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Prevalence and Risk Factors Associated with Some Intestinal Parasitic Infections among School Children in Yenagoa Metropolis, Bayelsa State, Nigeria

Otumbere Etiefa, Imarenezor Edobor Peter Kenneth,
Efere Y. Samson, Elkanah Edet Usodo, Buta Tarimotimi Sam
Federal University Otuoke, Bayelsa State, Nigeria
imarenezorep@fuotuoke.edu.ng

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Abstract

Intestinal parasite infections (IPIs) remain a major public health problem among school-aged children in Nigeria, with differing school environments and socio-economic conditions potentially shaping transmission dynamics. This study investigated the prevalence of IPIs and associated risk factors among children attending public and private primary schools in Yenagoa Metropolis, Bayelsa State, and compared prevalence patterns between these settings. A cross-sectional descriptive design was employed, and a total of 395 stool samples were collected from pupils in 10 primary schools (5 public and 5 private). Stool specimens were examined using direct wet mount and formal ether concentration techniques, while socio-demographic and risk-factor data were obtained through structured questionnaires. Associations between infection status and socio-economic variables were assessed using chi-square tests. The overall prevalence of IPIs was 23.8%, with slightly higher prevalence in public schools (25.7%) than in private schools (21.8%). The most frequently identified helminths were *Ascaris lumbricoides*, *Trichuris trichiura*, and *Strongyloides stercoralis*, while *Entamoeba histolytica* and *Giardia lamblia* were the predominant protozoa. Infection was most common among children aged 8–10 years (26.6%), and female pupils aged 11–13 years in public schools showed relatively higher infection rates, although no statistically significant differences were detected across age categories or between genders within and across school types. The findings underscore a moderate overall prevalence of intestinal parasites and highlight the continued vulnerability of primary school children to both helminthic and protozoan infections. The study concludes that improving hygiene practices, sanitation infrastructure, and access to clean water in both public and private school communities is essential to reduce transmission and protect child health in Yenagoa Metropolis.

Keywords: Intestinal Parasite Infections; Primary School Children; Prevalence; Risk Factors; Yenagoa, Nigeria.

INTRODUCTION

Intestinal parasitic infections (IPIs) occur when several parasites are present in the gastrointestinal tract of humans (Arosoye et al., 2018; Dudlová et al., 2016; Funso-Aina et al., 2020). According to Arosoye et al. (2018) these parasites might potentially belong to either the category of protozoa or helminths (worms). The three most common intestinal protozoan parasites are *E. histolytica*, *G. lamblia,* and *Cryptosporidium spp*. (Dagne & Alelign, 2021; Hemphill et al., 2019). These intestinal protozoan parasites are mostly characterised by diarrhoea (Dagne & Alelign, 2021; Di Genova & Tonelli, 2016; Hemphill et al., 2019). The three common forms of helminths are flukes (trematodes), tapeworms (cestodes), and roundworms (nematodes) (Mitre & Klion, 2021). Upon entering the human body, these worms may induce a parasitic infection, manifesting as intestinal worms (Varyani et al., 2017). Infections are widespread in many places around the globe, particularly in underdeveloped areas with inadequate sanitation and limited availability of clean water (Duguma et al., 2023; Kantzanou et al., 2021; Usip et al., 2023). Intestinal parasite infections remain a notable public health issue, especially affecting children in underdeveloped nations.

These infections pose a significant risk to the health and welfare of children, impacting their physical and mental development as well as their general well-being. The occurrence of intestinal parasite infections differs across locations, with elevated rates found in places characterised by substandard sanitation, restricted availability of uncontaminated water, and insufficient healthcare infrastructure. Children are more susceptible to harm because of their underdeveloped immune systems and behaviours that increase their exposure to polluted settings (Fauziah et al., 2022). Approximately 24% of the world's population is afflicted with soil-transmitted helminth infections. This includes more than 260 million children of preschool age and over 600 million children of school age who reside in places where these illnesses are widespread (WHO, 2023). In many regions of sub-Saharan Africa (SSA), the prevalence of intestinal parasite infection exceeds 50% (WHO, 2023). In addition, approximately 600 million individuals worldwide are believed to be affected by *S. stercoralis*. However, because of its transmission in regions with inadequate sanitation, its geographic distribution coincides with that of other soil-transmitted helminthiases. The projected prevalence rate of intestinal parasitic infections (IPI) in children in African nations, namely southern Nigeria, is 23.95% (Gbonhinbor et al., 2022). *Ascaris lumbricoides, hookworm*, and *Trichuris trichiura* are the primary causes of most illnesses (Gbonhinbor et al., 2022). In sub-Saharan Africa, *E. histolytica, Strongyloides stercorals, G. lamblia, Schistosoma mansoni, Diphyllobotium latium*, and *Fasciola hepatica* are the protozoan infections that children younger than 5 years old get the most of (Gbonhinbor et al., 2022; Mekonnen, 2019; WHO, 2023). There are notable apprehensions about the possible immediate and long-lasting problems of IPI in children (Koruk et al., 2010; WHO, 2023).

Intestinal parasitic infections (IPIs) may lead to impaired nutrient absorption and persistent blood loss, resulting in lasting impacts on the physical and cognitive development of children (Jourdan et al., 2018; Pullan et al., 2014). Malnutrition, particularly in disadvantaged groups, increases the susceptibility of children to intestinal parasitic infections (IPI). This, in turn, may lead to protein-energy malnutrition, iron-deficiency anaemia, and consequent impairments in both mental and physical development (Jourdan et al., 2018). Intestinal parasitic infections reside in the gastrointestinal tract (GIT), which is responsible for digesting and absorbing nutrients. As a result, these infections can lead to a decrease in food intake and/or an increase in nutrient wastage due to blood loss, vomiting, inflammation-induced impairment of digestion and absorption, or diarrhoea. Therefore, these consequences may result in or worsen protein-energy malnutrition, anaemia, and other deficiencies in nutrients (Lwanga et al., 2012; Yoseph & Beyene, 2020).

As a result, the World Health Organisation (WHO) recommends administering deworming treatment once a year in regions where the prevalence rate of soil-transmitted helminthiases ranges from 20% to 50%. In areas with prevalence rates exceeding 50%, treatment should be given twice a year, without requiring an individual diagnosis, to all individuals at risk who reside in endemic areas (Yoseph & Beyene, 2020). This technique reduces morbidity by decreasing the number of worms present. In addition, health and hygiene education may reduce the spread and recurrence of infections by promoting healthy behaviours. However, ensuring access to adequate sanitation is crucial, although it may not always be feasible in areas with inadequate resources (WHO, 2020). In 2016, there was a global objective to eradicate the occurrence of illness and death caused by intestinal parasite infections in preschool and school-aged children by the year 2020 (WHO, 2016). However, this has not been achieved. This is partly because the intestinal parasites are persistent, and many developing countries are yet to provide basic amenities for the majority of their people.

Therefore, predisposing the majority of children to these infections. Other factors include inadequate sanitation, unsanitary behaviours, a lack of drinkable water, substandard living conditions, and poverty (Abah & Arene, 2015; Tegen & Damtie, 2021). Intestinal parasitic infections are common in socio-economically disadvantaged communities where poor environmental sanitation, overcrowding, a lack of access to safe and clean water, and low levels of education are prevalent. These conditions contribute to the high prevalence of infections. The consequences of these infections include a perpetual cycle of poverty. Soil-transmitted helminths are consistently recognised as a prevalent public health issue and the most prevalent among intestinal parasitic infections (IPIs) owing to regular exposure to soil during everyday activities (WHO, 2023). The prevalence of infections caused by hookworm (Necator americanus and Ancylostoma duodenale), A. lumbricoides, and Trichuris trichiura is highest among the most impoverished individuals worldwide (Dagne & Alelign, 2021; Di Genova & Tonelli, 2016; Hemphill et al., 2019; WHO, 2023).

Intestine parasites are known to attach to fingers, fruits, vegetables, instruments, door knobs, and even money. Although, flies may also transfer them. Nevertheless, their attachment to fingernails is a prominent cause of infection. Therefore, the detection of intestinal parasites in the fingernails serves as evidence of one of the pathways by which the parasite might be transmitted. It also suggests the existence of an ongoing infection or a potential source of parasitic infection. Additionally, it serves as a sign of inadequate personal cleanliness, often seen among children living in rural regions. As a result, children may easily spread infections to the greater community by sharing school equipment, playing together, and by self-infection by biting and sucking their fingers, which is typical among children of this age (Usip et al., 2022). These infections have been linked to a higher likelihood of nutritional anaemias, protein-energy malnutrition, and growth deficiencies in children (Arosoye et al., 2018; Funso-Aina et al., 2020).

Thus, the ongoing prevalence of intestinal parasite infections in children may be attributed to many environmental and socio-economic variables. Given the adverse socio-economic consequences of these parasitic illnesses in children, it is imperative to develop effective prevention and control strategies that may be easily implemented in tropical regions. In order to do this successfully, it is necessary to consistently collect fundamental data on the prevalence of parasitic illnesses in various regions. Against this background, the study is proposed to assess the prevalence of intestinal parasite infections (IPIs) and identify the risk factors for transmission among children attending public and private primary schools in Yenagoa Metropolis, Bayelsa State.

MATERIALS AND METHODS

Study Area

The investigation will be conducted in Yenagoa, Bayelsa State, Nigeria. Bayelsa State was created from a portion of Rivers State in 1996 and is one of the six states in the South-South geopolitical zone. It borders Rivers State to the west and northwest, Delta State to the east and southeast, and the Gulf of Guinea to the south. The state covers about 9,415.8 km², located at latitude 4°45' N and longitude 6°05' E. In 2006 the population was 1,704,515, giving a density of 158 persons/km² (≈1.2 % of Nigeria's total population). Yenagoa is characterized by tropical rainforest and mangrove wetlands. Historically, fishing was a major economic activity, but oil exploration has degraded the environment. Agriculture (yams, cassava, plantains, oil palms, bananas) and activities such as palm-oil processing, logging, palm-wine extraction, local alcohol production, commerce, carving, and weaving are also important. The predominant ethnic group is the Ijaw, speaking dialects such as Tamu, Mein, Jobu, Oyariri, and Tarakiri. Settlements are "floating" villages and towns, with the highest population concentration in Southern Ijaw (23.8 %), followed by Yenagoa (9.3 %) and Kolokuma/Opukuma LGA (6.0 %). Yenagoa's capital hosts two major public hospitals—Federal Medical Centre (FMC) and Diete Koki Memorial Hospital, Opolo. Numerous private clinics exist, but most residents cannot afford them due to high costs and limited transport. Water sources include rivers, canals, piped water, the Niger River, dry riverbeds, seasonal streams, and open wells.

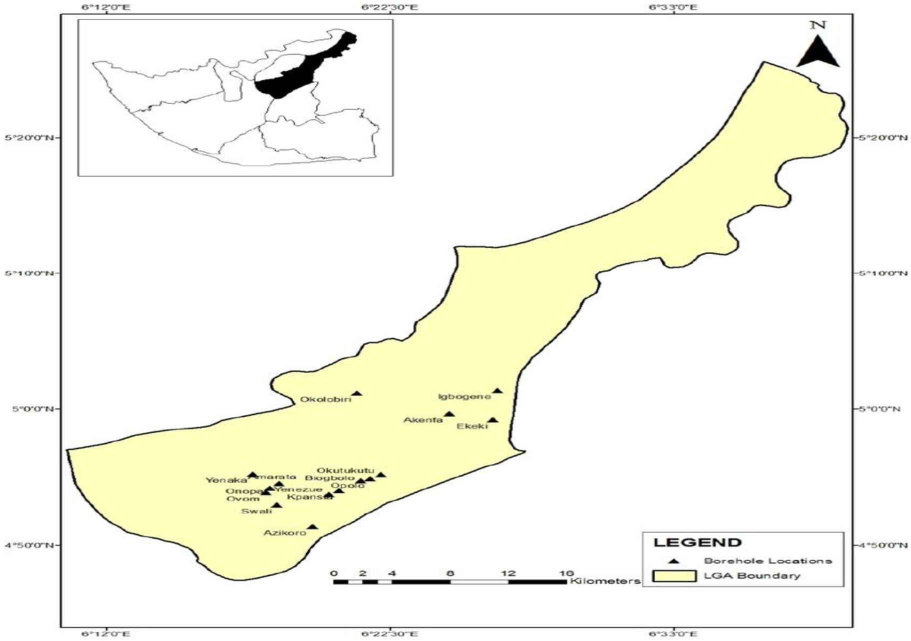

Figure 1: Map of the Study Area

Adapted from Nwankwoala et al., (2014)

Study Design

A cross-sectional descriptive study will be conducted using one-time sampling of public primary-school children. Ten schools (5 public, 5 private) will be selected across Yenagoa Metropolis.

Study Population

Primary-school children (aged 8-15 years, classes 3-8) from the selected schools. Each ward forms a stratum; balloting will choose schools per ward. A class list will be obtained from each head teacher and ages verified with parents during consent.

Inclusion Criteria

Children aged 8-15 years in classes 3-8 whose parents give written consent.

Exclusion Criteria

Children whose parents do not consent, those outside the age range 8-15 years, and pupils below class 3.

Sampling Technique

Stratified sampling by ward, followed by systematic sampling of pupils per class using the class register. Sampling interval = class population ÷ required sample size.

Sample Size Determination

Sample size was determined by use of the following formula:

$$n = \frac{Z^2pq}{d^2}$$ (Mugenda and Mugenda, 2003).

Where p = estimated prevalence of intestinal parasitic infections in the study area.

0.5 because IPI prevalence in Mbeere North is not known.

q = 1-p, d = level of statistical significance (0.05)

Z= standard normal deviation which corresponds to 95% confidence interval (1.96)

$$n = \frac{1.962 \times 0.5 \times 0.5}{0.052} = 385 \text{ pupils.}$$

Therefore, the sample size was raised to 414 pupils to cater for eventualities such as failure to sign informed consent form and data loss.

Number of pupils per school was 414/10 = 41.4 = 410

41 participants per school

Number of pupils per class = 41/6 = approx. = 7 persons per class.

Data Collection

Questionnaire: pre-tested, administered in the local language; includes demographic, socioeconomic and behavioural variables; fingernail inspection during interview.

Stool samples: children instructed to provide clean, labelled specimens in leak-proof containers with applicator sticks. Samples stored in 10 % formalin and transported to the Microbiology & Parasitology Laboratory, Department of Animal and Environmental Biology, Niger Delta University.

Laboratory Analysis

1. Microscopy (saline & iodine): direct smear examined at ×10 and ×40 for helminth eggs and protozoan trophozoites.

2. Formol-ether concentration: 1 g stool mixed with saline + 10 % formalin, filtered, ether added, centrifuged (3000 rpm, 1 min). Sediment examined microscopically.

Parasites identified using pictorial keys (Arora & Arora, 2010; Jeffrey & Leach, 2001).

Data Analysis

Prevalence calculated with descriptive statistics; chi-square test for associations. $p < 0.05$ considered significant. SPSS v.18 used; mean, SD and CV reported. Results presented in tables and figures.

Ethical Considerations

Ethical clearance obtained from the Department of Public Health, State Ministry of Health, and State Primary Schools Board. Written informed consent secured from parents/guardians and school heads. Participation is voluntary, with the right to withdraw at any time and no penalties or incentives.

RESULTS

Samples were collected from 10 schools (A-J) yielding 395 participants: 202 from public schools and 193 from private schools (see Tables 1-10 and Figures 1-2).

Prevalence in Public Schools

- Overall IPIs: 25.7 % (52/202).

- Helminths: A. lumbricoides 10 (4.95 %), T. trichiura 5 (2.48 %), S. stercoralis_ 2 (0.99 %), others 7 (3.47 %).

- Protozoa: E. histolytica 10 (4.95 %), G. lamblia 7 (3.47 %).

- Age-specific prevalence: 8-10 yr 26.6 %, 11-13 yr 26.8 %, 14-15 yr 23.2 %.

- Gender: females 31 (29.0 %), males 21 (22.1 %).

- No significant differences by age or sex ($p > 0.05$).

Prevalence in Private Schools

- Overall IPIs: 21.8 % (42/193).

- Helminths: A. lumbricoides 8 (4.15 %), T. trichiura_ 4 (2.07 %), S. stercoralis 2 (1.07 %), others 5 (2.59 %).

- Protozoa: E. histolytica 9 (4.66 %), G. lamblia 4 (2.07 %), other protozoa 6 (3.11 %).

- Age-specific prevalence: 8-10 yr 25.7 %, 11-13 yr 19.7 %, 14-15 yr 19.4 %.

- Gender: females 24 (21.6 %), males 18 (22.0 %).

- No significant differences by age or sex ($p > 0.05$).

Comparative Analysis

No statistically significant differences ($p > 0.05$) were found between public vs. private schools, age groups, or genders.

Table 1: Number of Participants admitted in each school

Schools	Total number of participants examined	Percentage (%)
School-A	40	10.13
School-B	38	9.62
School-C	40	10.13
School-D	39	9.87
School-E	40	10.13
School-F	38	9.62
School-G	40	10.13
School-H	41	10.38
School-I	41	10.38
School-J	38	9.62
Total	395	100

N=395

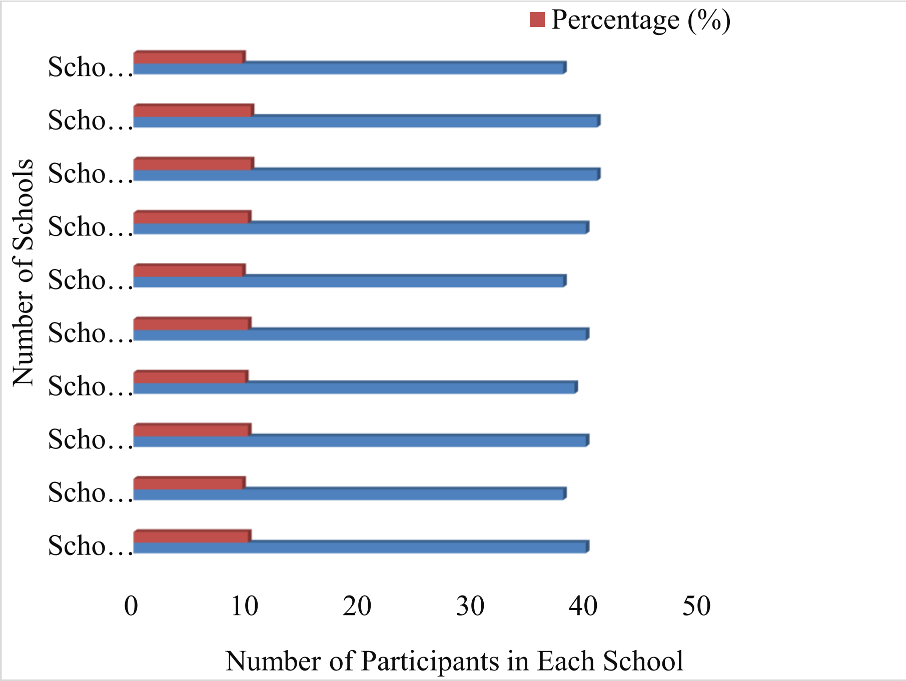

Figure 1: Participants from Public and Private Schools

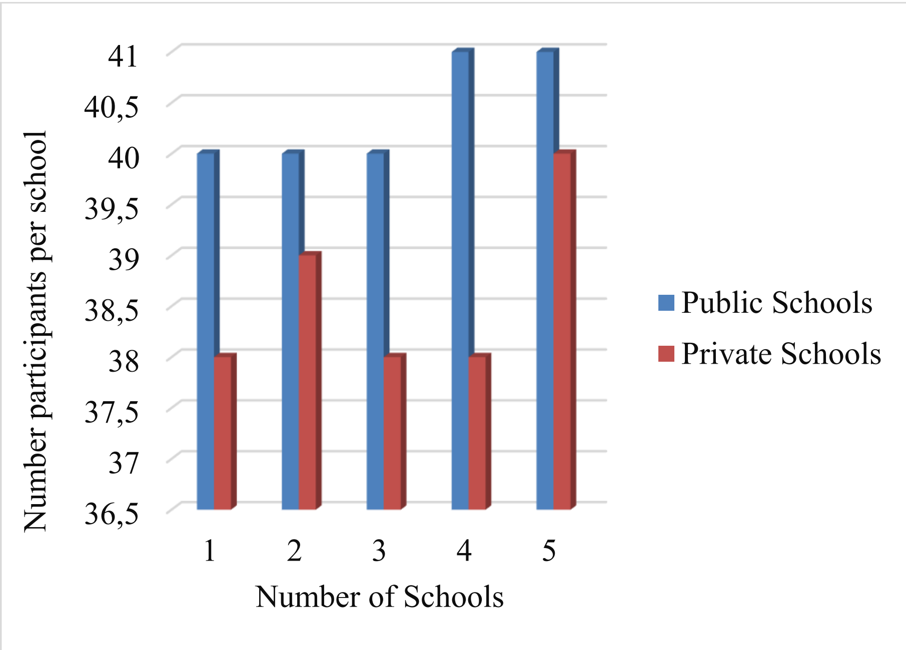

Figure 2: Participants from Public and Private Schools

Table 2: Prevalence of Intestinal Parasite Infections (IPIs) in Public Schools

Schools	Total number of participants examined	Total number of participants infected (*f*)	Prevalence (%)
School-A	40	10	25.0
School-B	40	12	30.0
School-C	40	11	28.0
School-D	41	10	24.0
School-E	41	9	22.0
Total	202	52	25.7

N=202

Table 3: Prevalence of Intestinal Parasite Infections (IPIs) in Private Schools

Schools	Total number of participants examined	Total number of participants infected (*f*)	Prevalence (%)
School-A	38	8	21.0
School-B	39	9	23.0
School-C	38	8	21.0
School-D	38	9	16.0
School-E	40	8	20.0
Total	193	42	21.8

N=193

Table 4: Prevalence of Intestinal Parasite Infections (IPIs) in Public Schools

Schools	No. examined	No. infected (f)	Prevalence	Helminthes						
				A.lumbricoides	T.trichiura	S.stercoralis	Others	E. histolytica	G. lamblia	Others
School-A	40	10	25.0	3 (7.5%)	1(2.5%)	0(0.0%)	2(5.0%)	2(5.0%)	0(0.0%)	1 (2.5%)
School-B	40	12	30.0	2(5.0%)	1(2.5%)	1(2.5%)	2(5.0%)	2(5.0%)	2(5.0%)	2(5.0%)
School-C	40	11	28.0	2(5.0%)	1(2.5%)	0(0.0%)	1(2.5%)	2(5.0%)	2(5.0%)	2(5.0%)

School-D	41	10	24.0	2(4.88%)	1(2.44%)	0(0.0%)	1(2.44%)	2(2.88%)	2(4.88%)	2(2.88%)
School-E	41	9	22.0	1(2.44%)	1(2.44%)	1(2.44%)	1(2.44%)	2(2.88%)	1(2.44%)	1(2.44%)
Total	202	52	25.7	10 (4.95%)	5(2.48%)	2(0.99%)	7(3.47%)	10(4.95%)	7(3.47%)	8(3.96%)

N=202

Table 5: Prevalence of Intestinal Parasite Infections (IPIs) in Private Schools

Schools	No. examined	No. infected (*f*)	Prevalence	Helminthes						
				A.lumbricoides	*T.trichiura*	*S.stercoralis*	Others	*E. histolytica*	*G. lamblia*	Others
School-A	38	8	21.0	2 (5.3%)	1(2.6%)	0(0.0%)	1(2.6%)	2(5.3%)	0(0.0%)	1(2.6%)
School-B	39	9	23.0	2 (5.1%)	1(2.6%)	1(2.6%)	1(2.6%)	1(2.6%)	1(2.6%)	2(5.1%)
School-C	38	8	21.0	1(2.6%)	1(2.6%)	0(0.0%)	1(2.6%)	2(5.3%)	1(2.6%)	1(2.6%)
School-D	38	9	16.0	2(5.3%)	1(2.6%)	0(0.0%)	1(2.6%)	2(5.3%)	1(2.6%)	1(2.6%)
School-E	40	8	20.0	1(2.6%)	0(0.0%)	1(2.5%)	1(2.5%)	2(5.0%)	1(2.5%)	1(2.5%)
Total	193	42	21.8	8 (4.15%)	4(2.07%)	2(1.04%)	5(2.59%)	9(4.66%)	4 (2.07%)	6(3.11%)

N=193

Table 6: Prevalence of Intestinal Parasite Infections (IPIs) in Studied Schools

Schools	No. examined	No. infected (f)	Prevalence	Helminthes						
				A.lumbricoides	**T.trichiura**	**S.stercoralis**	**Others**	**E. histolytica**	**G. lamblia**	**Others**
School-A	40	10	25.0	3 (7.5%)	1(2.5%)	0(0.0%)	2(5.0%)	2(5.0%)	0(0.0%)	1 (2.5%)
School-B	38	8	21.0	2 (5.3%)	1(2.6%)	0(0.0%)	1(2.6%)	2(5.3%)	0(0.0%)	1(2.6%)
School-C	40	12	30.0	2(5.0%)	1(2.5%)	1(2.5%)	2(5.0%)	2(5.0%)	2(5.0%)	2(5.0%)

School-D	39	9	23.0	2 (5.1%)	1(2.6%)	1(2.6%)	1(2.6%)	1(2.6%)	1(2.6%)	2(5.1%)
School-E	40	11	28.0	2(5.0%)	1(2.5%)	0(0.0%)	1(2.5%)	2(5.0%)	2(5.0%)	2(5.0%)
School-F	38	8	21.0	1(2.6%)	1(2.6%)	0(0.0%)	1(2.6%)	2(5.3%)	1(2.6%)	1(2.6%)
School-G	40	8	20.0	1(2.6%)	0(0.0%)	1(2.5%)	1(2.5%)	2(5.0%)	1(2.5%)	1(2.5%)
School-H	41	10	24.0	2(4.88%)	1(2.44%)	0(0.0%)	1(2.44%)	2(2.88%)	2(4.88%)	2(2.88%)
School-I	41	9	22.0	1(2.44%)	1(2.44%)	1(2.44%)	1(2.44%)	2(2.88%)	1(2.44%)	1(2.44%)
School-J	38	9	16.0	2(5.3%)	1(2.6%)	0(0.0%)	1(2.6%)	2(5.3%)	1(2.6%)	1(2.6%)
Total	395	94	23.8	18(4.6%)	9(2.3%)	4(1.0%)	12 (3.0%)	19(4.8%)	11(2.8%)	14(3.5%)

Table 7: Prevalence of Intestinal Parasite Infections (IPIs) in Relation to Age Group in Public Schools

Age group (years)	**No. examined**	**No. infected (*f*)**	**Prevalence**	**Helminthes**						
				A.lumbricoides	*T.trichiura*	*S.stercoralis*	Others	*E. histolytica*	*G. lamblia*	Others
8-10	64	17	26.6	5 (7.8)	2(3.1)	1(1.6)	3(4.7)	4(6.3)	3(4.7)	3(4.7)
11-13	82	22	26.8	3 (3.7)	2 (2.4)	1(1.2)	2(2.4)	4 (4.9)	2(2.4)	3(3.7)
14-15	56	13	23.2	2(3.6)	1(1.8)	0(0.0)	2(3.6)	2(3.6)	2(3.6)	2(3.6)
Total	202	52	25.7	10 (4.95%)	5(2.48%)	2(0.99%)	7(3.47%)	10(4.95%)	7(3.47%)	8(3.96%)

N=202

Table 8: Prevalence of Intestinal Parasite Infections (IPIs) in Relation to Age Group in Private Schools

Age group (years)	No. examined	No. infected (*f*)	Prevalence	Helminthes						
				A.lumbricoides	*T.trichiura*	*S.stercoralis*	Others	*E. histolytica*	*G. lamblia*	Others
8-10	70	18	25.7	4 (5.7%)	2(2.9%)	1 (1.4%)	2(2.9%)	3(4.3%)	2(2.9%)	3(4.3%)
11-13	61	12	19.7	2 (3.3%)	1(1.6%)	0(0.0%)	2(3.3%)	3(4.9%)	1(1.6%)	2(3.3%)
14-15	62	12	19.4	2(3.2%)	1(1.6%)	1(1.6%)	1(1.6%)	3(4.8%)	1(1.6%)	1(1.6%)
Total	193	42	21.8	8 (4.15%)	4(2.07%)	2(1.04%)	5(2.59%)	9(4.66%)	4 (2.07%)	6(3.11%)

N=193

Table 9: Prevalence of Intestinal Parasite Infections (IPIs) in Relation to Age Group

Age group (years)	No. examined	No. infected (*f*)	Prevalence	***Helminthes***						
				A.lumbricoides	*T.trichiura*	*S.stercoralis*	Others	*E. histolytica*	*G. lamblia*	Others
8-10	134	35	26.1	9 (6.7%)	4(3.0%)	2 (1.5%)	5(3.7%)	7(5.2%)	5(3.7%)	6(4.5%)
11-13	143	34	23.8	5 (3.5%)	3(2.1%)	1(0.7%)	4(2.8%)	7 (4.9%)	3(2.1%)	5(3.5%)
14-15	118	25	21.2	4(3.4%)	2(1.7%)	1(0.8%)	3(2.5%)	5(4.2%)	3(2.5%)	3(2.5%)
Total	395	94	23.8	18(4.6%)	9(2.3%)	4(1.0%)	12 (3.0%)	19(4.8%)	11(2.8%)	14(3.5%)

N=395

Table 10: Prevalence of Intestinal Parasite Infections (IPIs) in Relation to Sex in Public Schools

Gender	**No. examined**	**No. infected (*f*)**	**Prevalence**	**Helminthes**						
				A.lumbricoides	*T.trichiura*	*S.stercoralis*	Others	*E. histolytica*	*G. lamblia*	Others
Boys	95	21	22.1	4 (4.2%)	1(1.1%)	1(1.1%)	3(3.2%)	4(4.2%)	3 (3.2%)	3(3.2%)
Girls	107	31	29.0	6 (5.6%)	4(3.7%)	1(0.9%)	4 (3.7%)	6(5.6 %)	4(3.7%)	5(4.7%)
Total	202	52	23.8	10 (4.95%)	5(2.48%)	2(0.99%)	7(3.47%)	10(4.95%)	7(3.47%)	8(3.96%)

N=202

Table 11: Prevalence of Intestinal Parasite Infections (IPIs) in Relation to Sex in Private Schools

Gender	**No. examined**	**No. infected (f)**	**Prevalence**	**Helminthes**						
				A.lumbricoides	T.trichiura	S.stercoralis	Others	E. histolytica	G. lamblia	Others
Boys	82	18	22.0	3 (3.7%)	2(2.4%)	1(1.2%)	3(3.7%)	4(4.9%)	2(2.4%)	2(2.4%)
Girls	111	24	21.6	5 (4.5%)	2(1.8%)	1(0.9%)	2(1.8%)	5(4.5%)	2(1.8%)	4(3.6%)
Total	193	42	21.8	8 (4.15%)	4(2.07%)	2(1.04%)	5(2.59%)	9(4.66%)	4 (2.07%)	6(3.11%)

N=193

Table 12: Prevalence of Intestinal Parasite Infections (IPIs) in Relation to Sex

Gender	**No. examined**	**No. infected (*f*)**	**Prevalence**	**Helminthes**						
				A.lumbricoides	*T.trichiura*	*S.stercoralis*	Others	*E. histolytica*	*G. lamblia*	Others
Boys	177	39	22.0	7 (4.0%)	3(1.7%)	2(1.1%)	6(3.4%)	8(4.5%)	5(2.8%)	5(2.8%)
Girls	218	55	25.2	11 (5.0%)	6(2.8%)	2(0.9%)	6(2.8%)	11(5.0%)	6(2.8%)	9(4.1%)
Total	395	94	23.8	18 (4.6%)	9 (2.3%)	4 (1.0%)	12 (3.0%)	19 (4.8%)	11 (2.8%)	14 (3.5%)

N=3

DISCUSSION

This cross-sectional study examined intestinal-parasite infections (IPIs) and associated risk factors among 395 primary-school children (202 public, 193 private) in Yenagoa, Bayelsa State. Socio-demographic profile show that Females predominated (≈55 %); the modal age was 11-13 years (36.2 %). Public schools contributed slightly more participants (51.1 % vs 48.9 %). Overall prevalence IPIs were detected in 23.8 % of children, comparable to earlier Bayelsa reports (Gbonhinbor et al., 2022) but higher than rates in Wukari (9.2 %; Anyiam and Imarenezor, 2024) and Rivers State (21.0 %; Abah & Awi-Waadu, 2018). In terms of School-type differences, Prevalence was higher in public schools (25.7 %) than private schools (21.8 %). The three most common helminths across both sectors were Ascaris lumbricoides (4.6 %), Trichuris trichiura (2.3 %) and Strongyloides stercoralis (1.0 %); protozoa were dominated by Entamoeba histolytica (4.8 %) and Giardia lamblia (2.8 %). Risk factors such as environmental conditions (poor sanitation, limited clean water) and low socioeconomic status favour transmission (Funso-Aina et al., 2020). Barefoot play and geophagy likely explain the detection of A. lumbricoides, T. trichiura and S. stercoralis (Okpala et al., 2014). No statistically significant differences were found by age or gender ($p > 0.05$), consistent with several Nigerian studies (Achi et al., 2017; Abah & Arene, 2015; Udensi et al., 2015). Public-health implications show moderate IPI burden warrants school-based health-education on hand-washing, safe water use and footwear. Periodic mass deworming and screening can reduce prevalence. Improving water, sanitation and hygiene (WASH) infrastructure in schools and communities is essential. Recommendations are;

1. Implement compulsory hygiene-education modules in primary curricula.

2. Establish regular IPI screening and treatment (deworming) programmes.

3. Upgrade WASH facilities in schools; ensure access to clean water and safe latrines.

4. Engage parents and community leaders in awareness campaigns.

5. Strengthen surveillance to monitor trends and evaluate interventions.

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