

Case study

Historic Socio—economic and Current Status of Urinary Schistosomiasis in— Riverine Areas of Nigeria Ondo State.

Abstract

The historic ~~current~~ status of Urinary Schistosomiasis - in -riverine -areas- in Ilaje Local Government Area in Ondo State, Nigeria in Ilaje Local Government was surveyed in October 1996 ~~carried out~~. This was done by examining inged people from five (5) selected villages in the area. A ~~Total~~ number of 2052 urine samples were ~~as~~ collected and examined out of which 994 (representing 48.4% of the total population ~~size tested~~) were infected with the *Schistosoma haematobium* parasite. The infection rate was found to be high in Ode – mahin where 454 individuals were examined and 237 were infected, this represented 52.2% followed by Ugbo – nla (49.9%), Orioke – Iwamimo (48.9%), Abe – alala (45.9%), and with the least prevalence was ~~of~~

44.5% from Maran. The overall prevalence of infection was significantly higher in males (1030 were examined out of which 553 were infected, representing 53.7%) than in females (1022 were examined out of which 441 were infected representing 43.15%). For ~~Among~~ the ages of male examined, the 10 – 12 age cohorts showed the highest infection rate of 56.9%, while ~~Also~~, age 7 and 9 showed a ~~n~~ the infection rate of 53.8%. Age 4 – 6 showed the least infection rate of 39.2%. Infection rate according to age distribution followed similar age pattern. For the females ~~The~~ the highest infection rate was also found ~~between~~ in the age group 10 – 12 (56.9%) and in 13 – 15 (50.5%) while the least prevalence was found in 4 – 6 (39.2%). There was a significant difference between the male and the female susceptibility to schistosomiasis in the study area. More ~~also~~ over, this research report ~~has~~ show ~~sn~~ how parental occupation influence infection with ~~of~~ schistosomiasis in the study area. ~~However~~, Children of fishermen were found to be more vulnerable to schistosomiasis —infection compared to those with other parental/father's occupations: recommendations from this study were that the Nigerian Health and Education Departments should follow up with preventative and prescriptive awareness training plus compulsory annual treatment- with drugs to control this disease.

Keywords: Schistosomiasis, *Schistosoma* haematobium, susceptibility, vulnerable

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Introduction

There are a number of digenean parasitic trematodes (flatworms) capable of causing disease in man, Schistosomiasis (Bilharzia) is the most important of these helminth infections. This disease ~~is~~ caused by a member of the genus ~~Schistosoma~~. ~~These~~ parasites ~~are~~ important

pathogens, estimated to be infecting 200 million people in tropical and subtropical regions. The most important species that infect man are *Schistosoma japonicum*, *S. mansoni* and *S. haematobium* ^(1, 2). schistosomiasis is the most important of the helminth infections. Urinary schistosomiasis, caused by *Schistosoma haematobium* a trematode worm, ~~that~~ places an enormous toll on public health ~~in the of~~ affected regions. This parasite is an important pathogen, estimated to be infecting ~~about~~ between 200 ~~and~~ 600 million people in tropical and sub – tropical region ⁽³⁾. *Schistosoma mansoni* is found ~~in~~ parts of South America and the Caribbean, ~~-Africa -and~~ the Middle East; *S. haematobium* in Africa and the Middle East; and *S. japonicum* in the Far East. *S. mekogi* and *S. intercalatum* are found locally in South ~~-East~~ Asia and Central West Africa ⁽⁴⁾. ~~Over~~ 200 people are infected worldwide, 85% of the burden is concentrated ~~in -s~~ South of the Sahara ~~in~~ Africa ⁽⁵⁾. The prevalence of this helminthic infection is high in children, most especially in primary and secondary pupils. Mostly this disease does not ~~always~~ result in ~~ate~~ clinical disease ~~and while~~ many infections are asymptomatic, though it can result in or be accompanied by several other illnesses making it before been more complicated ⁽⁶⁾.

Urinary schistosomiasis is associated with hematuria (blood in the urine) and dysuria (painful urination), ~~-also- -lesions- of- the- bladder,~~ it may also cause retardation of growth in children ⁽⁵⁾, the infection is also associated with decreased ~~in~~ physical performance, and impaired

memory and cognition ^(7,8). The infection occurs through contact with freshwater that

contains infective cercaria released from an intermediate Snail host of species of aquatic freshwater *Bulinus* spp and *Biomphalaria* spp ⁽⁹⁾. Penetration of the human skin occurs after the cercaria have attached to and explored the skin. The parasite secretes an enzymes that breaks down the skin's protein to enable penetration of the cercarial head through the skin and then transforms into the migrating schistosomulum larvae that migrates through the bloodstream to the hepatic portal system to complete the parasite lifecycle ^(9,10). The

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parasites differentiate and migrate in pairs (male and female) into small venules draining the intestine (*Schistosoma* *haematobium* and *japonicum*) or the

~~haematobium and Schistosoma japonicum~~) or the bladder (*Schistosoma haematobium*) where they are fully exposed to the host's immune system. The female worm produces 300 to 3000 eggs each day, eggs pass into lumen of the intestine or bladder. Schistosomes can live an average of 3 10 years in their human hosts, –

~~10 years in their human hosts~~, but in rare cases they have been recorded as living as long as 40 years ⁽¹⁾.

The prevention of this disease is best accomplished by eliminating the water dwelling snails that serve as a natural reservoir. Acrolein Copper sulfate and niclosamide can be used for this purpose. Studies have suggested that snail populations can be controlled by the introduction or augmentation of existing Crayfish or fresh-water prawn populations ⁽¹¹⁾. Schistosomiasis is readily prevented and treated using a single oral dose of praziquantel drug annually ⁽¹²⁾. It has been ~~foun~~revealed that this disease is endemic in villages ~~with~~here streams ~~or~~and rivers ~~where the~~ habitat of the primary host is predominate. Thus there is a need to study the prevalence of this parasitic disease in these areas to determine the usual status of this pathogen with the aim of providing updated information on schistosomiasis in five selected communities in riverine area in Ondo State namely Ode – mahin, Ugbo – nla, Orioke – iwamimo, Abe – alala, and Maran ~~in the~~of Ilaje local government area of Ondo State Nigeria.

~~of Ondo State, Nigeria.~~

MATERIALS AND METHODS

Study area

This study was carried out in the Ilaje Local Government area, ~~in a~~ riverine area of Ondo State ~~in Ilaje Local Government~~ in October 1996 by the Nigerian Federal Government. ~~Ilaje~~ covers ~~ing~~ an area of about 3,000 square kilometers and ~~shares a~~ boundary in the North with Okitipupa Local Government, South by the Atlantic ~~Ocean~~, in the West by Ogun State and East by Delta State. There ~~are~~is sand formation ~~in a~~ the Western part of ~~the~~

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Ila Local Government area extending to Lekki peninsula in Lagos State to Araromi Sea – side and Zion pepe, Agba to Etugbo and Ipore. The area has many streams, rivers and lake. ~~I~~ ~~this~~ constitute the major source of water supply to all communities in the local government area.

Water contact activities like bathing, swimming, washing and drinking are from this source. The major and common occupations in this area are fishing and boat building. The area ~~contains well occupied with~~ fresh water, estuarine and marine areas.

Study Populations.

~~The f~~Five (5) villages ~~wi~~that ~~have~~ large fresh water areas were selected and two thousand and fifty two (2052) ~~villagers~~people were examined. The communities selected were Orioke – iwamimo, Ode – mahin, Ugbo – nla, Abe – alala and Maran. These communities were located very close to water areas; ~~while~~indeed ~~o~~Orioke – iwamimo, Abe – alala and Maran ~~were~~ mainly of freshwater with very little land ~~space~~areas. Before the ~~commencement~~start of this research ~~studywork~~ an letter of introduction ~~letter~~ was issued ~~byfrom~~ the Zoology Department ~~at~~of Ekiti State University. The letter was shown to the village heads to facilitate an easy approach to all individuals in these communities. ~~Thise~~ study was approved by the Department of Zoology, Faculty of Science, Ekiti State University, Nigeria. The endorsement of this study was based on the agreement that all the information will be maintained and treated with good laboratory practice and quality control and can be used for the purpose of this research studywork. Villagers ~~The examination of individuals was based from~~ the age of 4 to 19 and above were examined and a- ~~Q~~questionnaires were administered; ~~the~~ questions ~~were~~as translated into their local dialect while the answers were filled ing correctly in ~~to~~ the questionnaire sheetpapers. The ~~C~~ollection of urine samples ~~was~~er done ~~collected~~ with freewill.

Sampling Collection Techniques ~~A~~and Laboratory Analysis

Each sample of Aabout 20ml of clean catch, ~~midstream~~ urine was collected in a 50ml sterile urine bottle; ~~T~~wo thousand ~~and-~~ fifty two (2052) urine samples were collected, ~~were collected in 50ml capacity urine sterile bottle, all the~~eachse urine samples ~~was~~ere labelled ~~(for~~ sex and age). All Samples were obtained between 9am and 1pm and. ~~The samples~~ were fixed with formalin and kept in a cooler with ice packs before they were taken

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to the laboratory for analysis. Okanla's method (1991) and Cheesbrough's (2000) ~~were~~as used for the laboratory examinations. The urine samples were first examined for *Schistosoma* eggs

~~urine samples were first examined for Schistosoma eggs~~ using standard parasitological techniques. Ten milliliters (10ml) of each urine sample was dispensed into a centrifuge ~~tube~~ and ~~spun~~ for 5 mins at 5000 ~~rpm~~ revolution, the supernatant was discarded to leave the sediment ~~as and~~ deposit which was ~~released~~ mixed by tapping the bottom of the tube while ~~and~~ shaking it ~~the tube~~. A drop of ~~the~~ each deposit was placed on a sterile glass slide and covered ed with a cover slip before being examined under a ~~the~~ microscope using the 10x and 40x objectives s of the light microscope.

Macroscopic analysis of the urine samples was ~~carried-out~~ by visual examination of the colour and of visible haematuria. ~~The~~ A combi 9 strip was used to detect blood in the urine (haematuria-) and a record was taken. ~~A~~ Each reagent strip (urine – 10 parameter) was carefully dipped into a dark sterile bottle containing a ~~the~~ urine sample ~~for~~ -5 seconds. The resulting change in colour of the strip was compared with the manufacturer's colour chart to estimate the amount of blood in the urine.

Statistical ~~a~~ Analysis

~~The~~ D data was analysed s using SPSS version 22.0 with ~~and~~ Microsoft E excel 2007. One way ANOVA was used to compare the rate of infection in the study areas and across the age cohorts ~~-~~ at the 95% confidence lev ~~interval~~ (C. I = 95%) with frequency distribution tables showing the percentage prevalence of urinary schistosomiasis. ~~The~~ Chi-square test (X^2) was used to compare the differences in prevalence of infection between, gender and ages ~~schools~~. A Socio – economic study associating ~~ed~~ with risk factors with ~~and~~ infection prevalence was carried out.

Results

~~The~~ C current status of urinary schistosomiasis ~~-in~~ riverine -areas of Ondo State in the ~~il~~ laje local government area was stud ~~carried-out~~. A total ~~number~~ of two thousand and fifty two (2052) vill ~~individuals~~ ager s ~~were~~ as examined out of which one thousand and thirty (1030) were male and one thousand and twenty two (1022) were female. Table 1 showed the prevalence of urinary schistosomiasis within ~~the~~ age groups in the villages ~~studied~~ area. The

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highest prevalence rate was found ~~in between~~ age cohorts 10 – 12 years with 56.9% prevalence and mean standard deviation (Mean $\pm$ S.D) of 50.6 $\pm$ 4.05, followed by ~~the cohortage between~~ 7 – 9 years~~old~~ (53.8%). Th~~use~~ school children ~~with~~ the

age group 7 – 9 and 10 – 12 years ~~were~~ found to be ~~the most~~ susceptible in the ~~villages~~ ~~study~~ ~~area~~. The lowest infection rate was recorded ~~win the~~ ~~in~~ age group 4 – 9 years with a 39.2% rate. There ~~were~~ no significant differences ~~in the~~ infection rate between ~~the~~ age group 4 – 6 and ~~the group~~ 19 and above (39.2% ~~vs~~ ~~and~~ 41.6%). Age groups 7 – 9 (53.8%), 10 – 12 (56.9%) and 13 – 15 (50.5%) ~~had~~ ~~ve~~ no significant differences in rates of infection. The difference in mean infection rate was clearly pronounced in fig 1 with the highest mean infection rate fall between age group 10 – 12 (50.6d ± 4.04) and the least with 4 – 6 (14.8a ± 0.80) respectively (p – value = 0.000).

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Table 1: Prevalence (%) of Urinary Schistosomiasis within different age groups in Ilaje Local Government with means standard deviation (Mean ± S.D)

Age group	Number Examined	Number Infected (%)	Mean ± S.D
4 – 6	189	74 (39.2)	14.8a ± 0.80
7 – 9	373	201(53.8)	40.2cd ± 14.15
10 – 12	444	253(56.9)	50.6d ± 4.04
13 – 15	386	195(50.5)	39.0cd ± 8.86
16 – 18	398	162(40.7)	32.4b ± 8.20
19 and above	262	109(41.6)	21.8ab ± 4.66
Total	2052	994(48.4)	33.1 ± 13.24

(p – value = 0.000, $p < 0.05$, C.I

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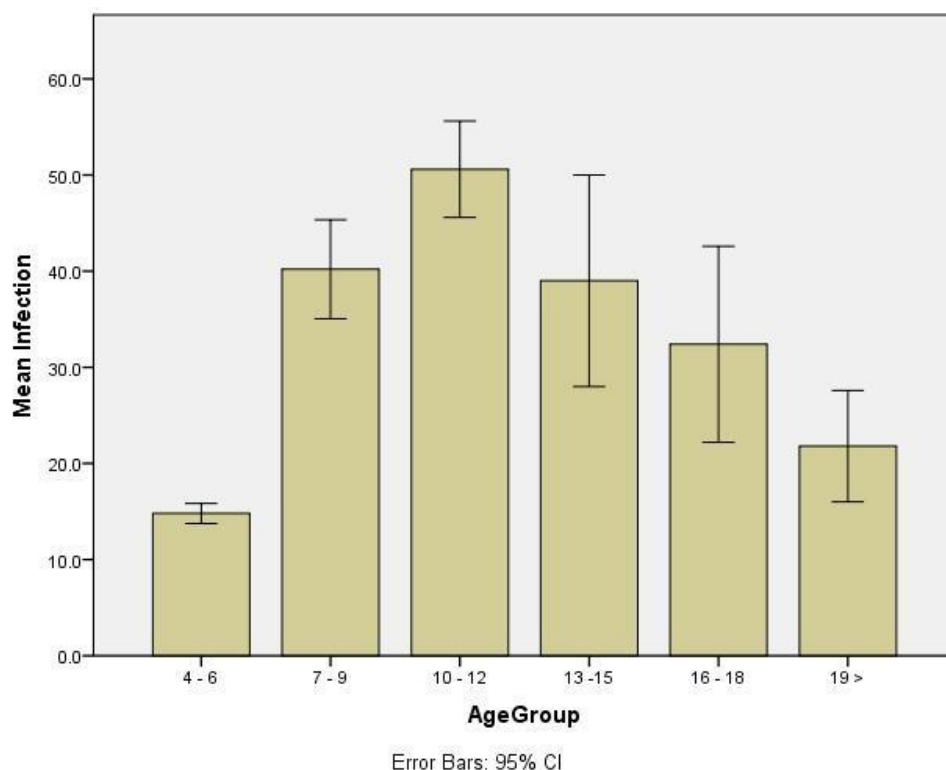


Fig 1: Mean infection of urinary schistosomiasis (*Schistosoma haematobium*) in respect to the age groups in the study ~~villages~~~~Areas~~.

Table 2 represent the overall percentage prevalence of urinary schistosomiasis between male and females examined in the study area. Out of one thousand and thirty (1030) males examined, five hundred and fifty three (553) were infected with *Schistosoma haematobium*, this represented a 53.7% infection rate of the total males examined from in this area. One thousand and twenty two (1022) females were also examined for the same pathogen (*Schistosoma haematobium*), four hundred and forty one (441) were infected (43.15%). This showed that the rate at which males-individual in the study were susceptible was a little higher compared to the females. Though, the infection rate was more close in both sexes (p – value = 0.364).

Table 2: Overall percentage prevalence of urinary schistosomiasis among the genders with the means standard deviation (Mean $\pm$ S.D)

Gender	Number Examined	Number Infected (%)	Mean $\pm$ S.D
Male	1030	553 (53.7)	92.2 $\pm$ 45.6
Female	1022	441(43.15)	73.5 $\pm$ 23.2
Total	2052	994(48.44)	82.8 $\pm$ 35.87

($X^2 = 12.0$, p – value = 0.364, $p > 0.05$)

Table 3 ~~showgave~~ an outlined of ~~the~~ prevalence of the disease (Urinary schistosomiasis) in ~~aeross~~ five (5) selected communities in the study area. The rate at which the infection occurs is not significantly different in all the five (5) selected study communities. Though Ode ~~—mahin has~~ve the highest prevalence ~~with of~~ 237_(52.2%) followed by Ugbo~~—nla~~ with 217_(49.9%). The least was recorded from Maran with 169 (44.5%) and Abe alala with 177_(45.9%), while

194_(48.9 %) ~~were~~as recorded ~~from in~~ Orioke~~—~~Iwamimo ($p > 0.05$). Table 4 ~~summarise~~represents the outcomes ~~of from~~ the groups~~—of individual~~ examined (Primary, Secondary~~ary~~ and Post~~—~~secondary school children) in the study area. Out of 562 primary school pupils examined, 275 were found to be infected with urinary schistosomiasis, this represented a 48.9% infection rate within the primary school children in this area. Primary school children fall in~~—~~between the ages of 4~~—~~6 and 7~~—~~9 years. ~~—~~Among

1069 ~~-~~secondary ~~-~~school ~~-~~children ~~-~~examined ~~-~~for urinary schistosomiasis, 545 (50.9%) were infected. The lowest rate was found amongst ~~st~~ ~~-~~the ~~-~~ post ~~-~~ secondary, where 421 ~~were~~as ~~-~~examined~~;~~ and 174(41.1%) were infected.

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Table 3: Prevalence (%) of urinary schistosomiasis within the study communities with mean ~~5~~ standard deviation (Mean $\pm$ S.D) of the infection

Community	Number Examined	Number Infected (%)	Mean $\pm$ S.D
Ori ~~—~~ Oke	397	194 (48.9)	32.3a $\pm$ 19.3
Ode ~~—~~ Mahin	454	237 (52.2)	39.5a $\pm$ 16.0
Ugbo ~~—~~ nla	435	217 (49.9)	36.2a $\pm$ 12.9
Abe ~~—~~ alala	386	177 (45.9)	29.5a $\pm$ 12.4
Maran ~~—~~	380	169 (44.5)	28.2a $\pm$ 11.8
Total ~~— —~~	2052	994 (48.4)	33.13 $\pm$

13.23 (p – value = 0.48, C. I = 95%, $p > 0.05$)

Table 4: Infection rate and mean standard deviation (Mean $\pm$ S.D) between primary school and secondary school pupils in study communities.

School	Number Examined	Number Infected (%)	Mean $\pm$ S.D
Primary School	562	275 (48.9)	27.5 $\pm$ 14.8
Secondary School	1069	545 (50.9)	44.8 $\pm$ 8.9
Post – secondary school	421	174 (41.1)	27.1 $\pm$ 8.4
Total	2052	994 (48.4)	33.1 $\pm$ 13.2

(p – value = 0.324, $p > 0.05$)

Table 5: Socio-economic factors and prevalence (%) of urinary schistosomiasis infection in study

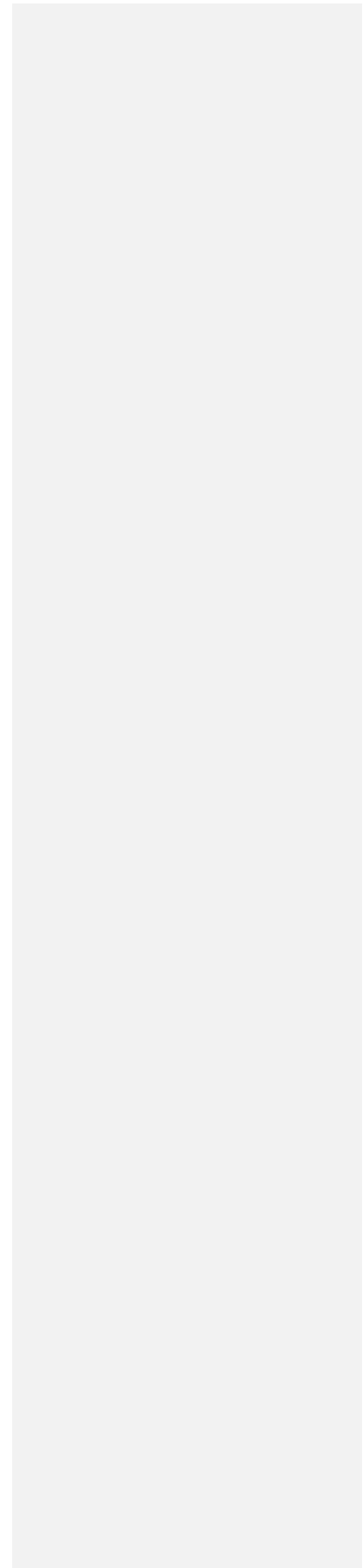
communities			
Factor	Number Examined	Number Infected (%)	p - value
<i>Source of water</i>			0.220
Rain	164	32 (19.5)	
Stream	678	462 (68.1)	
Well	328	109 (3.22)	
River	534	337 (63.1)	
Tap	348	54 (15.5)	
Total	2052	994 (48.4)	
<i>Water Contact</i>			0.224
Swimming	534	323 (60.5)	
Fishing	287	162 (56.5)	
Bathing	308	149 (48.4)	
Farming	349	134 (38.7)	
Washing	471	224 (47.5)	
No contact	103	2 (1.9)	
Total	2052	994 (48.8)	
<i>Parents-Fathers</i>			0.220
<i>Occupation</i>			
Teacher	164	29 (17.7)	
Fisher ~~man~~	923	646 (69.9)	
Health worker	103	9 (8.7)	
Farmer	513	208 (40.6)	
Others	349	102 (29.2)	
Total	2050	994 (48.8)	

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~~Discussion~~

Discussion



The study revealed a very high prevalence of urinary schistosomiasis in the study area. The ~~relative~~ high prevalence of schistosomiasis may be due to lack of proper sewage disposal facilities, and poverty as well as to ignorance. The results ~~of~~ from this study showed that the mean prevalence rate of urinary schistosomiasis ~~was to be~~ 48.4% in the study area. This ~~was~~ a little lower than ~~what~~ which was reported (65.0%) ~~from in~~ Ikepshi, a rural community in Edo State, Nigeria⁽¹⁵⁾ and ~~which~~ that was reported, (83.3%) ~~from by~~ Agi and Okafor in (2005). ~~The rates of prevalence rate in this study area showed that all different age groups were susceptible to the infection with the prevalence rate of infection being higher in males than in females between the age groups 7—9 and, 10—to—12 and 13 to—15 i.e. (ages 7 to —~~

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15). This is ~~similar~~ related to the findings of Oniya and Olofintoye (2009) in other parts of ~~other~~ Ondo State, where a 61.4% rate of schistosomiasis infection were reported.

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~~State, where 61.4% of schistosomiasis infection were reported.~~

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Ngele and Oyeukwu (2008) have also reported ~~from in~~ Ebonyi State, in Nigeria, ~~that~~ children we are more susceptible to urinary schistosomiasis than ~~the~~ adults. ~~In their~~ study, ~~young people~~ individuals appeared to be more exposed to this disease in ~~that~~ the area, this indicated a common pattern of behaviour and susceptibility for ~~these~~ children who ~~spending~~ their ~~spare break~~ time playing, swimming and fishing in the rivers, streams ~~and~~ ponds. Parental occupations also contributed to the prevalence of this infection, children of fishermen ~~were was~~ the most infected, ~~this~~ is due to constant contact with contaminated water bodies in the study area as well as their recreation activities. This report is also ~~consistently~~ related with the results reported by Okanla (1991) ~~from in~~ Ilorin, in Kwara State, Nigeria. Edunbgola (1980) has also long reported the relationship between occupation and schistosomiasis.

The prevalence of urinary schistosomiasis in respect to sex in the study communities fluctuated across the age groups. The males examined from the study area ~~had~~ the highest percentage ~~with of~~ 53.7%, ~~which~~ was 10.5% higher than ~~that~~ for the females examined (43.7%). This ~~was because~~ how ~~that~~ males in ~~this~~ the study areas were involve in activities that ~~make~~ them more exposed to the infection ~~more~~ than the females. This ~~was~~ contrary ~~gainst~~ to what was reported by Etim (1995). ~~who In Etim (1995) reported that,~~ females were more vulnerable due to the domestic activities that involveds the use of water for domestic

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purpose~~s~~, while this research work gave more details about parental ie. Father's occupation and its relationship with schistosomiasis infection.

Conclusion~~s~~ and Recommendation~~s~~

The isresults from this research~~-report~~ showed that urinary schistosomiasis infection iwas prevalent is the study area, and the infection rate iwas mainly influenced by parental ie father's occupation plusand lack of basic knowledge about the disease. It is therefore recommended that Primary health care workers in such local government areas should

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~~government area should~~ be trained in communication skills using the local dialect in order to conduct health education extension programmes at the ~~communities'~~ level. Also, appropriate drugs should be administered to the infected people in the area.

Ethical Consent and Approval

Before this research work was carried out, the authors ~~got seek~~ approval for the study from both departments of study and the ~~m~~Ministry of ~~h~~Health located in the ~~s~~State of the study. All~~The~~ samples were collected from the individuals s without any force attached.

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