

## A Comparative Study on the Prevalence of Intestinal Helminths among School Children and Farmers in Ndufu-Alike, Ikwo Local Government Area, Ebonyi State Nigeria

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**Abstract:** A comparative study on infection with intestinal helminths was carried out among primary school pupils and farmers of Ndufu-Alike in Ikwo, Local Government Area of Ebonyi State, Nigeria. Faecal samples were collected from 400 individuals (238 pupils and 162 farmers) and examined for eggs of intestinal helminthes using floatation technique and pretested questionnaire was administered to obtain information on individual's methods of fecal waste disposal. The obtained results showed that 48 farmers and 36 pupils respectively were infected with the overall prevalence based on occupation and famers recorded 12% prevalence against 9% for pupils. Among the risk factors evaluated, pit toilet recovered 24(6%), water closet 3(0.75%) and bush method 57(14.25%). The data collected on age revealed that between the age intervals 5-14 years recorded 23(5.75%) 15-24 years 15(3.75%) 25-34 years 27(6.75%) 35-44 years 4(1%) 45-54 years 2(0.55%). Basically four intestinal helminthes investigated in the study were *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Taenia* spp and *Trichuris trichiuria*. In evaluation of the parasite specie in respect to sexes (male and female), out of the 400 population sampled, 170 males were examined *Ascaris lumbricoides* record 5 (8.82%), *Ancylostoma duodenale* 19 (11.26%), *Taenia* spp 1 (0.59%). 230 females were examined *A. lumbricoides* recorded 19(8.26%) *A. duodenale* 30(13.04%) and *Taenia* spp 1(0.43%) whereas *Trichuris trichiuria* was absent in both male and female. At  $P < 0.05$ , the prevalence according to occupation, age and as well latrine types, the result was statistically significant. This research further revealed that the prevalence was not statistically significant to different villages and also parasite species against sexes at  $P \geq 0.05$ .

**Key words:** Helminths • Children • Ikwo • Health and Nigeria

### INTRODUCTION

Helminthes are larva-like organisms that reside in and depend on lively host for their food in addition with defense though disturbing the absorbed nutrient, leading to faintness in strength and ailment. Intestinal helminthes is the name used to describe those helminthes which abode in intestinal tract. They as otherwise named abdominal parasite. Helminthes comprise of these lists of taxa: monogeneses, tapeworm, round worm then trematodes (flukes) with their asexual life cycle in essential phase in the soil, except that of tapeworm. Helminthes can sustain in vertebral accommodators with the duration

many year because they are capable of influencing the resistance reaction with discharging immunodulatory products [1].

Helminthic infection of earth spreading origin being initiated by diverse classes of dependent larvae like *Ascaris lumbricoides*, *Trichuaris trichiura* and hook worm (*Ancylostoma duodenale*). Greater number of individuals on earth (especially in the developing countries) are infected with the various kinds of deadly helminthic infections with a significant amount of mortality [2]. The life cycle of intestinal helminth as earlier pinpointed cannot be completed without some aspect of it life cycle in the soil and as such cannot be completed in

isolation of either of the two environments, though there are helminthes in the intestine that cannot be directly transmitted through the soil rather through the intermediate host despite the fact that some aspect/stage of their life cycle take place in the soil, example *Taenia* spp. Helminthic infection is among the most infection in the world which infect the under privileged as well as disadvantaged societies that made agriculture their means of livelihood likewise places that indulge in high level of indiscriminate discarding of human as well as animal excreta, low level of individual cleanliness and scarcity quality water source [3].

The aim of this study was to investigate the prevalence rate of intestinal helminthes among pupils and farmers in Ndufu-Alike Ikwo Local Government Area, Ebonyi State.

## MATERIALS AND METHODS

**Study Area:** Ikwo Local Government Area of Ebonyi State is a very large Local Government area located on latitude 5° and 6° North, longitude 7° and 8° East with annual mean temperature of 25°C - 39°C and rainfall of 1800mm – 2300mm per annum (Figure 1). Ikwo community is a rural settlement with few health care facilities and dispensaries. Source of water supply in the area includes boreholes, dams, well, streams and rain water stored in tanks. Defecation on open fields and farm lands is a common practice observed in this area. The area is traversed by a number of streams, rivers which are marked by fairly thick vegetations. It has fertile soil with good soil composition for agricultural productivity. Two third (2/3) of their land mass are swampy and some parts are flood prone areas.

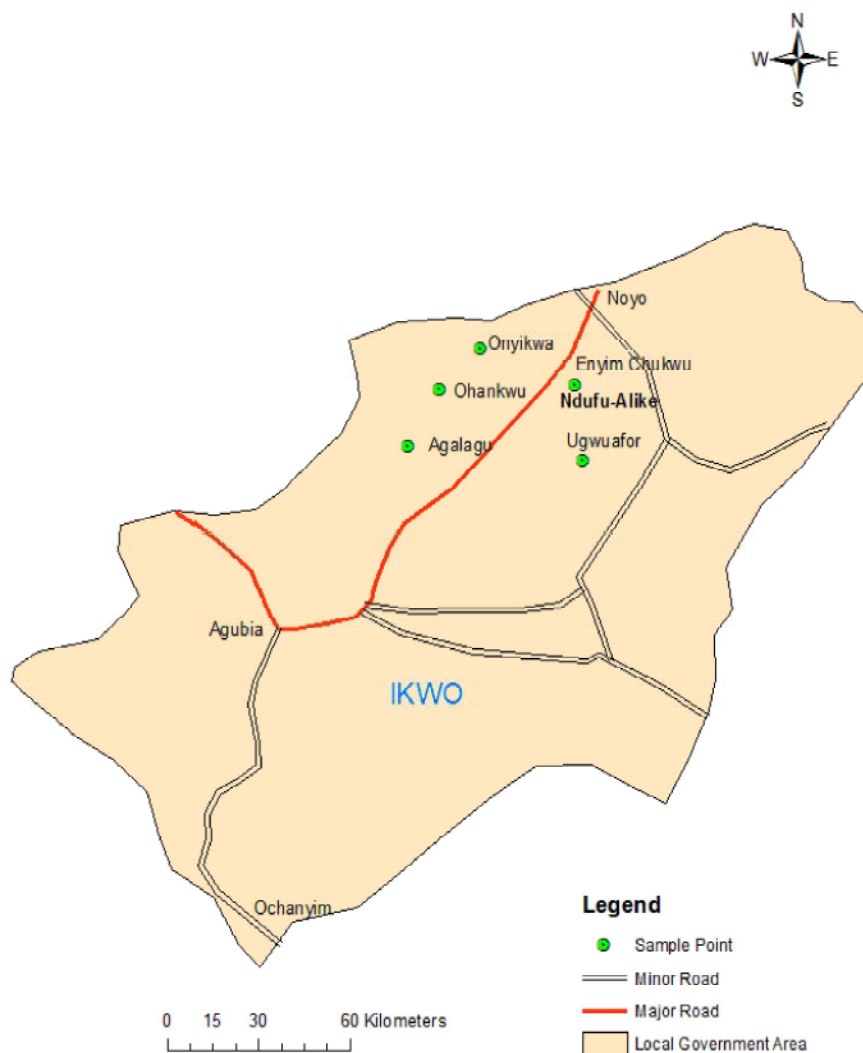


Fig. 1: Map of study area

Farming is a predominant occupation in the area irrespective of age and gender. It is the major source of livelihood in the area. Basic social amenities are totally lacking with no or poor state of sewage system in most communities. There is also very low literacy status dominating the population in the area. About 80% of the inhabitants are farmers even the few civil servants are also engaged in part time farming.

Ndufu-Alike (the study area) is one of the autonomous communities in Ikwo Noyo clan that is made up of six (6) principal villages.

**Study Populations:** Four hundred samples were collected from seven (7) villages namely Ogidiga, Onyikwa, Ohankwu, Enyimchukwu, Ukwuinyima, Agalagu and Ugwuafor Ndufu- Alike Community Ikwo L.G.A. The samples were collected from both males and females of school-aged children (5-14 years) and local farmers.

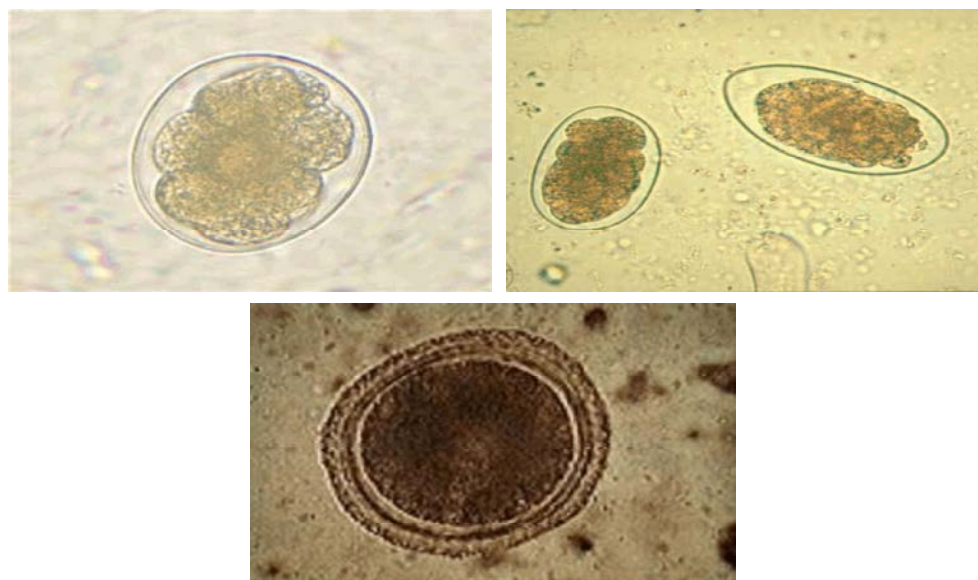
**Sample Collection:** Universal containers were given to the pupils and local farmers and they were directed to pass their early morning stool (fresh stool) and put 20 grams of stool inside the container. The stools were collected and taken to the laboratory for analysis. However, those samples that were not analyzed on the same day were preserved with 10% formalin solution.

**Stool Analysis:** In order to concentrate the parasites in the faeces, formol-ether concentration technique was

employed. Using a broom stick, about 1g of the faeces mixed with physiological saline was put in a screw-cap bottle containing 4ml of 10 % formol water. The bottle was capped and shaken vigorously to mix for about 20 seconds. Thereafter, the faeces was sieved and the sieve suspension collected in a beaker. The suspension was transferred to a tube and 3 ml of ether was added. The tube was stopped and mixed by shaking for one minute. Thereafter, the stopper was removed and centrifuged immediately at 3000 rpm for one minute. After centrifuging, four layers were observed; the top layer of ether, thin layer of debris, formalin and sediment in bottom with parasites. An applicator stick was used to loosen the layer of faecal debris from the side of the tube. The ether, debris and formalin were then carefully poured off. The sediment was mixed, transferred to a slide and covered with a cover glass slip and examined under the microscope using first, the 10x objective followed by 40x objective to identify the eggs [4]. Pretested questionnaires were given to each participant to obtain information on bio-data and their preferred method of faeces disposal. The number of pupils infected with intestinal helminths and the type of intestinal helminths observed were recorded.

**Statistical Analysis:** The prevalence of infection between ages and sexes varied by occupation were determined using the Chi - square tests from the contingency tables.

### Laboratory Diagnosis



## RESULTS

**Prevalence of Intestinal Helminths According to the Occupation of the Respondents:**

The prevalence of intestine helminths according to the occupation of the respondents as shown on Table 1 showed that out of the 400 samples examined, farmers recorded the prevalent rate of 48(12%), whereas pupils had 36(9%). The result showed that farmers had higher prevalence rate than pupils. Difference in prevalence based on occupation of the respondents showed a statistical significant result at  $< 0.05$ .

**Prevalence of Intestinal Helminths Based on the Preferred Toilet Type:**

Table 2 shows the prevalence of intestinal helminths based on the preferred toilet types used by the respondents. Bush method recorded the highest prevalence rate of 57(14.25%) followed by those using pit toilet having 24(6%) and those using water closet 3(0.75%) difference in prevalence based on toilet types was found to be statically significant at  $P < 0.05$ .

**Prevalence of Intestinal Helminths According to Age:**

The prevalence of intestinal helminths according to age as shown in table 3 shows that the age group between 25-34 years recorded the highest prevalence rate of 27 (6.75%), 5-14 years recorded 23 (5.75%), 35-44 years had 13(3.25%) and 45-54 was only 4 (1%) whereas 55-64 had 2(0.5%) and lastly, 65 and above had no infection 0(0%). The difference in prevalence according to age group showed a statistically significant result at  $P < 0.05$ .

**Prevalence of Intestinal Helminths in Different Villages:**

Prevalence of intestinal helminths according to villages showed that Onyikwa village appeared to have more prevalent cases of the infection of 18 (4.5%), followed by Izzamgbo with 17(4.25%), Enyimchukwu 12(3%) Ukwuinyima 10(2.5%), Ugwuafor 8(2%) and Ohankwu 4(1%). The result found on prevalence according to different villages was not statistically significant at  $P < 0.05$ .

**Prevalence Based on Parasite Species against Sexes:**

Table 5 showed the prevalence based on parasite species against sex (male). This revealed that out of 170 males samples, *A duodenale* had the highest prevalence rate than other intestinal helminths with 19(11.26), followed by *Ascaris* 15 (8.82) and *Taenia* spp 1(0.59) whereas *T. trichiuria* wasn't present.

Table 1: Prevalence of Intestinal Helminthes According to Occupation of Respondents

Occupation	No. Examined	No. Uninfected	No. Infected	%
Pupils	238	198	36	9
Famers	162	118	48	12
TOTAL	400	316	84	

Table 2: Prevalence of Intestinal Helminthes Based on the Preferred Toilet Type

Latrine Type	No. Examined	No. Uninfected	No. Infected	%
Pit toilet	125	101	24	6.00
Water closet	133	130	3	0.75
Bush method	142	85	57	14.25
TOTAL	400	316	84	21.00

Table 3: Prevalence of Intestinal Helminthes According to Age

Age	No. examined	No. Uninfected	No. Infected	%
5-14	205	182	23	5.75
15-24	58	43	15	3.75
25-34	71	44	27	6.75
35-44	36	23	13	3.25
45-54	16	12	4	1.00
55-64	12	10	2	0.50
65 and above	2	2	0	0.00
Total	400	316	84	21.00

Table 4:Prevalence Of Intestinal Helminthes In Different Villages

VILLAGE	No. Examined	No. Uninfected	No. Infected	%
Izzamgbo	63	46	17	4.25
Onyikwa	127	109	18	4.5
Ukwuinyima	42	32	10	2.5
Agalagu	63	48	15	3.75
Ohankwu	21	17	4	1
Ugwuafor	42	34	8	2
Enyimchukwu	42	30	12	3
TOTAL	400	316	84	

Table 5: Prevalence Based on Parasite Species against Sexes

Parasite spp	No examined	No infected male	No uninfected	%
Roundworm	170	15	155	8.82
Hookworm	170	19	151	11.26
Tapeworm	170	1	169	0.59
Whipworm	170	0	0	0

**Prevalence Based on Parasite Species Against Sex (Female):**

Table 6: This table showed the prevalence based on parasite species against sex (female). This table showed that out of 230 females sampled, *A. duodenale* also recorded the highest prevalence of 30(13.04) followed by *A. lumbricoides* 19(8.26), then *Taenia* spp 1(0.43%) and *T. trichiuria* was absent.

Table 6: Prevalence based on parasite species against sex

Parasite spp	No examined	No infected female	No uninfected	%
Roundworm	230	19	211	8.26
Hookworm	230	30	200	13.04
Tapeworm	230	1	229	0.43%
Whipworm	230	0	0	0

## DISCUSSION

The prevalence of intestinal helminthiasis showed that out of the four parasites investigated, *Ancylostoma duodenale* was the most prevalent followed by *Ascaris lumbricoides* and the least being *Taenia* spp. Whereas *Trichuris trichiuria* was absent. These are the most common parasites that afflict humans who live in the poor rural areas in the developing countries. This is in agreement with Montresor *et al.* [5]. It is also in agreement with Uneke *et al.* [6] in the work done at Enyigbichiri-Alike and Ndiagu-Echara Ikwu L.G.A. But contradicts that of Azira and Zeehaida [7], *A. duodenale* was found to be more common in the area. "From the study, intestinal helminth parasites were found to be more common among the productive age of (24-35) range and the school age children. This is in accordance with WHO [8]. The difference in the prevalence "could be as a result of environmental and behavioral pattern of the people" in the area. Ikwu, being a moist humid area and also where agricultural activities are predominant, favors the survival and the multiplication of the parasites. Among the different parasite species observed against sexes, in male *A. lumbricoides* recorded highest prevalence of 19(11.26%) followed by *A. lumbricoides* 15(8.8%) and *Taenia* spp 1(0.57%). In females *A. duodenale* recorded the highest prevalence of 30(13.04%), *A. lumbricoides* 19(8.26%) and *Taenia* spp 1(0.59%) and *Trichuris trichiuria* being absent. This result agrees with previous studies [9, 10].

Moreover, helminthic infection afflict tremendously on women at reproductive age and also adolescent. Higher incidence of hookworm infection has been recorded among women of productive age resulting to iron-deficiency among them. The "people also have a habit of eating with bare hands which might have been contaminated with ova or cysts of the parasite from the environment. While majority of the people in Ikwu are low income earners [9]. 80% of the people of the area walk bare-footedly which is believed to be the major factor that predisposes them to hookworm infection. In this area (Ikwu East "Nigeria), apart from the environment which is tropical and favors the survival of intestinal parasites, walking on bare - foot and eating with bare hands

contaminated with the cysts/ova of these parasite" infections attributes to the risk of intestinal helminth infection.

Moreover, people of the area have natural dislike for pig meat hence the low number of people infected with tapeworm. Therefore, pig rearers /pork eaters are not a common phenomenon in the area, rather almost every household engage in back-yard poultry farming, goat and sheep rearing and therefore reduce the risk of tapeworm in the area. The inhabitants of the area "are also exposed to slow running waters which they constantly wade through for bathing and also fetch for drinking. This" observation is in consonance with the previous work by Crompton and Savioli [9]. It was observed that among the seven villages studied, Onyikwa village recorded the highest prevalence of 18(4.5%) followed by Ezzamgbo which recorded 17(4.25%), Agalagu 15(3.75%), Enyimchukwu 12(3%), Ukwuinyima 10(2.5%), Ugwuafor 8(2%), Ohankwu 4(1%). It was observed that the sanitary conditions among these villages differ especially the toilet condition which was totally poor but slightly improved in Ohankwu village due to the few modern houses with good toilet facilities.

At Ezzamgbo and Onyikwa villages, the people have good toilet facilities are totally lacking, this has led to indiscriminate defecation by children and even adults within the bush around their compounds. The presence of good drinking water in the area was also lacking, particularly in Ezzamgbo, the main source of drinking water there is the popular Ako-river and there are few bore-holes there. Moreover greater number of them prefers water sourced from Ako-river to bore-hole.

However, the relative prevalence of intestinal helminthes observed in Ohankwu village, may have been due to environmental sanitation and few other social amenities in the area. Among the various sexes, men harbor most of the helminth parasites than their females' counterpart. In occupation, farmers recorded (12.0%) and pupils (9.0%). "This could be attributed to consistent exposure of the men to using of bare - hands in carrying out farming and other laborious works and without proper washing of their hands before eating-a common phenomenon in the area. Of the various age groups studied, we found out that the helminth parasites were most common among the adult ages from 25years to 35years. This" agrees with Brooker *et al.* [11], who reported that people that are at most risk of helminthic infections are school-children, adult in certain high occupation such as rural farmers, miners and women of child bearing-age. The reason for this variability in the

prevalence is most likely multifactorial. Behavioral and ecological patterns may also contribute to the differences in parasite distribution. The people of the area are of low socioeconomic status. Also, the reason for the high prevalence of helminth parasites among the people of the area could be attributed to environmental factors and also due to poor hygienic practice as is customary of most African settings where the standard of living is often uniformly poor across the population. The high percentage of helminth parasites can be averted by mass deworming strategies, this also provides an appropriate alternative given the low cost and affordability of anthelmintic drugs which give expected result.

#### **Summary, Conclusions and Recommendations:**

A comparative study on infection with intestinal helminths was carried out among primary school pupils and farmers of Ndufu-Alike in Ikwo Local Government Area of Ebonyi State, Nigeria. Faecal samples were collected from 400 individuals (238 pupils and 162 farmers) and examined for eggs of intestinal helminthes using floatation technique and pretested questionnaire was administered to obtain information on individual's methods of fecal waste disposal. The obtained results showed that 48 farmers and 36 pupils respectively were infected in the overall prevalence base on occupation and famers recorded 12% prevalence against 9% for pupils. Among the risk factors evaluated, pit toilet recovered 24(6%), water closet 3(0.75%) and bush method 57(14.25%). The data collected on age revealed that between the age intervals 5-14 years recorded 23(5.75%) 15-24 years 15(3.75%) 25-34 years 27(6.75%) 35-44 years 4(1%) 45-54 years 2(0.55%).

Basically four intestinal helminthes investigated in the study were *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Taenia* spp and *Trichuris trichiuria*. In evaluation of the parasite specie in respect to sexes (male and female), out of the 400 population sampled, 170 males were examined *Ascaris lumbricoides* record 5 (8.82%), *Ancylostoma duodenale* 19 (11.26%), *Taenia* spp 1 (0.59%). 230 females were examined *A. lumbricoides* recorded 19(8.26%) *A. duodenale* 30(13.04%) and *Taenia* spp 1(0.43%) whereas *Trichuris trichiuria* was absent in both and female respectively.

At  $P < 0.05$ , the prevalence according to occupation, age and as well latrine types, the result was statistically significant.

The high prevalence of intestinal helminth infection calls for urgent measure in improving the basic environmental and sanitary conditions. There should also

be school-based awareness campaign to educate and sensitize the school children on the need for good personal and environmental hygiene and also the possible ways of preventing the devastating parasitic infections and other neglected tropical diseases in developing countries of the world. There is also the need to emphasize on environmental sanitation as well as means of preventing the persistent parasitic infection and other unhygienic practices attributable to helminthic infection. This could be achieved through proper orientation of children and adults especially farmers in the rural settings.

The major factors that predispose people to high risk of this infection are poor sanitation, indiscriminate defecation, poverty and lack of awareness campaign. The research carried out by World Health Organization [12], revealed the use of sewage, faecal sludge on agricultural soil as manure are also the major contributory factors to the spread of helminthic infections. Good habit of eating such as proper washing of hands before handling food is highly advocated.

The result of this study lead us to a logical conclusion that improved sanitation such as proper sewage management, good personal hygiene, adequate awareness campaign on the scourge of helminthic infection through health education program, hygienic food preparation should be encouraged.

#### **Recommendations:**

- There should be a periodic anthelmintic chemotherapy for school children since it is the most efficacious, substantive and reliable means of controlling intestinal helminthes especially in the villages.
- The use of faecal matters and human excreta as manure as commonly practiced by farmers in the area should be prohibited, or recycled (treated) property before use.
- School health programmes should be introduced to schools to create awareness on the high morbidity rate caused by intestinal helminthes.
- The environmental and sanitary health officers should execute their statutory duties so as to control the indiscriminate defecation popularly called "bush method" as practiced by most people in the area.
- In summary, government and individuals in different communities should join hand to fight against intestinal helminth infections. This could be achieved by improved sanitary and environmental sanitation by individuals.

- Improved infrastructural facilities, access and affordable health services should be provided to the people. Abendazole, mebendazole and praziquantel should be made available for the treatment of the infected people in the area.
- The aforementioned measures will actually help to reduce the prevailing cases of intestinal helminthes and other neglected tropical parasitic diseases.

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