



## EPIDEMIOLOGY AND CONTROL OF SOIL TRANSMITTED HELMINTHIASIS AND GIARDIASIS IN NIGERIA- A REVIEW

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### Abstract

**Background:** Nigeria is the country with the largest population in Africa. Helminthiasis and giardiasis are endemic in Nigeria, due to poor environmental sanitation, pollution, and contamination of water and soil. However, parasitic infections in Nigeria are not only due to the large number of its population, but also due to its geographic nature which is apt for easy parasitic development and individuals infected are children and they attributed this to the fact that children are very careless of the risk associated with playing in contaminated environments and eating indiscriminately with unwashed hands.

**Objective:** To review the epidemiology of soil-transmitted helminthiasis (STH) and giardiasis in Nigeria and feasible control measures.

**Methodology:** A wide-ranging search of electronic bibliographic databases was performed on the epidemiology and control of soil-transmitted helminthiasis and giardiasis in Nigeria. Twenty three full-length articles were studied comprehensively in order to gather up the information on epidemiology of giardiasis and STHs in Nigeria.

**Result:** the occurrence of STH due to the triad of *Ascaris lumbricoides*, Hookworm and *Trichuris trichiura* was observed. The paper also showed that the highest and lowest prevalences of helminthiasis are 89.66% and 9.1% while that of giardiasis are 41.45% and 3.10% respectively.

**Conclusion:** This suggests that soil-transmitted helminthiasis and giardiasis are still endemic in Nigeria and majority of those affected are children younger than 10 years living in rural areas and urban slums.

**Keywords:** Soil, Helminthiasis, Endemicity, Giardiasis, Nigeria

### INTRODUCTION

#### Helminthiasis

Helminthiasis is a disease of humans and other animals in which a part of the body is infected with parasitic worms known as helminths. Geohelminths (Soil-transmitted helminths, STHs) are group of intestinal parasites belonging to the phylum nematoda, causing human infection through contact with parasite eggs or larvae that develop in warm and moist soil. They include roundworms (*Ascaris lumbricoides*), whipworms (*Trichuris trichiura*), and hookworms (*Ancylostoma duodenale* and *Necator americanus*), which are the most

commonly encountered STHs (Chukwuma et al., 2009). According to an estimate released by the world health organization (WHO) in 2012, more than two billion of the world's population is infected with STH. It has been suggested by a number of studies that even a moderately severe infection may cause poor cognitive development and growth retardation, particularly among school-age children and soil-transmitted helminthiasis is now considered as one of the leading causes of absenteeism and sickness (Curtale et al., 1999; Ostan et al., 2007).

Due to poor environmental sanitation, pollution and contamination of water and soil, helminthiasis is now endemic in Nigeria and children are highly at risk of contracting these infections (Damen *et al.*, 2010).

Intestinal helminthiasis has become a major problem due to poor socio-economic status and lack of basic amenities such as pipe-borne water and sanitary facilities in rural and sub-urban areas in Nigeria (Okon and Oku, 2001). High population in Nigeria with people living in insanitary surroundings where there is constant faecal pollution of soil, food and drinking water is not the only cause of the endemicity of parasitic infections, but also due to tropical environment that is apt for smooth parasitic development and spread (Adeyeba and Essiet, 2001).

### **Giardiasis**

Giardiasis is a major diarrheal disease caused by *Giardia intestinalis*, which is more common in children than in adults (Hill, 2005).

*G. intestinalis*, also known as *Giardia lamblia*, or *Giardia duodenalis*, is a flagellate and the most common protozoal intestinal parasite isolated worldwide (Daly *et al.*, 2010; Eisenstein *et al.*, 2008). It is a cosmopolitan parasite with the highest prevalence occurring in tropics and subtropics where there is poor sanitation (Arora and Arora, 2012). Travelers to highly endemic areas, immuno-compromised individuals, and certain active male homosexuals are among the high-risk groups, and about 20% of certain groups of active male homosexuals have been reported to develop giardiasis (John, 2007). Every year infects 200 million people worldwide

and may produce symptoms in 500,000 individuals. In developing countries, *G. lamblia* is one of the first pathogens to infect infants with the peak prevalence rates of 15-20% occurring in children younger than 10 years old (Arora and Arora, 2012).

### **Aim**

The aim of this paper was to review the epidemiology of soil-transmitted helminthiasis and giardiasis in Nigeria and to suggest possible control measures.

### **Statement of Research Problem**

It has been suggested by a number of studies that even a moderately severe infection due to these parasites may cause poor cognitive development and growth retardation, particularly among school-age children, and soil-transmitted helminthiasis is now considered as one of the leading causes of absenteeism and sickness.

### **Justification**

The Neglect of services and awareness that would help to minimize the prevalence of soil-transmitted helminthiasis and giardiasis across Nigeria calls for the need to undertake review study which will go a long way in providing data base for policy makers in healthcare delivery in Nigeria.

## **METHODOLOGY**

### **Study design**

- A systematic review of prospective cross-sectional studies on STH and Giardiasis.
- The information was obtained after a conscientious electronic search of titles related to giardiasis and STH using Pubmed, Science direct, and other bibliographic databases.

**REPORTED EPIDEMIOLOGY**

**Table1.** Reported Distribution and Prevalence of giardiasis in Nigeria

Geo-political zones	Geographical Area	Sample Size	Sample Setting	Prevalence (%)	Age group with Highest prevalence	Reference
	Orphanage homes , Benue	128	Urban	34.4	0-2 yrs	Atu and Jimoh, 2015
North-central	Guma, Benue	292	Rural	40.4	5-9 yrs	Nyamingee <i>et al.</i> , 2009
North-east	Maiduguri, Borno	200	Urban	14.3	1-10 yrs	Muhammad <i>et al.</i> , 2014
	UMTH, Borno	256	Urban	33.2	>25 yrs	Biu <i>et al.</i> , 2009
North-west	Sabon gari and Zaria, Kaduna	374	Urban	41.45	3-5 yrs	Halen <i>et al.</i> , 2011
South-west	Ilero, Oyo	199	Semirural	37.2	<6 yrs	Efunshile <i>et al.</i> , 2015
South-east	Nsukka, Enugu	250	Semiurban	20.40	Children	Nwangumah and Alumana, 2008
South-south	Edo	386	Rural	3.10	6-12 yrs	Asemota <i>et al.</i> , 2012

**Table2.** Reported Distribution and Prevalence of STHs in Nigeria

<b>Geo-political zones</b>	<b>Geographical Area</b>	<b>Sample Size</b>	<b>Prevalence (%)</b>	<b>Age Group with highest prevalence.</b>	<b>Most prevalent parasites encountered</b>	<b>Reference</b>
South-west	Ile Ife, Osun	395	59.2	8-9 yrs	<i>A. lumbricoides</i> <i>T. trichiura</i> Hookworm	Salawu, 2015
	Saki, Oyo	1537	62.2	7-8 yrs	<i>A. lumbricoides</i> , <i>T. trichiura</i> Hookworm	Salawu <i>et al.</i> , 2014
	Ilie, Ogbun, Osun	304	52	>15 yrs	<i>A.lumbricoides</i> Hookworm <i>S. stercoralis</i>	Adefiyoye <i>et al.</i> , 2011
South-east	Uga, Anambra	416	44.71	3-5 yrs	<i>A. lumbricoides</i> , <i>Taeniaspp</i> , Hookworm	Chioma <i>et al.</i> , 2015
	Isouchi, Abia	200	75	9 yrs	Hookworm <i>A.lumbricoides</i> <i>T. trichiura</i>	Azoro <i>et al.</i> , 2015
	Nsukka, Enugu	255	45.5	8-10 yrs	<i>A. lumbricoides</i> , Hookworm, <i>S. stercoralis</i>	Emeka, 2013
South-south	Rivers	3826	27.66	School aged	<i>A. lumbricoides</i> , Hookworm, <i>T. trichiura</i>	Abah and Arene, 2015

**Table 2.** Reported Distribution and Prevalence of STHs in Nigeria.

Geo-political zones	Geographical Area	Sample size	Prevalence (%)	Age group with highest prevalence.	Most prevalent parasites encountered	Reference
North-west	Mariri, Hausawa, Gyadi-Gyadi, kano	570	22.8	≥11 yrs	<i>A. lumbricoides</i> , <i>Hookworm</i> , <i>T. trichiura</i>	Ihesiolor <i>et al.</i> , 2013
	Maru, Zamfara	600	25.33	4-14	<i>A. lumbricoides</i> , <i>E. vermicularis</i> <i>T. trichiura</i>	Shehu <i>et al.</i> , 2013
	Gwagwada, Kaduna	244	67.2	7-9 yrs	<i>A. lumbricoides</i> , <i>T. trichiura</i> , <i>Hookworm</i>	Timothy <i>et al.</i> , 2014
	Gwagwalada, Abuja	150	28	5-10 yrs	<i>A. lumbricoides</i> , <i>S. stercoralis</i>	Gimba and Dawam, 2015
North-central	Panda, Nassarawa	288	39.58	0-10 yrs	<i>Hookworm</i>	Eke <i>et al.</i> , 2014
	Minna, Niger	116	89.66	31-40 yrs	<i>A. lumbricoides</i> , <i>Hookworm</i> , <i>T. trichiura</i>	Omalu <i>et al.</i> , 2013
North-east	Numan, Adamawa	296	9.1	<20 yrs	<i>Taeniaspp</i> , <i>Hookworm</i> , <i>A. lumbricoides</i>	Enimien <i>et al.</i> , 2015
	Konduga, Borno	257	80.9	6-8	<i>A. lumbricoides</i> , <i>T. trichiura</i>	Damen <i>et al.</i> , 2011

## **DISCUSSION**

### **Soil-transmitted helminthiasis**

The results revealed that there is consistency in the predominance of ascariasis over other helminthic infection and most of the individuals infected are children. Salawu and Ughele (2015) reported that most of the individuals infected are children and they attributed this to the fact that children are very careless of the risk associated with playing in contaminated environments and eating indiscriminately with unwashed hands. The fear is that *A. lumbricoides* is highly associated with massive intestinal obstruction and malnutrition in children (Damen *et al.*, 2011).

According to Timothy *et al.* (2014), the high prevalence of 67.2% observed for *A. lumbricoides*, *T. trichiura*, *Hookworm* could be as a result of unhygienic behaviours both at home and in school. They reported lack of sanitary facilities as the major contributing factor to this high prevalence in addition to inadequate supply of water. This made pupils mostly defecate in open spaces and as a result, faeces containing geohelminths' eggs contaminates the environment. In a study conducted by Omalu *et al.* (2013), the prevalence of soil-transmitted helminthiasis among food vendors reached up to 89.66% and the age group with highest prevalence was 31-40 years, which is contrary to the finding in this study but the difference may be due to the fact that majority of the food vendors are adults. They reported the high prevalence to be as a result of Unhygienic behaviors of the food vendors, poor source of water and lack of public health awareness.

A higher prevalence among males was observed and could be attributed to the fact that males normally get involved in activities that females are mostly not involved in (Eke *et al.*, 2014; Enimien *et al.*, 2015; Timothy *et al.*, 2014). The prevalence of STH decreases slightly with increase in age and this may be due to increase in hygiene and behavioral changes that mostly come with increase in age (Salawu and Ughele, 2015; Azoro *et al.*, 2015).

### **Giardiasis**

*Giardia intestinalis* occurs in both temperate and tropical regions and continues to be the most frequently identified human protozoal entero pathogen worldwide (Caccio and Ryan, 2008). According to Caccio and Ryan (2008), the prevalence rates of giardiasis vary from 4-42% which is in consonance with the findings in this review, where by the highest and lowest prevalences are 41.45% and 3.10% respectively. In the developed countries, overall prevalence rates are 2-5%. In the developing countries, the prevalence of human giardiasis commonly ranges from 20% to 30% of the population. Although prevalence rate of 15-20% in children younger than 10 years are most common (Caccio and Ryan, 2008; Roxström-Linquist *et al.*, 2006), prevalence rates of 34.40%, 40.40%, 41.45%, and 37.20% were recorded among children whose ages range from 0-2, 5-9, 3-5, and less than 6 years respectively. In Ethiopia, the prevalence has been reported to range from 2.0% to 11.4% (Galanew *et al.*, 2007), but the highest prevalence of *G. intestinalis* reached 41.45% in the reviewed literature. According to Laupl and Church (2005), giardiasis is slightly more common in males than in females. This is in accordance with the findings of Atu and Jimoh (2015) who reported prevalence rates that were higher in male than in female children and he ascribed it to behavioral differences in gender in terms of hygiene, sanitation, and recreational activities.

Atu and Jimoh (2015) also reported that those using wells water had the highest prevalence of giardiasis which he attributed to contamination by surface runoffs, and poor personal hygiene.

### **Conclusion**

In this review study, the occurrence of STH due to the triad of *A. lumbricoides*, Hookworms (*A. duodenale* and *N. americanus*), and *Trichuris trichiura*, was observed.

The study also revealed that the highest and lowest prevalence of giardiasis are 41.45% and 3.10% which suggest the endemicity of the parasitic infection in Nigeria and majority of those affected are children younger than 10 years living in rural areas and urban slums. The major contributing factors to the tenacity of these infections are cultural, socio-economic and environmental factors. Therefore effective measures should be taken to prevent massive occurrence of giardiasis and soil-transmitted helminthiasis in Nigeria.

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