EDITORIAL

Schistosomiasis: The Aftermath of 2012 Floods in Delta State, Southern Nigeria

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ABSTRACT

Objectives: **Schistosomiasis which rank second only to malaria in terms of its socioeconomic and public health is a common major public health problems in Nigeria, especially Delta State with the dawn of the recent flooding in the coastal region. This research was therefore conducted to ascertain the status of schistosomiasis among in Internally Displaced Persons (IDPs) and a call for mass treatment in Delta State.**

Materials and Methods: **The study was conducted between November 2012 and January 2013. Questionnaires were administered to obtain demographic information from each respondent. A total of 1,184 children from flood relief camps between 5-13 years were recruited comprising 748 males and 436 females from whom stool samples were collected and examined using Kato-katz technique.**

Results: **Of the 1,184 stool samples examined, 65(5.49%) tested positive for intestinal schistosomiasis. Delta South District had the highest infection rate of 33(8.59%) followed by Delta Central and Delta North district with respective prevalence of 21(5.72%) and 11(4.40%) with no prevalence recorded for the control population (non-IDPs). With respect to gender, males were most infected than females with respective prevalence of 46(3.89%) and 19(1.60%). Correlation analysis showed that the pairing was significantly effective ($r = 0.99$, $r^2 = 0.039$; $p < 0.05$) between males and females. The highest prevalence was obtained in 8-10 years category in both sexes except in Delta South which had its prevalence peak at 5-7 years. The mean number of eggs per gram (epg) of intestinal schistosomiasis indicated that the intensity of infections was heavy compared to the control population which had no prevalence nor intensity for the infection. Significant associations were observed between infection and factors such as source of water, usage of toilet papers, and mother's level of education.**

Conclusion: **Water contact activities in the area favor the transmission of the infection. Therefore this study underscores the need to increase prevention strategies against intestinal schistosomiasis among the flood victims and its affected communities.**

KEY WORDS

prevalence status, schistosomiasis, flood, Delta State, Nigeria

INTRODUCTION

In Nigeria, flooding is the most common and prevalent natural hazard accounting for about one-third of all catastrophes arising from geophysical hazards and undesirably affecting more people than any other natural disaster (Adebayo and Oruonye, 2013). The 2012 floods in Delta State adversely affected more people in one year than the combined number of all the people affected by other natural hazards, including soil erosion (Hassan and Tokula, 2013). This dominance is not surprising since the overtopping of the natural boundaries of rivers together with the submergence of the low-lying coastal areas, especially along the Niger-Delta axis, has become a frequent occurrence (Abam, 1988). The recent flooding experienced in various quarters of Nigeria with its attendant environmental hazards and other calamities is believed to have been the result of excess water from the Lagdo Dam situated in the State of Cameroun, which were opened thereby letting out more water than usual into Nigeria. Flood disasters according to Obeta (2013) accounted for about 38% of all the federally declared natural disasters between 1995 and 2005 in Nigeria. In many parts of Nigeria, flooding continue to be an increasing problem, catching individuals and communities by surprise in a repeatedly exasperating way and causing disruption of social activities, damage of infrastructure, displacement of corpse in mortuaries and even death of livestock and people as a result of infection (Obeta, 2013 and Ito, 2014).

The occurrence of flooding in Delta State caused several deaths, totally submerged no fewer than 100 communities, 12 Local Government Area and the displacement of over 300, 000 inhabitants. The advent of the floods and its possible effects on the epidemiology of schistosomiasis requires elucidation. Schistosomiasis is infections

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Table 1. Prevalence of Intestinal Schistosomiasis among IDP's Children in Delta State

Intestinal schistosomiasis	Number infected	Percentage prevalence (%)
Control Population	-	0.00
Delta North District	11	4.40
Delta Central District	21	5.72
Delta South District	33	8.59
Total	65	5.49

Table 2. Gender Prevalence of Schistosomiasis among Flood Victims in Delta State Districts

District	Male (n = 748)		Female (n = 436)	
	Positive	% Prevalence	Positive	% Prevalence
Control population	-	0.00	-	0.00
Delta North District	8	3.20	3	1.20
Delta Central District	14	3.81	7	1.91
Delta South District	24	6.25	9	2.34
Total	46	3.89	19	1.60

Table 3. Age and Gender Prevalence of Schistosomiasis among Children in Delta State Districts

Districts	Age group	Male		Female	
		Number infected	% Prevalence	Number infected	% Prevalence
Non-IDPs	All ages	-	0.00	-	0.00
Delta North	5-7	2	1.83	-	-
	8-10	5	11.63	2	8.33
	11-13	1	7.14	1	11.11
Delta Central	5-7	3	2.48	1	1.41
	8-10	7	11.48	5	9.62
	11-13	4	10.81	1	3.85
Delta South	5-7	14	11.86	8	11.11
	8-10	8	9.64	1	2.08
	11-13	2	5.26	-	-

known to cause a lot of morbidity and socio-economic deprivation in the population living in the tropic, where poor sanitary condition and poverty provides optimal environmental condition for their development and transmission. Schistosomiasis is one of the most widespread of all human parasitic diseases, ranking second only to malaria in terms of its socioeconomic and public health importance in tropical and subtropical areas (Alebie *et al*., 2014). Schistosomiasis affects human host by slow damage of the host organs due to granuloma formation around the eggs in the tissues (Ligabaw *et al*., 2014). This leads to the development of fibrosis and chronic inflammation in the liver and causes severe damage including bleeding, renal failures, and cancer (Harrison, 2005). Schistosomiasis together with intestinal helminthiases are the major cause of abdominal pain, general malaise and weakness, and may impair physical and intellectual growth, increased metabolic rate, anorexia, chronic anaemia, and diarrhoea associated with heavy worms load (WHO, 2006; Houmsou *et al*., 2014; Elom *et al*., 2014; Singh and Muddasiru, 2014).

An estimated 779 million people are at risk, with 240 million infected cases and more than 200,000 deaths occurring each year due to schistosomiasis worldwide (WHO, 2012). In Africa, over 90% of disease burden is found in sub-Saharan Africa (WHO 2010). In this sub-continent, approximately 393 million people are at risk of infection from *Schistosoma mansoni*, of which 54 million are infected (Alebie *et al*., 2014). *S. mansoni*, the causative agent of intestinal schistosomiasis is an important human parasite with disseminated infections being potentially fatal (Agbolade *et al*., 2004 and Vadlamudi *et al*., 2006). Humans are infected through ingestion of infective eggs or larvae in contaminated foods, on hands, in water, and by penetration of the skin by infective larvae of this parasite in the soil and water (Montressor, *et al*., 2002).

Schistosomiasis being a tropical disease is a common major public health problems in Nigeria especially Delta State with the dawn of the recent flooding in the coastal region. The floods resulted to displacement of human in the affected communities. This resulted to overcrowding in non-flood area and relief camps, indiscriminate defecation, lack of suitable water supply, poor sanitation and distribution of larvae from one host to another. This research was therefore conducted to ascertain the status of schistosomiasis among in IDPs and a call for treatment in Delta State.

The epidemiological indices of schistosomiasis in the flooded communities and camps need to be studied to identify scale of the problems and prevalence of infections and control measures for each endemic area (Nmorsi *et al*., 2005; Anto *et al*., 2014; Sang *et al*., 2014; Hailu and Yimer, 2014; Senghor *et al*., 2014; Okwori *et al*., 2014). Specifically, this research was conducted to (i) assess the prevalence and intensity of schistosomiasis among children from selected Internally Displaced Persons (IDPs) flood camps in the three districts in Delta State and (ii) investigate the relationship of schistosomiasis among various age group and gender.

MATERIALS AND METHODS

Description of Study Area

This study was conducted in among flood relief camps across in Delta State, situated between Longitude 5°00 and 6°.45' East and Latitude 5°00 and 6°.30' North with a population of 4, 098, 291 and estimated landmass area of 18,050 Km^2 inter-lace with rivulets and streams, which form part of the Niger-Delta. It is bounded in the North, East, South-East and on the Southern flank by Edo, Anambra, Bayelsa State and Bight of Benin respectively.

The state has a tropical climate, rainforest vegetation and a characteristic mangrove in Delta South and Delta North District with the southern and western parts being subjected to seasonal flooding. Geographically, the climate of this area is characterized by two different seasons; the rainy and the wet seasons. The rainy season occur between the months of April and October with a break in August popularly known as the "August break" and an annual rainfall of between 2,032 mm-3,540 mm, while the dry season occurs between the month of November and March with short period of cold drought in late December and early January.

Table 4. Age Related Prevalence/Intensity of Worm Infection among Subjects Examined in Delta State

	Intensity of Schistosomiasis					Overall Prevalence	
Districts	Age groups	Positive case	Total No. of infection	Mean arithmetic Epg	Intensity class	No. Examined	% prevalence
Non-IDPs	All ages	0	0	0.00	None	183	0.00
Delta North	5-7	2	192	96.00	Heavy	160	1.25
	8-10	7	384	54.86	(672 epg)	67	10.45
	11-13	2	96	48.00		23	8.70
Delta Central	5-7	4	168	42.00	Heavy	192	2.08
	8-10	12	408	34.00	(720 epg)	113	10.61
	11-13	5	144	28.80		63	7.94
Delta South	5-7	22	312	14.18	Heavy (888 epg)	190	11.58
	8-10	9	384	42.67		131	6.87
	11-13	2	192	96.00		63	3.17

Table 5. Epidemiological Factors Associated with Prevalence of Schistosomiasis in Delta State

Epidemiological Factors	Non-IDPs infection rate (%)	Delta North Infection rate (%)	Delta Central Infection rate (%)	Delta South Infection rate (%)
Toilet type				
Water closet	0(0.00)	0(0.00)	4(4.76)	0.0(0.0)
Pit latrines	0(0.00)	1(1.12)	7(5.43)	9(7.38)
Nearby bush	0(0.00)	10(6.81)	10(6.49)	124(4.04
Usage of Toilet paper				
Always	0(0.00)	1(0.74)	2(1.10)	6(3.51)
Sometimes	0(0.00)	1(1.64)	5(4.72)	11(7.91)
Never	0(0.00)	9(16.98)	14(17.50)	16(21.62)
Washing of anal with hands after defecation				
Yes	0(0.00)	3(1.64)	9(3.98)	2(0.84)
No	0(0.00)	9(13.43)	12(8.51)	31(21.09)
Washing of hand with soap after defecation				
Always	0(0.00)	0(0.00)	62(1.04)	3(1.68)
Sometimes	0(0.00)	4(5.97)	41(6.86)	11(9.40)
Never	0(0.00)	7(16.67)	37(16.67)	19(21.59)
Sources of water supply				
Tap water	0(0.00)	1(0.73)	0(0.00)	0(0.0)
Well water	0(0.00)	3(4.35)	17(16.50)	2(1.77)
Stream water	0(0.00)	7(15.91)	4(5.33)	31(37.35)
Mother's level education				
None	0(0.00)	8(12.90)	13(12.87)	17(12.98)
Primary	0(0.00)	3(3.16)	6(4.72)	9(8.41)
Secondary	0(0.00)	0(0.00)	2(2.04)	4(4.49)
Tertiary	0(0.00)	0(0.00)	0(0.0)	3(5.26)

Survey Methodology

Faecal samples were obtained from children of flood Internally Displaced Person (IDPs) randomly selected from flood relief camps and a control population not affected by flood to determine the impact flood on the prevalence of schistosomiasis using Kato-katz laboratory technique. Microscopic examination of a fixed quantity of faecal material was carried out to determine the number of eggs in a semi-quantitative diagnosis. The sampling design was the same in terms of age-stratification for both prevalence and intensity.

Sample size

This study was conducted among 1184 flood victim children between 5-13 years of age randomly selected from the flood camps. 183, 250, 367 and 384 faecal samples collected were collected from control population (non-IDP), Delta North, Delta Central and Delta South districts respectively.

Collection of samples

The stool samples from the selected children were collected in wide cellophane envelops and universal plastic containers with screw caps and a wooden spatula. The children were given a brief orientation on how to deposit the faecal sample into the containers which they were asked to return the following morning before 8.00 am. The selected children were each given a clean, dry container appropriately marked and well coded into which the faecal samples were deposited by the children. A day later, the specimen were collected and transported to Animal and Environmental Biology laboratory for examination of *Schistosoma* ova and cyst using the quantitative Kato-katz techniques. The samples were collected between November 2012 and January 2013, and WHO recommended questionnaire was modified and tested on the subjects.

Data handling and Analysis

Graph Pad prism version 5 statistical software was used in analyzing the data obtained. The significance of association between variables was tested using Analysis of variance (ANOVA), Chi-square (x^2), Bonferroni multiple comparisons test where appropriate for comparison of proportions while student t-tests where appropriate was used for comparison of mean in the analysis of prevalence and intensity of schistosomiasis. Significance level of each test was set at 0.05 and Correlation coefficient was calculated in order to determine possible relationships between infection patterns, prevalence and intensity of infection as indicated by (Nmorsi *et al.*, 2005).

RESULTS

This study was conducted among one thousand one-hundred and eighty-four (1,184) children between 5-13 years old. Of the 1,184 stool samples examined, 65 (5.49%) were infected with intestinal schistosomiasis (Table 1). Generally, males were more infected than females and this was statistically significant only among flood victims children in Delta South District ($p < 0.05$). With respect to district population sampled, the overall prevalence of intestinal schistosomiasis in this study is given in Table 1. Delta South District had the highest overall infection rate of 33(8.59%) of all districts samples followed by Delta Central and Delta North district with a prevalence of 21(5.72%) and 11(4.40%) respectively. Although the control population which was not affected by flood had no prevalence 0(0.0%).

The overall prevalence of intestinal schistosomiasis with respect to gender, showed a higher prevalence of 46(3.89%) in male than in female 19(1.60%) as recorded in Table 2. Pearson correlation analysis shows that the pairing was significantly effective (r = 0.99, r^2 = 0.039; $p < 0.05$) between males and females. However, there is no statistical significant difference ($p > 0.05$) between male and female infection in Delta North and Delta Central but significantly different ($p < 0.05$) in Delta South irrespective of age. Pearson correlation further revealed that there is a significant ($p < 0.05$) association between males and females infected in Delta South (P = 0.007, r = 0.99, t = 3.83) thereby accounting for 73.56% of the total variance observed in this study. Table 2 further revealed that among the males, Delta south district had the highest prevalence of 6.25% leaving Delta north with a prevalence of 3.20%. The highest prevalence of 2.34% was also recorded in the female population sampled while the least infection rate of 3(1.20%) was obtained in Delta North.

Table 3 showed that the highest prevalence was obtained in 8-10 years category in both males and females except in Delta South which had its prevalence peak at 5-7 years in both sexes. The least overall prevalence value of 1.60% with respect to gender was recorded among the female folks leaving the male with the highest prevalence of 3.89%. Delta north had no prevalence record for 5-7 years in the female gender and the highest prevalence of 11.63% was obtained from 8-10 year in the male sampled whereas the female had its prevalence peak of 11.11% at 11-13 years. Table 3 also revealed that Delta North had the least prevalence of schistosomiasis. Table 3 further revealed that there was infection in in both sexes in Delta Central. In Delta North district, males between the ages of 8-10 had its prevalence peak at 11.48% while the female counterpart recorded 9.62% for the same age group. Statistical analysis based on gender and age showed that schistosomiasis did not vary significantly ($p > 0.05$) with age of children in Delta North. But Paired t-test analysis revealed that there was significance difference ($p < 0.05$) between age and sex, hence, infection rate is significantly (t = 4.26, P = 0.0014) affected by age and sex in Delta Central and South.

The mean egg counts indicated a high level of aggregation for intestinal schistosomiasis (Table 4). Most infected individuals excreted few eggs while a small proportion was excreting massive numbers of eggs in all Districts. The mean egg count among flood victims for all infected subjects across the age groups did not followed the prevalence pattern as observed in the populations examined except that there was a significant egg load within 8-10 years age groups with an egg load of 384, 408 and 384 for Delta North, Central and Delta south respectively. Host age and location of districts significantly (t = 6.93, P = < 0.0001) influence parasite prevalence and had no effect on the intensity of infection. Based on intensity of worm infection, age 11-13 had the least infection in Delta Central district (Table 4).

The age/intensity of schistosomiasis in Delta South were also typical in shape with sharp peaks of egg count in 8-10 years old age group (Table 4). The table shows the arithmetic mean of epg scores for each age class in the population. The intensity range of schistosomiasis in Delta north was between 96-384 epg producing a total number of infections of 672 eggs per gram of faeces, placing this district on a heavy intensity threshold class. This was closely followed by delta central with intensity range of 144 - 408 with a total of 720epg ranking this district second in the intensity trend while Delta South epg ranged from 192 - 384 egg/g with a cumulative epg of 888 ranking delta south as the most infected population in this study. The mean number of eggs per gram (epg) of schistosomiasis in faeces indicated that the intensity of infections was heavy compared to the control population which had no prevalence nor intensity for the infection (Table 4). There was significant difference ($p < 0.0001$, t = 6.49,) in Delta North but no significant difference (($p > 0.05$, t = 2.07) in Delta- Central and South with respect to age.

The preceding analysis of data in Delta district describes the patterns of schistosomiasis at the level of the individual. In this section, an analysis of patterns of infection at the household level is evaluated. The standard of living data were used to investigate associations between epidemiological features and level of parasitism. Only features which varied between households were analysed. The socio-demographic factors which favor the transmission of helminthiasis are presented in Table 5. Schistosomiasis in Delta north exhibited a prevalence of 1.12% and 6.81% among subjects who made use of pit latrine and nearby bush respectively (Table 5). There was no prevalence record (0.00%) for respondents who used water closet while prevalence of 4.76%, 5.43% and 6.49% was recorded for in Delta central district among subjects who tested positive for the infection. Evaluation of the risk factors associated with schistosomiasis showed that there was no significant difference ($p > 0.05$) among children who made use of water closet toilet facility but there was significant difference ($p < 0.05$) in infected subjects who defecated in pit latrine. Further analysis of the risk factors showed that Delta South district had the highest prevalence (21.62%) among subjects who never use toilet paper followed by Delta Central with a peak prevalence of 17.50% while the least prevalence based on usage of toilet paper was obtain from subjects who always use toilet paper after defecation with respective prevalence of 0.74% (Delta North), 1.10% (Delta Central) and 3.51% (Delta South) as shown in Table 5. Usage of toiletries in accounts for 60.11% of the total variance (F = 15.77, P-value = 0.0041) which indicates that there is a 0.41% chance of randomly observing an effect on usage of toilet paper in the prevalence of intestinal schistosomiasis in Delta South district and this effect is considered very significant ($p < 0.05$) in the prevalence of the infection.

Based on anal washing with hand, majority of the respondents who do not wash their anal after defecation had the highest prevalence placing Delta South (21.09%) as the most infected followed by Delta North with a prevalence of 13.43% and Delta central (8.51%) as the least infected district. While only a small percentage of them who used water had the least prevalence as shown in Table 5. They claim that the inaccessibility to water made them resorted to use of nearby leaves especially during farming time. Chi-square statistical analysis showed that there is no statistically significant ($p > 0.05$) difference between subjects who admitted washing and not washing of hands after defecation for helminths infections (X^2 = 9.46, P-value = 0.024). Pearson correlation (r) with respect to washing of anal with hands after defecation also showed that the pairing was not significantly effective (r = 0.95, r^2 = 0.90, P = 0.052, 95% CI = -0.14 and 0.99).

Table 5 revealed that respondents who never wash their hands after defecation had the highest prevalence: 16.67%, 16.67% and 21.59% for Delta North, Central and South District respectively. Assessing respondents' attitude towards water drinking practices, indicated that those who relied mostly on tap water accounted for the least prevalence of 0.0%, 0.0% and 0.73% for Delta South, Delta Central and Delta North respectively. Sources of water accounted for 56.30% of the total variance which was statistically significant difference (F = 17.76, p = 0.0030) and suggest that there is 0.3% chance of observing an effect of sources of water on the prevalence of schistosomiaisis (F = 7.19, P = 0.021) and this effect is considered very significant ($p < 0.05$). Bonferroni multiple comparisons test showed significant difference ($p<0.05$) for Tap water vs Stream water and Well water vs Stream water but not Tap water vs Well water ($p > 0.05$).

In light of mother's level of education, Table 5 also revealed that children, whose mother had no educational qualification, had the highest prevalence for schistosomiasis. ANOVA revealed that there was significant difference in mother's level of education which accounted for 26.96% of the total variance (F = 5.66, p = 0.019). This therefore means there is 1.9% chance of randomly observing an effect of mothers educational level in the prevalence of schistosomiasis in Delta South district and this effect is considered very significant ($p < 0.05$). Knowledge and earlier health education on schistosomiasis from mother to children apparently had strong statistical ($p < 0.05$) impact on children infected with schistosomiasis but not significant for children whose mother had primary education. The risk factors associated with intestinal schistosomiasis in Delta State are very severe, hence, the high prevalence values obtained compared to the control population which was not affected by flood as shown in Table 5.

DISCUSSION

Prevalence of intestinal schistosomiasis among children continues to be a major public health concern in tropical countries especially in Nigeria. It is clear from the prevalence of 65(5.49%) that Delta State is endemic for intestinal schisotomiasis and it falls within the WHO classification of schistosomiasis endemic area (WHO, 2002). This present study is in accordance with other studies conducted in Nigeria which has shown the endemicity of intestinal schistosomiasis (Uneke *et al*, 2007; Elom, *et al*., 2014; Singh and Muddasiru, 2014; Auta, *et al*., 2014). The main factors that might be associated with the endemicity of intestinal schistosomiasis in the areas area are literacy, presence of infested flood water around houses, fetching of water for domestic purposes, washing of hands.

The prevalence rate in the present study is higher than various reports across Nigeria, 2.93% in Sokoto State, Nigeria, (Singh and Muddasiru, 2014) and 1.8% in Gwagwada, Nigeria (Auta *et al*., 2014). Contrarily, the result obtained in this study is lower than the reports of Alhassan, *et al*., (2013), Hailu and Yimer (2014) and Sang *et al*. (2014) who recorded 20.30% in Kaduna State, Nigeria, 7.3% in Northwest Ethiopia and 13.0% in south Nyanza, western Kenya respectively. Okwori *et al*., (2014) also reported higher prevalence of 44.30% in Gadabuke District, Toto LGA, North Central Nigeria. The prevalence recorded in this study is higher than findings of Ojurongbe *et al*., (2014) and Singh and Muddasiru, (2014) who reported a prevalence of 0.6% and 2.93% respectively. The prevalence of 0.0% 4.40%, 5.72% and 8.59% of intestinal schistosomiasis in Control population, Delta North, Delta Central and Delta South respectively may be attributed to water contact activities in the area as observed elsewhere (Agi and Okafor, 2005; Pukuma and Musa, 2007). Few studies have dealt with intestinal schistosomiasis among pre-school children and this is because researchers assume that at that period, children have less contact with water bodies or are still under the custody of their parents, hence preventing them from infection. The low prevalence observed in this study among flood victims children might be because children at this level were given more care and the few ones not infected were monitored and restricted from contact with flood water like their counterpart in the control population who were not affected by floods.

The lower prevalence rate of 1.60% among the females when compared to the males 4.89% can be attributed to higher tendencies of water contact among the males through playing and commitment in other activities like the building of water barriers besides the primary domestic activities of washing and fetching water which expose both sexes to infection. This high prevalence in males than in females may also be connected with the socio-cultural setup of the people of the study area. Majority of the females are restricted to their houses therefore they have less contact with infested water compared to their male counterparts. Swimming and bathing in the open water bodies is also very uncommon among females in community. The findings of the present study corroborates with those reported earlier by Ekejindu *et al*., (2002); Bello *et al*., (2003); Odaibo *et al*. (2004); Agi and Okafor, (2005); Pukuma and Musa, (2007); Sulyman *et al*., (2009) Who found higher prevalence in males than females in Lagos and Ondo States respectively.

The age related prevalence of intestinal schistosomiasis showed that children aged 8-10 years had the highest prevalence. These children fall within play age and in the flood affected communities, this is the population most commonly found in prolonged water contact behavior like playing, in flood water which are likely infested with infected snails. Other age groups of 10-13 years had lower infection rate. This is because they were actively involved in such water contact behavior as well as helping their parents in safeguarding properties from flood spoilage. The high prevalence of intestinal schistosomiasis observed during the flood season in this study is similar to reports of Sarkinfida *et al*. (2009) during rainy season in Danjarima community in Kano State.

The study population also depend on wells, rivers/streams, and boreholes for their water needs such as drinking, bathing and other domestic uses. This also accounted for the high prevalence recorded in the study. The flood water might be the main transmission foci in the affected districts and are distributed within the area. They provide a natural water sources and also serve as meeting point for the schistosome parasites (Singh and Muddasiru, 2014). These facilitated the continuous infection and re-infection of the people since no intervention strategy was available. However, the fluctuations in the prevalence of intestinal schistosomiasis could be attributed to the fact that children who lived in Delta central depend on well and stream water for their daily domestic use from where they got infected with intestinal schistosomiasis.

Mothers' educational background of the children did not significantly affect the prevalence of intestinal schistosomiasis, though children whose parents had no formal and primary education had the highest prevalence of infection. This could be due to lack of proper knowledge of the disease which leads to inability to properly educate their children/wards about the preventive measures against the disease. The fact that educational backwardness has a great impact on the distribution of schistosomiasis in rural communities has been reported in Cross River State of Nigeria (Etim, 1995).

CONCLUSION

The results obtained in this study showed that the Delta State is endemic for intestinal schistosomiasis. Health education on mode of infection and large-scale administration of chemotherapy for all children to reduce the prevalence and intensity of infection would be highly appreciated especially in flood affected communities. This study underscores the need to increase prevention strategies against intestinal schistosomiasis among the flood victims. All the villages of the Delta State districts need access to piped water to reduce contact with infected waters or re-infection.

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