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Water Contact Activities in Relation to the Prevalence Level of Urinary Schistosomiasis among School Age Children in Some Parts of Imo State, Nigeria

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Abstract**—** *A study was conducted to determine the water contact activities in relation to the prevalence level of Urinary Schistosomiasis among 2250 pupils from 45 Schools in some parts of Imo State, Nigeria. Structured questionnaire was used to elicit information on water contact activities such as swimming, fishing, washing, playing/bathing, collection of snail, fetching water and rice farming among the pupils. Out of the 2250 pupils, 602 (26.8%) were not involved in any of the water contact activities while 1648 (73.2%) were involved in one contact activity or the other with total Urinary Schistosomiasis infection level of 132(5.9%). Of all activities, those for swimming, playing/bathing and collection of snail had the highest and lowest Urinary Schistosomiasis infection of 33(12.5%), 38(12.5) and 4(3.4%) respectively. Result further revealed that School Children in Okigwe had the highest infection of 32(12.8%) while those from Ikeduru and Nwangele had least infection of 2(0.89%). Result also showed that there was a sex-related dependent among School Children with water contact activity with male having more infection of 75(8.3%) from most of the different sources examined while female had 57(7.6%). There was a significant age-related prevalence of S. haematobium among school children exposed to different possible focus of infection with children between 7-9years, 10-12years and 13-15years having total S. haematobium infection levels of 18(5.2%), 73(9.6%) and 41(7.4%), respectively. In view of the above results, it is therefore recommended that streams be treated with molluscicide to reduce the snail population, providing safe water supplies in villages to reduce as much as possible contact with infected water, providing sanitation facilitates and recreational facilities to be provided in schools to dissuade children from going to play in infected streams. Finally, health awareness should be intensified to create awareness on the mode of transmission of the parasite*.

Keywords**—** children, urinary, schistosomiasis, water contact.

I. INTRODUCTION

Schistosomiasisis the second common socio-economically devastating tropical parasitic disease after malaria affecting 240 million residents of developing countries (WHO, 2013). Despite the availability of effective drugs, the annual death rate is around 200,000 in Sub-Saharan Africa alone, making this group of parasite the most lethal worm in the world (Bamgbola, 2014). Africa account for over 85% of Schistosomiasis burden and Nigeria is the most endemic country in the world for urinary Schistosomiasiswith an estimated 25.83 million people infected (Okoli and Olabido, 1999; WHO, 2002). It is observed to be more prevalent in Nigeria than intestinal helminths because of the wide distribution of its snail host *Bulinus* species alongside indiscriminate urination of egg into water bodies containing the snail host (WHO, 1989). Possible consequences of its infection include haematuria, dysuria, nutritional deficiencies, lesions of the bladder, kidney failure and elevated risk of bladder cancer and in children growth retardation (Li *et al*. 2005). Accordingly the estimates for morbidity and mortality in affected populations are high (Li *et al.,* 2005). Schistosomiasis is more prevalent in school age children, adolescents and young adults who suffer from the highest morbidity and mortality (Hotez and Kamath, 2009). There are wide range of human behavioral activities associated with exposure to Schistosomiasis infection. Village primary school children are particularly vulnerable to Schistosomiasis because of their routine habit and lifestyle (Olaubi and Olukunle, 2013). It is obvious that knowledge of the pattern of exposure to infection is essential to an understanding of the epidemiology of *S. haematobium* infection (Ekwunife, 2004). Among water contact activities include swimming, fishing, irrigation, washing clothes and bathing (Ahmad *et al*. 2014). These activities are generally the norm which serves as potential source of transmission of *S. haematobium* (Olaubi and Olukunle, 2013).

Such activities have been reported to be responsible for the transmission of Schistosomiasis at Ruwansanyi dam site at Malumfashi area of Northern Nigeria (Bichi *et al*. 2003) Bichi *et al*. (2003) further reported that in the above study site, boys of less than 21years of age were found to account for more than 79% of the infection rate, also, 73.7% and 55.0% respectively were reported in Kadawa and GarunBabba, all in Kura Local Government area of Kano State, Nothern Nigeria. Muazu (2008) and Ekpo *et al*. (2010) also reported similar cases in areas with close proximity with contaminated waters among this age group in some parts of Kano State Nigeria.

Schistosomiasis according to Ogbeide *et al*. (2004) is often seen as a disease of the poor that typically afflicts rural dwellers especially school-age children, women and fishermen groups who lack access to safe water and sanitation and whose daily activities bring them into direct contact with infected water-sources. This view is also shared by Alozie and Anosike (2004) who reported that of equal importance to the transmission of water-borne diseases such as Schistosomiasis is the nature of human water contact activities. Alozie *et al*. (2004) further stated that fishing, swimming, washing clothes, bathing and playing in water have been indicated as the most

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important water contact activities which play major role in the prevalence and transmission of this disease.

Development of water reservoirs and their close proximity to most communities have been emphasized by authors such as Ofozie (2002), Scott *et al*. (2003) and Jeffrey *et al*. (2004) as an important factor enhancing water-contact activities and thereby increase in Schistosomiasis transmission.

II. METHODOLOGY

Study Area

Imo State is one of the thirty-six states of the Federal Republic of Nigeria. It is specifically in South Eastern Nigeria. It lies between geographic co-ordinates of latitude $4^0$45' and $7^0$15' N and longitude of $6^0$50'E with an area of about 5,100sq km (Imo State Government, 2010). The state has a common boundary with Abia state on the East, Anambra state on the North, Rivers state on the South. (Fig. 1).

People of Imo State are mostly public and civil servants, some are into agriculture while a good number are petty traders and casual workers. The State is divided into three zones, namely; Owerri zone, Orlu zone and Okigwe zone. Three Local Government Areas from each zone were selected for the study, namely; Oguta, Nwangele and Ohaji-Egbema Local Government Area were selected in Orlu zone. In Owerri zone, Ikeduru, Ngor-Okpala and Ezinihitte Local Government Area were selected. However in Okigwe zone, Isiala Mbano, Onuimo and Okigwe Local Government Areas were selected. In each Local Government, five schools located in five different autonomous communities were visited.

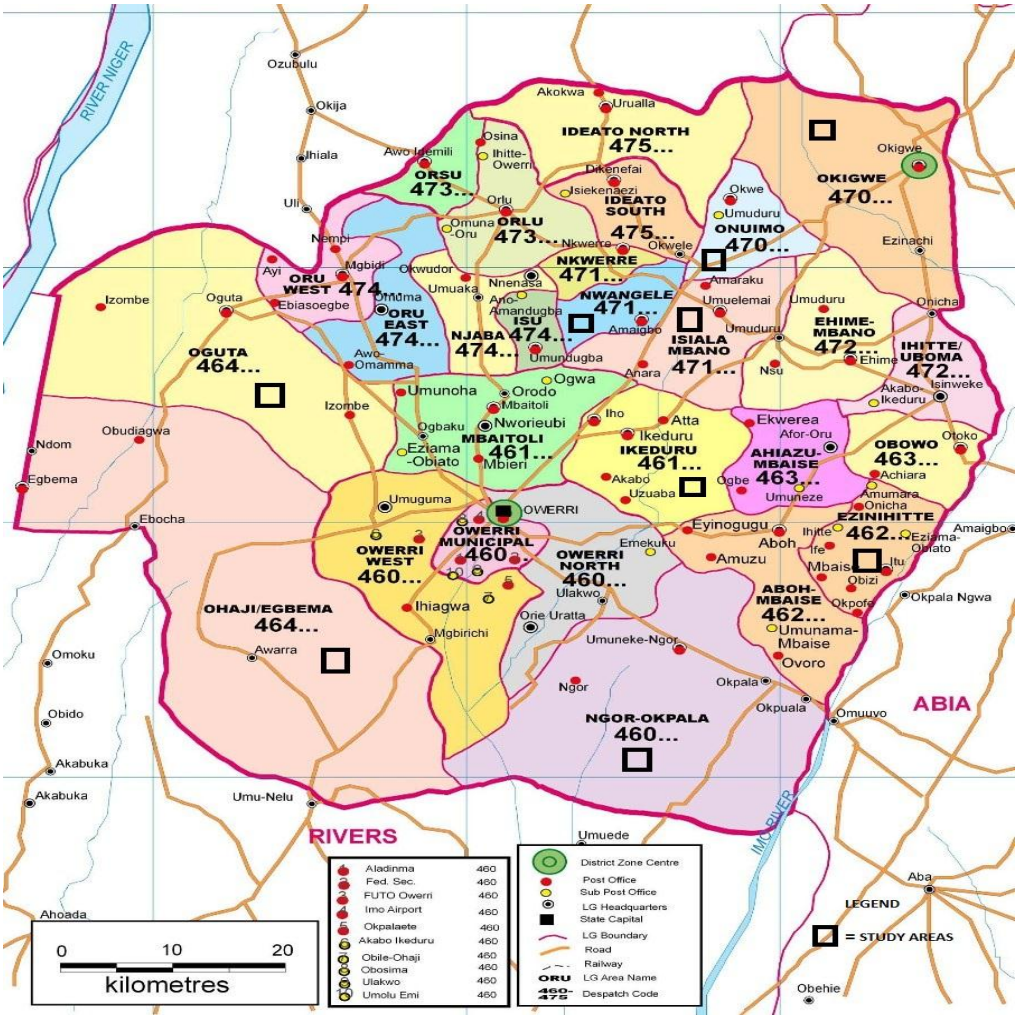

Fig. 1. Map of Imo State showing study areas.

Source: IMSG, 2010

These Local Governments were considered based on the low level of social amenities e.g., portable water in such Local Government Areas. Additionally, level of agricultural and fishing activities and presence of either natural or man-made water bodies were also considered. Communities and villages in these Local Government Areas sampled were also selected based on their proximity to known endemic foci of the disease (Anosike *et al.* 2001*).*

Study Population

Two thousand two hundred and fifty children between the age bracket of seven to fifteen years were examined for the

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study. Out of this number examined, two hundred and fifty children were examined from each Local Government Area and out of this number examined from each Local Government; fifty children were examined from each school located in each autonomous community visited, in accordance with the WHO guidelines.

Ethical Approval and Informed Consent

The study was approved by the Post Graduate Board of the Department of Animal and Environmental Biology Imo State University Owerri. With introduction letter from supervisors to State Ministry of Health and authority letters from the Ministry of Health and State Universal Basic Education Board to Local Government Health Units and subsequent authority letter from Local Government Health Units to Head Teacher of schools to be visited (appendix 1), a pre-survey visit was made to the study area using the approach of Hassan *et al.* (2012). During the pre-survey visit, there was discussion with community heads, Traditional rulers, Local Government health centers, headmasters and teachers of different schools in the villages and communities of the Local Government Areas selected for the study. Additionally, villages and communities were educated on the significance of the study.

Questionnaire Administration

A questionnaire containing questions relevant to urinary schistosomiasis was issued to each child examined. It was aimed at obtaining information on; sex, age, community, Local Government Area, name of school, Knowledge of signs and symptoms of schistosomiasis, awareness of schistosomiasis and its mode of transmission, levels of parental education and occupation. Additional information on the risk factors where sought which includes; source of water for domestic use, such as well, pipe born water/mono pump, bore hole and river/stream/lake. Type of water contact activities such as swimming, fishing, washing, playing/bathing, collection of snail, fetching water, rice farming was also determined. Each questionnaire was accompanied by a corresponding urine specimen (Rine *et al.* 2013). The questionnaire was administered with the help of trained field assistants. In all, there were thirty trained field assistants made up of teachers, volunteers from communities and undergraduate students. They were initially trained to enable them understand methods of sample and data collection, objective of the study, need to remain secretive.
During questionnaire administration, class teachers and trained field assistants mainly those from communities translated some of the questions and communicated to respondents from lower classes in the Local language for better understanding, while those in higher classes were directed to appropriately fill the form.

Statistical Analysis

Statistical analysis was done using chi square, correlation and simple percentage.

TABLE 3.1. The relationship between water contact activities and the prevalence of *S. Haematobium* among the study population.

Water contact activities	**No of children**	**No % infected with *S. haematobium* per activity**
Swimming	264	33(12.5)
Fishing	125	5(4.0)
Washing	234	22(9.4)
Playing/Bathing	302	38(12.5)
Collection of snail	117	4(3.4)
Fetching water	255	14(5.5)
Rice farming	101	6(5.9)
More than one activity	250	10(4.0)
None of the above	602	0(0.0)
Total	**2250**	**132(5.9)**

TABLE 3.2. Water contact activities in relation to the distribution of *Schistosoma Haematobium* infection among school age children in different local government areas studied.

LGA	**No of children examined**	**No % of children involved in water contact activities**	**No(%) of children infected with *S. haematobium***	**Water contact activities**							
				Swimming	**Fishing**	**Washing**	**Playing/bathing**	**Collection of Snail**	**Fetching water**	**Rice farming**	**More than one activity**
IsialaMbano	250	220(88.0)	23(9.2)	35(15.9)	5(2.3)	40(18.2)	49(22.3)	3(1.4)	43(19.5)	0(0.0)	45(20.5)
Onuimo	250	232(92.8)	27(10.8)	33(14.2)	8(3.4)	31(13.4)	47(20.3)	6(2.6)	42(18.1)	27(11.6)	38(16.4)
Okigwe	250	238(95.2)	32(12.8)	31(13.0)	28(11.8)	348(14.3)	40(16.8)	7(2.9)	28(11.8)	38(16.0)	32(13.4)
Ngor Okpala	250	204(91.6)	15(6.0)	28(13.7)	12(5.9)	42(20.6)	36(17.6)	8(3.9)	31(15.2)	9(4.4)	38(18.6)
Ikeduru	250	97(38.8)	2(0.8)	10(10.3)	6(6.2)	12(12.4)	21(21.6)	0(0.0)	20(20.6)	0(0.0)	28(28.9)
Ezinihitte Mbaise	250	175(70.0)	8(3.2)	29(16.6)	15(8.6)	18(10.3)	51(29.1)	3(1.7)	17(9.7)	0(0.0)	42(24.0)
Oguta	250	215(86.0)	17(6.8)	35(16.3)	45(20.9)	11(5.1)	20(9.3)	40(18.6)	19(8.8)	27(12.6)	18(8.4)
Nwangele	250	101(40.4)	2(0.8)	15(14.9)	0(0.0)	15(14.9)	26(25.7)	20(19.8)	25(24.7)	0(0.0)	0(0.0)
Ohaji/Egbema	250	166(66.6)	6(2.4)	48(28.9)	6(3.6)	31(18.7)	12(7.2)	30(18.1)	30(18.1)	0(0.0)	9(5.4)
Total	**2250**	**1648(73.2)**	**132(5.9)**	**264(16.0)**	**125(7.6)**	**234(14.2)**	**302(18.3)**	**117(7.1)**	**255(15.5)**	**101(6.1)**	**250(15.2)**

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TABLE 3.3. Occurrence of water contact activities and associated *Schistosoma haematobium* infection among school different local government areas studied.

LGA	No % of children involved in water contact activities	Water contact activities								
		Swimming	Fishing	Washing	Playing/ bathing	Collection of Snail	Fetching Water	Rice farming	More than one activity	Total Infected (%)
Isiala Mbano	220(88.0)	5/35*=2.8	0/5= 0.0	5/40=2.8	7/4= 3.2	0/3= 0.0	2/43=0.9	0/0= 0.0	4/45=20.5	23 (10.4)
Onuimo	232(92.8)	7/33=21.1	2/8=25	4/31=12.9	8/47=17.0	0/6=0.0	3/42=71.1	1/27=3.7	2/38=5.2	27(11.6)
Okigwe	238(95.2)	9/31=29.0	1/28=3.5	6/34=14.3	9/40=22.5	1/7=14.2	4/28=14.2	2/38=16.0	2/32=2.25	32(13.4)
Ngor Okpala	204(91.6)	3/38=10.7	0/12=0.0	2/42=4.7	5/36=13.8	0/8=0.0	2/31=6.4	0/9=0.0	3/38=7.8	15(7.3)
Ikeduru	97(38.8)	1/10=10.0	0/0=0.0	1/12=8.3	0/21=0.0	0/0=0.0	0/20=0.0	0/0=0.0	0/8=0.0	2(2.1)
Ezinihitte Mbaise	175(70.0)	2/29=6.8	0/15=0.0	1/18=5.5	2/51=3.9	0/3=0.0	2/17=11.7	0/0=0.0	1/42=24.0	8(4.6)
Oguta	215(86.0)	4/35=11.1	2/45=4.4	2/11=18.1	4/20=20.0	2/40=5.0	0/19=0.0	3/27=11.1	0/18=0.0	17(7.9)
Nwangele	101(40.4)	1/15=6.6	0/0=0.0	0/15=0.0	1/26=3.8	0/20=0.0	2/25=8.0	0/0=0.0	0/9=0.0	2(2.0)
Ohaji/Egbema	166(66.6)	1/48=2.2	0/6=0.0	1/31=3.2	2/27=3.2	1/30=3.3	1/30=3.3	0/0=0.0	0/9=0.0	6(3.6)
Total	1648(73.2)	33/264=12.5	2/125=4.0	22/234=9.4	38/302=12.5	4/117=3.4	16/255=5.9	6/101=5.4	12/250=4.8	132(8.0)

*denominator= Number infected, Numerator= Number in contact with water

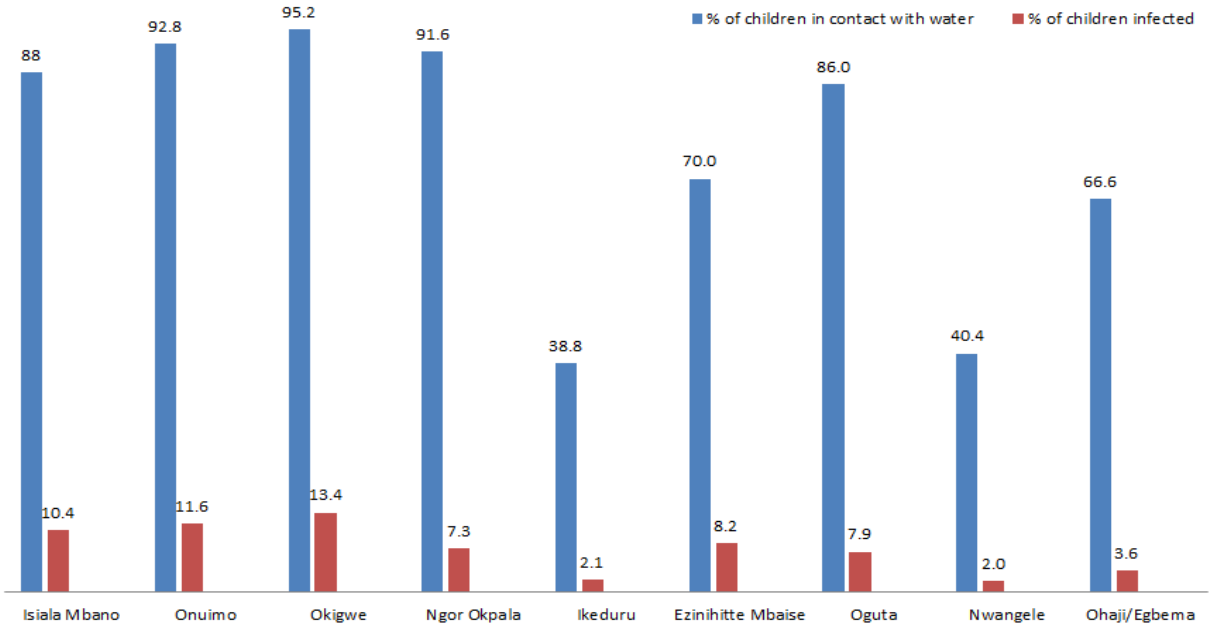

Fig. 1. Occurrence of water contact activities and associated infection rate.

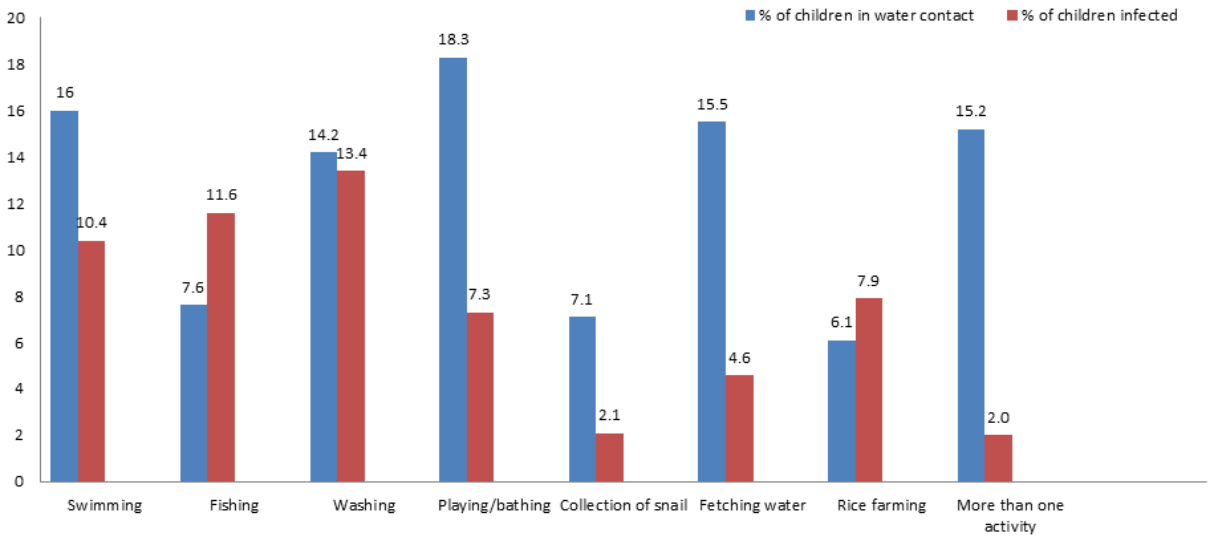

Fig. 2. Occurrence of water contact activities and associated infection.

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TABLE 3.4. Water contact activities in relation to the distribution of *Schistosoma haematobium* infection among school age children in Isiala-Mbano L.G.A.

Name of Schools	No of children examined	No of children involved in water contact activities(%)	Water Contact Activities								No of children infected with *S. haematobium*
			Swimming	Fishing	Washing	Playing/bathing	Collection of snail	Fetching water	Rice farming	More than one activity	
Central Sch. Oka	50	50(100.0)	3(6.0)	0(0.0)	2(4.0)	4(8.0)	0(0.0)	1(2.0)	0(0.0)	3(6.0)	13(26.0)
Central Sch. Amauzari	50	47(94.0)	1(2.1)	0(0.0)	2(4.2)	2(4.2)	0.(0.0)	1(2.1)	0(0.0)	1(2.1)	7(14.0)
Okwanta Pri. Sch. Obollo	50	45(90.0)	1(2.2)	0(0.0)	0(0.0)	1(2.2)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(4.0)
Central Sch. Anara	50	40(80.0)	0(0.0)	0(0.0)	1(2.5)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(2.0)
Central Sch. Amaraku	50	38(76.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Total	**250**	**220(88.0)**	**5(2.3)**	**0(0.0)**	**5(2.3)**	**7(3.2)**	**0(0.0)**	**2(1.0)**	**0(0.0)**	**4(1.8)**	**23(9.2)**

TABLE 3.5. Water contact activities in relation to the distribution of *Schistosoma haematobium* infection among school age children in Onuimo L.G.A.

Name of Schools	No of children examined	No of children involved in water contact activities(%)	Water Contact Activities								No of children infected with *S. haematobium*
			Swimming	Fishing	Washing	Playing/bathing	Collection of snail	Fetching water	Rice farming	More than one activity	
Dev. Pri. Sch. Umuogele	50	48(96.0)	4(8.3)	1(2.1)	2(4.2)	5(10.4)	0(0.0)	2(4.2)	0(0.0)	1(2.1)	15(30.0)
Com. Pri. Sch. Okwelle	50	46(92.0)	2(4.3)	1(2.2)	1(2.2)	3(6.5)	0.(0.0)	1(2.2)	1(2.2)	1(2.2)	10(20.0)
Com. Pri. Sch. UmuchekeOkwe.	50	46(92.0)	1(2.1)	0(0.0)	1(2.2)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(4.0)
Okai Community School	50	46(92.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
St. Kelvin Pri. Sch. Umuokwaraiyi	50	46(92.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Total	250	232(92.8)	7(3.0)	2(0.9)	4(1.7)	8(3.4)	0(0.0)	3(1.3)	1(0.4)	2(0.9)	27(10.8)

TABLE 3.6. Water contact activities in relation to the distribution of *Schistosoma haematobium* infection among school age children in Okigwe L.G.A.

Name of Schools	No of children examined	No of children involved in water contact activities(%)	Water Contact Activities								No of children infected with *S. haematobium*
			Swimming	Fishing	Washing	Playing/bathing	Collection of snail	Fetching water	Rice farming	More than one activity	
Ndiuche Com. Pri. Sch. Amauro	50	49(98.0)	5(10.2)	0(0.0)	4(8.2)	6(12.2)	0(0.0)	3(6.1)	0(0.0)	0(0.0)	18(36.0)
Ezinachi Central Sch. Amajaranta Ezinachi	50	48(96.0)	2(4.2)	1(2.1)	2(4.2)	2(4.2)	2(2.1)	1(2.1)	0(0.0)	0(0.0)	9(18.0)
Ndiamazu Ikpaocha Model Central Sch.	50	48(96.0)	1(2.1)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(4.2)	0(0.0)	3(6.0)
Com. Pri. Sch. Ihube	50	47(94.0)	1(2.1)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(2.0)
Ugwuaku Community Pri. Sch. Ugwuaku	50	46(92.0)	0(0.0)	0(0.0)	0(0.0)	1(2.2)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(2.0)
Total	**250**	**238(95.2)**	**9(3.8)**	**1(0.4)**	**6(2.5)**	**9(3.8)**	**1(0.4)**	**4(1.7)**	**2(0.8)**	**0(0.0)**	**32(12.8)**

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TABLE 3.7. Water contact activities in relation to the distribution of *Schistosoma haematobium* infection among school age children in Ngor Okpala L.G.A.

Name of Schools	No of children examined	No of children involved in water contact activities (%)	Water Contact Activities								No of children infected with *S. haematobium*
			Swimming	Fishing	Washing	Playing/bathing	Collection of snail	Fetching water	Rice farming	More than one activity	
Com. Sch. Umuokoro Eziama	50	46(92.0)	2(4.3)	0(0.0)	1(2.8)	3(6.5)	0(0.0)	0(0.0)	0(0.0)	2(4.3)	8(16.0)
Central Sch. Umuekwune	50	43(86.0)	1(2.3)	0(0.0)	1(2.3)	1(2.3)	0(0.0)	1(2.3)	0(0.0)	0(0.0)	4(8.0)
Central Sch. Obiangwu	50	39(78.0)	0(0.0)	0(0.0)	0(0.0)	1(2.6)	0(0.0)	1(2.6)	0(0.0)	1(2.6)	3(6.0)
Central Sch. Logara	50	38(76.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Umuohie Pri. Sch. Umuohie	50	38(76.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Total	**250**	**204(81.6)**	**3(1.5)**	**0(0.0)**	**2(1.0)**	**5(2.5)**	**0(0.0)**	**2(1.0)**	**0(0.0)**	**3(1.5)**	**15(6.0)**

TABLE 3.8. Water contact activities in relation to the distribution of *Schistosoma haematobium* infection among school age children in Ikeduru L.G.A.

Name of Schools	No of children examined	No of children involved in water contact activities (%)	Water Contact Activities								No of children infected with *S. haematobium*
			Swimming	Fishing	Washing	Playing/bathing	Collection of snail	Fetching water	Rice farming	More than one activity	
Central Sch. Avuvu	50	15(30.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Pri. Sch. UzoagbaUmueme	50	12(24.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Pri. Sch. Umudim	50	18(36.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
St. Peters' Pri. Sch. Umuziri Inyishi	50	37(24.0)	1(2.7)	0(0.0)	1(2.7)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(4.0)
Central Sch. Amaimo	50	15(30.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Total	250	97(38.8)	1(1.0)	0(0.0)	1(1.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(0.8)

Infection was recorded only in St. Peters' Pri. Sch. Umuziri Inyishi among the exposed students (4.0%)

TABLE 3.9. Water contact activities in relation to the distribution of *Schistosoma haematobium* infection among school age children in Ezinihitte L.G.A.

Name of Schools	No of children examined	No of children involved in water contact activities (%)	Water Contact Activities								No of children infected with *S. haematobium*
			Swimming	Fishing	Washing	Playing/bathing	Collection of snail	Fetching water	Rice farming	More than one activity	
Com. Sch. Umuawada Onicha	50	47(94.0)	2(4.2)	0(0.0)	0(0.0)	1(2.1)	0(0.0)	2(4.2)	0(0.0)	1(2.1)	6(12.0)
Com. Sch. Amumara	50	46(92.0)	0(0.0)	0(0.0)	1(2.2)	1(2.2)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(4.0)
Central Sch. Umunama	50	29(58.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Com. Sch. Akpodim	50	27(54.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Town Sch. Eziudo	50	26(52.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Total	250	175(70.0)	2(1.1)	0(0.0)	1(0.6)	2(1.1)	0(0.0)	2(1.1)	0(0.0)	1(0.6)	8(3.2)

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TABLE 3.10. Water contact activities in relation to the distribution of *Schistosoma haematobium* infection among school age children in Oguta L.G.A.

Name of Schools	No of children examined	No of children involved in water contact activities (%)	Water Contact Activities								No of children infected with *S. haematobium*
			Swimming	Fishing	Washing	Playing/bathing	Collection of snail	Fetching water	Rice farming	More than one activity	
Pri. Sch. Ejemekwuru Akabor	50	50(100.0)	2(4.0)	1(2.0)	0(0.0)	3(6.0)	2(4.0)	0(0.0)	3(6.0)	0(0.0)	11(22.0)
Agbosi Pri. Sch. Izombe	50	43(86.0)	1(2.3)	0(0.0)	1(2.3)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(4.0)
Pri. Sch. Umuefeke Agwa	50	39(78.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Pri. Sch. Umudikaogu Awa	50	46(92.0)	1(2.2)	1(2.2)	1(2.2)	1(2.2)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	4(8.0)
Com. Sch. Egbuoma Ubaraemehi	50	37(74.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Total	**250**	**215**(86.0)	**4(1.9)**	**2(0.9)**	**2(0.9)**	**4(1.9)**	**2(0.9)**	**0(0.0)**	**3(1.4)**	**0(0.0)**	**17(6.8)**

TABLE 3.11. Water contact activities in relation to the distribution of *Schistosoma haematobium* infection among school age children in Nwangele L.G.A.

Name of Schools	No of children examined	No of children involved in water contact activities (%)	Water Contact Activities								No of children infected with *S. haematobium*
			Swimming	Fishing	Washing	Playing/bathing	Collection of snail	Fetching water	Rice farming	More than one activity	
Town Sch. Amaigbo	50	35(70.0)	1(2.8)	0(0.0)	0(0.0)	1(2.8)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(4.0)
Town Sch. Umudurunna	50	18(36.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Com. Sch. UmuorluIsu	50	20(40.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Central Sch. Abajah	50	10(20.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Com. Sch. Umuakara	50	12(24.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Total	250	101(40.4)	1(1.0)	0(0.0)	0(0.0)	1(1.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(0.8)

TABLE 3.12. Water contact activities in relation to the distribution of *Schistosoma haematobium* infection among school age children in Ohaji-Egbema L.G.A.

Name of Schools	No of children examined	No of children involved in water contact activities (%)	Water Contact Activities								No of children infected with *S. haematobium*
			Swimming	Fishing	Washing	Playing/bathing	Collection of snail	Fetching water	Rice farming	More than one activity	
Com. Pri. Sch. Abacheke	50	46(92.0)	1(2.2)	0(0.0)	0(0.0)	2(4.3)	1(2.2)	1(2.2)	0(0.0)	0(0.0)	5(10.0)
Pri Sch. Obitti	50	30(60.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Com. Pri. Sch. Opuoma	50	28(56.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Pri. Sch. Umuboke Obile	50	26(52.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Pri. Sch. Umuokanna	50	36(72.0)	0(0.0)	0(0.0)	1(2.8)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(2.0)
Total	250	166(66.4)	1(0.6)	0(0.0)	1(0.6)	2(1.2)	1(0.6)	1(0.6)	0(0.0)	0(0.0)	6(2.4)

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TABLE 3.13. Sex related pattern of water contact activities by school age children with *Schistosoma haematobium* infection in the study area.

Water contact activities	Total of children involved in water contact activities	Male		Female		Total No(%) infected with *S. haematobium* per activity
		No of children examined	No (%) of children infected with *S. haematobium*	No of children examined	No (%) of children infected with *S. haematobium*	
Swimming	264	152	20(13.2)	112	13(11.6)	33(12.5)
Fishing	125	75	4(5.3)	50	1(2.0)	5(4.0)
Washing	234	125	6(4.8)	106	16(15.1)	22(9.4)
Playing/bathing	302	162	29(17.9)	140	9(6.4)	38(12.5)
Collection of Snail	117	62	1(1.6)	55	3(5.5)	4(3.4)
Fetching water	255	123	5(4.1)	132	9(6.8)	14(5.5)
Rice farming	101	63	3(4.8)	38	3(7.9)	6(5.9)
More than one activity	250	137	7(5.1)	113	3(2.7)	10(4.0)
Total	**1648**	**902**	**75(8.3)**	**746**	**57(7.6)**	**132(8.0)**

TABLE 3.14. Age related pattern of water contact activities by school age children infected with *Schistosoma haematobium*in the study area

Water Contact activities	Total no of children examined	Age Groups (Years)						Total No (%) infected with *S. haematobium* per contact activity
		7-9		10-12		13-15		
		No of children examined	No % of children infected	No of children examined	No of children infected	No of children examined	No of children infected	
Swimming	264	53	5(9.4)	150	20(13.3)	61	8(13.1)	33(12.5)
Fishing	123	19	0(0.0)	44	1(2.3)	62	4(6.5)	5(4.0)
Washing	234	49	3(6.1)	96	13(13.5)	89	6(6.7)	22(9.4)
Playing/bathing	302	53	5(9.4)	194	24(12.4)	55	9(16.4)	38(12.5)
Collection of snail	117	9	0(0.0)	27	1(3.7)	81	3(3.7)	4(3.4)
Fetching water	255	80	2(2.5)	103	8(7.8)	72	4(5.6)	14(5.5)
Rice farming	101	23	0(0.0)	27	2(7.4)	51	4(7.8)	6(5.9)
More than one activity	250	62	3(4.8)	107	4(3.7)	81	3(3.7)	10(4.0)
Total	**1648**	**348**	**18(5.2)**	**748**	**73(9.6)**	**552**	**41(7.4)**	**132(8.00**

III. DISCUSSION

The major water contact activity observed among school age children examined and their relationship with the prevalence of *Shistosoma haematobium* among the study population include; swimming (12.5%), playing/bathing (12.5), washing (9.4%), rice farming (5.9%), fetching water (5.5%), fishing (4.0%) and collection of snail (3.4%) while *Shistosoma haematobium* egg was not recovered from none children without water contact. The result on water contact pattern in this study is in agreement with Onwuliri *et al*. (2005) which stated that the impact of cultural limitations in the transmission of schistosomiasis is shown in the gathering of rural African women and their kids as the local sources of water where they do their laundry, wash household utensils, draw water for domestic use and bath, a custom that is considered as an essential part of the social activity of the village. Swimming (12.5%), playing/bathing (12.5%) and washing (9.4%) accounted for more infection, this is probably due to longer duration of stay in a water body. Moreover, these activities are often taking up by children within the age bracket under study. Fishing (4.0%), collection of snail (3.4%) and rice farming (5.9%) accounted for lower prevalence of urinary schistosomiasis because these activities are mostly taking up by elderly people. Lower level of prevalence due to fetching of water may be attributed to short duration associated with this type of contact activity.

From Table, it is also shown, that local government such as Okigwe with highest percentage of children (95.2%) involved in water contact activity also recorded highest percentage of children (12.8%) infected with *S. haematobium*. The same trend is applicable to Onuimo (92.8%), Isiala-Mbanno (88.0%) and Oguta (86.0%) that recorded percentage infection level of 10.8%, 9.2% and 6.8%, respectively. On the other hand, Ikeduru and Nwangele locl government areas, with low levels of water contact actitivities of 38.8% and 40.4%, respectively had low infection level of 0.8% each. This trend is also in accord with findings by Onwuliri *et al*. (2005).

Infection through water contact activity was sex-dependent (x^2=220, α=0.05, df= 8). In all, more males (8.3%) than females' (7.6%) were infected due to their participation in most water contact activities. Significant risk factors such as swimming, fishing, and playing/bathing in rivers have been implicated from the study to be responsible for the high intensity of urinary schistosomiasis among male children. Furthermore, more males (5.1%) than females (2.7%) were observed to participate in more than one contact activity. All these factors contributed in increasing the rates at which male children visit streams, ponds and rivers. These resulted to higher prevalence of infection in males than females that recorded higher frequency in washing, collection of snail and fetching of water that does not require frequent visit to river and with short duration.

Results also revealed significant age-related prevalence of *S. haematobium* among children exposed to different possible foci of infection. Children within the age bracket 10-12years recorded more infection (9.6%) than those in 13-15years (7.4%) and finally those in 7-9years (5.2%). This trend of result could be due to the involvement within 10-12years in

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most of the water contact activities than those in 13-15years who is addition may have more improved habits and development of naturally acquired anti- *S. haematobium* antibodies as age progresses (Ekpo *et al*. 2010). Children within 7-9years had least prevalence of infection probably because; they have low level of exposure and are still under the custardy of their parents because they are been restricted, monitored and supervised by their parents.

IV. Conclusion

Based on the findings of this study, which showed that the prevalence of infection in the areas is moderate and the infection depends on sex, age and sources of water supply, it is hereby recommended that schistosomiasis control program in the state should be embarked upon to educate the populace on risk factor that predispose one to urinary schistosomiasis and the need for proper sewage disposal, the state government should provide toilet facilities at certain junction in the area and in the market found within the area and also pip borne water to rural areas to reduce the observed ate of infection with *S.haematobium* in the study area.

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