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Research Article

Prevalence and Perception of Pupils towards Urinary Schistosomiasis in Ikwo Community of Ebonyi

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Received: February 28, 2023; **Published:** April 21, 2023

Abstract

This study was a cross-sectional based study carried out with a structured questionnaire administered to 270 primary schools pupils from four primary schools in four communities. Urine microscopy was carried out using sedimentation method. Prevalence of urinary schistosomiasis was determined by considering number of positive urine samples collected and intensity were calculated using geometric mean intensity (GMI) and observing the egg count/10 ml of urine. The findings revealed that out of the 270 pupils examined, 153 (56.7%) were males and 117 (43.3%) were females. An overall prevalence rate of 23 (8.5%) was obtained. Severe infection of *S. haematobium* ova was higher for the male pupils (60 ova/10 ml) compared to female (40 ova/10 ml). Data was analyzed using (SPSS version 20) Prevalence of urinary schistosomiasis infection was higher for male pupils 14 (9.2%) compared to their counterpart female pupils 9 (7.7%) (χ^2 = 0.181, p-value = 0.671.). There was no significant difference in the infection, $p < 0.05$ Pupils of age group 9-12 were found to have high prevalence of 13 (11.93%) compared to other pupils in other age groups, χ^2 = 3.248, p-value = 0.197. Prevalence and intensity of the infection was relatively higher in Community Primary School Enyibichiri (17.8%) χ^2 = 0.181, p-value = 0.671. The level of awareness and knowledge of infection amongst school pupils was average. Some practices like drinking of infested freshwater, defecating, urinating, swimming, washing and bathing in canals are still being practiced. There is need for stringent laws to curtail these practices.

Keywords: *Knowledge; Attitude; Schistosomiasis; Schistosoma haematobium; Cercariae*

Introduction

Schistosomiasis, a trematode infection has been of public health importance in African continent. According to [1], despite numerous programs targeted at combating the global disease spread, prevalence rates of infection still remains high. In Sub Saharan Africa, over 85% of people are living with Schistosomiasis. The presence of the snail intermediate hosts of *Schistosoma* species in most of the water bodies, irrigated farms and rice paddies makes the re-infestation of the disease possible [2]. According to [3], many species of schistosomes are prevalent in Africa, these species are *Schistosoma intercalatum, Schistosoma mekongi*, *Schistosoma japonicum*, *Schistosoma guineensis*, *Schistosoma haematobium* and *Schistosoma mansoni*. The report of [4] specified *S. haematobium* and *S. mansoni* as

the primary cause of urogenital and intestinal schistosomiasis. According to the findings of [5] infection is usually found among the poor in African continent. According to [6], the disease is preventable and treatable but lack of treatment had led to debilitating and irreversible clinical complications such as liver and spleen enlargement, bladder ulceration, deformities, infertility and kidney blockage. [7] in his findings explained that children and women who are continually exposed to water bodies due to their daily activities are at greater risk of being infected. Previous reports by other researchers has shown that prevention in women and children, will drastically reduce the burden of schistosomiasis [8]. The high prevalent rates of infection recorded in African continent was attributed unsafe practices such as poor sanitation, lack of knowledge, negative attitudes and beliefs about schistosomiasis. Illiteracy among the populace has been found to be an additional factor to infection [9]. [10] in his work recommends the inclusion of pre-school ages into health education campaigns to avoid re-emergence of infection. According to [11] school children remains the best target for schistosomiasis intervention programmes. [12], explained that having comprehensive knowledge of attitude and practices on parasitic infections, will help in its effective preventive and control measures. However, this is influenced according to community settings and programs implemented. According to [13], Knowledge, attitude, and practice (KAP) surveys are used to represent a population's idea, believe towards a particular situation, challenge or disease and its always used by researchers as a study tool. According to the report of [14], knowledge is usually employed to see how far a population's knowledge corresponds with the situation or health challenge on ground. According to [15], attitude was defined as "a learned predisposition to think, feel and act in a particular way towards a given object or class of objects". Attitude is all about beliefs, feelings, and values. Practices is about the type of measures taken by people to curb an outbreak or infection [16]. World Health Assembly adopted resolutions for the elimination of schistosomiasis through the use of integrated control strategies [6]. These resolutions align with the Supply–Enabling Environment–Demand (SEED) programming model [17]. It states that disease elimination is achievable through contact tracing, provision of apt treatment, case management, and promotion of positive health seeking behaviour, improved knowledge, attitudes and practices for sustainability of control efforts. [18] reported that the Supply–Enabling Environment–Demand (SEED) programming model stems has been used in many control programmes and countries. Over the past decade, there has been many findings reporting of high prevalence of urinary schistosomiasis in Ebonyi State [19-21,28]. Not much report has been shown on the knowledge, attitude and practices of the populace towards the infection that causes re-emergence of infection. Today, in Ebonyi State, the issue of individual and public beliefs, perceptions and general knowledge of schistosomiasis continues to play an important role in influencing the effectiveness of the disease control strategies including preventive health programmes. Therefore, the need to evaluate the prevalence and knowledge, attitude and practice of primary school children on urinary Schistosomiasis in the Ikwo L.G.A. will enhance the control and preventive measures against the disease. Therefore, this study investigated the knowledge, attitude and practices of school children towards urinary schistosomiasis in Ikwo local government area of Ebonyi State, Nigeria. We determined the prevalence of urinary schistosomiasis among school children, the intensity of infection among primary school children. We evaluated the school children's knowledge of urinary schistosomiasis and also assessed the attitude of school children towards urinary schistosomiasis.

Materials and Methods

Study area

This study was conducted in Ikwo local government area. It is situated on the eastern part of Ebonyi State (Figure 1). The city and local government area has a land mass of approximately 500 square kilometers and shares a border with Abakaliki, Izzi and Ezza Local Government Areas as well as Cross River State. The area consists of seasonal streams and ponds in which a larger portion of the population depends for water. Rainfall is seasonal; it runs between the months of May to September and measures about 200cm to 250cm, while the dry season is from October to April. A daily temperature of 30°C is recorded. The inhabitants of the area are mainly farmers while others engage in petty trading, civil service work, fishing and palm wine tapping. Due to the swampy nature of the grassland majority of the farmers engage in the cultivation of rice. Other crops cultivated are yam, cassava, groundnut [22]. The coordinates of Ikwo is 6.0693° N, 8.1994° E longitude and latitude [22]. The natural streams and ponds serve the inhabitants throughout the year and due to the drastic

reduction in volume of these water bodies during the dry season, people inevitably wade into them to bath, fetch water for drinking and other domestic uses [22].

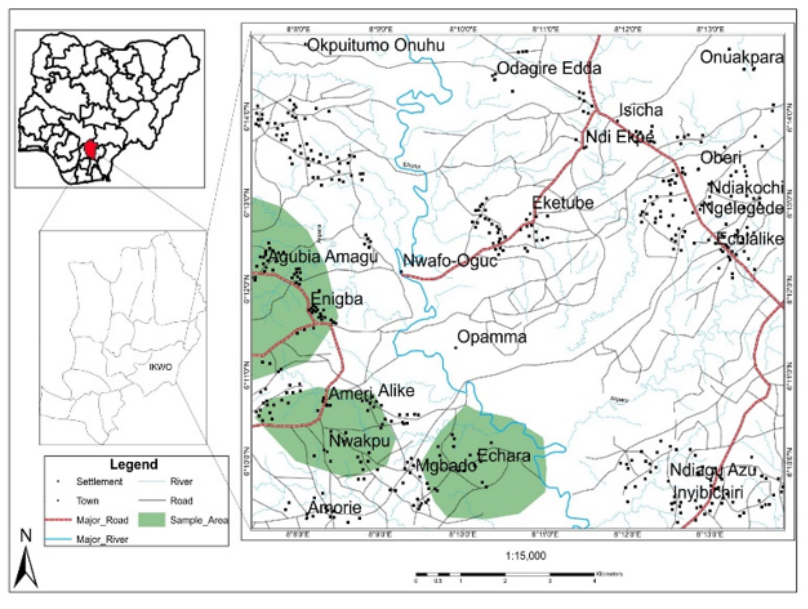

Figure 1: *Map of Ikwo local government area.*

Study design

This was a cross-sectional and structured questionnaire based study that assessed knowledge, attitude, and practice on urinary schistosomiasis among primary school children in selected schools in the study area. The study involved 4 schools selected on purpose due to their closeness to streams and ponds each from the 4 different communities while the school children was selected based their consent. The study was carried out over a period of 6months (January-June 2019). After obtaining administrative and ethical clearances from Ministry of Health Ebonyi State, visits were made to the village authorities to explain the procedures and benefits of the study, as well as plan dates for visits to school. 270 pupils were randomly selected for this study through their consent. During the school survey, the study was explained to the pupils. Unique study numbers were been assigned to the pupils and to each class rooms. We used the structured questionnaire to collect data on socio-demographic, environmental and clinical variables of the pupils.

Study population

The study population comprised of primary school children aged 5 - 16 years attending pre-grade one to grade six in primary schools in four (4) communities of Ikwo Local Government Area. A total of 270 pupils were involved in this study, of which 50 were selected from each primary school. School children aged between 5 and 16 years, who gave consent to participate in the study and whose parents/guardians provided a written informed consent were eligible for the study. Schoolchildren with history of being clinically ill, and also had used anti-schistosome drugs within a period of six months before the study, were not involved in this study [23].

Sample size determination

The sample size was calculated using the formula: $N = [Z^2 (pq)] \div d^2$

Z = Normal standard distribution that corresponds to 95.0% confidence interval as 1.96.

p = Prevalence of Schistosomiasis (20%) = 0.20

q = 1-p (1-0.20) = 0.8

d = degree of accuracy/precision expected as 0.05.

Using $n = \frac{z^2 \times p\ (1-p)}{e^2}$

Were z = 1.96; p = 0.20%; e = 5% = 0.05

Hence $n = \frac{(1.96)^2 \times 0.20 \times (1-0.20)}{0.05^2}$

$n = \frac{n = 3.8416 \times 0.20 \times 0.8}{0.0025}$

n = 245.5

The sample size was 245.5 then increased by 10 percent to take care of attrition rate, the sample size was then 270 school children.

Ethical considerations

Permission to carry out this research work was obtained from the ethical review Committee of the Ministry of Health, Abakaliki, Ebonyi State with the reference number: EBS/MOH/ERC/V.53/032.

Data collection

Questionnaire was used to gather information on demographic characteristics of the study participants and their KAPs towards schistosomiasis infection. The participants were grouped Variables such as age, sex, socio-economic activities of parents/guardians, sanitary practices, water contact behavior were assessed. Also, the questionnaire involved questions concerning the knowledge about schistosomiasis, etiology, transmission, clinical manifestations, prevention, and control.

Data analysis

The collected data were entered into excel 2013. Data analysis was done using SPSS Version 20.0. Descriptive statistics, including percentages and mean values, were used to summarize the data. The chi-square test was used to assess the association between categorical variables. *P*-values less than 0.05 were considered statistically significant.

Collection of urine samples

Sterile mid-stream specimens of urine (MSSU) were collected in 20 ml specimen bottles and within 24 hours of the collected MSSU, the samples collected were been posted to the Alex Ekwueme Federal University Ndufu-Alike Biology laboratory for analysis using sedimentation method [24].

Sample analysis

Ten milliliters of each of the well-mixed urine samples was poured into a quantitative centrifuge tubes used specifically for counting cells or parasites in urine and the samples were centrifuged at 3,000revolution per minute (rpm) for 5minutes. The supernatant was

discarded, but about 0.6ml of residual urine was retained at the bottom of tube. The residual was poured on a glass slide and covered with cover slip. It was then viewed under microscope at 40x and 10x magnification [25]. The number of eggs present in any 10-ml of urine sample were recorded. Any sample that contained less than 50 ova/10 ml were considered as an indication of a mild infection and anyone above 50 eggs/10 ml was considered an indication of severe infection.

Results

Overall prevalence of urinary schistosomiasis in Ikwo

A total of 23 (8.5%) children were found positive for urinary schistosomiasis infection in all the 4 primary schools out of the 270 examined (Table 1).

Specimen	Positive No. of cases	Prevalence%	Total No. Examined
Urine	23	8.5%	270

Table 1: *Prevalence of urinary schistosomiasis.*

From (Table 2), A total of 9 (7.7%) of the female children were found infected with urinary schistosomiasis. A higher prevalence of 14 (9.2%) was recorded in males children.

Sex	No. Infected	Prevalence%	Total No. Examined
Male	14	9.2	153 (56.7%)
Female	9	7.7	117 (43.3%)
Total	23	8.5	270 (100%)

Table 2: *The prevalence of urinary schistosomiasis in each sex of the study population.*

$X^2 = 0.181$, *p-value = 0.671.*

Prevalence of infection among age groups

Table 3 shows the distribution of urinary schistosomiasis infection in different age groups. The higher infestation 13 (11.93%) in school children was observed among age group (9 - 12 years). The age group 13-16 years comes next 6 (7.9%). The age group 5 - 8 years 4 (4.7%) had the least infection rate. This difference of age group as factor was statistically not significant $\chi^2 = 3.248$ p-value = 0.197.

Age group	No. Infected	Prevalence%	Total No. Examined
5 - 8 years	4	4.71%	85 (31.5%)
9 - 12 years	13	11.93%	109 (40.4%)
13 - 16 years	6	7.90%	76 (28.1%)
Total	23	8.52%	270 (100%)
$\chi^2 = 3.248$ p-value = 0.197			

Table 3: *Prevalence of urinary schistosomiasis infection in different age group among the pupils.*

This report in figure 2 showed prevalence of urinary schistosomiasis among examined schools. The result of the infection among the primary schools in Ikwo area revealed that, Community Primary School (C. P. S.) Enyibichiri community had high prevalence rate

of 17.8% followed by Urban Primary School (11.70%). There were no infection from the other two schools. There was no significant difference in infestation $\chi^2 = 0.181$, p-value = 0.671.

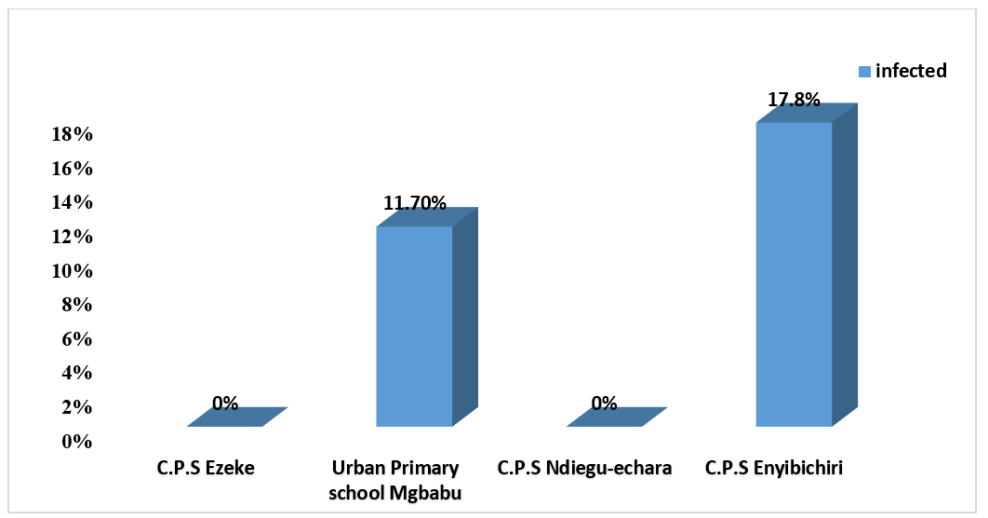

Figure 2: *Prevalence of urinary schistosomiasis among school children in Ikwo.*

Intensity of infection

Intensity was reported as the number of ova/10ml of urine and was categorized as moderate (< 50 ova/10ml of urine) and severe (> 50 ova/10 ml of urine). Table 4 reported that males had the highest mean intensity of *S. haematobium* than their female counterparts in Community Primary School Enyibichiri in Alike Community. Among the 10 infected pupils none had egg counts below 50. However, the intensity of S. *haematobium* was moderate for both males and females in Urban Primary School Mgbabu.

Schools	Sex	No. infected	Egg count/10 ml of Urine	Mean Intensity/10 ml Urine
C.P.S Enyibichiri	Males	10	57, 60, 59, 52, 63, 59, 61, 58, 59, 69	60.0
	Females	6	56, 59, 60, 67	40.3
Urban primary school	Males	4	46, 38, 57, 49	48.0
	Females	3	27, 23, 46	32.0

Table 4: *Intensity of infection among children.*

Demographic and socio-economic characteristics of the pupils in all the sampled schools

Out of 270 pupils who received questionnaire only 93 were returned. Among the respondents, were these age group composition 5 - 8 years was 12 (12.9%); 26 (28.0%) for 9 - 12 years and 55 (59.0%) for 13 - 16years. Among the sex, the males 53 (57%) got higher response than the females 40 (43%). 59 (63.4%) had educated parents, 42 (45.2%) came from low income families, 41 (44.1%) were

children of farmers and business parents, 40 (43%) of the children make use of manual borehole, 67 (72%) use latrine, 33 (35.5%) had history schistosomiasis, 44 (47.3%) of the children swim and bath in canal, 16 (17.2%) of the children defecate and urinate indiscriminately in streams and canals, 45 (48.4%) of the children fetch water from streams and canals, 20 (21.5%) drink water from streams and canals, 15 (16.1%) children get treatment from the doctors, 17 (18.3%) got treatment from traditional healers. For signs and symptoms, 36 (38.7%) of the children experience haematuria, 39 (41.9%) have no idea. For transmission, 26 (28%) of the children knew you can get from swimming and bathing in contaminated water, 44 (47.3%) of the children had no knowledge of transmission. 41 (44.1%) of the children avoid bathing and wading in streams and canals, 17 (18.3%) had no knowledge of prevention, 51 (54.8%) of the children knew schistosomiasis cause complications while 42 (45.2%) had no knowledge of the complications. 57 (61.3%) of the children knew they can protect themselves from schistosomiasis while 36 (38.7%) had no idea.

Variables	Number	Percentage
Age-group		
5 - 8 years	12	12.9
9 - 12 years	26	28.0
13 - 16 years	55	59.0
Gender		
Male	53	57.0
Female	40	43.0
Socio-economic status		
Educated parents (at least primary school)	59	63.4
Low family income (< 12000)	42	45.2
Farmer and business father	41	44.1
Water pipes supply	40	43.0
Latrine in the house	67	72.0
History of Schistosomiasis	33	35.5
Signs and symptom		
Haematuria	36	38.7
Fever	1	1.1
Pain	10	10.8
Not known	39	41.9
Transmission		
Swimming and bathing in polluted water	26	28.0
Wading in polluted water	14	15.1
Drinking polluted water	16	17.2
Not known	44	47.3

Prevention		
Avoid bathing and wading in canals	41	44.1
Avoid urination in or nearby canals	13	14.0
Treating patients with anti schistosomes drug	9	10.0
Controlling snails	19	20.4
Not known	17	18.3
Does Schistosomiasis cause complication		
Yes	51	54.8
No	42	45.2
Is it possible to protect ourselves from Schistosomiasis		
Yes	57	61.3
No	36	38.7

Table 5: *Demographic and socio-economic characteristics of the pupils in all the communities (n = 93).*

Discussion

This present study is the first to provide information about the knowledge, attitude and practices (KAP) concerning urinary schistosomiasis in school children in Ikwo L.G.A of Ebonyi State. Despite the control strategies put in place by the government for the eradication of the disease, urinary schistosomiasis is still prevalent among school children in the rural communities and this corresponds with the work of Sady., *et al*. [26].

This study revealed that the prevalence of urinary Schistosomiasis is relatively low in Ikwo Local Government Area. Out of the 270 pupils examined, 23 (8.5%) were been found infected. Males had more prevalence 14 (9.2%) than the female ones 9 (7.7%). This is totally in agreement with the study that was reported by Ndyomugenyi (1992).

It was observed that the highest prevalence of urinary Schistosomiasis was seen across age-group 9 - 12 years. This aligns with findings of Anosike., *et al*. [27].

Intensity of infection for urinary schistosomiasis in Ikwo local government area

Intensity was reported as the number of ova/10 ml of urine and was categorized as moderate (< 50 ova/10 ml of urine) and severe (> 50 ova/10 ml of urine). Males had the highest mean intensity of *S*. *haematobium* than their female counterpart in Community Primary School Enyibichiri in Alike Community. Also, the intensity of S. *haematobium* was mild for both males and females in Urban Primary School Mgbabu, this corresponds with work of Anosike., *et al*. [27]. However, the other two schools had no infection. We were meant to understand by the teachers, that the children were taught in their different classes the dangers of getting in contact with infected water bodies.

Pupil's knowledge, attitude and practices related to the occurrences of urinary schistosomiasis in the study area

This study revealed that the overall level of awareness and knowledge about urinary Schistosomiasis amongst school children in the four communities visited was relatively average, this corresponds with the work of Sady., *et al*. [26]. Most of the pupils suggested haematuria as one of the symptoms, while others suggested the signs and symptoms of urinary schistosomiasis to include: pain, fever and 39

(41.9%) of the pupils do not have any knowledge of urinary schistosomiasis. The awareness may be due to initial health education programmes carried out in the whole area, the same was reported by Maseko., *et al*. [28]. There were various causes of urinary schistosomiasis mentioned by the participants. Majority said that the disease was caused by bathing and swimming in the stagnant water, some said that the transmission is through drinking of contaminated water, and some of the pupils thought that transmission was gotten through wading in water. About 47.3% of the pupils had no knowledge of how urinary schistosomiasis is transmitted. This is similar to the work of Sama., *et al*. [29]. The water bodies served as natural water sources and breeding sites to intermediate hosts of schistosome parasites especially in Enyibichiri and Mgbabu communities where rice farming is their major occupation. These water bodies constitute the main transmission site for *S. haematobium*. These conditions make it certain that the children will continue to be infected and re-infected because no intervention strategy against the intermediate hosts has been put in place in these areas. Also, these two communities are situated in the most remote part of Ikwo, they share boundaries with Cross River State. They inter marry with Cross River people that live in the riverine area. These activities must have led to infection and re-infection of urinary Schistosomiasis in these communities.

Pupils' attitude and practices related to urinary schistosomiasis

Most of the participants knew that urinary Schistosomiasis can cause complications while (45.2%) of them maintained that it does not cause complication. Also, majority of the participants believed that one can protect oneself from contracting urinary schistosomiasis while the other group believed that one cannot be protected from it. This study also revealed some of the practices of the participants that can be traced to be the major causes of urinary Schistosomiasis. Out of the 93 pupils interviewed, 41 (44.1%) still bath and swim in streams and canals, 20 (21.5%) still urinate in or around the water bodies. These practices have led to continuous existence of urinary schistosomiasis despite Ebonyi state effort in combating this dreadful disease. Participants mentioned various ways of preventing Schistosomiasis, these included avoid bathing and wading in water bodies 41 (44.1%), avoid urinating in and around water bodies 13 (14%), and control of snail host species 19 (20.4%). From this study we observed that poverty, cultural beliefs may be the reasons for seeking alternative methods of treatment for schistosomiasis [30]. Freshwater snails grow in stream where there are lots of human and animal activities. Enyibichiri in Alike community and Mgbabu Community were found to have limited access to safe water supply and poor environmental sanitation compared to Ezeke in Unweka and Ndieguechara Community. Furthermore, a control programme, including control of intermediate snails, to decrease the prevalence and intensity should be implemented in these areas to improve community health. Stringent laws should be enforced by government to ban people from defecating and urinating in and around canals. Government should ensure that community-based treatment using praziquantel should be done annually to ensure that this parasitic diseases is eradicated. According to Adoka., *et al*. [31] there is need for proper health education of pupils on schistosomiasis. This will help in its control and preventive measures.

Conclusion

In summary, this study has revealed that most primary school children in Ikwo have an average knowledge of urinary Schistosomiasis. Based on these findings, all efforts put in place by Ebonyi State government in combating this parasitic disease seems non-effective. Rice farms in some of the communities serve as transmission sites for schistosomiasis. There is need to get them more acquainted with the knowledge of urinary schistosomiasis through public health programme, community mobilization, introduction of high knee boots to farmers, rubber hand gloves for farming, and house to house sensitization by health workers in other to enhance prevention of urinary schistosomiasis. There is need for mass drug administration to the affected communities. Through this study, we observed that there has been awareness but implementation of the policies and control strategies remained obsolete. Thus, we believe that our findings generalizes the entire rural population in Ikwo not the State. However, further studies need to be carried out in other schools to confirm this study. All the communities within Ikwo need access to pipe-borne water or boreholes to reduce contact with *Schistosoma* infested water bodies.

Acknowledgements

The authors immensely acknowledge the support of Ministry of Health Ebonyi State for approving this study to be carried out in the study locations and on the participants. Special thanks to Mr Emeka Oko, a laboratory technician for helping out during sample collections and laboratory analysis.

Funding Support

This study was self-funded.

Authors' Contributions

The study was conceived and designed by COA. All authors contributed to make the manuscript a success.

Competing Interests

The authors declared that they have no conflict of interest.

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