International Journal of Engineering, Management and Humanities (IJEMH)
Volume 3, Issue 5, pp: 32-38 www.ijemh.com

Survey of *Ascaris Lumbricoides* Prevalenceamong School Aged Children in Mangu Local Government Area of Plateau State, Nigeria.

Keswet, Yosi Anderson[1], Fwogos, Ishaku Chung[1], Dudaba, Aaron John[1]and Gowok, Simon Andrew[1]

[1]*Department of Medical Laboratory Science,*
Plateau State College Of Health Technology,
Zawan, Plateau State, Nigeria

Date of Submission: 10-09-2022 Date of Acceptance: 25-09-2022

ABSTRACT
Ascaris lumbricoides is one of the most prevalent of the soil transmitted helminthes that causes a disease condition called ascariasis. It is an intestinal parasite which is associated with faecal contamination. The adult worms are known to affect the nutritional status of patients, mostly children under the age of five(5), leading to malnutrition and night blindness due to vitamin A deficiency. The long term effect of the malnutrition is retarded growth; other symptoms are intermittent colicky cramps, loss of appetite and obstruction of the intestinal tract. The study was carried out to determine the presence and prevalence of Ascaris lumbricoides among school –aged children in Mangu Local Government Area of Plateau State, Nigeria. A simple structured questionnaire was distributed to the pupils to determine their source of water, age, gender and toilet facility in the schools and homes. Six hundred and eighty four (684) stool samples collected were processed using Kato Katz cellophane faecal thick smear technique. The results obtained showed that 38(5.56%) of the study subject were found to be positive for the parasite. Kerang district in Mangu LGA recorded the highest prevalence (8.33%). Males were more infected(6.91) than females(4.41%). The highest prevalence of 11,9% was recorded among pupils from L.E.A primary school , SabonBarki. There was no significant difference($P<0.05$) between the prevalence of Ascaris lumbricoides among children examined from various schools. This study also shows that study subjects who use River/Stream water(9.8%) were more infected than those who use Borehole(4.71%) and well (6.56%) water ,although there was no significant difference ($p>0.05$). Ascariasis is very common in communities with inadequate sanitation facilities, and it can be controlled through improved sanitation, personal hygiene deliberate policy for regular deworming of pupils /students by the Government will decrease the rate of ascariasis infection.

KEY WORDS: Ascaris lumbricoides, prevalence, children, School Aged Children, Mangu, Plateau State, Nigeria.

I. INTRODUCTION

Ascaris lumbricoides is an intestinal nematode (round worm) which belongs to the super family Ascaridodea. It is the etiological agent of ascariasis which infects man.

The intestinal nematode *Ascaris lumbricoides* is responsible for human helminth infections globally **[3].**The highest prevalence of this infection occurs in tropical countries where warm, wet climate enhances the transmission of the infection (De Silva *et al*, 1997a). Recent estimates suggest over a billion humans are infected with *Ascaris* infections [16]

Ascariasis is a disease caused by the large round worm ;*Ascaris lumbricoides* which is one of the soil-transmitted helminth parasites . *A*dult *Ascaris lumbricoides* lives in the small intestine of man and is said to be the most widespread soil-transmitted helminth infection. Ascariasis could be mild and often show little or no symptoms; heavy infections however, are debilitating causing severe intestinal blockage and impaired growth in children. The frequent exposure of children to contaminated environment such as during playing, eating raw vegetables, fruits and drinking waste water makes them the most susceptible to ascariasis. [4].

A person becomes infected by ingesting infective eggs in contaminated food, water or from hands that have become faecally contaminated.

International Journal of Engineering, Management and Humanities (IJEMH)
Volume 3, Issue 5, pp: 32-38 www.ijemh.com

Infected persons are the chief source of soil contamination through indiscriminate defaecation in open environments where the resistant eggs remain viable for long periods under favourable conditions of moist loose soils with moderate shade [16]. The infective eggs are chiefly transmitted from hands to mouth by people who come in contact with contaminated soil directly or through dirty eating habits [16].

Following ingestion, the larvae hatch in the small intestine where they are carried to the heart and lungs [1]. They remain in the alveoli for several days, ascend the respiratory tree to the epiglottis where they descend to the esophagus. Their maturation is achieved in the intestine, after mating the female lays large numbers of eggs which are passed in the faeces (Ukoli, 1991; Cheesbrough, 1987). It is particularly common in areas of inadequate sanitation where untreated humans faeces are used for fertilization of farms or (as fertilizers) [17].

Though infection with a few worms may be symptomless, heavy infections are serious, as will be known to anybody who has seen marasmic children with distended bellies starved with 80 to 100 worms [5].*A. lumbricoides* is a prominent parasite in both temperate and tropical zones but it is more common in warm temperate countries and is more prevalent where sanitation is poor. [6]stated that *Ascaris* infection occurs in all ages, but it is most prevalent in the 5 to 9 years old group of pre-school and young school children, who are more frequently exposed to contaminated soil than the adults.

The incidence is approximately the same in both sexes; the poor classes in urban and rural areas are most affected by the parasite due to soil pollution and poor hygiene. Infection is a household affair, the family being the unit of dissemination, infected children, provides the chief source of soil contamination by their indiscriminate defaecation in door yards and earthen-floored houses, where the resistant eggs remain viable for long periods [16].

Ascaris lumbricoides infection is common among children aged 3 - 8 years [14]. They often become infected by playing in contaminated soil, eating raw food grown in contaminated soil or drinking inadequately treated water [5]. Although many of these children are asymptomatic, some infected children may develop malnutrition, stunted growth [13] and impaired cognitive function with low educational achievement [14].

II. MATERIALS AND METHODS

2.1 THE STUDY AREA

The Study was carried out in Mangu Local Government Area of Plateau State, in North Central Nigeria. The area lies within longitude $9^{o}26'$N and latitude $9^{o}08'$E. It covers a landmass of 1,653 square kilometers, with a projected population of 294,931, according to the Population Census of 2006. Mangu town, the headquarter of the Local Government lies 77 kilometers away from Jos. It has 11 districts, namely; Mangu, Gindiri, Langai, Kombun, Panyam, Pushit, Kerang, Ampang West, Mangun, Chakfem and Jipal. The area is inhabited by two major ethnic groups; the Mwaghavul and the Pyem people, with several other minority groups, like Mupun, Berom, Afizere, Bijim, Fulani, as well as Hausa settler groups. The inhabitants of the area are predominantly farmers, civil servants, traders and fishermen.

Mangu Local Government Area has a minimum temperature of 13^{o}C and a maximum of 27^{o}C.The area has an average rainfall of 580mm. The area has 2 main seasons; the dry and wet seasons. Dry season in the area commences from the month of November and ends in March, while wet season spans from April to October.

2.2 ETHICAL CLEARANCE

Prior to commencement of the study, an ethical clearance was obtained from Plateau State Ministry of Health headquarters, Jos and was submitted to the office of the Chairman, Mangu Local Government Area, and his permission was sought to carry out this research in his domain. The objectives of the research were discussed with the authority of the local government.

A letter of permission was also obtained from the Local Education Authority of Mangu Local Government Area to the different schools that were randomly selected for the study, and sought the consent of the school authorities and parents/guardian to use pupils/students as study sujects. The objectives of the study were also discussed with the school authorities, parents, staff and pupils/students.

2.3 SELECTION OF STUDY DISTRICTS AND SCHOOLS

Six out of the eleven districts in Mangu L.G.A were randomly selected. The selected districts include Ampang West, Kerang, Mangun, Mangu, Panyam and Gindiri. Eleven schools were also selected by a simple random sampling technique from the different communities.

2.4 SELECTION OF STUDY POPULATION

The study population consists of school children aged between 5 and 19 years. Children

within the selected age range fall mainly in the indicator age population of these helminth diseases [16]. Also pupils in lower classes are usually under age and would be difficult to manage as stated by [1]. Enrolled school children were recruited for the purpose of this study including males and females. A systematic stratified random sampling method was used in selecting children for the research [16]. Children below 5 years, above 19 years and adults were excluded from this study. The children who did not give their consent to take part in the study were also excluded.

2.5 COLLECTION OF STOOL SAMPLES

Prior to the time of stool sample collection, permission was obtained from the head teachers/staff, pupils and students were released from their classes, and lined up outside class by class. The study population were instructed on how to collect the stool sample, not contaminating the sample with their urine. Study children were issued with 2 duly labelled and numbered 25mls of well capped universal containers. One was used for the stool collection. After collecting the stool samples, children were asked to line up and a simple structured questionnaire was used for the collection of bio data information such as type of toilet facility, source of water supply for domestic use and water contact activities. The simple structured questionnaires were duly numbered in accordance with the number on each sample container. All samples collected were transported to examination centres (Mangu General Hospital and College of Health Technology Zawan).

The collection of samples was made possible with the assistance of three Medical Laboratory Technicians and one Medical Laboratory Assistant, who were employed to assist in the course of the study. These medical laboratory personnel were trained on how to collect and process the stool samples for the purpose of microscopic examinations.

2.6 PROCESSING AND EXAMINATION OF STOOL SAMPLES

All stools collected were viewed macroscopically before they were processed for microscopic examination. Stool samples were processed using the Kato Katz cellophane faecal thick smear described by WHO (1994).

DATA ANALYSIS:

Data was edited during and after collection, coded, classified to adjust for any missing information, entered. Descriptive statistics were computed and categorical variables were compared using Chi-square test using SPSS statistical package and Microsoft excel package. All statistical tests were considered significant at $p<0.05$.

III. RESULTS

Table 1

Prevalence of *Ascaris lumbricoides* infection among School-Aged Children in Mangu L.G.A. of Plateau State, Nigeria

Parasite	**No. examined**	**No. infected**	**% infected**
Ascaris lumbricoides	684	38	5.56
Total	684	38	5.56

The result showed that *A. lumbricoides* is present among school-aged children in the study area, (Table 1). The overall study on the prevalence of *Ascaris lumbricoides* among school-aged children in Mangu LGA revealed that out of 684 stool samples examined, 38(5.56%) of the children were infected with *A. lumbricoides* (Table 1).

Table 2

Gender-related prevalence of *Ascaris lumbricoides* among school-aged children in the study area.

Gender	**No. examined**	**No. infected**	**Prevalence (%)**
Males	362	25	6.91
Females	322	13	4.41
Total	684	38	5.56

Table 2 shows the gender-related prevalence of *Ascaris lumbricoides* among school-aged children in the study area.

Males were more infected 25(6.91%) than females 13(4.41%). Among the female children stools that were examined, 4.41%), had the eggs of *A. Lumbricoides*. From the result obtained, it is observed that male children

are more proned to contaminated soils and are more involved in farming activities. Children of as young as 5 years are actively involved in farming activities in wet and dry seasons.
A total of six hundred and eighty four (684) samples (made up of 362 males and 322 females) were examined, and the result of this study showed that 25(6.91%) males were infected and 13(4.41%) females were infected with *Ascaris lumbricoides*.

Table 3
Age related prevalence of *Ascaris lumbricoides* infection among school-aged children in Mangu LGA, Plateaustate, Nigeria**.**

Age Group (years)	No. Examined	No. Positive	% infected
5-9	194	8	4.12
10-14	488	30	6.69
15-19	42	0	0.00
Total	684	38	5.56

The result in table 3 shows that children of age group 10 – 14 years were more infected with *Ascaris lumbricoides*, showing a prevalence of 30(6.69%), followed by children of age group 5- 9 years with a prevalence of 8(4.12%), while there was no Ascaris infection among the children of age group 15 – 19 years.

Table 4
Prevalence of *Ascaris lumbricoides* among School Children According to Districts in Mangu L.G.A. in Plateau State, Nigeria.

Districts	**No. examined**	**No. infected**	**% infected**
Gindri	165	13	7.88
Mangu	113	4	3.54
Panyam	198	7	3.53
Ampang west	100	8	8.00
Mangun	60	2	3.33
Kerang	48	4	8.33
Total	684	38	5.56

The result from the different districts revealed that A. lumbricoides occurred in all the districts. Infection of children with A. lumbricoides in the six districts indicated that children from kerang and Ampang west were more infected with prevalence of 7(8.33%) and 8(8.00%) respectively, while children from Mangu district were the least infected 2(3.33).

Table 5
Distribution and Prevalence of *Ascaris lumbricoides* infection according to Schools in Mangu L.G.A, Plateau State, Nigeria

School	**No. examined**	No. infected	% infected
Kam'ar Comp. Sec. Sch. Mangu	58	1	1.72
L.E.A Prim. Sch. Millet	55	4	3.54
G.S.S. Panyam	44	1	2.27
L.E.A. Prim. Sch. Panyam Central	72	3	4.17
Veroduns Prim. Sch. Panyam	82	3	3.66
Pilot Sci. Prim. Sch. Mangun	60	2	3.33
L.E.A. Prim. Sch. Larpiya	50	3	6.00
L.G.E.D. Bwonpe Central	50	5	10.00
L.E.A. Prim. Sch. Kuntup	48	4	8.33
L.E.A Pri. Sch. SabonBarki	69	8	11.59
DEM. Pri.Sch. Gindiri	96	5	5.21
Total	684	38	5.56

Table 5 shows the distribution of *Ascaris lumbricoides* infection in children of the different schools sampled and examined during the period of study.

The prevalence of *A. lumbricoides* infection among the children was 38(5.56%) for the whole area. The school with the highest infection of *A. lumbricoides* was L.E,A Primary School SabonBarki in Gindiri with a prevalence of 8(11.59%), followed by children from L.G.E.D Bwompe Central with prevalence of 5(10.00%). Results of *A. lumbricoides* infection from children of L.E.A Primary School Kungtup, L.E.A Primary School Larpiya, L.E.A primary School Millet, L.E.A primary School Panyam Central were 4(8.22%), 3(6.00%), 3(5.45%) and 3(4.17%) respectively. Children from Veroduns Private School Panyam, Pilot Science Primary School Mangun and G.S.S Panyam had *A. lumbricoides* infection of 3(3.36%), 2(3.33%) and 1(2.27%) respectively. *A. lumbricoides* infection was least 1(1.72%) among children of Kam'ar Comprehensive Secondary School Mangu.

The results of *Ascaris lumbricoides*infection among the children varied from one school to another ($p< 0.05$).

Table 6
***Ascaris lumbricoides* Infections in Relation to availability of toilet Facility used.**

Toilet Facility	No. examined	No. infected	% infected
No Toilet/Bush	471	28	5.94
Pit Latrine	131	4	3.03
Water System	82	6	7.32
Total	684	38	5.56

Table 6 shows the distribution of *Ascaris lumbricoides* among school-aged children in the study area according to the type of toilet facilityused.

Infectivity with soil-transmitted helminths parasites among children that defaecate in the bush indicated that *A. lumbricoides* infection has a prevalence of 28(5.94%). The children who used water system toilets had prevalence of 6(7.32%). Children who use pit toilets had prevalence of 4(3.03%). High risk occured in children who used water system, while those who used pit toilet were the least infected with *Ascaris lumbricoides.*

Prevalence of*Ascaris lumbricoides*in children according to toilet facilities used did not differ significantly at 5% level ($P> 0.05$).

Table 7
***Ascaris lumbricoides* Infections in Relation to Sources of Drinking Water**

Source of Water	No. examined	No. infected	Prevalence (%)
Borehole	255	12	4.71
River /Stream	51	9	9.803
Well	378	21	5.56
Total	684	38	5.56

Table 7 shows the distribution of *Ascaris lumbricoides* infection according to sources of drinking water.

Results of prevalence of*Ascaris lumbricoides* according to sources of drinking water revealed that the children who obtained their water from streams and rivers had the highest infection. Out of 51 stool samples that were examined, 9(9.80%) harbored the eggs of *A. lumbricoides*(9.80%). This was followed by those who obtained their water from hand dug wells;out of 378 stools examined, 21(5.56%) had *A. lumbricoides* eggs in their stools.Prevalence rates in relation to water sources did not vary significantly ($P> 0.05$). Odds ratio revealed association between infection and use of Borehole water (OR=3.2), River water (OR=1.4), and no association between infection and use of Well water (OR=0.24).

IV. DISCUSSION

Out of 684 school- aged children recruited for the study, 5.56% gave an overall prevalence of *Ascaris lumbricoides* as shown in Tables 1-7. This is significantly higher than the findings of [3] who recorded 1% in Jos; it also disagrees with [5] and [7] who recorded 2.5% and 2.0% respectively in Plateau State. Also there is a significant difference with that of [9] which stated about 67.5% and [12] who recorded 43.7% for the same parasite.

[14] reported a prevalence of 22.4% Ascaris infection among school Children in Ilorin, Kwara State, Nigeria, this is also in disagreement with the result of this study.

This study is also in agreement with the findings of [10] who recorded a prevalence of 5.56% among Primary School Children in Biase, Southern Nigeria . It is also in consonance with the findings of [12] who recorded a prevalence of 6.3% among pupils in Ifelodun, Kwara state, Nigeria.

The result of this work also agrees with that of [10] and [11] who recorded a prevalence of 6.17% for *Ascaris lumbricoides* among secondary school children in Akwanga Central, Nigeria.

[5] recorded 88.5% in Ile-Ife and Oduntan (1974) recorded 79.1%, which are also in disagreement with the result of this work.

The gender distribution of infection shows 6.91% males were positive for *A. lumbricoides and* 4.41% females were positive for *Ascaris lumbricoides(2.5% difference),* this disagrees with the work of [5] which showed a slightly lower prevalence among girls (0.0%) compared to boys (0.4%) and it is similar with that recorded by [13], [14] and [15] whose results showed higher prevalence among males in relation to their female counterparts .

Ascaris is controlled by preventing soil from becoming faecally polluted by providing and using adequate latrine. Avoiding the used of untreated humans faeces as fertilizer. Treated infected individuals are part of a controlled programme. It can also be controlled by preventing eggs from being ingested by washing the hands before eating, avoiding eating of uncooked vegetables, green salads and fruits which may be contaminated with *Ascaris lumbricoides* eggs from polluted soil [9].

V. CONCLUSION AND RECOMMENDATIONS

Based on the findings and observations, infected persons should be treated and adequate attention should be given to awareness, and persons should be educated on the mode of infection and epidemiology of the parasite.

It is recommended that frequent deworming of school-aged children should be carried out in schools. Awareness should be carried out in schools on how persons acquire *Ascaris lumbricoides* infection; i.e people should be educated on the mode of infection and epidemiology of *Ascaris lumbricoides* infection.

REFERENCES

[1]. **Arora, D. G., &Arora, B. (2005)**.A textbook of Medical Parasitology.Second Edition CBS Publishers and Distributors, pp. 139-144.

[2]. **Asaolu, S. O., Holland, C. V., &Jegede, J. O. (1992).**The prevalence and intensity of soil – transmitted helminthiasis in rural communities in Southern Nigeria.Annals of Tropical Medicine and Parasitology, 86(3), 279 – 287.

[3]. **Braid J. K. (1986).** Fatal human Ascaris following secondary massive infection, American Journal of Tropical Medicine and Hygiene,35(2), 314 – 318.

[4]. **Brooker, S., Clements, A. C.,& Bundy, D. A. (2006).** Global epidemiology, ecology and control of soil – transmitted helminth infections, Advanced Parasitology,62, 221-261.

[5]. **Dangana A., Abayomi R. O., Way G. D. and Akobi O. A (2012).**Survey of Ascaris lumbricoides among pupils of primary school in Jos south local government area of Plateau State, Nigeria.African Journal of Microbiology Research.

[6]. **Harold, W.B & Franklin, A.N. (1983).**Epidemiology of Ascaris lumbricoides. Basic clinical parasitology, Fifth edition.

[7]. **Handzel, T., &Karanja, D. H. (2003).** Geographical distribution of schistosomiasis and soil-transmitted helminths in Kenya: Implicationns for anthelminthic mass treatment. American Journal of Tropical Medicine and Hygiene, 69(3),318-323.

[8]. **Kightlinger, L.K., Seed, J.R., Kightlinger, MB., (1995).** Ascaris lumbricoides intensity in relation to environmental, socioeconomic and behavioural determinants of exposure to infection in children from southeast Madagascar, Journal of Parasitology, 84(3):480 – 484.PMID:9645843

[9]. **Kenneth NnamdiOpara,EteyeUdobongWilson,ClementAmehYaro ,LuayAlkazmi, NsimaIbangaUdoidung,Friday MadukaChikezie,BasseyEyibioBassey, and Gaber El-Saber Batiha(2021).**Prevalence, Risk Factors, and Coinfection of Urogenital Schistosomiasis and Soil-Transmitted Helminthiasis among Primary School Children in Biase, Southern Nigeria.Journal of Parasitology Research. Volume, Article ID 6618394, 12 pages https://doi.org/10.1155/2021/6618394

[10]. **Mamman, A. S. & Reuben C.R. (2014).** Intestinal helminthiasis among inmates of Jos prison, Plateau State, Nigeria.World journal of Biology and Biological Sciences. 2(4): 067 – 071.

[11]. **Mamman, A.S. &Maikenti J. (2014).** Prevalence of Ascaris among secondary school children in Akwanga Central, Nigeria.Journal of Biology, Agriculture and healthcare Vol. 4, No 23, 2014:115 – 118

[12]. **Oloyede Samuel Bolaji, CallistusAdewaleAkinleye, BosedeToluwani Agunbiade3, AbiolaOlasunkanmi Adeyemo1, Olaoluwa Esther Bakare,&OluwaseyiAdegboyegaAdeyeba.**Survey of intestinal schistosomiasis and soil-transmitted helminthiasis among pupils in ifelodun, kwara state nigeria.J.Bio.Innov 6(1), pp: 78-90, 2017

[13]. **Obeta M.U., Ejinaka O.R. Jwanse R.I., Lote-Nwaru I.E. & Ibrahim, A.S.** Prevalence and Distribution of Soil-Transmitted Helminths among Children Attending Township Primary School, Jos, Plateau State, Nigeria.London Journal of Medical and Health Research, Volume 19 | Issue 1 | Compilation 1.0 2020.

[14]. **Saka, M. J., Aremu, A. S., &Saka, A. O. (2014).** Soil-transmitted helminthiasis: prevalence rate and risk factors among school children in Ilorin, Nigeria. Journal of Applied Sciences in Environmental Sanitation,9(2), 139-145.

[15]. **Viteri, F. E. (1994).** The consequences of iron deficiency and anaemia in pregnancy and maternal health, the foetus and the infant.SCN News, 11, 14-1

[16]. **World Health Organization.** Accelerating work to overcome the global impact of neglected tropical diseases: a roadmap for implementation: executive summary. World Health Organization, 2012, February 2020, https://apps.who.int/iris/handle/ 10665/70809.

[17]. Cheesbrough M, (2009). District Laboratory Practice in Tropical Countries. New York: Cambridge University Press 5: 236-240.