

## Original Article

# Current Status of Intestinal Parasites among Pre-school Children in Eke, Okpokwu Local Government Area, Benue State, Nigeria

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## ABSTRACT

Intestinal parasitic infection is a disease of public health importance in developing countries like Nigeria. Conducive environmental factors in developing countries accelerate parasitic growth and development. This study was set up to determine the current status of parasitic infection of preschool children in Benue State. A cross sectional study design was used in this study and computer generated table of random numbers was used to select the respondents. Univariate and bivariate analysis were computed using SPSS version 23. In bivariate analysis variables with  $p$  values  $<0.05$  were considered statistically significant. The overall prevalence of intestinal parasite was 58.0% ( $n=94$ ) and the mean age of the children was 27.8 months. *Ascaris lumbricoides* was the most prevalent parasites. Families using pit latrine had the highest prevalence of parasitic infestation with the prevalence of 69.2% ( $n=64$ ). There was a statistically significant association between parasitosis and methods of waste disposals such as pit latrines, open dumping and water closet ( $p \leq 0.05$ ).

**Keywords:** Children, Latrines, Parasites, Refuse, Water, Under-five

## INTRODUCTION

Intestinal parasites and protozoa infections are among the most common infections worldwide. It is estimated that some 3.5 billion people are affected worldwide and that 450 million are ill as a result of these infections; the majority being children.<sup>1</sup> Each year, some 65,000 deaths are directly attributed to hookworm infection and another 60,000 to *Ascaris lumbricoides*. *Entamoeba histolytica* which causes amoebiasis is estimated to cause severe disease in 48 million people, killing 70,000 each year.<sup>2</sup> Multiple infections with several different parasites are common and

their harmful effects are aggravated by co-existent malnutrition or micronutrient deficiencies.<sup>1, 2</sup> These infections are major causes of morbidity and of the unacceptable high mortality in infants and children particularly the tropics and sub-tropics. This is so because of the terrible trilogy of poverty, ignorance and disease that is characteristic of this area.<sup>1</sup>

Parasites can be broadly divided into protozoa organisms and helminthes. The protozoas include *Giardia lamblia*, *Entamoeba histolytica*, *Balantidium coli*, e.t.c. Helminthes include organisms like platyhelminthes or flat worms e.g Tapeworm or *Taenia solium*, schistosomes, nematodes or roundworms like *Ascaris*, Hookworm, Pin worm etc.<sup>3,4</sup>

The prevalence of these infections in the tropics has to do with the fact that the climate offers excellent opportunities for the rapid and easy development of the different stages of these parasites, which are rapidly disseminated in soil through gross and indiscriminate defecation habits.<sup>5,6</sup>

They tend to be more common in children than adults because of habits practiced by children like direct and indirect consumption of soil. The age group mostly affected is the 6-15 months and this is followed by the 1-5 years.<sup>7,8</sup> Boys are more commonly affected than their female counterpart because they are more adventurous and that exposes them to the parasites in the process. Some studies done in Poland and India showed that parasitic infections co-existed with protein calorie malnutrition and may be attributed to the close association between poverty, poor hygiene, ignorance and disease.<sup>6,8</sup>

Parasitic infections are of public health importance; personal hygiene and good sewage disposal have been shown to reduce the spread. Parasites are widespread and relatively easy to control.<sup>9,10</sup> Treating school children regularly increases their height and weight, improves iron stores and reduces iron deficiency anemia.<sup>11,12</sup> The aim of this study was to determine the prevalence of intestinal parasites in under-five children and their pattern.

## MATERIALS AND METHODS

### Study Area

This study was carried out at the Day Care Unit of Ayigbo International nursery and primary school Eke, Eke Ward in Okpokwu Local Government Area of Benue State. This is a rapidly developing multi-ethnic sub-urban community with an estimated population of approximately 7500 people. The Day Care Centre was founded in 1990 and currently has 570 children.

### Study Population

The study population comprised of under-five children of the Day Care Center a unit of Ayigbo International nursery and primary school Eke in Okpokwu Local Government area of Benue State.

### Inclusion Criteria

All the under-five children of the Day Care Center of Ayigbo International nursery and primary school Eke between the ages of 0-5 years who were officially registered in the school and whose parents /caregivers consented were included in the study.

### Exclusion Criteria

All the under five children of the Day Care Center unit of Ayigbo International nursery and primary school Eke between the ages of 0-5 years who were eligible for the study but were critically ill or who had commenced anti parasitic drugs at the time of the study were excluded.

### Study Design

A cross-sectional descriptive study was employed to determine the prevalence of intestinal parasites in under-five children and their pattern.

### Study Size

The minimum sample size was calculated using the formula

$$N = \frac{z^2 pq}{d^2}$$

Where N = minimum sample size

z = confidence level of 95% (1.96)

p = proportion or prevalence of study

(0.108)

q = complementary probability (1-P)

$$N = \frac{1.96^2 \times 0.108 \times 0.892}{0.05^2}$$

This gave a minimum sample size of 162 after catering for none, poor and incomplete responses.

### Sampling Technique

A multi stage sampling technique was used in this study. Okpokwu Local Government Area (LGA) was selected out of the 23 local governments of the state using simple random sampling technique by balloting. Following which Eke ward was selected from the list of 11 wards in Okpokwu LGA using simple random technique by balloting. Ayigbo International nursery and primary school Day Care Unit Eke was selected using simple random technique by balloting out of the list of 3-day care centers in the ward. Following which a separate list of the children who met the inclusion criteria was made with numbers allocated to each child and computer-generated table of random numbers was used to select the 162 children for the study.

### Data collection tool and procedure

A semi-structured questionnaire regarding the explanatory variables was designed after reviewing several literatures. It was pre-tested on 20 under five children from David

Agaba Standard Day Care Centre Ajide-Eke about 20 kilometers from Ayigbo International Nursery and Primary School. Areas of ambiguity were removed from the tool. Two research assistants were trained to assist the investigator in the supervision and collection of the explanatory variables while two laboratory scientists were recruited for stool collection and diagnosis. Data were collected using interviewer administered technique from the parents/caregivers. The questionnaire administration and stool sample collection were done consecutively by the research assistants between 8 AM and 12 mid-day every day when the respondents bring their children to school until all the samples were completed. The exercise lasted for 7 days. They stayed in the school with the children until they closed by 12 noon.

### Stool sample collection and examination

Fresh stool samples were collected from each study participants in a clean, wide mouth, screw capped, well labeled stool cups. Each of the stool samples was examined both macroscopically and microscopically using saline preparation, lugol's iodine and formal ether concentration techniques.<sup>3</sup>

### Data Processing and Analysis

The data were checked for its completeness and coded manually before data entry. SPSS version 23 was used to enter and analyze data. Descriptive statistics; including frequency, mean and standard deviations, were used to describe the data.

### Ethical Issues

Ethical clearance was obtained from the ethics and Research Committee of the Benue State University Teaching Hospital, Makurdi, Nigeria. Verbal consent was obtained from the parents/caregivers of the children.

## RESULTS

Table 1: Socio-demographic characteristics of Respondents (n=162)

Characteristics	Frequency	Percent
<b>Age group (months)</b>		
<6	17	10.5
6-11	33	20.4
12-23	49	30.2
24-59	63	38.9
<b>Total</b>	<b>162</b>	<b>100</b>

Table 1: Contd.

<b>Sex</b>		
Male	78	48.2
Female	84	51.8
<b>Total</b>	<b>162</b>	<b>100</b>
<b>Religion of Mother/Guardian</b>		
Christianity	162	100
<b>Occupation of Mother/Guardian</b>		
House Wife	25	15.3
Farming	104	64.3
Government	8	15.2
Trading	25	5.2
<b>Ethnicity</b>		
Idoma	149	92.0
Ibo	13	8.0
<b>Educational level</b>		
None	11	6.8
Primary school	126	78.0
Secondary	22	13.4
Tertiary	2	1.8
<b>Annual Income (Naira)</b>		
Less than 20,000	33	20.5
20,001-40,000	98	60.2

In this study 12 children were excluded based on the exclusion criteria while 162 were included given a response rate of 100%. The mean age of the participants was 27.8 months. There were slightly more females 51.8% (n=84) than males in this study. All the participants were Christians and slightly above 64.0 % (n=104) were farmers. Majority 78.0% (n = 126) had primary school education while over 60.0% (n=98) earned between 20000 and 40000 Naira annually.

**Table 2 Distribution and Pattern of Intestinal Parasites Infestation**

Parasite Infestation	No. of Children	Percentage %
<b>Infested</b>	94	58.0
<b>Non infested</b>	68	42.0
<b>Total</b>	162	100
<b>Mono parasitism</b>	51	54.0
<b>Poly parasitism</b>	43	46.0
<b>Total</b>	94	100
<i>Ascaris lumbricoides</i>	64	56.0
<i>Ancylostoma duodenale</i>	23	20.0
<i>Taenia spp</i>	13	11.4
<i>Entamoeba coli</i>	10	0.1
<i>Entamoeba histilytica</i>	2	0.0
<i>Trichuris trichuria</i>	1	0.1
<i>Schistosoma mansoni</i>	1	0.1
<b>Total</b>	114	100

In this study the overall prevalence of intestinal parasitic infection amongst the under- five children was 58.0% (n=94), 54.0% (n=51) had mono-parasitism and 46.0% (n=43) had poly-parasitism. Of all the parasites identified *Ascaris lumbricoides* was the most predominant 56.0% (n=64) followed by *Ancylostoma duodenale* 20.0% (23) and *Taenia* species 11.4% (n=13).

**Table 3: Distribution of intestinal parasites based on water supply, methods of waste disposal and water treatment**

Main source of water supply	Number of children infested	Number of children not infested	Percentage %
Well	60	57	63.8%
Tap	33	10	35.1
Rain	1	1	1.1
<b>Total</b>	<b>94</b>	<b>68</b>	<b>100</b>

Method of waste disposal	Infested	Not infested	Percentage infested
Water closet	11	12	11.7
Pit latrine	65	44	69.2
Open dumping	18	44	19.2
<b>Total</b>	<b>94</b>	<b>68</b>	<b>100</b>

Method of water treatment	Number of children infested	Number of children not infested	Percentage of those infested
Filtration	26	17	27.7
Boiling	-	2	-
No treatment	68	49	72.3
<b>Total</b>	<b>94</b>	<b>68</b>	<b>100</b>

In this table those whose children drank well water had the highest prevalence of parasites of 63.8% (n=60), followed by those who drank tap water 31.1% (n=33). Amongst the methods of waste disposal those parents/caregivers who used pit latrine their children had the highest prevalence of parasitic infection of 69.2% (n=65) followed by open dumping 19.2% (n=18) and water closet 11.7% (n=12). Children who drank water that was not treated had the highest prevalence of parasites of 72.3% (n=69), while filtration was 27.7% (n=27).

Table 4: Test of associations with sex, age, waste disposal, sources of water and intestinal parasite distribution in Okpokwu Local Government of Benue State.

Sex			
Parasitosis	Female	Male	Total
Yes	54	40	94
No	30	38	68
<b>Total</b>	<b>84</b>	<b>78</b>	<b>162</b>

$X^2=2.3$ ,  $df=1$ ,  $P>0.05$

## Age

Parasitosis	0-24 months	25-48 months	49-60 months	Total
Yes	35	37	22	94
No	31	20	17	64
<b>Total</b>	<b>66</b>	<b>57</b>	<b>39</b>	<b>100</b>

$X^2=1.41$ ,  $df=2$ ,  $p>0.05$

Parasitosis	Open dumping	Pit dumping	Bucket	Water closet	Total
Yes	11	65	-	18	94
No	12	44	-	12	68
<b>Total</b>	<b>23</b>	<b>109</b>	<b>-</b>	<b>30</b>	<b>162</b>

$X^2=28.29$ ,  $df=3$ ,  $p<0.05$

Parasitosis	Tap	Well	Rain	Stream	Total
Yes	60	33	1	-	94
No	57	10	1	-	68
<b>Total</b>	<b>117</b>	<b>43</b>	<b>2</b>	<b>-</b>	<b>162</b>

$X^2=6.03$ ,  $df=3$ ,  $p>0.05$

Table 4 Contd.

Parasitosis	Boiling	Alum	Filter	Nothing	Total
Yes	26	-	-	68	94
No	17	-	2	49	68
<b>Total</b>	<b>43</b>	<b>-</b>	<b>2</b>	<b>117</b>	<b>162</b>

$X^2=53.31$ ,  $df=3$ ,  $p<0.05$

The parasitic infestation rate amongst males 42.5% (n=40) was lower than that of females. The chi-square test showed that there was no significant association between intestinal parasite infestation and gender ( $X^2=2.31$ ,  $df=1$ ,  $P>0.05$ ). Amongst the various age groups, those that fell between 25-48 months had the highest infestation rate of 39.4% (n=37) while the age group 46-60 months had the least 23.4% (n=22). There was however no significant statistical association between intestinal parasite and age ( $X^2=1.41$ ,  $df=2$ ,  $p>0.05$ ). On the method of waste disposal those using pit latrine had the highest prevalence of intestinal parasite infection 69.2% (n=65), followed by open dumping 19.1% (n=18). There was significant association between method of waste disposal and intestinal parasites infection ( $X^2=28.29$ ,  $df=3$ ,  $p<0.05$ ). The parasitic infestation rate amongst people that do not treat their water at all was as high as 72.34% (n=65) compared to 27.70% (n=26) in those that boil their drinking water. The chi-square test showed that there was significant association between parasitic infestation rate and treatment of water ( $X^2=53.31$ ,  $df=3$ ,  $p<0.05$ ).

## DISCUSSION

It is very important to know the distribution and scope of intestinal parasitic infection in young children to be able to devise successful preventive and therapeutic interventions. This study was conducted to assess the prevalence of intestinal parasites in children less than 5 years of age in a day care centre in Okpokwu Local Government Area of Benue State Nigeria. The overall prevalence of intestinal parasite was 58.0%. This was far higher than other similar studies done in Ethiopia, Ife in Oyo State, Nigeria and Niger Delta.<sup>4,12,13,14</sup> This relatively diverse prevalence of intestinal parasites observed in these studies could be due to

differences in geographical areas of study, the type of settlement and the variations in environmental factors like level of sanitation. Other factors could be due to weather it is situated in the urban or rural, sample size of the work, or those included maybe on anti-helminths.

Children with an unclean environment were found to have higher prevalence of parasitic infection. This is due to the presences of microorganisms and eggs in dirty surfaces. This is supported by a study which concluded that inadequate sanitation and hygiene behavior are associated with soil transmitted helminths and intestinal protozoan infections.<sup>15</sup> On the other hand, children who had an open defecation in the family were 3.4 times more likely to harbour intestinal parasites. This finding agreed with a cluster randomized controlled trial conducted in India that showed the inversely proportional relationship between improved latrine use and intestinal parasitosis prevalence and another study conducted in Coted'Ivoire had similar findings<sup>1,19</sup>

Similar to our study there were some studies that showed significant association of age with prevalence of intestinal parasites<sup>15,16</sup> Like the current study, studies in Ethiopia and Saudi Arabia indicated children of the age group 25- 48 months were having the highest infection rate of intestinal parasites.<sup>4,17</sup> On the other hand it was in difference with a study conducted in Utan, Plateau State that revealed the least infected age range was between 25-48 months.<sup>18,19</sup>

Our study showed no statistically significant relationship between gender and prevalence of intestinal parasites. This disagreed with the study carried out in Nepal, which showed that males were more affected due to the fact that they played more with dirt, which may be contaminated.<sup>10,21</sup>

In homes both sexes were equally exposed to the same environmental conditions.

Some studies indicated that the predominant parasite among children was *Giardia lamblia*, were as in the current study the most encountered parasite was *Ascaris lumbricoides*.<sup>12, 13, 20</sup> This may be attributed to the fact that *Ascaris* remains viable for a larger period of up to 15 months.<sup>12,14</sup> More than half of the people harbouring one or more of the parasites in them used pit latrine as their method of waste disposal in this study. This disagreed with other studies done in Niger Delta were those that used open dumping were infected most.<sup>14,15</sup> This could be due to the fact that the pit latrines were poorly maintained. From the checklists, they were bushy, no provision of water for washing hands, the drop holes were too large without suitable cover, lack of super structure covering it etc. There was however statistically significant relationship between

intestinal parasites and methods of waste disposal  $X^2=28.29, df=3, p<0.05$ )

## CONCLUSION

In this study, the prevalence of intestinal parasites was found to be higher than WHO annual or biannual population treatment level. Children and family use of toilet were significantly associated with intestinal parasitic infection. Thus, strengthening of health education of personal and environmental hygiene of both children and mothers/guardians is crucial. Besides, improving mothers/guardian awareness about the mode of intestinal parasites transmission is necessary.

**Conflict of Interest-** None

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