

1 PREVALENCE OF UROGENITAL SCHISTOSOMIASIS AMONG SCHOOL AGE
2 CHILDREN IN RIVERINE AREA OF ANAMBRA WEST LG, ANAMBRA STATE,
3 NIGERIA
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Aims: The aim was to determine prevalence of urogenital schistosomiasis among school age children in Igbedor, Igbokenyi and Nzam: Riverine communities of Anambra State, Nigeria.

Study Design: This is a cross-sectional, prospective, school based study in which three communities situated along Omambala River were selected after which a public primary school in each of the selected communities were selected for the study. A simple open-ended questionnaire that elicited information on age, literacy and occupation were administered to all respondent volunteers.

Place and Duration of Study: This study was conducted in three public primary schools within three rural communities in Anambra West Local Government Area of Anambra State, Nigeria between April to December, 2023. The laboratory investigations and analysis were done in the Parasitology and Entomology Laboratory, Department of Parasitology and Entomology, Nnamdi Azikiwe University, Awka, between April and June 2023.

Methodology: A total of 320 urine samples were collected from primary school children in three randomly selected primary schools from Igbedor, Igbokenyi and Nzam. Urine samples collected were examined for visible haematuria (macrohaematuria), tested for microhaematuria using reagent strips and examined for *S. haematobium* using microscopy. Structured pretested questionnaires were administered to parent/guardians to determine their level of knowledge, attitudes and management practices of urogenital schistosomiasis in the study area. The data generated from questionnaires and laboratory analysis was collated, analyzed and presented using SPSS version 22.0

Results: Out of 320 school children examined microscopically, 45 (14.1%) were found positive with *S. haematobium*, 2 (0.9%) were positive for macrohaematuria and 13 (6.1%) were positive for microhaematuria. The overall prevalence was higher in females 24 (14.1%) than males 21 (14.0%) though the difference was not statistically significant ($p > 0.05$). School children between 9-12 years old had the highest prevalence of the infection 8 (6.9%) followed by those in age group 13-15 years old (5.1%). Children between 4-8 years old had no infection 0 (0.0%). When prevalence was assessed using microscopy, pupils whose parents were farmers had the highest prevalence of the infection 37 (16.8%), followed by those whose parents were fishermen 8 (9.7%). Pupils whose parents had no form of formal education had significantly highest prevalence 41 (23.0%). With regard to source of water for the household those whose source their water from the stream statistically had the highest prevalence of urogenital schistosomiasis 44 (16.5%). Similarly, those who defecate in the bush had the highest prevalence of the infection 44 (15.0%). Most inhabitants were not aware of the infection. There was a high level of ignorance on the causation,

signs and symptoms of urogenital schistosomiasis. 57.5% do not consider it a serious disease while 76.7% would do nothing when they are infected with the disease.

Conclusion

The study demonstrated a low prevalence of urogenital schistosomiasis in the study area, Anambra West Local Government Area, Anambra state Nigeria.

Keywords: Igbedor, Igbokenyi, Nzam, Urogenital Schistosomiasis, Anambra West.

INTRODUCTION

The history of urogenital schistosomiasis dates back to ancient times when the disease was first described in ancient Chinese medical texts and also in the medical papyrus, an ancient Egyptian medical book, where haematuria was discussed several times, indicating that it was a prevalent complaint of ancient Egyptian patients

Schistosomiasis is a chronic and debilitating illness caused by digenetic trematode flatworms (flukes) of the genus *Schistosoma* [27]. It remains one of the most prevalent Neglected Tropical Diseases (NTDs), which constitutes a major public health problem in 78 developing countries in both tropical and subtropical regions [26]. It is one of the prevalent human parasitic diseases in the world, second only to malaria in terms of socio-economic and public health importance [2]. More than 229 million people within these regions required preventive treatment in 2018, which should be repeated over a number of years, to reduce and prevent morbidity in communities with moderate-to-high transmission [26]. Ninety percent (90%) of these infections occur in sub-Saharan Africa but a total of 25,215 deaths occurred globally in 2018 for all types of schistosomiasis among 13,188 males and 12,027 females [26]. Out of this number, Africa recorded a total of 21,150 deaths comprised of 10,963 males and 10,187 females [26].

Although, urogenital schistosomiasis is endemic in Nigeria, it is usually a neglected common parasitic disease among children [10][3][8]. Its treatment only targets school children (6-15 years) and/or adults (over 15 years old) in high risk occupational groups (example fishermen), researchers, adventurers and holiday makers neglecting the preschool aged children (children below 6 years) [5]; [9]; [13].

Early signs of morbidity common to *S. haematobium* infection and which manifest in school aged children are anaemia, impaired growth, and cell development, poor cognition and substandard school performance [12]; [18]. People affected with *S. haematobium* may develop cough, fever, skin inflammation and tenderness of the liver because the spined egg attaches to the host tissues and causes tissue degeneration. Calcified eggs embedded in the bladder walls increase the chances of blockage of the blood vessels.

Even with growing awareness of the problem associated with urogenital schistosomiasis in school aged children there is still paucity of documented information on the current prevalence of urogenital schistosomiasis in Igbedor, Igbokenyi and Nzam, riverine communities of Anambra state.

This study was therefore undertaken to determine the prevalence of the disease in school aged children. The information so obtained may complement the existing baseline information on the epidemiology of this infection in the country.

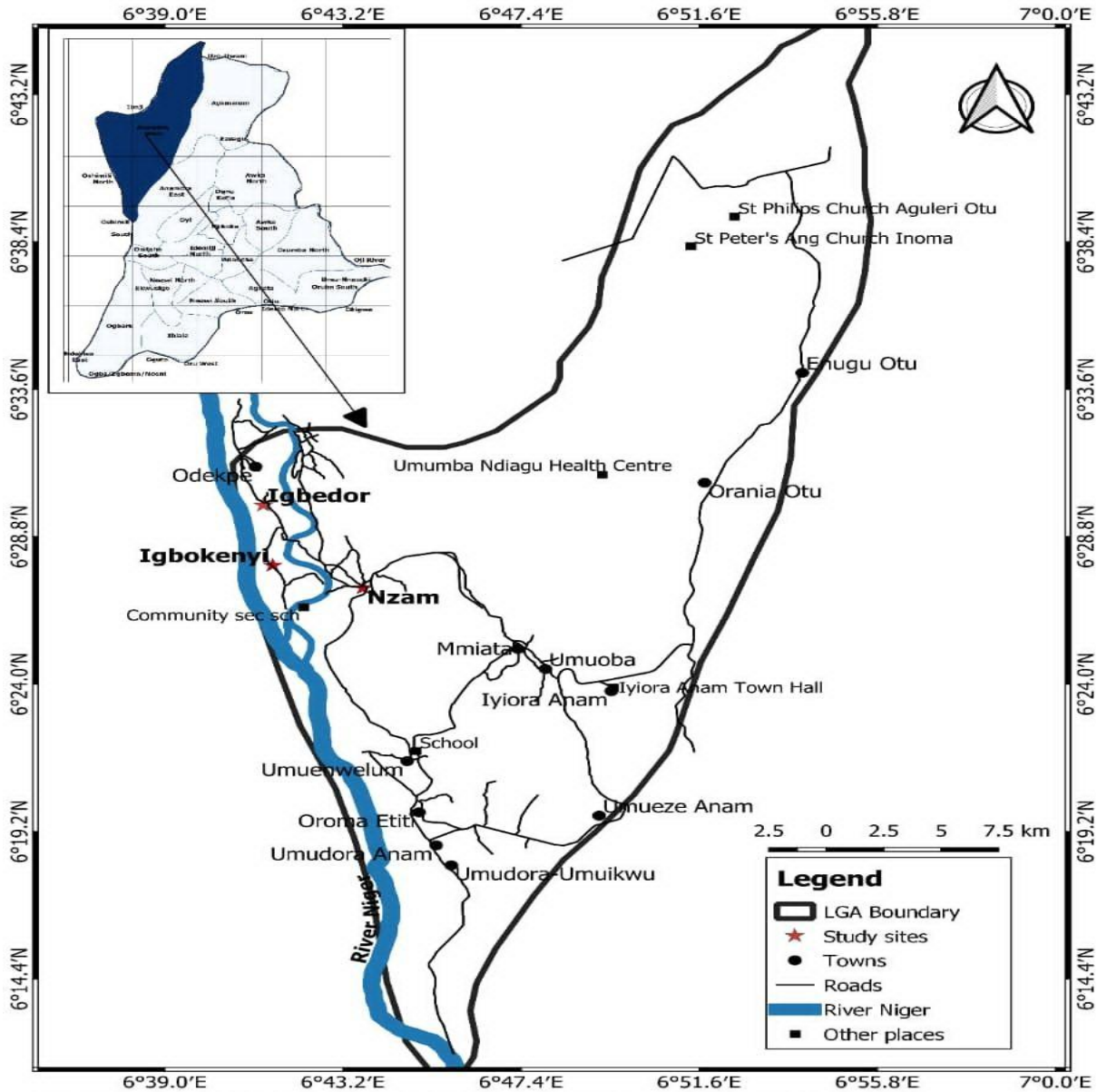
MATERIALS AND METHODS

Study Area:

This study was conducted from April to December 2023, in three rural communities namely Igbedor, Igbokenyi and Nzam in Anambra West Local Government Area of Anambra State. Anambra West lies geographically between longitude 6°47'E to 7°0.0'E East and latitude 6°33'N and 6°38'N with an aerial extent of about 85 square kilometers (Map data, 2023). It falls between the tropical rain forest belt of Nigeria in Anambra State. It has two main seasons every year: a rainy season beginning around April and ending in October and a dry season

55 from Novemberto March with. Anambra West LGA is made up of ten major communities (Fig 1). They have
 56 common boundaries with Ika (in Kogi State) in the west, Ebu (Delta State) in the east and Auchi (Edo State) in
 57 the South. The Igalaspeaking communities are collectively called Olumbana, namely: Igbedor, Igbokenyi, Allah
 58 N'onugwa, ukwalla, owelle and Odemogwu and are all surrounded by River Niger tributaries. The major
 59 economic activity of the people is agricultural farming like fishing and rice farming which keeps them in constant
 60 contact with surface water with very few engaged in white collar jobs. The major sources of water supply for the
 61 people were rivers, dams, streams, stagnant ponds, few shallow dugwells which are found in few rich families
 62 and boreholes provided by government in some areas. These ponds, streams, quarry pit water, dams and rivers
 63 harbor most of the snail intermediate host from where the infective stage of the parasite emerges ready for
 64 transmission. Omambala River that runs along these three communities is believed to have healing and
 65 medicinal powers [11].

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Source: GIS Lab, Dept of Geography & Meteorology, Nnamdi Azikiwe University, Awka.

68 **Fig(1) Map showing study location**

69

70 Study Population

71 The study population consists of pupils within the age range of 4-15 years both gender in primary schools
72 selected for study which constitute the study population from where the respective sample sizes were derived
73 and volunteers subsequently enrolled for the study. A total of 1603 registered pupils enrolled for the study. Of
74 this, 580 pupils were from Central School Igbedor, 533 from Community Primary School, Igbokenyi while 490
75 were enrolled from Central School, Nzam. Participants who were males and those on their menstrual period
76 were excluded from the study.

77 Sample Size Determination

78 The sample size of this research was calculated using Taro Yamane [30] formula with 95% confidence level; $n =$

$$79 \frac{N}{1+(e^2)} .$$

80 Using the formula $n = \frac{N}{1+(e^2)}$

81 Where

82 $n =$ sample size

83 $N =$ total population

84 $e =$ error term at 95% confidence interval

$$85 \frac{1603}{(1+1601 \times 0.05^2)}$$

$$86 \frac{1603}{1+(1603 \times 0.0025)}$$

$$88 \frac{1603}{1+4.0025}$$

$$89 \frac{1603}{5.0075} = 320.12$$

93 Urine Sample Collection

94 A labelled, sterile wide-mouthed, screw-capped plastic container was provided for each pupil to collect his/her
95 mid-day, midstream urine sample between 10.00 hrs and 2.00 pm to suit the diurnal rhythm corresponding to the
96 peak output of Schistosoma eggs as described by [28]. The name, age, location and gender of each pupil and
97 patient were recorded as a unique identifier after urine samples have been collected and coded on the container.
98 0.1 ml Sodium-Hypochlorite solution was added to each of the urine samples to preserve the original morphology
99 of the parasite eggs and were transferred to the Department of Parasitology and Entomology for parasitological
100 analysis within four (4) hours of collection

Determination of Haematuria

Urine samples were examined for haematuria using dipstick (Medi-Test Combi 9, Macherey-Nagel GmbH & Co. KG) by submerging the strip into the urine samples and reading the result by comparing the strip with the colour codes on the container as described by [8].

Urine Microscopy

Microscopic examination of the collected urine samples was done to detect the presence of *Schistosoma* eggs after observing them for macrohaematuria. The laboratory analysis was done using the Sedimentation method as described by [8]. Ten (11) ml of each urine sample was collected and centrifuged for 10 min at 2000 rpm. The supernatant was decanted, and using a clean pasteurized pipette, a drop of the sediment was placed on a clean grease-free microscope slide, covered with coverslip and examined using the $\times 10$ and $\times 40$ objective lenses respectively for the characteristic *Schistosoma haematobium* ova with terminal spines.

Structured Questionnaire

A total of three hundred and twenty pre-tested questionnaires were administered among the respondents studied. The questionnaire consisted of open-ended questions of discriminatory statements on demographic, socio-economic, educational status, level of knowledge on causes, signs and symptoms, preventive measures and management practices of the community in relation to urogenital schistosomiasis in Anambra West LGA. The structured questionnaires were given to the respondents to fill and administered in their mother tongue (Igbo Language) for respondents who do not understand some of the questions in English language. Finally, accuracy and completeness of all the questionnaires were checked at the end of each data collection day. Three hundred and twenty questionnaires were given out and all (100.0%) were retrieved from the participants.

Data Analysis

The data generated from questionnaires and laboratory analysis was collated, analyzed and presented using descriptive statistics. The relationship between each variable and *Schistosoma haematobium* prevalence was analyzed using Chi-square Test of statistical significance set at P value of 0.05 (95%) confidence interval.

RESULTS

Prevalence of Urogenital Schistosomiasis in Relation to the Study Area.

Of the three hundred and twenty urine samples examined for urogenital schistosomiasis by microscopy, 45 were infected given an overall prevalence of 14.1%. The rapid assessment methods using macrohaematuria (visible haematuria) and microhaematuria (invisible haematuria) gave a prevalence of 0.9% and 6.1% respectively (Table 1).

In relation to the sex of the children studied, the three diagnostic methods used (microscopy, macrohaematuria and reagent strip) used showed that prevalence of *S. haematobium* infection was lower in males (14.0%, 1.33% and 5.3%) respectively than in females where a prevalence of 14.1%, 0.0% and 2.9% were recorded for

152 microscopy, macrohaematuria and microhaematuria respectively. However, the difference in the prevalence in
 153 relation to sex in the three diagnostic methods was not statistically significant ($P > 0.05$) (P -value = 0.179)

154
 155 In relation to age of the pupils, the highest prevalence of the infection was recorded among children in the age
 156 bracket 9-12 years old as shown by the three diagnostic methods: microscopy (6.9%), macrohaematuria (1.7%)
 157 and microhaematuria (6.9%). This was followed by those in the age group 13-15 years' old: microscopy (5.1%),
 158 macrohaematuria (0.0%) and microhaematuria (6.4%). The prevalence in relation to age was not statistically
 159 significant ($p > 0.05$) (p -value = 0.37)

160
 161 The prevalence of *S. haematobium* by school showed that pupils from Central Primary School Igbedor recorded
 162 the highest prevalence using the three diagnostic methods: microscopy (18.3%), macrohaematuria (0.0%) and
 163 microhaematuria (4.9%) While Community Primary School Igbo Kenyi recorded: microscopy (15.0%),
 164 macrohaematuria (1.5%) and microhaematuria (6.9%). The observed difference was not statistically significant
 165 ($p > 0.05$) (p -value = 0.52).

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 170 **Table 1: Prevalence of *S. haematobium* Infection in Relation to Risk Factors**

Variable	No. Examined	No. positive (%)		
		Microscopy (%)	Macrohaematuria (%)	Microhaematuria (%)
Total	320	45 (14.1)	2 (0.9)	13 (6.1)
Gender				
Male	150	21 (14.0)	2 (1.33)	8 (5.3)
Female	170	24 (14.1)	0 (0.0)	5 (2.9)
Age (years)				
4-8	127	0 (0.0)	0 (0.0)	0 (0.0)
9-12	116	8 (6.9)	2 (1.7)	8 (6.9)
13-15	77	4 (5.1)	0 (0.0)	5 (6.4)
School				
C. SIgbedor	120	22 (18.3)	0 (0.0)	4 (4.9)
C. PIgbo Kenyi	100	15 (15.0)	2 (1.5)	9 (6.9)
C. SNzam	100	8 (8.0)	0 (0.0)	0 (0.0)

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 174 Those whose parents were farmers had the highest prevalence of *S. haematobium* infection using the three
 175 diagnostic methods: microscopy (16.8%), macrohaematuria (0.0%) and microhaematuria (1.3%) Those whose
 176 parents were fishermen had the second highest prevalence of *S. haematobium* infection: microscopy (9.7%)
 177 macrohaematuria (2.4%), microhaematuria (10.9%) (Table 2).

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 180 In relation to parents' level of educational attainment, the highest prevalence of infection was recorded among
 181 those whose parents had no form of formal education: microscopy (23.0%), macrohaematuria (0.6%)
 182 microhaematuria (5.1%), followed by those whose parents had First School Leaving Certificate: microscopy
 183 (8.6%), macrohaematuria (2.8%) and microhaematuria (8.6%). Statistical analysis revealed that there was no
 184 significant difference in the prevalence of *S. haematobium* infection in relation to literacy level ($P > 0.05$) (P -
 185 value = 0.87).

186
 187 On the source of drinking water, the highest prevalence of *S. haematobium* infection was recorded among those
 188 whose source of drinking water was from river/stream: microscopy (16.5%) macrohaematuria (0.7%) and
 189 microhaematuria (4.5%) this was followed by those whose source of drinking water was rain: microscopy (3.0%)
 190 macrohaematuria (0.0%) and microhaematuria (3.0%). No infection was recorded among those whose source of

drinking water from packaged water. Statistical analysis showed that there was no significant difference in the prevalence of *S. haematobium* infection in relation to source of drinking water ($p > 0.05$) (p -value = 0.81).

Those who defecate in the bush recorded the highest prevalence of infection: microscopy (15.0%), macrohaematuria (1.1%) and microhaematuria (6.5%). This was followed by those who defecate in the pit latrine: microscopy (3.8%), macrohaematuria (0.0%) and microhaematuria (3.8%). No case of infection was recorded among those whose toilet facility was water closet. Statistical analysis showed no significant difference in the prevalence of *S. haematobium* infection in relation to type of toilet facility ($p > 0.05$) (p -value = 0.51).

Table 2: Prevalence of *S. haematobium* infection in relation to risk factors

Risk factors	No. Examined	Number positive (%)		
		Microscopy (%)	Macrohaematuria (%)	Microhaematuria (%)
Parents' occupation				
Farmers	220	37 (16.8)	0 (0.0)	3 (1.3)
Traders	10	0 (0.0)	0 (0.0)	0 (0.0)
Fishermen	82	8 (9.7)	2 (2.4)	9 (10.9)
Civil servants	8	0 (0.0)	0 (0.0)	0 (0.0)
Total	320	45 (14.1)	2 (0.6)	13 (4.1)
Parents' level of education				
Nonformal	178	41 (23.0)	1 (0.6)	9 (5.1)
FSLC/Primary	35	3 (8.6)	1 (2.8)	3 (8.6)
SSCE/Secondary	83	1 (1.3)	0 (0.0)	1 (1.3)
Tertiary	24	0 (0.0)	0 (0.0)	0 (0.0)
Total	320	45 (14.1)	2 (0.6)	13 (4.1)
Source of drinking water				
River/stream	266	44 (16.5)	2 (0.7)	12 (4.5)
Rain	33	1 (3.0)	0 (0.0)	1 (3.0)
Packaged (sachet)	21	0 (0.0)	0 (0.0)	0 (0.0)
Total	320	45 (14.1)	2 (0.9)	13 (6.1)
Toilet facility				
Bush	292	44 (15.0)	2 (1.1)	12 (6.5)
Pit	26	1 (3.8)	0 (0.0)	1 (3.8)
Water closet	2	0 (0.0)	0 (0.0)	0 (0.0)
Total	320	45 (14.1)	2 (0.9)	13 (4.1)

Knowledge, attitudes and management practices of urogenital schistosomiasis among the riverine communities

The level of knowledge, attitude and management practices of the community members in relation to urogenital schistosomiasis is summarized in Table 3. The various names for the infection include 'oyammamili' or 'oriaobara'. On the awareness of the infection, 5.6% affirmed that they were aware of it. The source of information includes health centre (9.3%), mass media (7.8%), and school (4.6%).

Generally, there was a high level of ignorance on the correct cause of urogenital schistosomiasis. Seven point eight percent (7.8%) associated it with drinking untreated water. Other responses were: witchcraft (47.8%), eating contaminated food (4.6%), and dirty hands (3.8%) while 32.8% stated that they do not know.

Similarly, the respondents' perception on the signs and symptoms of urogenital schistosomiasis was poor. Only 10.0% and 9.4% of the respondents correctly associated the infection with bloody urine and painful/burning

217 urination respectively. Other responses were as follows: regular fever (2.8%), body ache (1.6%), abdominal pain
 218 (6.3%), vomiting (3.1%), 45.3% stated that they do not know.
 219 The preventive measures for the control of urogenital schistosomiasis were as shown in Table 3. seventeen
 220 point five percent (15.4%) correctly stated that it is by avoiding washing clothes and other materials in the river.
 221 Similarly, 6.9% correctly stated that it is by avoiding swimming in the river. However, 43.7% affirmed that they do
 222 not know.
 223 On the attitude of the respondents towards urogenital schistosomiasis, 57.5% of the respondents stated that it
 224 is not a serious disease, 17.5% stated that it is just like any other disease. Only 5.6% stated that it is a very
 225 serious disease, however, 19.4% affirmed that they do not know.
 226 On management/treatment practices, 11.9% would go to patent medicine store to buy drug, 3.1% would treat
 227 with herbs, and 4.7% would resort to prayer house/healing home. Only 3.75% would go to hospital while 76.6%
 228 stated that they would do nothing

229 **Table 3: Knowledge, attitude and management practices of respondents toward *S. haematobium***
 230 **infection.**

Variable	Frequency	% prevalence
Do you know what schistosomiasis?		
Yes	18	5.6
No	302	0.9
Source of information		
Health Centre	30	9.3
Mass media	25	7.8
School	15	4.6
Do not remember	250	78.1
Cause/transmission of urogenital schistosomiasis		
Eating snail	0	0.0
Contact with infected water	0	0.0
Witchcraft attack	153	47.8
Playing with soil	10	3.1
Dirty hand	12	3.8
Eating contaminated food	15	4.6
Drinking untreated water	25	7.8
Don't know	105	32.8
Signs and symptoms of urogenital schistosomiasis		
Body ache	5	1.6
Bloody stool	10	3.1
Regular fever	9	2.8
Itching of the body	15	4.7
Abdominal pain	20	6.3
Bloody urine	32	10.0
Swollen stomach	15	4.6
Vomiting	10	3.1
Feeling of fatigue	11	3.4
Diarrhea	6	1.9
Burning/painful urination	30	9.4
Loss of appetite	5	1.6
Anaemia	7	2.2
Don't know	145	45.3
Attitude to the infection		
Very serious infection	18	5.6
Just like other infections	56	17.5
Not serious infection	184	57.5

Don'tknow	62	19.4
Preventivemeasures		
Wearingofffootwears	14	4.4
Avoidswimmingintheriver	22	6.9
Sleepingundernet	31	9.7
Avoidwashingclothesand other materials in the river	56	17.5
Avoidfishingintheriver	57	17.8
Don'tknow	140	43.7
Management/treatingoption		
Hospital	12	3.75
Patentmedicine store	38	11.9
Treatmentwithherbs	10	3.1
Prayer/healinghome	15	4.7
Nothing	245	76.6

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237 DISCUSSION

238 **Schistosomahaematobium**Prevalence

239 This present study showed that urogenital schistosomiasis is present among school children in Igbedor,
240 Igboke and Nzam communities, Anambra West Local Area, Anambra State, Nigeria. The prevalence of
241 infection with *Schistosomahaematobium* in the three schools did not happen by chance, the same causative
242 agent is involved. Any pupil with *Schistosomahaematobium* infection in any of the three schools is a potential
243 carrier that can equally transmit it any time anywhere, all things being equal. However, the occurrence of *S.*
244 *haematobium* in all the schools in the three communities with overall prevalence of 45 (14.1%) showed that
245 this area is endemic for the disease. The results suggest that the study area falls within the WHO classification
246 as a low prevalence area. As WHO classifies prevalence less than 10% as a low prevalence area, prevalence more
247 than 20% but less than 60% as a moderate prevalence area while prevalence higher than 50% is classified as
248 a high prevalence area [26]. The outcome of this study correlates with the low endemic status obtained respectively
249 for primary school children in Agulu (4.28%) [19], among primary school pupils in Maiduguri (14.5%) [18], ten
250 different primary schools in Maiduguri Metropolitan Council (14.5%) [14], in Orumba North and South Local
251 Government Area (15.7%) [22]. The findings of this survey equally contrast with the high prevalence rates of
252 48% and 58.3% in Umuowe village in Agulu [20] and 40.7% in Kebbi State [4].

253

254 The low prevalence of urogenital Schistosomiasis recorded among school aged children in these communities
255 could be attributed to the quarterly Mass Drug Administration of Praziquantel (MDA) campaign, by the State
256 Government (with support from the Carter Foundation, USAID, WHO); this is done once in every three years for
257 areas with prevalence less than 20%. This is in line with World Health Assembly drafted resolution that endorsed
258 chemotherapy as the main strategy for control of Schistosomiasis [23]. The prevalence recorded is also in
259 agreement with the report that in recent years there has been a drop in incidence and prevalence of urogenital
260 schistosomiasis in some areas and increase in others [6], [14], [13], [27] [7]

261

262 Furthermore, the use of Praziquantel (PZQ) as the drug of choice as recommended by physicians or through
263 self-medication by parents/guardians may have also contributed to the low prevalence. It could also be attributed
264 to the period of the study which commenced on April, 2023 to December, 2023, which is the peak of rainfall
265 (June/July) which reduces activities in the water bodies as people have their tanks and drums filled with rain
266 water and thereby less frequenting of the streams/ponds [6].

267 Prevalence by gender was not statistically significant in the study. This may be an indication that both male and
268 female pupils are equally exposed to infection through water contacts. In this study, females were equally

269 exposed and susceptible as they were also engaged in other surface water contact activities such as washing
270 and fetching of water. This was similarly reported by [15]; [24].

271 The peak infection was recorded in the age group 9-12 and this is in agreement with Nwosu *et al.* (2004).
272 However, a feature of this infection is that children of the age group 9-12 years old are always the group at risk.

273
274 In relation to school, the higher prevalence in Central Primary school Igbedor compared to the other two schools
275 could be attributed to the closeness of the school to the water body. It was observed that some pupils go down
276 straight to the river after school to swim before going home. This was similar to the findings of [24] who reported
277 that lack of basic amenities, low literacy, inadequate disposal of human waste and high water contact activities
278 may have been responsible for high endemicity of urogenital schistosomiasis.

279
280 Those who urinate/defecate in the bush had the highest rate of the infection. Some individuals would prefer to
281 urinate and defecate in the bush and farmland areas. When it rains, water run-off would help to transfer the
282 eggs in the stool/urine to suitable environments where they can attach to the intermediate host [24]. When this
283 happens, some of the pools of water and the surrounding vegetation may become sources of infection to the
284 unsuspecting users. This goes to buttress the fact that parasitic disease transmission depends upon poor
285 environmental conditions including indiscriminate deposition of urine/faeces and personal hygiene [24].

286
287 Infection rate was higher (16.5%) among pupils whose stream as their source of drinking water and water for
288 domestic uses. This is consistent with the observations of [15], [26] as regular visits to the stream gave room for
289 frequent water contact and contact with the breeding site of the snail intermediate host where infection would
290 usually occur. Proximity to the water bodies and snail breeding sites is a key determinant in the infection with
291 schistosomiasis most prevalent in rural areas where ponds, streams, ditches and lakes form major sources of
292 water for domestic use [24].

293
294 Results from the knowledge, attitude and management practices in the study area as shown showed poor knowledge
295 about urogenital schistosomiasis. Their low knowledge on transmission of urogenital schistosomiasis reflects high
296 level of illiteracy among community members. Zero cases of the infection among those with tertiary education is
297 also a strong indication that illiteracy is a positive factor in the transmission of parasitic diseases.

298 On the ability to recognize signs and symptoms, only 10.0 and 9.4% associated it with burning sensation while
299 urinating and bloody urine respectively. This again reflects high level of illiteracy in the area. Majority of the
300 respondents believe urogenital schistosomiasis is not a serious disease and therefore cannot kill. This explains
301 why only 3.75% visit hospital as the last resort. [1] [24] similarly reported this in their study.

302 On the management and treatment options for urogenital schistosomiasis in the study communities, it was
303 observed that it is a common practice for the respondents to patronize patent medicine store keepers while
304 76.6% would do nothing. This clearly showed that they do not regard it as a serious infection.

305 **Conclusion**

306
307 This study showed overall prevalence of 45 (14.1%) which is a low prevalence, this might be as a result of
308 control measures taken against the disease through various government and NGO intervention programmes
309 The low prevalence might also be linked to the new government programme of WASH in every school in the
310 Local Government Area in partnership with State Ministry of Environment as at the time of this study to reduce
311 disease burden among children.

312 Massive education to prevent people from getting infected is advocated. It would therefore be apt to include
313 Igbedor, Igbokenyi and Nzaminthe schistosomiasis control programme to prevent further spread.

314 The study has also provided baseline information for evidence-based planning and implementation of urogenital
315 schistosomiasis control activities in the state by governments, their agencies and individuals.

135 **Informed Consent**

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137 An advocacy visit was paid to the NTDO officer in the State through whom Ministry of Education was informed.
138 These selected schools were also notified through their head teachers and parents were adequately informed and
139 consent received before selecting their schools. Written informed consents were obtained from each of the
140 participants after a detailed explanation about the objectives, procedures, importance and potential risks of the
141 study. They were also informed in their local language that participation will be voluntary, and that withdrawal
from the study does not involve any penalty.

130 **Ethical Approval**

131 TheethicalapprovalforthisresearchwasobtainedfromtheHealthResearchEthicsCommitteeofAnambra
132 State,MinistryofHealth,Awka.(MH/AWK/M/321/428).

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317

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COMPETING INTERESTS

Authorshavedeclaredthatnocompetinginterestsexist.”.

AUTHORS' CONTRIBUTIONS

'Author“OEP”designedthestudy,performedthestatisticalanalysis,wrotetheprotocol,andwrotethefirst draftofthemanuscript.'AuthorECA'and'AuthorAEO'managedtheanalysesofthestudy.'AuthorMOI'NCI, OUM,UEA.managedtheliteraturesearches.Allauthorsreadandapprovedthefinalmanuscript.

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