



ISSN:2456-9739

Available Online at <http://www.bjbmr.org>

# BRITISH JOURNAL OF BIO-MEDICAL RESEARCH

Cross Ref DOI: <https://doi.org/10.24942/bjbmr.2019.498> Volume 03, Issue 03, May -June 2019

## Research Article

### Soil Transmitted Helminth Infection In Okpoko, An Urban Slum

Nwachukwu O. Ndubuisi<sup>\*1</sup>, Unegbu N. Valentine<sup>2</sup>, Ulasi E. Amara<sup>3</sup>, Ekeleme J. Ezinne<sup>1</sup>

<sup>1</sup>Department of Microbiology, Abia State University, P.M.B 2000, Uturu, Nigeria

<sup>2</sup>Department of Applied Microbiology, Renaissance University, Ugbawka, Enugu State, Nigeria.

<sup>3</sup>Department of Animal and Environmental Biology, Abia State University, P.M.B 2000 Uturu, Nigeria.

#### ARTICLE INFO

##### Article History:

Received on 17<sup>th</sup> May 2019

Peer Reviewed on 28<sup>th</sup> May 2019

Revised on 14<sup>th</sup> June 2019

Published on 29<sup>th</sup> June 2019

##### Keywords:

Soil transmitted helminthes,  
Helminthiasis, Urban slum,  
Okpoko, Nigeria

#### ABSTRACT

Soil transmitted helminth infections are known to be endemic in developing countries. We investigated soil transmitted helminth infection at Okpoko community an urban slum. Fresh stool samples were collected from 808 patients randomly selected from five health facilities in the community. Stool samples were examined for presence of helminthes using the Stoll's dilution method. Hookworm was the most common helminth identified in the community (64.4%). Other soil transmitted helminths identified were *Ascaris lumbricoides* (29.6%) *Trichuris trichiura* (2.2%), *Enterobius vermicularis* (1.5%), *Strongyloides stearcoralis* (0.7%), *Hymenolopsis nana* (0.7%) and *Taenia* species (0.7%). *Schistosoma mansoni* was not identified in this study. Multiple infection occurred in individuals with Hookworm and *Ascaris* the most prevalent (3.0%). The triad *Ascaris*, Hookworm and *Trichuris trichiura* accounted for 1.5% among the multiple infected population. An overall prevalence of soil transmitted helminth infection of 17.1% was observed. There was no predilection for gender with intestinal helminth infection in Okpoko community (females 9.7% vs 7.3% males). Children less than 10 years had the greatest helminth infection rate (38.5%). It is therefore imperative that sanitation and education of the populace be improved upon to reduce helminthiasis in the community.

Br J Bio Med Res Copyright©2019, Nwachukwu O. Ndubuisi et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material for any purpose, even commercially, provided the original work is properly cited and states its license

**Corresponding Author:** Dr Nwachukwu O. Ndubuisi, Department of Microbiology, Abia State University, P.M.B 2000, Uturu, Nigeria.

## INTRODUCTION

Helminths are worms with many cells and are widespread throughout the world.<sup>[1]</sup> Soil transmitted helminth infections are among the most prevalent infections in developing countries.<sup>[2-4]</sup> Nematodes (roundworms), Cestodes (tapeworms) and Trematodes (flatworms) are among the most common helminths that inhabit the human gut. There are four species of Nematodes (also known as geohelminths) namely *Ascaris lumbricoides* (roundworms), *Trichuris trichiura* (whipworm), *Ancylostoma duodenale* and *Necator Americanus*.<sup>[5]</sup>

These soil transmitted helminth infections are mostly spread in developing countries through faecal-oral routes as a result of poor sewage disposal and lack of adequate water.<sup>[5]</sup> They also thrive in communities where poverty is entrenched, lack of access to healthcare and overcrowding.<sup>[4,6]</sup> The World Health Organization recommends periodic deworming of all at-risk people living in endemic areas and this includes pre-school children, those involved in subsistence farming (commonly associated with hookworm infection); those who live in poor rural areas where households lacking safe water and sanitation are clustered and those who live in warm and moist climates that are hospitable to worms and parasites.<sup>[4]</sup> Okpoko, an urban slum, meets the WHO conditions for periodic deworming. The majority of previous studies on soil transmitted helminth infections in Nigeria centred pre-school and school children. We therefore aimed at studying soil transmitted helminth infections in Okpoko community.

## MATERIALS AND METHODS

### Study Area

This cross-sectional, community-based study was conducted at Okpoko, a low-income urban slum in Ogbaru Local Government Area, Anambra State, Nigeria for a two-year period (2015-2017). Okpoko has an estimated population of 670,000. The population density is estimated at 49.78 persons per hectare<sup>[7]</sup> and are inhabited by poor and middle-class families.

Residential and sanitary conditions are typical of any congested urban settlement.

Five healthcare facilities were used for the study. They include two primary healthcare centres and three privately-owned clinics. These facilities have high output of patients and were randomly selected to cover the entire Okpoko community.

### Study Participants

A total of 808 patients participated in the study. Age of patients ranged from one year to eighty years. These patients attended clinics and were requested to be investigated for helminthiasis.

## METHODS

Fresh stool samples were collected for the study. Each patient was issued with a clean, dry, leak-proof plastic container with a wide mouth and screw cap. Their identification number was labeled on the container. Patients were duly instructed on how to collect about 10grams of stool samples into the containers. The stool samples were examined using Stoll's dilution technique<sup>[8]</sup> to determine presence of helminthes.

Macroscopic examination of stool samples, noting colour, consistency and constituents was first carried out.

### Ethical Clearance

The ethical clearance was obtained from the Ogbaru Local Government Health and ethics committee and patients voluntarily consented to participate.

## RESULTS

The soil transmitted helminths identified at Okpoko community, between 2015 and 2017 are shown in Table 1. Hookworm was the most prevalent helminth identified (64.4%). This was followed by *Ascaris lumbricoides* (29.6%). Other helminths identified were *Trichuris trichiura* (3.2%) and *Enterobius vermiculans* (1.5%). *Taenia sp*, *Strongyloides stearcoralis* and *Hymenolopsis nana* each has a prevalence of 0.7%. *Schistosoma mansoni* was not identified in the study. Multiple intestinal helminth infections occurred in individual patients. Hookworm and ascaris was the most common combination (3.0%) (Table 1).

*Table 1: Soil transmitted helminthes identified at Okpoko community between 2015-2017.*

Helminth species	Frequency of occurrence (%)
Hookworm	87(64.4)
<i>Ascaris lumbricoides</i>	40(29.6)
<i>Trichuris trichiura</i>	3(2.2)
<i>Enterobius vermicularis</i>	2(1.5)
<i>Taenia</i>	1(0.7)
<i>Strongyloides stearcoralis</i>	1(0.7)
<i>Hymenloysis nana</i>	1(0.7)
<i>Schistosoma mansoni</i>	0(0.0)
Hookworm + <i>Ascaris</i>	4(3.0)
Hookworm + <i>Ascaris</i> + <i>Trichuris trichiura</i>	2(1.5)

Fresh stool samples were collected from a total of 808 patients comprising of 366(45.3%) males and 442(54.7%) females. Exactly 138(17.1%) patients had helminth ova detected in stool. Females 79(9.7%) were more infected than males 59(7.3%) ( $P>0.05$ ). Children less

than 10 years old had the highest infection rate (38.5%). Soil transmitted helminth infections was also observed among older age groups: 21.8% in 11-20 year old; 16.5% among 21-30 year old and least, 7.5% in the 41 year old as shown in table 2.

*Table 2: Distribution of soil transmitted helminth infection among patients at Okpoko community.*

n = 808				
Characteristics		No studied (%)		No infected (%)
<b>Gender</b>				
Males		366(45.3)		59(7.3)
Female		442(54.7)		79(9.7)
Age (years)	No studied	Males infected (%)	Females infected (%)	Total no infected (%)
<10	117	15(12.8)	30(25.6)	45(38.5)
11-20	110	11(10.0)	13(11.8)	24(21.8)
21-30	266	19(7.1)	25(9.4)	44(16.5)
31-40	168	10(6.0)	4(2.4)	14(8.4)
41 and above	147	4(2.7)	7(4.8)	11(7.5)
Total	808	59(7.3)	79(9.8)	138(17.1)

## DISCUSSION

Geohelminths (Nematodes) constituted over 90% of all soil transmitted helminths recovered from Okpoko community. Geohelminths thrive in warm and moist soils and global estimates indicate that approximately 3.5 billion people are infected with one or more of the most common of these nematode parasite.<sup>[9]</sup>

In our study, the nematodes identified were Hookworm, *Ascaris lumbricoides*, *Trichuris trichiura* and *Strongyloides stearcoralis*. Other soil transmitted helminthes identified include *Enterobius vermicularis*, *Taenia sp* and *Hymenloysis nana*. It is noted that *Schistosoma mansoni* was not identified in Okpoko community. In a previous study, these

helminths were confirmed in Nigeria between 2005 and 2015.<sup>[2]</sup>

Hookworm was the most prevalent helminth identified in our study. This finding is similar to other studies from Southeastern Nigeria.<sup>[3,10-12]</sup> It has previously been recognized that hookworm is the most common soil transmitted helminth infection and the most common Neglected Tropical Disease in sub-Saharan Africa, with the greatest number of cases occurring in Nigeria.<sup>[13]</sup> The high prevalence of Hookworm could be attributed to favourable environmental conditions such as low level environmental sanitation <sup>[14]</sup> and socio-economic conditions, unhygienic nature of Okpoko community and poverty.<sup>[15]</sup>

Ascariasis was the next frequently identified helminth infection in Okpoko community (29.6%). Similarly, a prevalence of 21% and 13% respectively was reported from Southwest and Southsouth regions of Nigeria.<sup>[14]</sup> In Okpoko community, indiscriminate dumping of wastes into drainages with the slightest rainfall, unhygienic practice of open defecation are the order of day. These practices encourage transmission of Ascaris infection.

*Trichuris trichiura* was also commonly found in this study (2.2%). A prevalence of (1.3%) had similarly been observed at Ezza North Local Government Area of Ebonyi State, Nigeria.<sup>[16]</sup> This could be a result of poor sanitary habits of indiscriminate defecation which leads to pollution of soil with ova.

We did not observe *Schistosoma mansonii* in Okpoko community. Few studies have diagnosed helminths like *H. nana* <sup>[17]</sup> and *S. mansonii*.<sup>[18]</sup>

Multiple intestinal helminthiasis was observed in Okpoko community. Hookworm and ascaris are the most common combinations observed (3.0%) followed by the triad hookworm, ascaris and *Trichuris trichiura* (1.5%). Hookworm + ascaris combination have been reported at 3.8% <sup>[19]</sup> and 3.5% .<sup>[3]</sup> A higher prevalence of 7% and 18% were previously observed in other parts of Nigeria respectively. <sup>[10,20]</sup> The prevalence of soil transmitted helminth infection in Okpoko community was 17.1%. This is comparable to

16.9% observed. <sup>[21]</sup> The implication is that helminthiasis is still of public health concern in Nigeria.

Sex is an epidemiological factor in assessing prevalence and intensity of parasitic diseases. We found no predilection for gender with intestinal helminth infection (females, 9.7% vs 7.3% males). This is in agreement with a study in Guyana.<sup>[22]</sup> In many previous studies, there were no clear lines of gender prevalence. While some studies had identified higher prevalence among male participants [ 3,11,23], some have reported females as the most infected gender.<sup>[12,24-25]</sup>

Typically, children exhibit higher soil transmitted helminth intensities than any other single population.<sup>[26]</sup> In Okpoko community, children less than 10 years old were found to be most infected with soil transmitted helminth infection(38.5%). This could be because of high level of soil contact activity and low personal hygiene which facilitate transmission of helminths. Our finding is consistent with the results of other workers. <sup>[19,27-28]</sup> Older age groups were also infected in the community . This implies increased exposure in an unhygienic environment. Similar findings have found highest infection rates among 21-40 year and 41-50 year bracket respectively. <sup>[20, 29]</sup>

#### Conclusion

Hookworm is the most prevalent helminth in Okpoko community. Multiple infections were also common. There was no predilection for gender with soil transmitted helminths in the community. Children less than 10 years old were the most infected. It is therefore imperative that sanitation and education of the populace should be improved on.

#### REFERENCES

- 1) Eljack IA. Prevalence and associated risk factors of intestinal helminthes infection among pre-school children (1 to 5 years old) in IDPS settlements of Khartoum, Sudan. SavantJ Med Med Sci,2015; 16:085-097.
- 2) Taiwo OT, Sam-Wobo SO Taiwo Am. Spatial distribution of helminth infections

- in Nigeria (2005-2015) and the need for attitudinal and behavioural changes in the water, sanitation and hygiene interventions. *Ife J Sci*, 2016; 18(4):913-930.
- 3) Kelechi KO, Emeka CN, Francis M, Alfreda CI, Seline O. Prevalence and pattern of soil-transmitted helminth infection among primary school children in a rural community in Imo State, Nigeria. *J Trop Med*, 2015; ID 349439.
  - 4) Laura M, Federica B, David DC, Lucia E, Domenico O, Annuziala G. Intestinal parasite infections in immigrant children in the city of Rome, related risk factors and possible impact on nutritional status. *Parasite and Vector*, 2012;5:265.
  - 5) Saviol L, Albonico M. Soil transmitted helminthiasis. *Nat Rev Microbial*, 2004; 2:618-619.
  - 6) Sam-Wobo SO, Asiwaju R, Idowu OA, Eromosele CO, Adeleke MA. Communal evaluation of intestinal helminthes in some Guineaworm controlled communities in Ogun State Nigeria. *J Entomol Nematol*, 2012; 4(2):7-11.
  - 7) UN-HABITAT. The state of African cities report. United Human Settlement Programme. (UN-HABITAT): 2008.
  - 8) Chesbrough M. Techniques used to identify parasites in: District Laboratory Practice in Tropical Countries Part 2. Cambridge University Press, Cambridge UK
  - 9) Bethony J, Brooker S, Albonico M, Geiger SM, Loukas A, Hotez PJ. Soil transmitted helminth infections: ascariasis, trichuriasis and hookworm. *Lancet*, 2006; 367:1521-1532.
  - 10) Kalu MK, Eugene CN, Ifeanyi AO. Intestinal nematode parasites amongst school children attending some primary schools in Mbaitoli Local Government Area, Imo State, Nigeria *J Biol Sci Bioconserv*, 2013; 5(1):102-110.
  - 11) Emmy-Egbe IO. Faecal disposition methods and incidence of intestinal helminth parasites among in Ihiala Local Government Area, Anambra State, Nigeria. *Int Sci Res J*, 2013; 81-87.
  - 12) Wosu MI, Oyeagbor AI. The prevalence of intestinal parasite infections among school children in a tropical rainforest community in southeastern Nigeria. *J Animal Sci Adv*, 2014 4(8):1004-1008.
  - 13) Hotez PJ, Aruna K. Neglected tropical diseases in sub-Saharan Africa: review of their prevalence distribution and disease burden. *PLOS Negl Trop Dis*, 2009; 3(8):e412.
  - 14) Awolaju BA, Morenikeji OA. Prevalence and intensity of intestinal parasites in five communities in Southwest, Nigeria. *Afr J Biotech*, 2009; 8(18):4542-4546
  - 15) Ojurongbe O, Oyesiji KF, Ojo JA, Odewale G, Adefiaje OA, Olowe AO *et al*. Soil transmitted helminth infections among primary school children in Ile-Ife Southwest, Nigeria: a cross-sectional study. *Int Res J Med Sci*, 2014; 2(1):6-10.
  - 16) Uhwo AC, Odikamnoroo OO, Ani CO. The incidence of intestinal nematodes in primary school children in Ezza North LGA Ebonyi State Nigeria. *Adv Appl Sci Res*, 2011; 2(5):257-262.
  - 17) Kamalu NA, Uwakwe FE, Opara JA. Prevalence of intestinal parasite among high school students in Nigeria. *Acada J Interdiscipl Studies*, 2013; 2(7): 9-16.
  - 18) Okonko IO, Soleye FA, Amusan TA, Mejeha OK, Babalola ET, Adekolurejo OA. Detection and prevalence of intestinal parasites in patients in Abeokuta, South-Western Nigeria. *World Appl Sci J*, 2009; 7(9):1183-1187.
  - 19) Owala EE, Njoku OO, Uhwo CA, Odikamnoroo OO. Survey of intestinal helminth infection amongst school children in rural communities of Eboonyi State, Nigeria. *Int J Sci Res Pub*, 2016; 6(5).
  - 20) Omalu ICJ, Paul S, Adeniran IA, Hassan SC, Parn VA, Eke SS *et al*. Assessment of level of gastrointestinal parasite infection among food vendors in Minna, North Central Nigeria. *Ann Rev Res In Biol*, 2015; 3(4):705-715.
  - 21) Chigozie J, Kevin OE, Patrich GO, Nelson M CA, Emmanuel A. Soil-transmitted

- helminth infection in school children in Eastern Nigeria: the public health implication Internet J Third World, 2007;(4)1
- 22) Lindo JF, Validum L, Ager AL. Intestinal parasites among young children in the interior of Guyana. West Indian Med J, 2002;25-27.
- 23) Akinbo, FO, Ikedje A, Okaku CE. Intestinal Parasitic infections among artisans in Benin City, Nigeria. N J Basic Clin Sci, 2013;10:16-69.
- 24) Chioma U, Mbanugo JL, Nwachukwu EE. Prevalence of intestinal helminthes parasites in stools of nursery and primary schools pupils in Uga, Anambra State, Nigeria SKY J Microbial Res, 2015; 3(1):6-10.
- 25) Akinseye JF, Nnorsi OPG, Akinbolaji TJ. Human Soil transmitted helminthiasis among adolescents in Ilara-Mokin Community Ondo State, Nigeria: a case study of *Acaris lumbricoides*, *Trichuris trichiura* and Hookworm. Int J Life Sci Res, 2015;3(1):108-112.
- 26) Brooker S, Clements AC, Bundy DA. Global epidemiology, ecology and control of soil transmitted helminth infections. Adv Parasitol, 2006; 62:221-261.
- 27) Eke SS, Omalu ICJ, Otuu CA, Hassan SC, Ibrahim S, Boyi AA. Hookworm infection among humans in Panda, Panda development area, Karu LGA of Nasarawa State, Nigeria. IJABR, 2014; 6(1):66-73.
- 28) Akingbade OA, Akinjinmi AA, Ezechukwu US, Okerentugba PO, Okonko 10. Prevalence of intestinal parasites among children with diarrhea in Abeokuta, Ogun State, Nigeria. Researcher, 2013; 5(9):66-73.
- 29) Banjo TA, Amoo AOJ, Busari A, Kama AC, Lawal IA Ogundahunsi OA *et. al.* Intestinal parasites among abattoir workers in Abeokuta. American J Res Comm, 2013; 1(10):84-96.

**How to cite this article:**

Nwachukwu O. Ndubuisi, Unegbu N. Valentine, Ulasi E. Amara, Ekeleme J. Ezinne. *Soil Transmitted Helminth Infection In Okpoko, An Urban Slum Br J Bio Med Res , Vol.03, Issue 03, Pg.897-902, May - June 2019. ISSN:2456-9739 Cross Ref DOI : <https://doi.org/10.24942/bjbmr.2019.498>*

**Source of Support:** Nil

**Conflict of Interest:** None declared.

Your next submission with **British BioMedicine Publishers** will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats (Pdf, E-pub, Full Text)
- Unceasing customer service
- Immediate, unrestricted online access
- Global archiving of articles



Track the below URL for one-step submission

<http://www.britishbiomedicine.com/manuscript-submission.aspx>