THE PREVALENCE OF INTESTINAL NEMATODES AND SOCIO-ECONOMIC IMPLICATIONS: A CASE STUDY AMONG THE PUPILS OF MUSLIM PUBLIC PRIMARY SCHOOL ILESE-IJEBU OGUN STATE SOUTHWESTERN NIGERIA

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ABSTRACT

A survey of the prevalence of Intestinal Nematodes and the implications of socio-economic status was carried out among Muslim Primary School pupils aged 5 - 13 years in 2012. A focus group discussions method was used to extract information on the type of residences the pupils reside in and sanitary facilities they use and the Faecal matter samples were collected from 240 pupils, processed using wet and iodine preparation for isolation of nematodes. Then results were combined using coefficient of determination R^2 Microsoft excels to determine the factors responsible for the infections. The results showed that 40% of the school pupils examined had one or more helminthes. The prevalence of Ascaris lumbricoides was (36.7%), Hookworm (2.9%) and strongyloides (0.4%).The prevalence of intestinal nematode infection was higher in female pupils (21.7%) than in male pupils (18.3%). On the other hand, the results of correlation analysis showed strong positive correlation coefficient between the prevalence of the nematodes and poor hygiene practices (0.897), while 0.535 coefficients recorded for the prevalence and sanitary facilities the pupils used. The study concludes that The prevalence is as results of eating habits hygiene practice and environmental factors .The result of this study showed that parasitic

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infection is still existing among school pupils in rural parts of Nigeria and the situation can be reduced by educating the pupils and parents and provision of adequate sanitary and hand washing facilities in all the schools.

Keywords: prevalence, intestinal nematodes, socio-economic, pupils, hygiene and rural

INTRDOUCTION

Nematode infections in humans include ascariasis, trichuriasis, hookworm, enterobiasis, strongyloidiasis, filariasis, and trichinosis, among others (Medscape.2013). The phylum Nematoda, also known as the roundworms, is the second largest phylum in the animal kingdom, encompassing up to 500,000 species. Members of Nematoda are elongated, with bilaterally symmetric bodies that contain an intestinal system and a large body cavity (Medscape.2013).

Many of the species are free living in nature. Recent data have demonstrated that approximately 60 species of roundworms parasitize humans. Intestinal roundworm infections constitute the largest group of helminthes diseases in humans. According to a 2005 report by the World Health Organization (WHO), approximately 0.807-1.221 billion humans have ascariasis, 604-795 million have trichuriasis, and 576-740 million have hookworm infections worldwide (WHO, 2005).

In another report, many hundreds of millions of people throughout the world harbour nematodes in the intestine. In their social and economic implications these parasitic infections constitute a major public health problem, particularly in developing countries. Infection is transmitted by eggs or larvae, which begin their cycle of development within the human host when, depending on the species, they either actively penetrate intact skin or are ingested or, very rarely, inhaled (WHO, 1990). The larvae of the most widely prevalent species remain dormant but potentially infective for long periods in contaminated soil; the larvae or cysts of other species are ingested when the flesh of reservoir hosts is eaten either raw or undercooked (WHO, 1990). The nematodes can be food borne or soil borne, for instance when the meat and fish are not adequately cooked or sewage not properly managed that contaminates the soil within community. On the other hand, socio-economic status can be another factor like malnutrition and poor hygienic practices, eating contaminated food, dirty fingers, drinking contaminated water, walking bare footed, undercooked flesh foods, germs that enter through nose and skin, poor

sanitation, therefore, making the infection the public health issues. Then, the pupils from any typical rural setting including the study area, are highly susceptible to the infection where they play with water and soil that contain the nematodes (Arora, 2008) and (Dakul *et al*, 2003) and /or eat infested fruits without washing the fruits or washing their hands before meal and some of the pupils walk around barefooted (Gbakimo *et al*, 1994).

From previous studies and literatures, there are different of type nematodes and the infestation, from different sources and effects on the victims caused by different factors with associated control (Olushola et al, 2010), (Uhuo et al, 2011), (Jeroen et al, 2008) and (Dunca and Sleigh, 2010) among others.

However, the study area Ilese-Ijebu, with its peculiarity do not possess any surface water bodies, the inhabitants depend on borehole water and rain water and the State College of Health Technology is located within the community. Furthermore, the primary school contains pupils from different socio-economic, religious and cultural backgrounds, with parents engage in different livelihoods like farming, trading, civil servant etc. Based on the aforementioned the study was carried out to achieve the following set objectives to determine the prevalence of the infection and the impact of socio-economic factor-the occupations, education qualifications, housing conditions of the parents and hygiene practices that are control by the mentioned socio-economic factors adopted from Kapila Tharanga Rathnayaka and Zhong-Jun Wang (2012) and Sowole and Adegbite (2012)

1.1 OBJECTIVES OF THE STUDY

1. To determine the prevalence of intestinal nematodes among Muslim Primary School Ilese-Ijebu, Ogun State, Nigeria.
2. To determine the impact of socio-economic factors contributing to the infection among the pupils.

1.2 The Study Area

The study was carried out among the pupils of Muslim public primary school Ilese-Ijebu in Ijebu East local Government Ogun State between October and December 2012. The study area Ilese is a community, under Atan town a Headquarter of Ijebu East local Government in Ogun State, Nigeria. It has an estimated population of 10,000 according to 2006 population census. The community consists of one public primary school and some private primary schools. Their predominant occupations of the inhabitants are farming and trading with low level of literacy and the community blessed with different kind of fruits. Their sources of water are rain and boreholes.

MATERIALS AND METHOD

The study combined both standard laboratory examination of feacal and urine samples from the pupils and focus group discussions methodologies. Two hundred and forty students (240) pupils participated in the exercise (115male and 125 female) and their stool samples were collected from the pupils for analysis.

2.1 First stage-Focus Group Discussions

The researchers organized an interactive session among the primary school pupils and the classroom teachers served as moderators. The topic and discussions about family background of the pupils were introduced to the pupils. During the discussions, the teachers discussed about family composition, different types of jobs father and mother can do, the types of the house a family can reside, sources of water, sanitary facilities, fruit bearing trees near their houses etc and requested the pupils to contribute.

Afterward, in the form of evaluation, prepared forms labeled 1-300 were given out to the pupils The items on the form were father's and mother's occupation, sources of water, hygiene practices, type of housing they reside in, toilet facilities, in order to determine the socio-economic status of the family they came from.

2.2 Second Stage-Collection of Samples for Laboratory Analysis

A sterile collection sample bottles labeled with number 1-300 as in the case of the evaluation form were handled together with evaluation forms to the pupils to keep. After filling out the evaluation form, they were asked to produce the feaces.

2.3 Procedure for Sample Collection and Analysis

2.3.1 Sample Collection

Labeled sterile wide mouth screw capped plastic bottles were used to collect stool samples from individual pupils. These were transferred to the laboratory for microscopy examination; instructions were given to the pupils on how to collect the samples.

2.3.2 Sample Preservation

The stool samples were preserved with 1-2 drops of 10% formol saline from the point of collection.

2.3.3 Stool Examination

Stool samples were obtained from all 240 participants and examined microscopically for the presence of intestinal parasitic cysts, ova, larva or adult worm. About Ten grams of each stool samples were collected and using wet normal saline preparation and iodine techniques, stool examination was performed microscopically. Formol- ether concentration techniques was equally carried on all the stool samples (Chessbrough, 2006).

2.3.4 Microscopic Examination

Wet saline preparation (direct smear) this is the only method that reveal actively motile stage of protozoa, it is most useful for examination of amoeba and flagellate, trophozoites as well as ova and larvae of helminthes (Chessbrough, 2006).

2.4 Analysis of Data

The results were analyzed by correlating the laboratory results of the feaces examination and the socio-economic responses of the pupils using the coefficients of determination R^2 (Adapted from Sowole and Adegbite, 2012). The analysis can be used to determine the relationship between the prevalence of the infection and socio –economic background of the pupils.

RESULTS AND DISCUSSION

4.1. Extraction from the Evaluation Report

Table 1: Showing the responses of the pupils on their background and hygiene practices

	Parents Occupation			**Sanitary Facilities**			**Hygiene Practices**		
	Farming	Trading	Civil Servant	Latrine	Flush/pour flush/ VIP	Open Defecation	Hand wash before Meal	Hand wash after Meal	Hand wash after using
Male Infected (44)	29	10	5	17	10	2	15	40	6
Female Infected (52)	20	22	10	31	15	6	12	52	7
Total (96)	**49**	**32**	**15**	**48**	**25**	**8**	**27**	**92**	**13**

The table 1 above consists of the responses of the pupils on the occupation of the parents (father precisely), then type of sanitary facilities the households uses and the hygiene practices (hand wash before meals, hand wash after meals and hand wash after using the toilets).

The results showed that forty nine (**49**) of the pupils parent are farmers, followed by traders (**32**) and pupils from civil servant home (**15**). The responses on the sanitary facilities showed that, **48** pupils use pit latrines, 25 pupils make use of flush and pour/VIP latrines and open defecation practices not common among the pupils. Two **(2)** responded that they do engaged in the open defecation. However, the results showed that the pupils do not observe good hygiene practices. From their responses, out ninety six **(96)**, only twenty seven **(27)** do wash their before meal and

unfortunately thirteen (13) do wash their hands after defecation/visiting toilets, the rest do not wash their hands after visiting toilets or defecation,

4.2. Extraction from the Evaluation Report

4.2.1. The sex distribution and the incidence of the infection among the pupils

Table 2: Showing the sex distribution and the infection among the pupils

Sex	Children With Intestinal Nematode		Children Without Intestinal Nematode		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Male	44	18.3	71	29.6	115	47.9
Female	52	21.7	73	30.4	125	52.1
Total	**96**	**40.0**	**144**	**60.0**	**240**	**100**

A total number of twenty hundred and forty (240) stool samples were collected and examined. 96 (40%) were infected with intestinal parasitic nematodes while 144 (60%) were not infected. The number of males examined was 115 (47.9%) while 125 (52.1%) females were examined. Among the children infected, 44 (18.3%) were male pupils, while 52 (21.7%) were female pupils as shown in Table 2 above.

4.2.2. The age distribution and the incidence of the infection among the pupils

Table 3: Showing the age distribution of pupils infected by the Intestinal Nematodes

Age Group (years)	No Examined		No Infected	
	No	%	No	%
6-7	84	35	24	25.0
8-9	110	45.8	47	49.0
10-11	28	11.7	17	17.7
12-13	18	7.5	8	8.3
Total	**240**	**100**	**96**	**100**

Furthermore, those with the age group 8-9 years has the highest number of their stool samples examined 110 (45.8%) followed by 6 - 7 years with 84 (35%), 10 - 11 years with 28 (11.7%) and those from 12- 13 years with 18 (7.5%). The infection rate was highest in 8 - 9 years age group 47 (49.0%) and the least was in 12 - 13 years 8 (8.3%). The results represented in the Table 3 above.

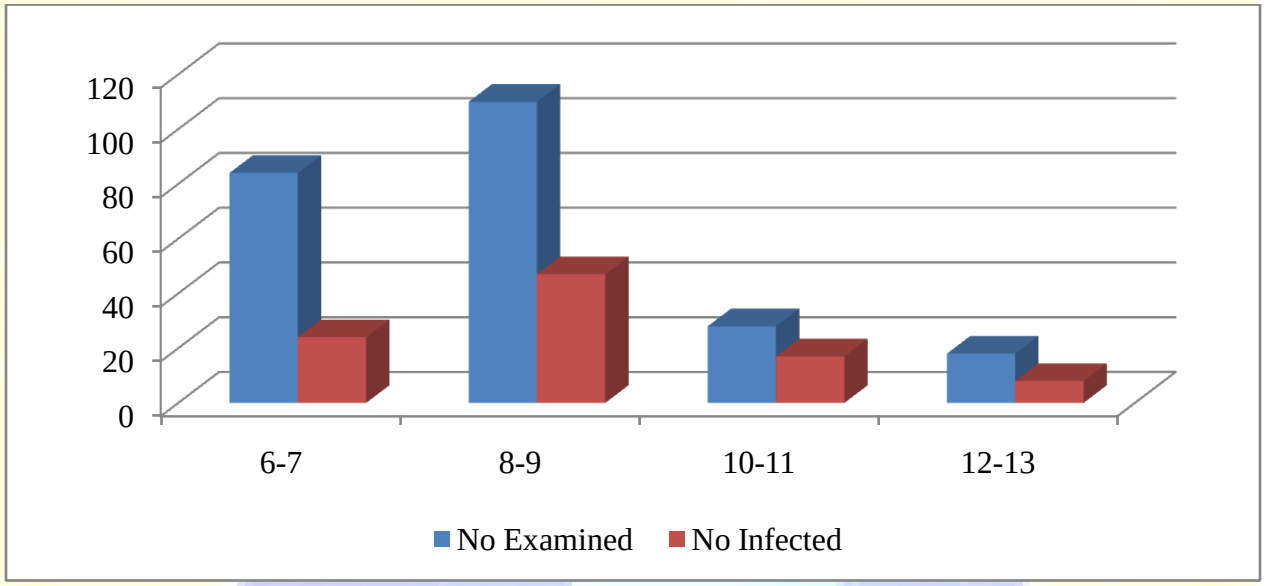

Figure 1: showing the age distribution of the examined and infected pupils

4.2.3. The age distribution and the prevalence of the infections among the pupils

Table 4: Showing the age related prevalence of the infections among the pupils

Age Groups	Number examined	Number Infected	% Infected	Number not Infected	% Not infected
6-7	84	24	28.6	60	71.4
8-9	110	47	42.7	63	57.3
10-11	28	17	60.7	11	39.3

12-13	18	8	44.4	10	55.6
Total	**240**	**96**	**40**	**144**	**60**

The figures in the table 3 above showed the prevalence of the infection among the pupils. The high prevalence of 60.7% was observed in the age group of 10-11 years, followed by 44.4 % prevalent among the 12-13 years of age with low prevalence recorded among the pupils of 6-7 years age group

4.2.4. The Distribution of the Intestinal Nematodes Detected among the Pupils

Table 5: Showing the distribution of the type of Intestinal Nematodes detected

	Number of Nematodes		**Numbers in male**		**Number in female**	
	No	%	No	%	No	%
Ascaris Lumbricoides	88	91.7	38	86.4	50	96.2
Hookworm	7	7.3	5	11.4	2	3.8
StrongYloides stercoralis	1	0.1	1	0.2	0	0
Total	**96**	**100**	**44**	**100**	**52**	**100**

The commonest intestinal nematodes detected among the pupils being *Ascaris lumbricoides* in eighty eight 88 (91.7%) pupils, Hookworm 7 (7.3%) and Strongyloides *stercoralis* 1 (0.1%) as indicated in the Table 3 above. Then, the table also showed that out of 88 pupils that had Ascaris Lumbricoides, thirty eight (38) were male pupils while the rest fifty (50) were female pupils, while out seven pupils with hookworm, five (5) were male pupils and the rest two (2) were female.

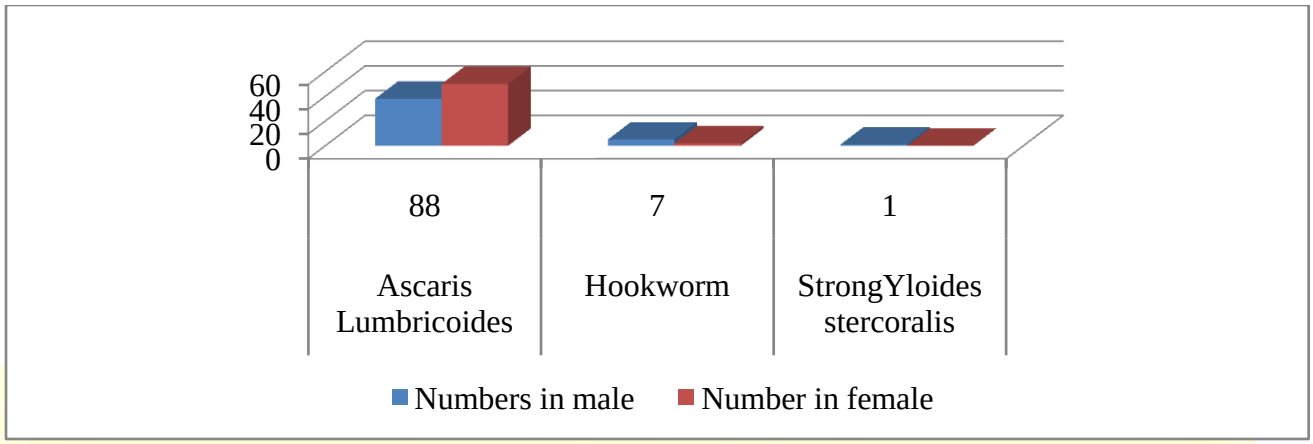

Figure 2 showing the number of pupils infected by different intestinal nematodes

However, no stongyloides stercoralis recorded among the female and except only a male pupil infected with the nematodes (see table 3 and figure 2 above)

4.2.5. The Results of the Correlation Analysis

The results of correlation analysis using Microsoft excel packages showed strong positive correlation coefficient between the prevalence of the nematodes and poor hygiene practices (0.897), while 0.535 correlation coefficient recorded for the prevalence and sanitary facilities the pupils used and negative correlation coefficient of -0.56 observed the correlation between occupation of the pupils parents and the prevalence of the infections.

4.3. Discussion of the Results

It was found that 40% of the pupils examined harboured different forms of intestinal nematodes. The number (50.3%) which is a little bit lower than a similar work done by (Ume, 2005), in .Liberty Boulevard, Jos area of Plateau State shows that intestinal parasite infection is becoming a major health problem among children. However, the prevalence of *Ascaris lumbricoides* (36.7%), Hookworm (2.9%) and *strongyloides* (0.4%) recorded during this study is lower than the one (Agbolade et al, 2007) in their work which *Ascaris lumbricoides* led (54.4%). In this

study Hookworm (2.9%) and *StrongYloides stercoralis* (0.4%) are also lower as compared to the work of (Agbolade et al, 2007) in which the study recorded 17.8%.

Apart from the unhygienic nature of some people's homes, sharing and begging habits of school pupils may be source another sources of infection. A child may after using the toilet share biscuits among other children with unwashed hands. This may predispose them to the danger of dislodging cyst into their mouths thereby getting infected. Also the habit of some of the children walking bare footed especially those in the neighboring community have access to hookworm infections. The survey also revealed that those pupils that have fruit bearing trees around them having the nematode infections an indication that they might have been picking the fruits that fell on the ground, ate them without proper washing.

The prevalence rate of infection in relation to age group showed that children of ages 7 – 9 years as having the highest prevalence. This to some extend agreed with the findings of (Holland et al, 1989) which says that the bulk of parasitic infection is with the ages of 8 - 15 years, this may be due to' the high activity of this age group. On the hand, the number of female pupils infected is more than the male (supported by the work of Uhuo et al, 2011). They can play in field, do farm work and involved in household waste disposal by visiting dump sites and get contaminated with feaces. Another reason is that parents tend to de-worm younger children more regularly than older ones. Furthermore, the lower infection rates among the pupils might be as results of dry season of December where there less contact with contaminated water, the run –off, sewage that are flowing on the environment.

CONCLUSION

The study concludes that the nematodes infection incidence recorded among the primary pupils in the Ilese-Ijebu and socio-economic factors of parental occupations and housing conditions are responsible with indicators of sanitary facilities where the pupils reside and hygiene practices among the pupils. The indiscriminate dumping of refuse, blockage of gutters and household wastewater not properly managed are sources of the nematodes that the pupils get exposed to, are yet to be completely eradicated. It is therefore advocated that urgent step be taken to improve the sanitary condition in the schools and public awareness of transmission. Also periodic

administration of anti-helminthic drugs should be targeted to pre-school and school children to allow a normal growth and prevent stunting.

The following measures should be taken to reduce and control intestinal helminthes infection. Adequate enforcement of regular environmental sanitation by the government People should be encouraged to practice good personal hygiene and proper disposal of refuse Health education programme should be organized to enlighten people on the causes and modes of transmission of the infections. Furthermore, there is need for provision and maintenance of hand washing facilities for the pupils in the schools and encourage them to put them into use and the food vendors for the schools should be routinely examined for the parasites

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