



## The Burden of Multiple Intestinal Helminthes among Primary School Children in Doma, Doma Local Government Area, Nasarawa State, Nigeria

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### Authors' contributions

This study was carried out in collaboration among all the authors. All authors read and approved the final manuscript.

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### ABSTRACT

Intestinal parasitic infections have always been an important public health problem in the tropics particularly in developing countries such as Nigeria for example. A cross-sectional survey involving 440 schools going children of both sexes aged 6 - >12 years was conducted in 4 primary schools at a different location in Doma Local Government Area (LGA) of Nasarawa State, Nigeria, between September 2015 to February 2016 to determine the prevalence of intestinal parasites. Of the 440 samples examined 155 (35.22%) were infected with different intestinal parasites. The parasites observed included *Entamoeba histolytica* (6.59%), bookworm (5.22%), *Ascaris lumbricoides* (53.40%), *Trichuris trichiuria* (0.45%), *E. coli* (4.77%) and mixed infection of *Ascaris lumbricoides* and hookworm (7.27%) with *Ascaris lumbricoides* having the highest prevalence. Doma south primary school 38 (34.54) Islamiyya nursery/primary school and Doma west primary school had the lowest prevalence with 36 (32.72%) and 34 (30.90%) respectively. An overall prevalence of

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(35.22%) intestinal parasitic infection in school going children is moderately high and of public health concern. There is need to intensified integrated control measure to reduce or completely eradicate the intestinal parasitic infection in school pupils.

*Keywords: Intestinal parasites infection; primary school children; Doma.*

## 1. INTRODUCTION

Intestinal helminthes are living organisms that are worm-like in shape which receive nutrient and protection from their host, disrupting the internal activities [1]. They are also called soil-transmitted helminthes because their infections are specifically through coming in contact with soil, which is contaminated with faecal matters. People get infected with worms when living in an unclean environment of poor sanitation and unhygienic habit [2]. The human becomes infected by ingesting infective eggs of parasite or by infective larva about ten (10) days [3]. Hence the disease burden depends on the condition of the ecological area including the standard of the locality, sanitation and the social and economic development of the inhabitant [4]. Children are the group with the highest prevalence of helminthes infection since they are the most vulnerable to the factors that cause it [4]. Furthermore, there are different types of lifestyle playing on sand, licking of fingers etc which are common to those infected with variety of helminthes infections, resulting in very widespread parasitism; thus, eating habits that involve the consumption of unwashed raw vegetables, sand etc also allows the transmission of helminthes infection [4]. The three main types of common intestinal worms that infect humans are large intestinal roundworm (*Ascaris lumbricoides*), hookworm (*Ancylostoma duodenale* and *Necator americanus*) whipworm (*Trichuris trichuris*) (UNICEF, 2012). Various studies carried out in Nigeria have been to estimate the situation of the rate of infection of intestinal helminthes in communities with better housing, sanitation, water supplies, health care, education and low income [1]. Most of the worms spend part of their lifecycle in either animal, rodents, or human beings and cause infection such as vomiting, anaemia, fever, intestinal obstruction, malnutrition dysentery, dehydration, colitis and other impairments [5].

These different types of worm infections, if untreated or controlled may harm the children's cognitive development, learning abilities,

nutritional status and result in other health problems [6]. Hence, the present work was undertaken to determine the risk factors, associated with the prevalence of intestinal helminthes among school children in Doma.

## 2. MATERIALS AND METHODS

The study area was Doma, Doma Local Government Area, Nasarawa State, Nigeria. The predominant people in the study area are farmers; some are civil servants, while others are businessmen and women. Nasarawa state lies between latitude 7° 45'N and 9° 25'N of the equator and between longitude 7° and 9° 37'E of the equator, Nasarawa State, according to National Population Commission (2006) census the population was 1,863,275. Nasarawa State is within the Guinea savannah region of Nigeria. The rainy season usually from April to October and the dry season are between November to April.

### 2.1 Study Population

The study population were eight (8) primary schools in the town with an enrolment of 2900 pupils four (4) schools were randomly selected for the study, out of this only 440 (220 boys and 220 girls) voluntarily had agreed to participate in this study.

The minimum sample size required for this study was calculated according to the formula provided by Lwanga and Lemeshow [7]. At 95% level of significance and 5% confidence level, the minimum number of participants required for the study was estimated at 440.

### 2.2 Specimen Collection

Sample collection was carried out according to international best practices [8,9] structured questionnaires on knowledge attitude and practices used to obtain information from pupils [10]. Before the day of specimen collection, sterilized plastic bottles with numbers and names were distributed to all the selected pupils for stool collection. The stool sample of 110 pupils aged 5

and 13 was collected in four schools giving a total of 440 samples. After collection, the stool was preserved with 5% formalin and transported to the laboratory for further processing.

Stool samples were processed in the pathological laboratory using two parasitological techniques which included direct wet preparation and concentration techniques [11].

### 2.3 Faecal Sample Analysis

The diagnosis of the intestinal parasite was confirmed by the recovery of helminthes eggs and larva from each stool sample in the laboratory. The direct wet mount was used for preliminary investigation and detection of heavy infection. The direct wet mount using normal saline and then iodine was used for every sample in order to detect any motile trophozoites and/or larva and screen for other parasite. The techniques involve placing a drop of fresh physiological saline at the centre of a clean grease-free glass slide with the aid of applicator stick little amount of faecal specimen was picked and placed in the saline preparation. It was emulsified thoroughly removing any discovered debris. The entire preparation was then covered with Coverslip (ensuring that no air bubbles were not trapped) taking care that no air bubbles were

trapped. The preparation was observed under X10 objective and X40 objective of the microscope for confirmation.

### 2.4 Concentration Method for the Confirmation of Eggs and Larva in Light Infection

The formol-Ether concentration method was also employed to increase the probability of finding the parasites in the faecal sample. One gram of faeces was suspended in 10 ml of 10% formol-saline solution and mixed with a glass rod. The suspension was passed through a funnel covered with a wire gauze pad into a centrifuge tube. Then 3 ml of ether was added and the suspension was mixed for 1min. the tube was centrifuged for 2 minutes at 2,500 rpm after which the supernatural was discarded and the sediment, examined for ova or larvae. After mixing the sediment with the aid of a Pasteur pipette, a drop was placed on a glass slide. The deposit was then examined using X<sub>10</sub> and X<sub>40</sub> objectives of the compound microscope.

### 2.5 Identification of Parasites

The parasites were identified and classified concerning their morphology by the researcher (e.g eggs, larvae, and oocyst).



Figure 1. Map of Nasarawa State showing study area  
Source: Nasarawa State Urban Development Board, (2001)

### 3. RESULTS

A total of four hundred and forty (440) stool samples from pupils (consisting of 220 male and 220 female primary school pupils) across four different primary schools within Doma were collected and examined for eggs, ova and larvae of intestinal parasites. An overall prevalence of 155 (35.22%) school children tested positive to intestinal parasitic infection. Males recorded a higher prevalence of 85 (32.63%) than females 65 (29.54%). The parasites observed in this report include *Entamoeba histolytica* (6.59%), hookworm (5.22%), *Ascaris lumbricoides* (53.40%), *Trichuris trichiuria* (0.45%) *Entamoeba coli* (4.77%) and mixed infection of *Ascaris lumbricoides* and Hookworm (7.27%). Table 1 shows infection was higher in pupils from Doma south primary school with an infection rate of (38.18%) followed by Doma central primary school and Ismamiyya Nursery/Primary School Doma with an infection rate of 32.72%). The least infected group of pupils belonged to Doma west primary school with an infection rate of (30.90%). Table 2 reveals the student t-test analysis of the parasite infection between the males and females showed significant differences between the sexes ( $P < 0.01$ ). The percentage prevalence of infection was high in pupils between age 10 – 11 and progressively decreased in the pupil, between  $> 12$  years.

### 4. DISCUSSION

In this study we found the prevalence of intestinal parasites to be 35.22%, prevalence that is higher when compared with previous findings in south-west Nigeria (28%) [12]; but the prevalence is lower when compared with previous findings in south-eastern Nigeria (55.2%) [13] south-south Nigeria (67.2%) [14] and north-east Nigeria (80.9%) [15]. The results, however, are an agreement with the findings of Legochi et al. (2015) where they reported an overall prevalence of 48.7% intestinal parasites among primary school children in parts of Imo State. These findings contradict those of Abossie et al. [16], Gabbad and Mohammed [17] and Banke et al.

[4] who reported 81.0%, 64.4% and 54.13% respectively. The relatively low prevalence was observed in this study disagrees with previous finding in parts of northern Nigeria and another report from parts of tropical Africa which show very high ( $\geq 70\%$ ) infection rates of intestinal helminthes [18]. Age is an important factor for the prevalence of intestinal parasite infection. In this study age, 10 – 11 years had the highest prevalence of 38.18%, followed by age 8 – 9 years 34.54%. Age  $\geq 12$  years had the least prevalence of 30.90%. This report agrees with the findings of a similar study conducted by Oyeniran et al. [19] where they reported that parasitic infestation increased progress with increasing age but limited to age 16 and above. The difference in infection rate between male and female pupils was not statistically significant. However, the males had the highest infection rate, a report which agrees with agrees with the findings of Bui et al. [20], Luka et al. [21] and Ukpai and Ugwu [22] that recorded higher infection rates in male and reasoned that this was as a result of gender differences in recreational activities. The higher prevalence recorded in males is in contrast to the report of Banke et al. [4] and Odo et al. [23].

The parasites observed in this study included hookworm *Ancylostoma duodenale* (5.22%), roundworm *Ascaris lumbricoida* (53.40%), *Entamoeba histolytica* (6.59%) with *Ascaris* having the highest prevalence. This result agrees with Kpurpur et al. [24] and also agrees with the findings of Houmsou et al. [25], Ugochi et al. [26], Oyeniran et al. [19] who reported *Ascaris lumbricoides* as the most prevalent intestinal parasite followed by *Ancylostoma duodenale*.

High prevalence of intestinal parasitic infestation is apt to occur in low socio-economic conditions, characterized by inadequate water supply, poor hygiene and poor sanitary disposal of faeces. This situation is typical of the lives of the pupils living in a town like a study area. It was reported that 75% of primary school in town and villages do not have toilets thereby defecating in the bushes which result in the contamination of soil

**Table 1. Prevalence of intestinal parasites in the different school's samples**

Location	No. Exam	No. infected	% prev.
Central prim school Doma	110	38	(34.54)
Doma south primary school	110	42	(38.18)
Doma east primary school	110	34	(30.90)
Islamiyya primary school Doma	110	36	(32.72)
Total	440	155	

**Table 2. Prevalence of intestinal parasites infection about sex distraction**

Schools location	Male			Female			Total		
	No exam	No of infection	%	No exam	No of infection	%	No exam	No of infection	%
Doma central primary	55	22	(40%)	55	16	(29.09)	110	38	(34.54%)
Doma south primary	55	23	(41.18%)	55	19	(34.54%)	110	42	(38.18%)
Doma west primary	55	16	(29.09%)	55	18	(32.72%)	110	34	(30.90%)
Islamiyya nursery/primary	55	24	(43.63%)	55	12	(21.81)			
Total	220	85	(38.63%)	220	65	(29.54%)	440	155	(35.22%)

**Table 3. Prevalence of intestinal parasites by age**

Age of pupils (years)	No examine	No. infected	% prev.
6 – 7	98	36	(32.72%)
8 – 9	102	38	(34.54%)
10 – 11	131	42	(38.18%)
>12 years	109	34	(30.90%)
Total	440	155	

**Table 4. Frequency of species of intestinal infection among primary school pupils**

Species	No. examined	No. positive	% positive
<i>Entamoeba/history</i>	440	29	6.59%
<i>Hookworm</i>	440	23	5.22%
<i>Ascaris lumbricoides</i>	440	235	53.40%
<i>Trichuris trichiuria</i>	440	2	0.45%
<i>Entamoeba coli</i>	440	21	4.77%
Mixed infections			
<i>Ascaris lumbricoida</i> + hookworm	440	32	7.27%
Total	2640	342	12.95%

with eggs and larvae of helminthes and bathing in stagnant rivers which could expose them to water-borne diseases is usually a common phenomenon. Most school children walk barefooted while at home go around refuse dump and eat without washing hands all of which predisposing factors in the group of children. The relative prevalence recorded in this that intervention strategies targeted at parasites by way of deworming campaigns and actual deworming of primary school children.

## 5. CONCLUSION AND RECOMMENDATIONS

This study recorded a low prevalence of intestinal parasitism among school pupils if compared with other parts of Nigeria where a prevalence of greater than 50% is shown from previous findings. Children with intestinal

parasite should be treated periodically using a broad spectrum or multi-agent drugs combination because of the multiple susceptibilities in children. Enhancing socio-economic status, improving sanitation facilities, providing health education and way of keeping personal hygiene can be good strategies targeted at parasites. The clean environment should be intensified geared towards prevention and control of parasitic infections among children in rural areas.

## CONSENT AND ETHICAL APPROVAL

Ethical approval for the study was obtained from the headmasters of the schools. Parents of all children were informed about the study through the parent-teacher association (PTA) and were required to consent to their children's participation. Infected children were appropriately treated.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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