

1 **Epidemiology of Intestinal Polyparasitism among Primary School Pupils in Awe, Awe**
2 **Local Government Area, Nasarawa State, Nigeria**

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6 **ABSTRACT**

7 Fecal samples were collected from 389 school children 200 (76.9%) boys and 189 (80.8%) girls
8 and were examined by using direct smear, formalin-ether administration techniques socio-
9 economic personal hygiene, environmental and demographic information were collected by
10 using self administered questionnaire. The overall 389 (78.7) of the children were found to be
11 infected by at least one parasite species. Of these 12.2% had multiple parasites. The overall
12 prevalence infection were *Trichuris trachiura* (0.20%), *Ascaris lumbricoides* (48.6%),
13 Hookworm (5.3%), *Entamoeba histolytica* (6.3%), *Entamoeba coli* (5.7%) and *Ascaris*
14 *lumbricoides* + *E. histolytica* (7.5%). Parasitic infections between male and females showed
15 significant different in all the sexes (P<0.01). The percentage prevalence of *Ascaris lumbricoides*
16 was high in children between 7 – 8 years and ≥12 years. For other intestinal parasites, no specific
17 age relationship was established among the children. Findings from this study showed that using
18 an unsafe water supply as a source for drinking water, presence of other family members infected
19 with intestinal parasitic infections (IPI), not washing vegetables before competition, absence of
20 toilet in the house, not wearing shoes when outside, not cutting nails periodically and not
21 washing hands before eating were significant risk factors associated with intestinal multiple
22 parasites among these pupils.
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24 **Keywords:** Intestinal parasites, infection, Primary school children, Awe.
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26 **INTRODUCTION**

27 Parasitic infestation greatly affects the health and socio-economic status of individuals and
28 communities. They weaken the individuals and made them unable to do gainful activities due to
29 infestations. Furthermore, anaemic persons are anamia, they succumb easily to many infections
30 also to develop serious disease and eventually become poor mothers and child, since they are
31 generally weak (WHO, 2002).

32 In humans, intestinal parasites are often spread by poor hygiene related to faeces, contact with
33 animals or poorly cooked food containing parasites. The major groups of parasites include
34 protozoans and parasitic worms (Helminthes). These protozoans including *Cryptosporidium*,
35 *microsporidium* and *Isospora*, *Entamoeba histolytica*, *Balatidium coli*, *Giardia lamblia* etc, each
36 of these parasites can cause, infection at the same time. Intestinal helminthic parasite, are worms

37 that are found in the body lumens of the gut of animal (Agbolade *et al.*, 2004). These intestinal
38 parasites are amongst the most prevalent human infections affecting approximately one quarter
39 of the world's populations, mainly school children due to their poor hygienic nature or poor
40 sanitary conditions coupled with their voracious eating habits (WHO, 2002).

41 Human, get the parasites through the mouth from uncooked or unwashed hand, food,
42 contaminated water or hands or by skin contact with larva infected soil. There is general
43 acceptance that severe intestinal parasite are likely to result in failure and poor growth in
44 children (Crompton and Nesheim, 2002), vitamin A deficiency (Al-Mekhlafi *et al.*, 2010), iron
45 deficiency anemia (Faustini, *et al.*, 2006) and poor educational performance (Haque *et al.*, 2003).
46 Recent studies highlighted the impact of polyparasitism on the host immunity and showed that
47 intestinal parasites are associated with higher infections related to infection with a single parasite
48 (Shokhana, *et al.*, 2004, Gibson *et al.*, 2011).

49 In some persons, intestinal parasites do not cause any symptom or they display some symptoms
50 include cramping, abdominal pain, coughing bloating and diarrhea. In more serious cases skin-
51 itching, fever, nausea, vomiting or bloody stools may occur. However, because many parasitic
52 infections especially those of helminthes are usually asymptomatic or produce only mild
53 symptoms, they are often neglected until serious complications or chronic clinical symptoms
54 appear (WHO, 2002).

55 In Nigeria many intervention schemes which were attempted to control these infections did not
56 yield much successes, many are still heavily infected particularly children (Ijagbone and
57 Olagunju, 2006). Because of the negative socio-economic impact of these parasitic infections on
58 infected humans, efforts would be made to reduce their epidemiological state among pupils. The

59 study was, therefore, carried out to determine the prevalence of the intestinal parasitic infections
60 and to investigate its associated risk factors among Awe school children.

61 MATERIALS AND METHODS

62 Study Area

63 This research was carried out in Awe Local Government Area of Nasarawa State Nigeria. Awe is
64 located in the southern part of Nasarawa State on latitude $8^{\circ} 31^{\circ}$ N and longitude $7^{\circ} 31^{\circ}$ E. Its
65 location linked Awe and Keana Local Government Area in the East and West respectively. The
66 mean monthly Temperature in this area ranges between 30°C in March and 25°C December. The
67 mean annual rainfall is about 1270 – 1540mm received over six to seven months (April –
68 October) of rain season, with five months of dry season. The main socio-economic activities of
69 the people are farming, trading and some are in public services.



70

71 **Figure 1:** Map of Nasarawa State showing study area

72 Ethical Clearance

73 The protocol for this study was approved by the local education authority and the primary
74 schools intended to be used. The approval was on agreement that participants anonymity must be
75 maintained and good laboratory practices quality control ensured and every findings would be
76 treated with utmost confidentiality and for the purpose of this research only. Participants were
77 fully informed on their right to with draw without any constraints.

78 **Study Design**

79 The study on intestinal polyparasitism was carried out over a period of four months (February to
80 May 2018). The participants are school children between the age of 6 and 13 years in Awe west,
81 Awe east, Awe central and Isilamiyya primary school of Awe Local Government Area, from
82 which we randomly selected 123 children per school. The 494 children (247 boys and 247 girls)
83 were all given registration number on a card which they enclosed with their stool samples in
84 disposable polythene bags supplied to them. The fresh feecal samples were put in refrigerator
85 and immediately transported to the general hospital laboratory in Awe for examination.

86 **Microscopy Examination of Stool Sample**

87 Freshly voided stool samples were examined for blood, colour, consistency and mucus. Smear
88 were used for analysis of the faecal sample for parasites. Diagnosis was based on identification
89 of the characteristics protozoan cysts and helminthes ova with a compound microscope using \times_{10}
90 and \times_{40} objective (Cheesbrough, 1992).

91 The fecal samples for direct smear were washed prior the concentration procedure saline and
92 iodine preparation were made from the deposite on a clean grease free slide and examined for
93 cysts and helminthes ova with compound microscope using \times_{10} and \times_{40} objectives.

94 The result was analyzed using sample percentage and SPSS 16.0 package to compare prevalence of
95 infection. The difference were considered to be statistically significant when the P-value obtained was
96 less than 0.01.

97 **Simple Size Calculated**

98
$$Ss = \frac{Z^2 \times (p) \times (1 - R)}{C^2}$$

99
100 Where Z = value (e.g 1.96 for 95% confidence level)

101 P = percentage picking a choice in decimal = 0.5)

102 C = Confidence interval, express as decimal e.g 0.04

103 **RESULTS**

104 A total of 494 fresh fecal samples were collected from pupils between the ages of 6 – 13 years.
105 This consisted of 260 boys and 234 girls from the four primary schools in Awe town. The total
106 fecal samples, 389 (78.7%) were infected, 200 (76.9%) boys and 189 (80.8%) girls were
107 infected. Table 1 shows occurrence of intestinal helminthes infection according to sex, being
108 higher in girls than boys.

109 Table 2 states the prevalence rate of infection based on age with the percentage prevalence of
110 infection was high with (82.0%) in pupils between 8 – 9 years of age and decreased with
111 (74.59%) in pupils between ≥12 years of age.

112 Table 3 showed the prevalence rate of *Entamoeba histohytica* 31 (6.3%), *Entamoeba coli* 28
113 (5.66%), *Ascaris lumbricoide* 240 (48.6%), trichiuristrichuria 1(0.2%), hookworm 26 (5.3%),
114 and mixed infection are *Ascaris lumbricoides* and *Entamoeba histolytica* recorded 37 (7.5%) in
115 the study. The pupils t test analysis of the parasitic infection between the boys and girls recorded
116 a significant difference between the sexes (P<0.01).

117 **Table 1: Prevalence of intestinal parasite according to sex**

Schools	Male			Female			Total		
	No. examine	No. infection	% prevalence	No. examine	No. infection	% prevalence	No. examine	No. infection	% prevalence
Awe central pri. sch.	102	93	91.17%	90	88	97.77	192	18	94.3%
Awe south pri. Sch.	54	39	70.32%	52	43	82.69	106	82	77.4%
Sangari pri. Sch.	52	37	71.15%	48	37	77.08	100	74	74%

Emirs palace sch.	52	31	59.61%	44	21	47.72	96	52	54.2%
Total	260	200	76.92	234	189	80.76	494	389	78.7%

118

119 **Table 2: Prevalence of intestinal parasite infection among primary school pupils by age**

Age (years)	No examine	No infected	% prevalence
6 – 7	124	101	81.5%
8 – 9	128	105	82.0%
10 – 11	120	92	76.7%
>12	122	91	74.6%
Total	494	389	78.7%

120

121 **Table 3: Frequency of species of intestinal parasites among pupils**

Species	No. examine	No. positive	% positive
<i>Entamoeba histolytica</i>	494	31	6.3%
<i>Entamoeba coli</i>	494	28	5.7%
<i>Ascaris lumbricoides</i>	494	240	48.6%
<i>Trichuris trichuria</i>	494	1	0.2%
Hookworm	494	26	5.3%
Co-infection			
<i>Ascaris lumbricoides</i> + <i>Entamoeba histolytica</i>	494	37	7.5%
Total	2964	363	12.2%

122

123 DISCUSSION

124 Intestinal parasitic infestation remain major health problems globally particularly among rural
 125 children in developing nations. The common intestinal parasites recorded in this research include
 126 hookworm, *Trichuris trichuria*, *Ascaris lumbricoides*, *Entamoeba histolytica*. The infection rate
 127 of the intestinal parasites in primary school in Awe town showed that there was consistently
 128 higher infection among the 494 school children examined. The participating children were
 129 positive for at least one parasite species with *Ascaris lumbricoides* infection being the most
 130 common (48.6%) in these children, followed by *Entamoeba histolytica* (6.3%), *E. coli* (5.7%)
 131 and hookworm (5.3%) infection, which was in disagree to the findings made among school
 132 children in a study by World Health organization (WHO, 2002). On the other hand, the
 133 prevalence in this study was higher compared to the findings of (Chukwuma, *et al.*, 2009) who
 134 showed a prevalence of 13 (5.9%) among primary school children in Anambra State, Nigeria,

135 this was due to poor hygienic conditions of the school environment. The result of this study is
136 also in agreement with the prevalence recorded by (Omah, *et al.*, 2014) who showed a
137 prevalence of 286 (29.2%).

138 This study has revealed that parasitic infestation increased progressively with age pupils aged
139 between 6 – 7 had (81.5%), 8 – 9 (82.0%), 10 – 11 (76.7%) and >12 (74.6%). This could be due
140 to random selection of pupils for treatment of parasitic infection. The infestation of hookworm
141 was 5.3%, this could be due to the poor toilet facilities. The pupils were found defecating in their
142 backyard and around the school premises thereby littering the environment with faecal matters
143 which were likely to contains intestinal parasites including hookworm ova. The children most
144 often move bare footed in their environment exposing themselves to infect with infective
145 hookworm larva.

146 Generally this prevalence has been contributed by several authors, to improper hygiene, poor
147 sanitation and agricultural habits, physical and chemical composition of the soil and degree of
148 human exposure (Ugbomoiko, *et al.*, 2006). In this research, female pupils had the highest
149 prevalence of (97.8%) compare to their male counterpart with about (91.2%). There was no
150 significant difference observed in infection among the gender group ($P>0.05$). The risk of eating
151 soil (geophagy), licking of fingers and drinking well or stagnant water were significantly high
152 risks for *A. lumbricoides* and *T. trichiura* infection and hookworm which was only associated
153 with walking bare footed.

154 **CONCLUSION**

155 The findings from this research revealed that *Entamoeba histolytica*, *Ascaris lumbricoides*,
156 *Trichuris trichiura*, Hookworm were more common in Awe, Nasarawa State, Nigeria. This was
157 due to the poor state of hygiene and high rate of carriers among the school children.

158 **RECOMMENDATIONS**

- 159 1. Screening, deworming and improved sanitation by provision of modern toilet facilities,
160 2. Health education by enlightenment campaigns, school-based health programme would go
161 a long way in reducing infections.
162 3. Government and private hospitals should ensure modern diagnostic equipment's for
163 intensive and reliable test for diseases.

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