

# ANTHROPOGENIC INDICES OF SOIL-TRANSMITTED HELMINTHIASIS AMONG CHILDREN IN NIGERIA

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# INTRODUCTION

- One of the principal factors contributing to children morbidity and mortality in the tropical countries is the high prevalence of intestinal infections.
- These infections have been associated with low standard of sanitation as well as poverty.
- Approximately 500 million children are infected and mortality ranges from 40,000 to 130,000 persons per year (Roche and Bento 1999).

# Soil-transmitted diseases

## Effects

- Growth Retardation
- Malnutrition and Iron deficiency /anaemia
- Impaired cognitive development

# Alarming effects of.....

- ❑ Adverse effects of intestinal parasitic infections among children are diverse and alarming.
- ❑ sufficient attention has not been given to several remote, rural community where health and environmental facilities and structure are poor, inadequate or altogether lacking.
- ❑ These communities reflect the situation in developing countries where the absence of regular and sustained intervention could be detrimental to the well being of growing children

**Intestinal parasitic infections have detrimental effects on survival, appetite, growth, school attendance and cognitive performance of school age children**

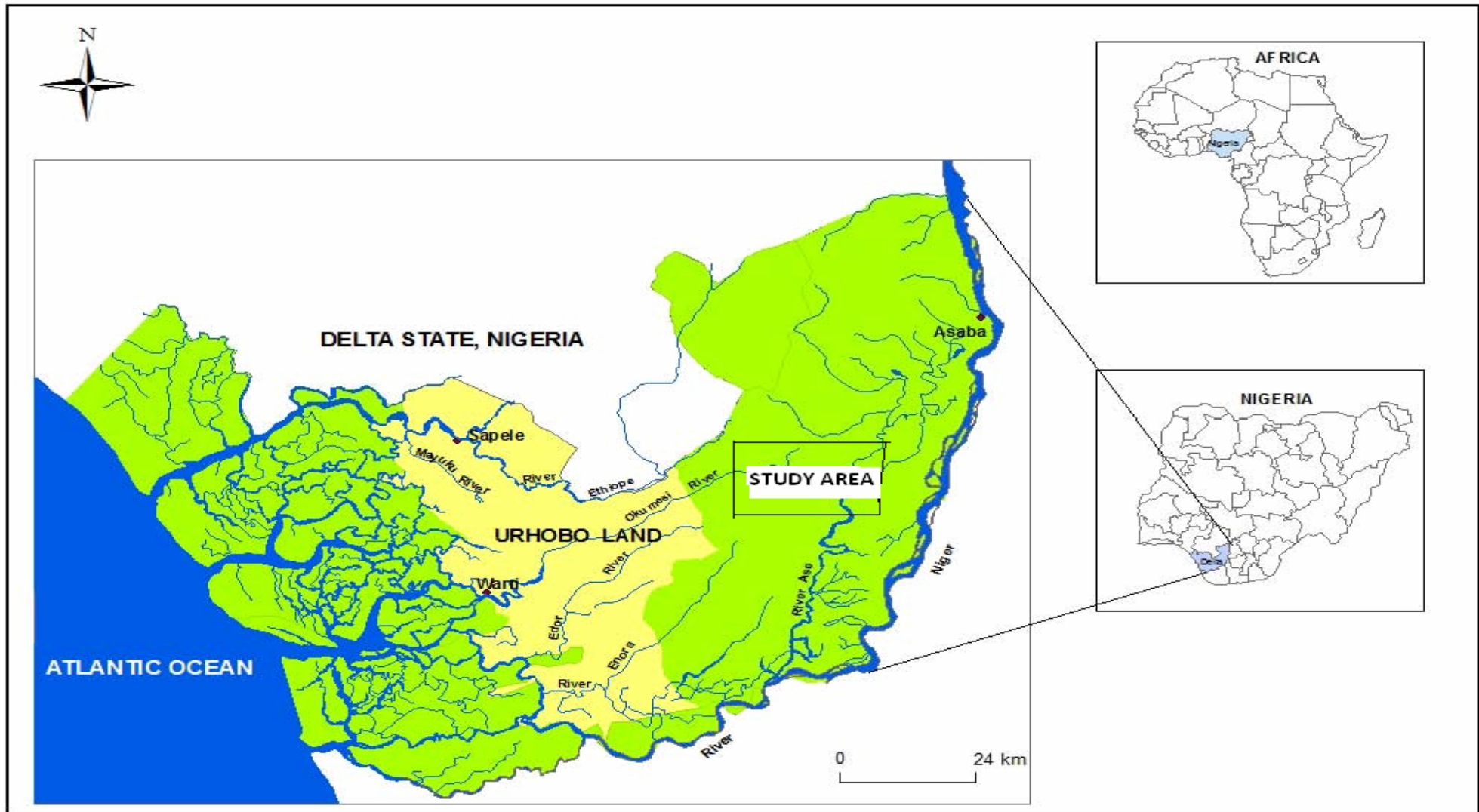


# OBJECTIVES

- To carry out a baseline survey among school children to determine the prevalence and intensity of infections in line with the recommendations of the World Health Organization (WHO)
- To add to the growing pool of essential baseline data on the prevalence and intensity of soil transmitted helminthes infection in Nigeria, a developing nation
- To establish the relationship between intensity of infections and the anthropogenic indices of subjects in the study area

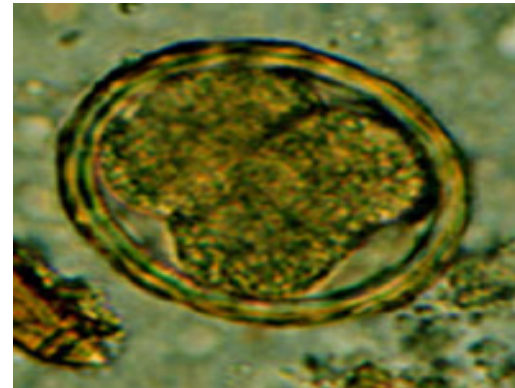
# MAP OF STUDY AREA

A Map of Delta State, Nigeria, Showing Urhoboland and Major Rivers of Western Niger Delta



# SUBJECTS

- The subjects were 978 (516 males and 462 females) primary school children between the age of 5 and 13 years randomly selected from the primary schools within the community



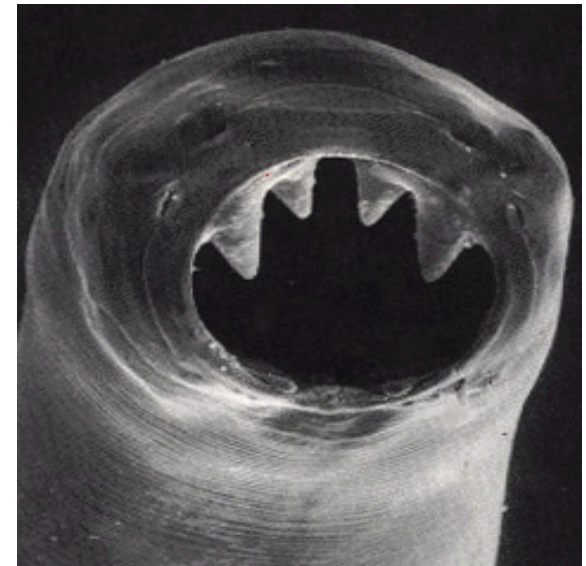
# METHODS

- Stool samples of subjects were screened for the presence of STH using direct smear method and Kato Katz techniques (WHO, 1994)
- Data such as age, sex, parents' occupation, type of toilet facility and source of drinking water among others were obtained from each child using a well-structured questionnaire.
- Statistical analyses were performed using SPSS for windows version 11.0 (SPSS inc, Chicago,IL, USA).



# RESULTS

- The study indicated that **907 of the 978 children were positive** for one or more helminthes infection therefore revealing a general prevalence of **92.74%**.
- In all only three helminthes were observed in the infected stool samples; these includes ***A. lumbricoides***, **hookworm** and ***T. trichiura***.



**Table 1a: Prevalence and Intensity of STH by age of Pupils in Igbede Community, Delta State, Southern Nigeria.**

Age (years)	n	Parasite					
		<i>A. lumbricoides</i>		Hookworm		<i>T. trichiura</i>	
		No infected (%)	Epg $\pm$ SE	No infected (%)	Epg $\pm$ SE	No infected (%)	Epg $\pm$ SE
5-7	308	278 (90.26)	275.60 $\pm$ 131.00	136 (44.16)	66.80 $\pm$ 19.40	36 (11.69)	75.80 $\pm$ 6.02
8-10	438	314 (71.69)	389.70 $\pm$ 197.80	216 (49.32)	120.20 $\pm$ 33.60	94 (21.46)	92.40 $\pm$ 12.06
11-13	232	160 (68.97)	384.30 $\pm$ 192.40	182 (78.45)	83.80 $\pm$ 39.61	156 (67.24)	88.12 $\pm$ 717.80
<b>Total</b>	<b>978</b>	<b>752 (76.89)</b>	<b>322.80 <math>\pm</math> 133.60</b>	<b>534 (54.60)</b>	<b>93.86 <math>\pm</math> 21.02</b>	<b>286 (29.24)</b>	<b>85.20 <math>\pm</math> 9.21</b>
P value		<0.05	NS	<0.05	NS	<0.05	NS

NS= not significant; Epg= Eggs/grams; *A. lumbricoides* (x<sup>2</sup>=22.9), Hookworm (x<sup>2</sup> = 35.9), *T. trichiura* (x<sup>2</sup> = 110.3)

**Table 1b: Multiple Infection Prevalence and Intensity of STH by age of Pupils in Igbede Community, Delta State, Southern Nigeria.**

Age (years )	n	Parasite			
		<i>A. lumbricoides</i> + Hookworm	<i>A. lumbricoides</i> + <i>T. trichiura</i>	Hookworm + <i>T. trichiura</i>	<i>A. lumbricoides</i> + <i>T. trichiura</i> + Hookworm
		No infected (%)	No infected (%)	No infected (%)	No infected (%)
5-7	308	112(36.36)	28(9.09)	22(7.14)	12(3.90)
8-10	438	174(39.73)	48(10.96)	28(6.39)	18(4.11)
11-13	232	96(41.38)	14(6.03)	10(4.31)	4(1.72)
<b>Total</b>	<b>978</b>	<b>382(39.90)</b>	<b>100(10.22)</b>	<b>60(6.13)</b>	<b>34(3.48)</b>
P value		NS	NS	NS	NS

NS= not significant; Epg= Eggs/grams; *A. lumbricoides* (x<sup>2</sup>=22.9), Hookworm (x<sup>2</sup> = 35.9), *T. trichiura* (x<sup>2</sup> = 110.3)

**Table 2a: Prevalence and Intensity of STH with regard to sex among Pupils in Igbede Community, Delta State, Southern Nigeria.**

Parasite	Sex				Total (n=978)		P value
	Male (n=516)		Female (n=462)		Number Infected (%)	Epg $\pm$ SE	
	Number infected (%)	Epg $\pm$ SE	Number Infected (%)	Epg $\pm$ SE			
<i>A. lumbricoides</i>	396 (76.74)	337.8 $\pm$ 129.20	356(77.0)	302.10 $\pm$ 112.30	752(76.9)	321.2 $\pm$ 116.40	NS
Hookworm	350(67.83)	99.80 $\pm$ 29.02	184(39.8)	87.4 $\pm$ 23.80	534(54.6)	93.8 $\pm$ 25.50	<0.05
<i>T. trichiura</i>	164(31.78)	98.20 $\pm$ 12.60	122(26.4)	71.10 $\pm$ 9.60	286(29.2)	85.20 $\pm$ 9.02	<0.05

NS = not significant, Hookworm ( $x^2 = 38.6$ ), *A. lumbricoides* + Hookworm ( $x^2 = 5.6$ )

**Table 2b: Multiple Infection Prevalence and Intensity of STH with regard to Sex among Pupils in Igbede Community, Delta State, Southern Nigeria.**

Parasite	Sex		Total	P value
	Male	Female		
	Number infected (%)	Number infected (%)	Number infected (%)	
<i>A. lumbricoides</i> + Hookworm	176(34.11)	206(44.59)	382(39.06)	NS
<i>A. lumbricoides</i> + <i>T. trichiura</i>	56(10.85)	44(9.52)	100(10.22)	NS
Hookworm + <i>T. trichiura</i>	28(5.43)	32(6.92)	60(6.13)	NS
<i>A. lumbricoides</i> + <i>T. trichiura</i> + Hookworm	16(3.10)	18(3.90)	34(3.48)	NS

NS = not significant, Hookworm ( $x^2 = 38.6$ ), *A. lumbricoides* + Hookworm ( $x^2 = 5.6$ )

**Table 3: Multiple Logistic Regression Analysis for the Association between the Epidemiological Variables and STH among pupils in Igbede Community, Delta State, Southern Nigeria (1).**

Variables	<i>A. lumbricoides</i>		Hookworm		<i>T. trichiura</i>	
	Odd ratio (95% CI)	P	Odd ratio (95% CI)	P	Odd ratio (95% CI)	P
<b>Eat Soil (Geophagy)</b>						
a) I do not	1.00		1.00		1.00	
b) Regularly	5.77 (2.92-11.41)	<0.001	4.18 (1.43-12.24)	0.009	16.74 (6.04-46.35)	<0.001
c) Occasionally	9.98 (4.61-21.61)	<0.001	2.09 (1.17-2.81)	0.038	5.35 (1.45-19.8)	0.012
<b>Lick Finger/Bite Nails</b>						
a) I don't	1.00		1.00		1.00	
b) Regularly	1.10 (0.62-3.38)	<0.001	1.58 (1.04-3.78)	0.046	2.65 (1.45-4.83)	0.002
c) Occasionally	1.19 (0.49-2.82)	Ns	0.62 (0.37-1.04)	Ns	1.72 (1.04-2.85)	0.035

**Table 3: Multiple Logistic Regression Analysis for the Association between the Epidemiological Variables and STH among pupils in Igbede Community, Delta State, Southern Nigeria (2).**

Variables	<i>A. lumbricoides</i>		Hookworm		<i>T. trichiura</i>	
	Odd ratio (95% CI)	P	Odd ratio (95% CI)	P	Odd ratio (95% CI)	P
<b>Walk Barefooted</b>						
a) I don't	1.00		1.00		1.00	
b) Regularly	1.66 (1.34-3.96)	Ns	4.39 (2.59-7.45)	<0.0 01	0.54 (0.20-1.45)	NS
c) Occasionally	2.79 (0.52-5.74)	Ns	2.24 (1.16-4.30)	0.01 6	0.70 (0.40-1.23)	NS
<b>Site of Defaecation</b>						
a) Water Closet	1.00		1.00		1.00	
b) Pit Toilet	1.66 (1.34-3.96)	0.041	1.90 (0.19-6.59)	Ns	0.64 (0-0.31)	NS
c) Bush/No Toilet	29.24 (12.58- 67.95)	<0.00 1	4.30 (2.19-8.42)	<0.0 01	0.19 (0.06-0.59)	0.004

**Table 3: Multiple Logistic Regression Analysis for the Association between the Epidemiological Variables and STH among pupils in Igbede Community, Delta State, Southern Nigeria (3).**

Variables	<i>A. lumbricoides</i>		Hookworm		<i>T. trichiura</i>	
	Odd ratio (95% CI)	P	Odd ratio (95% CI)	P	Odd ratio (95% CI)	P
<b>Source of Drinking Water</b>						
a) Bore-hole	1.00		1.00		1.00	
b) Wells/tanks	0.02 (0.007-0.08)	<0.001	0.49 (0.19-1.26)	Ns	0.06 (0.02-0.20)	<0.001
c) River/Stream	0.085 (0.53-1.36)	Ns	1.21 (0.82-1.79)	Ns	0.78 (0.51-1.21)	NS
<b>Occupation of Parents</b>						
a) Wage earner	1.00		1.00		1.00	
b) Farming	0.06 (0.30-0.12)	<0.001	0.19 (0.11-0.32)	<0.001	3.17 (1.09-2.58)	0.006
c) Trading/self-employed	0.13 (0.69-0.26)	0.007	0.54 (0.35-0.84)	<0.001	0.78 (0.51-1.21)	NS



# DISCUSSION (1)

- High rate of positivity for STH among school children an indication that much attention is required.
- Clear reflection of high rate of symptomatic carriers in Igbede community
- The overall prevalence of **92.74%** of STH among children in Igbede community is in line with report of Oyewole *et al*; (2007) who observed prevalence of 94.00% in Ondo state an area of same ecological zone.

## DISCUSSION (2)

- The study further reconfirms the triad patterns of *Ascaris* – hookworm – *Trichuris* infections common in rural communities in Nigeria and Africa at large (Pukuma and Sale 2007).
- Of all the intestinal helminthes observed, *A. lumbricoides* had the highest prevalence of 96.89%.
- Similar findings were made by (Scolari; *et al*; 2000, Adeyeba and Akinlabi ; 2002, Pukuma and Sale 2007). They separately reported that *A. lumbricoides* was the predominant parasite observed among school children.

# DISCUSSION (3)

- The occurrence of multiple infections is consistent with reports in other parts of the country (Mba and Amadi 2001; Adeyeba and Akinlabi 2002; Ukpai and Ugwu 2003)
- The trend in the prevalence of STH among this age group shows a common pattern of behavior and susceptibility for age group
- However, the decrease of the prevalence with age suggests that with increase in age, children are becoming more conscious of personal hygiene as well as development of resistance via increase of immunity.

# DISCUSSION (4)

- The higher prevalence of STH among males is in consonance with observations of (Adeyeba and Akinlabi 2002; Ukpai and Ugwu 2003; and Oyewole *et al*;2007), who separately reported higher prevalence of helminthes parasites among males.
- Behavioral activities such as eating soil (geophagy) for all parasites.
- Licking of fingers were significantly higher risks for *T. trichiura* infection.
- Walking barefooted is a risk factor for hookworm infection.
- Occupation of Parents is a risk factor for *A. Lumbricoides*, and hookworm infections.

# DISCUSSION (5)

- The transmission of intestinal helminthes infection is often associated with poverty, poor environmental sanitation and contamination of environment with human waste among others.

# CONCLUSION



- Establishment of sustainable and regular deworming programme in the community coupled with health education messages on good hygienic practices is highly essential.

# ACKNOWLEDGEMENTS

- The financial support received from Institute of Tropical Medicine, Nagasaki University, Japan to attend this conference is highly appreciated.







# STUDY AREA

- Igbede is a rural community in Isoko South Local Government Area of Delta State, southern Nigeria.
- It is found within the tropical rainforest belt in the Niger Delta area of Nigeria.
- The area has a relatively high temperature ranging from 25°C to 27°C in the wet season but rises a little to between 27°C to 30°C during the dry season.
- The community is characterized by a plain landscape with pockets of hills and slope.
- It experiences heavy flooding during the rainy season resulting in gully erosion in some areas.
- The major drainage system is the Owodokpokpo River.

# INHABITANTS

- The inhabitants of this metropolis are a mixture of people from various ethnic groups in Nigeria, although the majority is the Isoko speaking people of Delta State.
- They are mainly civil servants, traders, farmers, artisan workers, transport workers anglers and sand dredgers.
- The sources of water supply in the community are; pond water, wells, stream, pipe borne (tap water), which runs occasionally and borehole water.
- Latrine facilities include; water closets, pit latrines, while others defecate in the nearby bush sometimes in well dug out open trenches.
- The heavy flooding during the rainy season, inadequate sewage and refuse disposal increases sanitation problems.