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A cross sectional study on the prevalence of ascariasis among school children; a case study of ikwo, ebonyi state nigeria

Chioma O. Anorue*, Ihuoma N. Anyanwu, Ogochukwu C. Chiamah

Department of Biology/Microbiology/Biotechnology. Faculty of Science. Alex Ekwueme Federal University, Ndufu-Alike, Ebonyi state, Nigeria.

***Corresponding Author**:
Chioma Ogochukwu Anorue Phone :+2348037759108;
E-mail: chummyogo@gmail.com

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Abstract

Background: Ascariasis is a common intestinal parasitic infection prevalent among school children in many developing countries.

Aim: this study was to determine the prevalence of ascariasis among school children in Ikwo Local Government Area (L.G.A.) of Ebonyi State, Nigeria.

Material and Method: Between February 2016 and December 2016, a cross-sectional study was conducted, and 300 stool samples were collected from primary school children in Ikwo L.G.A. The brine flotation method was employed for laboratory analysis to detect the presence of Ascaris lumbricoides eggs. The prevalence of ascariasis was calculated by determining the proportion of positive cases among the total number of children examined.

Results: Out of the 300 stool samples examined, 180 were found to be infected with Ascaris lumbricoides, yielding a prevalence rate of 60%. Among the infected school children, 170 were males (66.6%) and 130 were females (33.3%). The infection rate among males was significantly higher than among females ($p < 0.05$).

Conclusion: This study identified a high prevalence of ascariasis among school children in Ikwo L.G.A., Ebonyi State, Nigeria. The findings emphasize the need for targeted public health interventions, such as deworming programs and health education campaigns, to reduce the burden of ascariasis and improve the overall health of the affected population, particularly among school-aged children.

Keywords : Ascariasis; *Ascaris lumbricoides*; Deworming; Health education; parasitemia; prevalence

INTRODUCTION

Ascaris lumbricoides is an intestinal parasitic nematode that causes ascariasis [W.H. Ascariasis is a highly prevalent helminthic infection, estimated to have affected 804 million individuals in 2013 [1], leading to approximately 600,000 deaths annually [2]. This infection poses a significant health challenge in developing countries, particularly among children, with over 1 billion reported cases of ascariasis [3]. Bethony et al. highlighted that Ascaris lumbricoides is one of the most common soil-transmitted helminths causing infection [4, 5]. It is especially prevalent in tropical and sub-tropical regions, where it is estimated that over a quarter of the global population is infected with this helminth [6]. Das et al. (2007) stated that ascariasis primarily occurs through the ingestion of agricultural products and food contaminated with parasite eggs via hand-to-mouth transmission [7]. Poor sanitation and inadequate sewage disposal significantly contribute to the transmission and persistence of ascariasis. Intestinal blockages are frequently attributed to Ascaris lumbricoides infections, leading to substantial morbidity and mortality worldwide [8].

Numerous studies have documented the endemicity of Ascaris infections among primary school children. Abah et al. reported a prevalence rate of 51.78% for ascariasis [9]. The infection has devastating effects on children and is primarily acquired through the ingestion of eggs present on contaminated hands and food. Upon consumption by a human host, embryonated eggs hatch in the small intestine, and the larvae undergo a brief migratory phase through the venous system, liver, lungs, trachea, and esophagus before returning to the small intestine, where they mature and reproduce [10]. Ogoamaka et al. found a prevalence rate of 35.4% for ascariasis. However, it is anticipated that the recent implementation of health policies and programs in the region will contribute to a reduction in the infection rate [11]. Opara et al. group reported a prevalence rate of 58% among children in daycare centers in Owerri municipality, Imo State, Nigeria [12]. Nevertheless, high prevalence rates are not unique to Nigeria but are observed in regions with poor sanitary and environmental conditions [13].

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AIM OF THE STUDY

The aim of this study is to determine the prevalence of Ascaris lumbricoides, an intestinal parasite, among school children in Ikwo Local Government Area (L.G.A.) of Ebonyi State, Nigeria. Additionally, the study will investigate the infection rates among different schools, age groups, and genders

Material and Method

Study Area

Ikwo Local Government Area is situated within Ebonyi State, covering a land mass of 500 square kilometers see figure 1 . It is bordered by Abakaliki and Ezza Local Government Areas. The region is renowned for its mineral resources, including lead and salt, and is known for its bronze-casting industry. The daily activities of the local population rely on water bodies such as rivers, streams, ponds, and swamps. The vegetation in Ikwo is a combination of savannah and tropical rainforest.

For the purpose of this study, four primary schools in Ikwo Local Government Area of Ebonyi State, located in the southeastern part of Nigeria, were selected

as study sites. The region features a tropical climate and clayed soil, and the majority of the population is engaged in farming. However, the area suffers from poor sanitary conditions due to poverty and a lack of toilet facilities. There is a prevailing belief among the local population that defecating in farmlands enriches the soil with nutrients. Please refer to Figure 1 for a map depicting the geographic information system data.

Study Population

This cross-sectional study involved the participation of 300 pupils selected from four primary schools, with 75 pupils selected from each school. The selection process was conducted randomly, taking into consideration the pupils' complaints and ages. Prior to the collection of stool samples, preliminary visits were made to each school to establish rapport and ensure smooth coordination. Informed consent was obtained from both the school children and their parents or guardians before the collection of stool samples. Stool samples were collected from both male and female pupils, following the guidelines set by the World Health Organization [3] regarding the appropriate sample size for such studies

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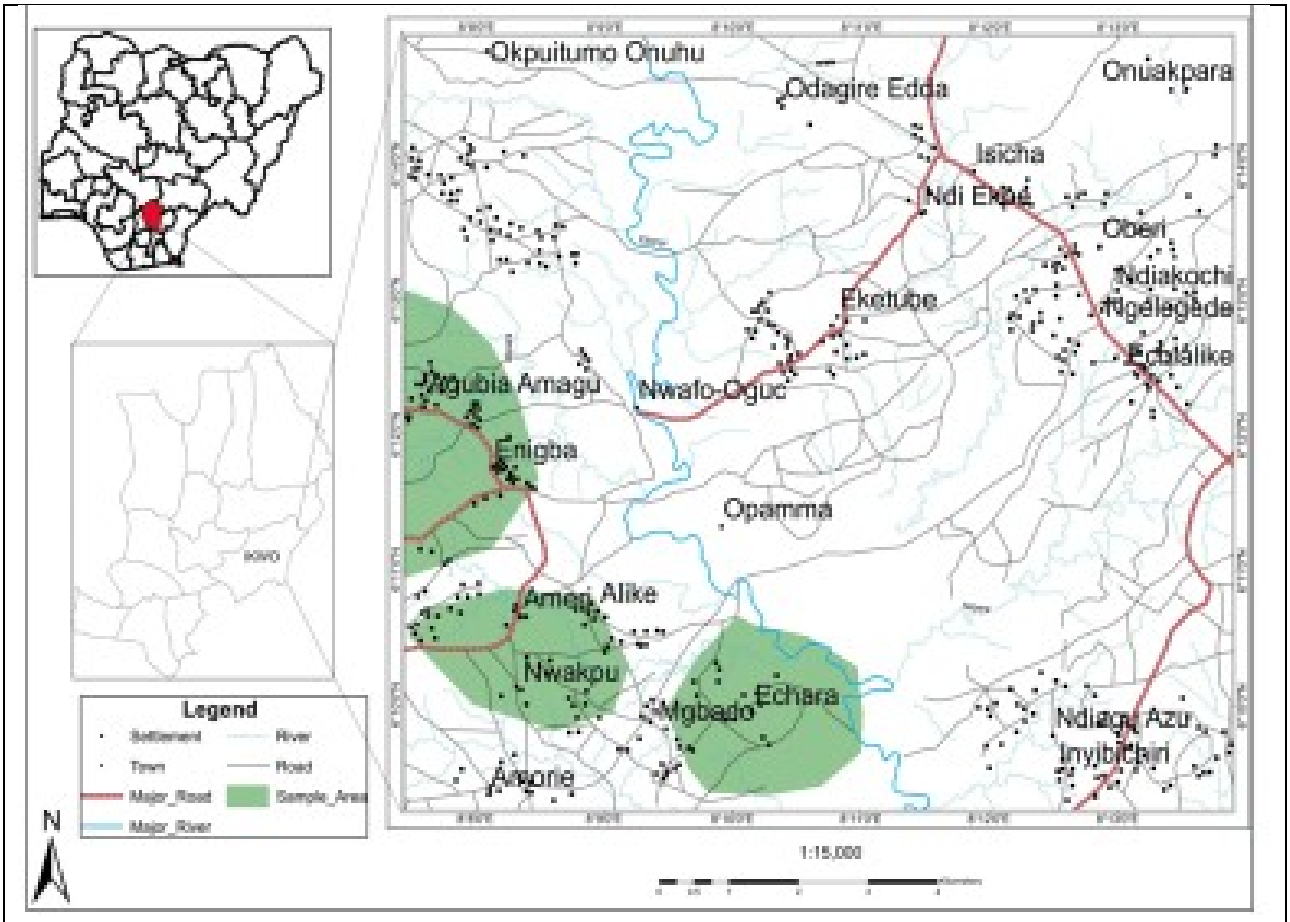

Figure 1 map of Ikwo local government Area showing Area Surveyed

Specimen collection and analysis

Ten grams of stool samples were collected using sterilized plastic containers and transported to the Biology laboratory of Alex Ekwueme Federal University Ndufu-alike, Ebonyi State, Nigeria. Macroscopic examination of the fecal samples was conducted, assessing their appearance, color, consistency (whether formed, semi-formed, unformed, or watery), and the presence or absence of blood, mucus, and pus. The Brine flotation method was employed for the examination. Each sample was accompanied by detailed information including the names, gender, and age of the individuals.

For the laboratory analysis, 4mg of stool was emulsified with 8ml of normal saline solution using an applicator stick. The mixture was then filtered through wire gauze and transferred to a universal bottle. Brine solution was added to fill the bottle up to the designated mark. A microscope slide was placed on the bottle's mouth and left undisturbed for 30 minutes. Afterward, the slide was carefully lifted and examined under the microscope, utilizing magnifications of 10x and 40x [11].

Individuals found to be infected with the disease were subsequently dewormed using albendazole, a common treatment for ascariasis.

Data Analysis: The statistical analysis was conducted using SPSS package determining the descriptive test and percentages.

Results

Out of the 300 pupils examined, 170 males and 130 females were included in the study (Table 1). The overall prevalence of ascariasis among the school children was found to be 60% (Table 2). Among the infected individuals, 120 were males (66.67%) and 60 were females (33.33%) (Table 3). The percentage prevalence of the infection was higher among male pupils.

When examining the sex-related prevalence within the schools (refer to Figure 2), it was observed that infected males had a higher prevalence in two primary schools: Urban Primary School (40%) and Igboji Primary School (41.3%, 30.7%, and 26.7% respectively). The infected females recorded prevalence rates of 22.6%, 21.3%, 20%, and 16% in the respective schools.

In terms of age-related prevalence (refer to Figure 3), the 12-14 age group had the highest prevalence of 64.70% in Igboji Primary School and 61.9% in Urban Primary School among males. Among females, the 6-8 age group had the highest prevalence of 38.9% in Good Shepherd Primary School, and the 12-14 age group had a prevalence of 35.3% in Igboji Primary School.

The prevalence of infection varied among the different schools, with Good Shepherd Primary School reporting the highest prevalence (Figure 4)

TABLE 1: NUMBER OF PARTICIPANTS FROM THE FOUR SCHOOLS N=300

Characteristics	No. of males examined	No. of females examined	Percentage of males examine	Percentage of females examine
Sex	170	130	56.67%	43.33%

Table 2: OVERALL PREVALENCE OF ASCARIASIS IN THE SCHOOL CHILDREN

Number of infected	Total number examined	%prevalence
180	300	60%

TABLE 3: PREVALENCE OF INFECTION AMONG SEX IN THE FOUR PRIMARY SCHOOLS

No. of males examined	No. of males infected	Percentage prevalence of infected males	No. of females examined	No. of females infected	Percentage prevalence of infected females	Total no. infected
170	120	66.67%	130	60	33.33%	180

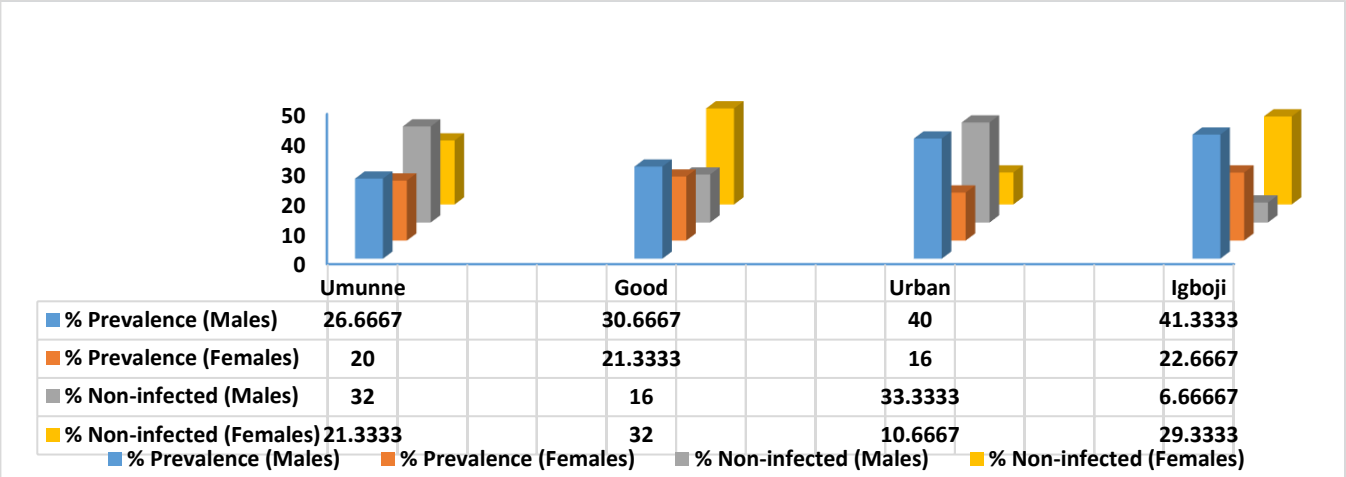

Figure 2: Prevalence of Ascariasis among the sex of the pupils within different schools

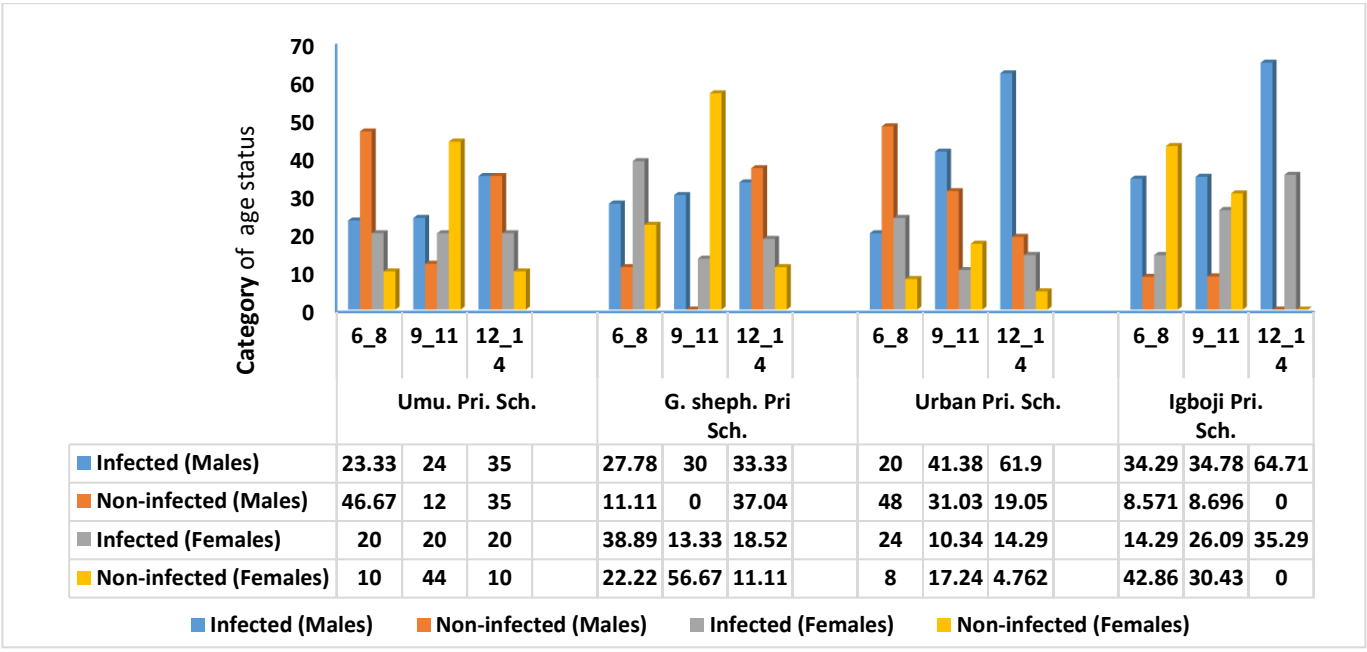

Figure 3: Prevalence of infection among the ages of the pupils with different schools

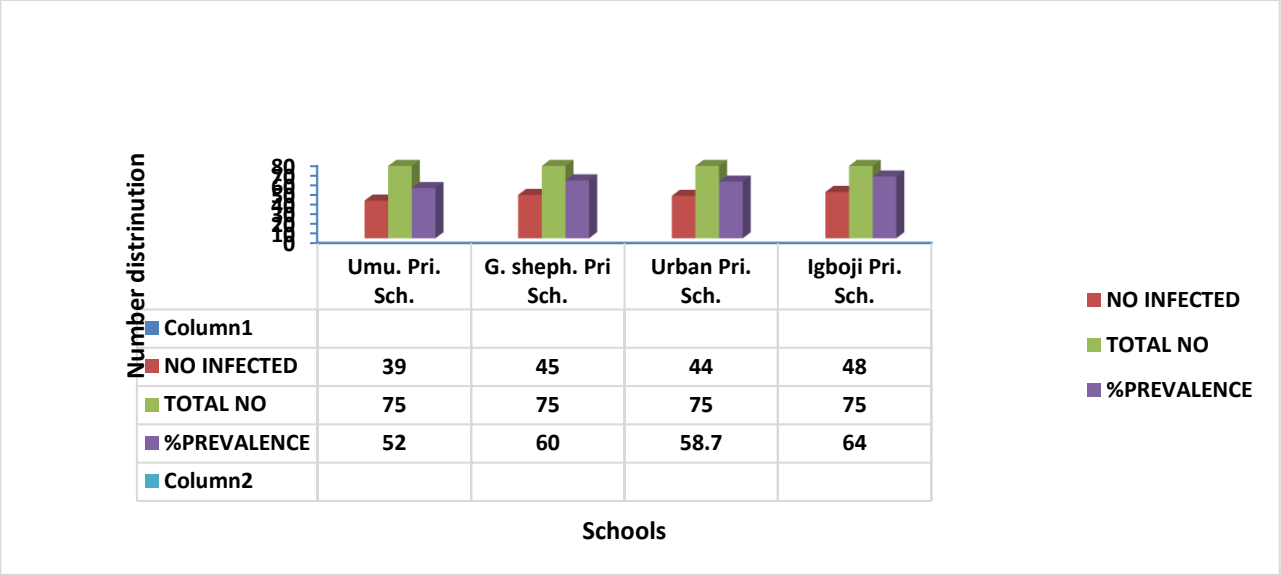

Figure 4: Percentage prevalence among schools in Ikwo L.G.A.

Discussions

The prevalence of *Ascaris lumbricoides* among school children in Ikwo L.G.A. is alarmingly high, with a recorded prevalence rate of 60%. This indicates a significant issue of poverty, poor hygiene, and sanitation in the area. These findings are consistent with a previous study conducted by Agbalaka et al. [14]. Among the infected school children, males had a higher infection rate of 120 (66.6%), while females accounted for 60 (33.3%) cases. This observation aligns with other studies [15].

The overall prevalence of ascariasis among school children being 60% highlights the fact that the infection affects both sexes and different age groups. This suggests that there is a need for improved implementation of health education policies in the area. These findings correspond to the study conducted by Dankwa group [16]. However, a study by Abah et al. reported a lower prevalence of 42.7% for intestinal helminthiasis among primary school children in another region [9].

Based on the results of this study, it is evident that the local government where these schools are located requires comprehensive health education policies to effectively combat the infection. Mass chemotherapy through deworming programs should be implemented to reduce the prevalence of ascariasis. Furthermore, introducing proper health education programs on hand washing in all primary schools within the state is essential. Adequate desks should be provided to replace the practice of studying on the bare floor. Basic toilet facilities need to be established, and pupils should be educated about the importance of avoiding the consumption of unwashed vegetables and fruits.

Considering that ascariasis is a soil-transmitted helminthic infection, it is crucial to address the pupils' habit of sitting on the ground to study. Moreover, the practice of defecating in the bushes, as reported by the majority of pupils, needs to be addressed. The use of hands or scraping on the ground for cleaning the anus due to the unavailability of tissue papers is also concerning.

The significant prevalence of infection among male pupils, consistent with the findings of Swartzman, may be attributed to their hyperactive nature and increased exposure to bushes and farmlands without proper footwear [17]. Many of the pupils in this study complained of gastrointestinal and respiratory symptoms associated with the infection.

Conclusion

Ascariasis infection remains a neglected tropical disease that requires urgent attention. Adequate preventive and control measures need to be put in place for the eradication of this infestation. Proper health education and awareness programs need to be introduced in schools. The Ministry of Health and Education should collaborate to implement effective deworming exercises.

Acknowledgments

This study was carried out in the Biology laboratory of Alex Ekwueme Federal University Ndufu Alike Ebonyi State. The contributions of all the co-authors made this research a success.

Ethical Clearance

This study received ethical approval from the relevant authorities, including the Ministry of Health, the local government chairman, head teachers, and pupils. Before proceeding with the sample collection, comprehensive meetings and pre-surveillance activities were conducted in the local government area to ensure proper understanding and cooperation. The purpose, objectives, potential benefits, and procedures involved in the study were communicated effectively to the parents and guardians of the wards, and their informed consent was obtained prior to the commencement of the research. Ethical considerations were diligently followed throughout the study to safeguard the rights and well-being of all participants involved.

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Authors' contributions

All authors made contributions through designing, drafting, and analysis of the research work. We all have mutual interest, no conflicts of interest. This work has not been published elsewhere.

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