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# Incidence of Intestinal Helminthic Infection among Primary School Pupil in Kura District, Kano State Nigeria

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**Abstract:** Intestinal helminthiases are among the most common infections worldwide. It affects the poorest and most deprived communities. The study was aimed to determine the incidence of intestinal helminthiasis among primary school pupils in Kura district in Kura Local Government area of Kano State in Northern Nigeria. A total of 117 pupils (67 boys and 50 girls) from four primary schools in the district were chosen. Faecal samples were collected from pupils in sterile dry specimen bottles with the use of applicator sticks and analyzed using sedimentation and floatation techniques. The overall incidence of intestinal helminth infection among the study subjects was found to be 13.7%. The results showed that Ascaris lumbricoides has the highest frequency with total of 6 appearance which accounted for 37.5%, followed by Strongyloides stercoralis, Trichuris trichiura and hookworm (12.5%) while Teania, S. mansoni, H. nana and E. vermicularis appeared once. The incidence was higher among male with total of 10 out of the 16 subjects which accounted for 62.5% while female has 37.5%. Based on the age of the subjects, those ranged between 6 to 8 years have the highest incidence (9 out of 16) which accounted for 56.25% while those ranged between 12 to 14 years recorded the lowest incidence with total of 18.75%. It is concluded that the incidence of intestinal helminth infection was higher among less aged pupil.

**Keywords:** *Incidence, Intestinal Helminthic, Infection, Pupil, Kura District.*

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## Introduction

Intestinal helminthiases are among the most common infections worldwide. It affects the poorest and most deprived communities (Savioli *et al*., 2002; WHO, 2017). Intestinal helminthiasis caused by worms can be grouped into nematodes, cestodes, and trematodes (Arya *et al*., 2016). It is one of the most common, but neglected disease affecting more than two billion people worldwide (Bethony *et al*., 2006). The World Health Organization (WHO) estimates that over 1.5 billion people are infected with helminths worldwide (WHO, 2017). Globally, about 100 million children experience stunting or wasting because of worm infestation (Liu *et al*., 2012). Undernutrition remains the world most serious health challenge and the single biggest contributor to child mortality (Liu *et al*., 2012).

It is more endemic in Sub-Saharan Africa, Asia, Latin America, and Caribbean (de Silva *et al*., 2006). This may be due to favorable climatic conditions that enhance development and survival of the ova of helminths in these regions (de Silva *et al*., 2006). Prevalence estimates of intestinal helminthiasis among children in the general population are of variable ranges with 1.6–93.0% in Latin America and Caribbean (Ault *et al*., 2010). Reported prevalence rates in sub-Sahara Africa vary from 9.1% to 90.3% (Ohuche *et al*., 2020). Over 270 million preschool-age children and over 600 million school aged children live in areas where these helminths are intensively transmitted. The public health burden and prevalence of intestinal helminths in Nigeria are increasing, with 45% of school-age children infected annually (Mbanugo and Onyebuchi, 2002; Ozumba and Ozumba, 2002).

All age groups are infested by intestinal helminths but the highest prevalence and intensities are found among school age children (Brooker *et al*., 2006). In Nigerian school children, Oninla *et al*., (2007), documented a prevalence of 24% and 36% for urban and rural subjects, respectively. Children living in suburban, rural, and institutionalized centers have been reported to be more prone to helminthic infestations than those living in urban or normal home settings (Wosu and Onyeabor, 2014). The harmful effects of intestinal helminths, such as malnutrition and anemia, on these preschool and school aged children are as a result of consumption of nutrients meant for their host, obstruction of intestinal lumen, anorexia, diarrhea, and chronic anemia due to heavy worms load (Okolo and John, 2006). These harmful effects will lead to loss of nutrients, fluid, and electrolyte as well as depletion of red blood cells and growth failure (Awasthi and Panda, 1997). In addition, intestinal helminths secrete toxic bioactive compounds within the small intestine of the host, which deplete nutrients and impair absorption, thereby playing an important role in childhood malnutrition (WHO, 2001).

Some risk factors for high prevalence of intestinal helminthiasis such as poor environmental sanitation and personal hygiene, lack of clean drinking water and improper sewage disposal are common in institutionalized centers (Nwaneri and Omuemu, 2012). Some authors (Shehata and Hassanein, 2015) opined that children in institutionalized homes could be at higher risk of both the intestinal helminthiasis. Information on the incidence of helminthiasis among primary school pupil will be necessary to provide appropriate authorities on the need to implement periodic deworming of primary school pupils in Kano, as this may improve the nutritional status of pupils, to enable them attain their full potentials as adults. The aim of this study therefore is to determine the incidence of intestinal helminthiasis among primary school pupils in Kura district in Kura Local Government area of Kano State in Northern Nigeria

## Materials and Methods

### Study Area

Kura is one of the Local Government areas of Kano State. It is located in the southern part of the state along Kano-Zaria express with a distance of about 35 Kilometer from the state capital. Geographically, it is located at latitude 11046'N and Longitude 8025'E. It covers an area of about 206 Km2 of land. According to 2006 population census, it has a total population of 144,601 and the projected population of 199,002 as of 2016 (NPC, 2016). Kura Local Government shares common boundaries with Garun-Mallam (West), Dawakin-kudu (East), Bunkure (South) and Madobi Local Government (North). Farming and irrigation remain the major occupations in the area. However many educated indigenes in the area are employed in the formal sector while others engaged in various trading activities.

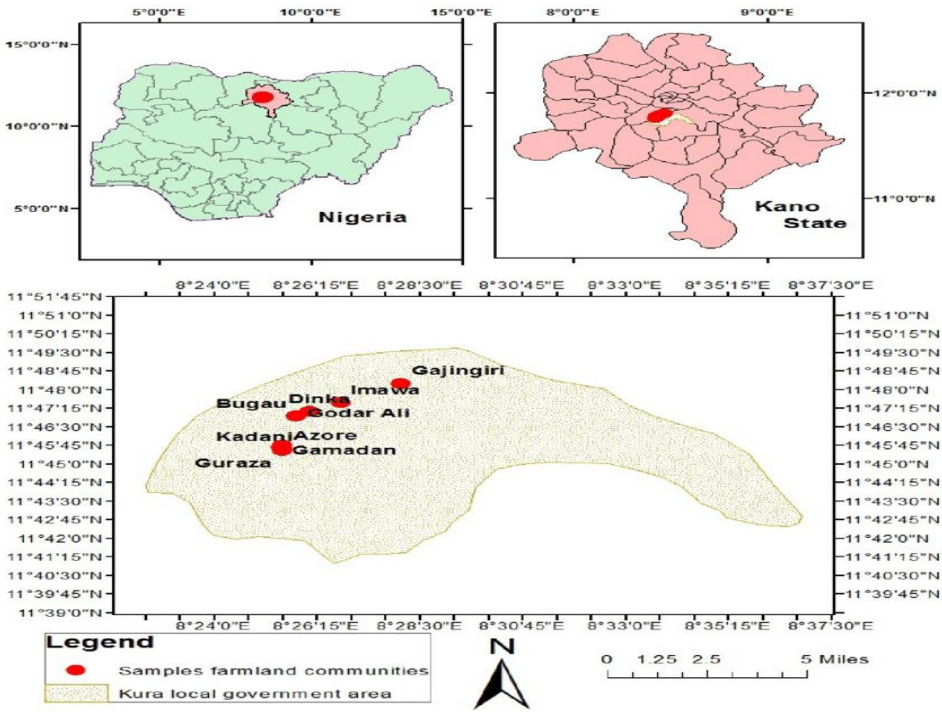


**Figure 1: Map of Kura Local Government Area**

### Sample Size Determination

Sample size determination for this study is calculated based on the prevalence reported from initial studies carried out in the state using the following epidemiological formulae;

$n= (Z^2pq)/d^2$

Where;

n = Number of samples (sample size)

Z = Standard normal deviate at 95% confidence interval = 1.96

p= Prevalence from initial studies = 8.3% = 0.083

d = degree of confidence at = 0.05

$q = 1-p = 1 - 0.083= 0.917 = ([1.96]^2\times0.083\times0.917)/[0.05^2] = (3.8416\times0.07611)/0.0025= 0.2923/0.0025=116.95 \approx 117$

### Study Design and Population

This was a cross-sectional study in which a structured questionnaire was used to obtain data from guardians/caretakers of the study subjects in the study area between June and December 2022. Data obtained included information on socio-demographic factors, knowledge and practice of their children regarded intestinal helminth infections. A total of 117 pupils (67 boys and 50 girls) from four primary schools in the district were chosen. All the sampled subjects used for the study gave their consent to be involved in the research.

### Questionnaire Administration

A total of one hundred and seventeen (117) simple structured questionnaires were designed using close ended questions to provide information about the socio-demographic factors of participants and predisposing factors to both infections.

Informed consents were obtained from all participants before inclusion.

**Sample Collection**

Early morning stool was collected from 117 pupils attending the selected primary schools in sterile dry specimen bottles with the use of applicator sticks. The pupils were given orientation on how to collect the samples into clean/dry, wide mouthed, screw capped, leak proof tight fitted labeled specimen bottles which was given to them. The samples were collected directly into the specimen bottles avoiding contamination with urine and other contaminants. The sample were preserved using diluted carbon fuchsine and transported immediately to the laboratory for analysis (Ukam *et al*., 2020).

**Faecal Sample Analysis**

**Sedimentation technique**

Three (3) grams of fecal sample was measured into a labeled container. About 50 ml of distilled water was poured into the container and mixed thoroughly with a string device. The fecal suspension was derived from the mixture by filtering the solution through a double layer filtering material into another labelled container. The filtered material was then poured into a centrifuge test tube and centrifuged at 3000 rpm for 5 minutes. The sediments were then collected and stained adding one drop of methylene blue. This was covered with a cover slide and viewed under the microscope using the 10x and 40x objectives for the presence of intestinal parasite, larvae, ova, or cysts (Ukam *et al*., 2020).

**Floatation technique**

Another 3 g of fecal samples was placed in a container and 50 ml of zinc sulphate was poured into the container. The mixture was then stirred thoroughly with a tongue blade and then poured into a test-tube using a double layer filtering material. The test-tube, filled to the brim with the mixture, was carefully placed in the test tube rack to stand for about 20 minutes covered with a cover slip. Afterwards, the cover slip was carefully lifted from the test-tube together with the drop of fluid adhering to it and immediately placed on the microscopic slide facing downwards. The cover slip was examined microscopically using the 10x and 40x objectives as described by Ukam *et al*. (2020).

**Identification of Parasite Species**

Identification of the parasite egg and cyst were done based on structural and morphometric criteria with the help of parasitology laboratory atlas. The criteria include size, shape and possibly color of the egg and cyst (Cheesbrough, 2012; Arora and Arora, 2012).

**Statistical Analysis**

Data were analyzed using basic descriptive statistics such as percentages. The data on the incidence of helminth infection was analyzed using Chi-square ($X^2$) test to assess relationships between selected categorical variables such as age, gender and residential area. The level of significance was set at $p<0.05$.

**Ethical Clearance**

Ethical approval for the study with reference number HMB/GEN/488/VOL.1/009 was obtained from Kano State Hospital Management Board based on the consent of ethical committee of Kura General Hospital, Kano.

## Results

**Demographic distribution of the subjects**

A total 117 subjects participated in the study with 67 (57.3%) males and 50 (42.7%) females of all ages. Majority of the participants were 12 to 14 years age bracket. Participant parent's occupation is mostly farming 39 subjects accounted for 33.4%, followed by trading 26 subjects (22.2%).

**Table 1: Demographic distribution of the subjects**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Gender** | | |
| Male | 67 | 57.3 |
| Female | 50 | 42.7 |
| **Age (years)** | | |
| 6 – 8 | 25 | 21.4 |
| 9 – 11 | 43 | 36.7 |
| 12 – 14 | 49 | 41.9 |
| **Father's occupation** | | |
| Farming | 39 | 33.4 |
| Fishing | 17 | 14.5 |
| Artisan | 20 | 17.1 |
| Trading | 26 | 22.2 |
| Civil servant | 15 | 12.8 |

**Incidence of Intestinal Helminths among Study Subjects**

The incidence of intestinal helminths among study subjects in Table 2 showed 13.7% were positive for intestinal helminth whereas 86.3% were negative.

**Table 2: Incidence of Intestinal Helminths among Study Subjects**

| Result | Number (n) | Percentage (%) | P-value |
|---|---|---|---|
| Positive | 16 | 13.7 | |
| Negative | 101 | 86.3 | |
| Total | 117 | 100 | |

**Prevalence of Intestinal Helminths among Study Subjects**

The result of prevalence of intestinal helminths among study subjects is presented in Table 3. The results showed that *Ascaris lumbricoides* has the highest frequency with total of 6 appearance which accounted for 37.5%, followed by *Strongyloides stercoralis*, *Trichuris trichiura* and hookworm (12.5%) while *Teania*, *S. mansoni*, *H. nana* and *E. vermicularis* appeared once.

**Table 3: Prevalence of Intestinal Helminths among Study Subjects**

| Parasite | Number (n) | Prevalence (%) |
|---|---|---|
| *Ascaris lumbricoides* | 6 | 37.5 |
| *Strongyloides stercoralis* | 2 | 12.5 |
| *Trichuris trichiura* | 2 | 12.5 |
| Hook worm | 2 | 12.5 |
| *Teania* spp | 1 | 6.25 |
| *Schistosoma mansoni* | 1 | 6.25 |
| *Hymenolepsis nana* | 1 | 6.25 |
| *Enterobius vermicularis* | 1 | 6.25 |
| **Total** | **16** | **100** |

**Relationship between demographic factors and Incidence of intestinal helminths**

The relationship between demographic factors and incidence of intestinal helminths among study subjects is presented below in Table 4. From the result, incidence was higher among male with total of 10 out of the 16 subjects which accounted for 62.5% while female has 37.5%. Based on the age of the subjects, those ranged between 6 to 8 years have the highest incidence (9 out of 16) which accounted for 56.25% while those ranged between 12 to 14 years recorded the lowest incidence with total of 18.75%.

**Table 4: Relationship between demographic factors and Incidence of intestinal helminths**

| Variable | Frequency (n) | Positive (n) | Incidence (%) | P-value |
|---|---|---|---|---|
| **Gender** | | | | |
| Male | 67 | 10 | 62.5 | |
| Female | 50 | 06 | 37.5 | |
| **Total** | **117** | **16** | **100** | |
| **Age (years)** | | | | |
| 6 – 8 | 25 | 09 | 56.25 | |
| 9 – 11 | 43 | 04 | 25.00 | |
| 12 – 14 | 49 | 03 | 18.75 | |
| **Total** | **117** | **16** | **100** | |

## Discussion

The overall incidence of intestinal helminth infection among the study subjects was found to be 13.7%. This incidence was lower than 20.7% and 23.7% reported by Nwaneri and Omuemu, in 2011 and Bakari *et al*. (2023) among school children in South-South and North Central Nigeria respectively. On the other hand, this result was higher than that of Njoku *et al*. (2022) who recorded 2.5% prevalence of helminth among school children in some states in South Western Nigeria. Incidence of helminth in this study could be due to refuse dumped within the school premises where the pupils often defecate. This behavior increases the likelihood of transmission of parasitic infections.

The result of prevalence of intestinal helminths showed that *Ascaris lumbricoides* has the highest frequency, followed by *Strongyloides stercoralis*, *Trichuris trichiura* and hookworm while *Teania*, *S. mansoni*, *H. nana* and *E. vermicularis* appeared once. This finding was in conformity with that of Njoku *et al*. (2022) who reported similar helminth from school children in some states of South Western, Nigeria. Reports have incriminated Ascariasis, Trichuriasis and Hookworm infection as the three major causes of

soil-transmitted helminth infections in children in sub Saharan Africa (De Silva *et al*., 2003). The ova of *A. lumbricoides* was found to be highest in the faecal samples examined in study area. The high prevalence of *A. lumbricoides* can be due to the fact that the ova remain viable the fact that children from both schools practice open defecation, exposing them to the ova of the parasites released in the soil. The higher positive rate among public school children might be due to low socio-economic status, poor hygienic habit and lack of sanitation prevailing in the school.

Incidence of intestinal helminths among the study subjects was higher in males (62.5%) than in females (37.5%). The findings from this study agrees with that of Nzeako *et al.* (2013) who reported that an overall total of 124 (62%) pupils were infected out of which 56 (45.1%) and 68(58.8%) were females and males respectively. The high prevalence of infection in males when compared to females may be attributed to the fact that males spend more time outdoors (Ochei and Kolhatkar, 2008). Male children tend to be more active than their female counterparts in their involvement in play, playing barefoot on sand; plucking and handling of fruits (Ukpong and Agamse, 2018).

Children in the age range of 6 – 8 years had the highest incidence of intestinal parasitic infection (56.25%). Ugbogu and Asogu (2013) also reported that children in the age range of 6 - 10 years had the highest prevalence rate of intestinal parasites with *A. lumbricoides* being the most prevalent. Children in the age range 12 - 14 years had the lowest prevalence of intestinal parasitic infection in both schools. This finding agrees with that of Gboeloh (2018) who reported that the prevalence of helminthic infections decrease with increasing age. This is probably due to the fact that older children are more likely to maintain personal hygiene if other factors remain constant (Ukibe *et al*., 2018). This exposes the pupils to active helminth larvae in the soil and can easily penetrate them when picking dirt and walking barefooted around school compound. This is in agreement with Aribodor *et al*. (2013) who stated that sanitary habits, refuse disposal, consuming fruit and vegetables without washing and water treatment showed significant effect as predisposing factors to intestinal helminth infections.

## Conclusion

In conclusion, the overall incidence of intestinal helminth infection among the study subjects was found to be 13.7%. The result of prevalence of intestinal helminths showed that *Ascaris lumbricoides* has the highest frequency, followed by *Strongyloides stercoralis, Trichuris trichiura* and hookworm while *Teania*, *S. mansoni*, *H. nana* and *E. vermicularis* appeared once. Incidence of intestinal helminths among the study subjects was higher in males (62.5%) than in females. Based on the age of the subjects, children in the age range of 6 – 8 years had the highest incidence of intestinal parasitic infection while those age range 12 - 14 years had the lowest prevalence of intestinal parasitic infection in both schools. It is recommended that Government should provide good toilet facilities and clean water as well as free antihelminth drugs to primary school pupil especially in local communities.

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