanitation, provision of adequate water supply, good housing and toilet system both in the school premises and at home will go a long way in prevention and control of these pathogens. Furthermore, awareness programs should be intensified in schools and not be a rather once in a while issue.

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## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest regarding the publication of this paper

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