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Profile of a one year epidemiological study of urinary schistosomiasis in two Local Government Areas (LGAs) of Benue State, Nigeria

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Abstract

Urinary schistosomiasis is endemic in Nigeria and continues to pose public health challenges especially in inhabitants of rural areas. In an attempt to establish the prevalence of urinary schistosomiasis in relation to epidemiological factors among children in Buruku and Katsina-Ala local government areas (LGAs) of Benue State, Nigeria, 1,124 urine samples were collected from pre-school, primary and secondary school children between November 2008 and September 2009. Urine filtration technique using polycarbonate membrane filters was employed to determine presence of *Schistosoma haematobium* eggs in urine. Questionnaires were also administered to children to collect information on socio-demographic data and water-contact activities. An overall prevalence rate of 466(41.5%) was observed out of the 1,124 children examined. Secondary school children recorded higher prevalence rate of 45.4% than primary school children (38.6%) and pre-school children (37.1%). A statistically significant difference in prevalence was observed between the three categories of children examined (χ^2 = 92.8, p = *0.000*). Males had higher prevalence rate (48.6%) than females (37.2%), with a statistically significance difference in prevalence (χ^2 = 7.9, p = *0.005*). The age group >18 years recorded the highest prevalence rate of 48.6%, while the least prevalence rate of 37.0% was observed in the 3-7 years age groups and no significant difference was observed between the different age groups (χ^2 = 8.9, p = *0.31*). Monthly prevalences showed that the months of May 2009 and June 2009 recorded the highest prevalence rates with 49.2% and 52.7% respectively. However, no significant difference in prevalence was observed between months (χ^2 = 20.6, p = *0.14*). With regards to educational background of the children' parents, children whose parents have no formal education and whose parents have primary education recorded the highest prevalences of 47.0% and 43.8% respectively with a significant difference (χ^2 = 20.0, p = *0.000*). With regards to occupational background children whose parents' occupation is farming had the highest prevalence (44.0%), while children of non-farmers had 35%. The difference observed in prevalences between occupation of the children parents was significant (χ^2 = 33.7, p = *0.000*). With regards to water contact activities, least prevalence was observed among children that go swimming & fishing (42.8%). Children that played/bathed washed and collected edible snails from infested water bodies (ponds and streams) had the highest prevalence rates of 87.1%, 86.1% and 74.7% respectively. Such children especially those who played/bathed and collected fresh water snails had higher risks of infection with urinary schistosomiasis in the area (odd ratio (OR) of 2.16 and 2.00 respectively and confidence interval (C.I) of 1.51-3.10 and 1.45-2.76 respectively at p<*0.000* level). The study draws attention to the health hazards posed by urinary schistosomiasis among children in Buruku and Katsina-Ala LGAs of Benue State. The urgent need for a decisive control intervention to stem this problem cannot be overemphasized.

Key words: prevalence, urinary schistosomiasis, Buruku, Benue State, Nigeria

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Introduction

Urinary Schistosomiasis due *Schistosoma haematobium* is a significant cause of clinical morbidity and disability in the endemic countries of Africa and the Middle East, where more than 110 million people are infected (Van der Werf and De Vlas, 2001).

Recent reports of the World Health Organization (W.H.O) estimated that about 779 million people in 76 tropical and subtropical countries are at risk of schistosomiasis (Steinmann *et al*., 2006). Over 207 million people in these countries are infected. Of these, 120 million are symptomatic, with 20 million having severe clinical disease (Engels *et al*., 2002 and Steinmann *et al*., 2006). Persons at risk include those who live or travel in areas where schistosomiasis occurs and who come into contact with fresh water where the appropriate type of snail intermediate host is present.

In sub-Sahara Africa 192 million are estimated to be infected with the two forms of schistosomiasis (intestinal and urinary) and Nigeria recording the largest number with about 29 million cases (Hotez and Kamah, 2009).

The highest prevalences and intensities of human schistosomiasis occur in school-aged children, adolescents, and young adults who also suffer from the highest morbidity and mortality (Hotez and Kamah, 2009). Approximately two-thirds of the schistosomiasis cases are due to infection caused by *Schistosoma haematobium*, which represents an important cause of severe urinary tract disease (van der Werf *et al*., 2003).

In Nigeria, the national policy on schistosomiasis control has adopted Praziquantel as the main drug to be used in the control strategy aimed at reducing morbidity. It was just recently that an assessment was made on different channels for Praziquantel delivery in mass treatment effort (Mafe *et al*., 2005). Unfortunately not much has been achieved in the control of urinary schistosomiasis in Nigeria largely because the disease is mainly a rural occupational disease that affects people engaged in agriculture or fishing and other people residing in rural agricultural and peri-urban areas. There is a high risk level of becoming infected as a result of low literacy level, poverty, sub-standard hygiene, and inadequate public infrastructure. Another important factor that has adversely affected control efforts is the lack of epidemiological data and basic information regarding preventive measures towards the disease in many rural communities with high risk groups particularly school age children.

The dearth of specific baseline epidemiological data on *S. haematobium* infection in Buruku and Katsina-Ala LGAs communities can adversely affect adequate patient evaluation, management and control programmes. This study was therefore undertaken in order to determine the level of infection and factors associated with the disease among children. These can be used to plan strategies for control programme for the area in accordance with W.H.O recommendations.

Materials and Methods

Study Area

The study was conducted in two contiguous local government areas (Buruku and Katsina-Ala) of Benue State. The State is also endemic for other parasitic diseases like the different forms of filariasis, intestinal parasites and malaria (Atu and Galadima, 2003; Houmsou *et al*., 2010a, b, c; Amuta *et al*., 2010a,b). The selection of the areas was based on previous reports from local hospitals, clinics and health centers where cases of urinary schistosomiasis were common particularly among school children. The relative position of the two Local Government Areas in Benue State is about the Middle Eastern part of the State. The areas are drained by streams and rivers among which river Katsina-Ala is the biggest; ponds are also found all over the areas especially during the wet months (**Figure 1**). The areas have a monthly temperature ranging from 27°- 38°C. The areas receive 900-1000 mm of rain fall annually with two distinct seasons: the dry season starts in late October and usually ends by March, while the rainy season which lasts from mid-April to early October is the period of intensive agricultural activities when the indigenous people of the areas mainly Tivs and Etulos are engaged in fishing and farming of crops like yams, guinea corn, maize, rice, sesame and cassava which are the principal food crop and cash crop. Water contact activities like bathing, swimming and washing in the streams are common. Educational status of most of the inhabitants is generally very low.

Study Population

Prior to the commencement of the research, permission was sought from the Local Government Chairmen and Local Government Education Authorities of both areas. Announcements were made in churches and a pre-survey visit was made to the communities, while consultation/discussions were held with communities' heads that assisted in mobilizing the people for study. Six communities and 10 schools (6 primary and 4 secondary) were visited. The communities included: Sev-Av, Mbajor and Ishan from Buruku LGA; Mbayer, Ikowe and Tavachan from Katsina-Ala. The schools visited were: St Peters Primary school, NKST Ishan primary school, Roman Catholic Mission (RCM) primary school Abwa, Binev community Secondary school and Tombo community secondary school from Buruku LGA and UBE central primary school, Local Govern-

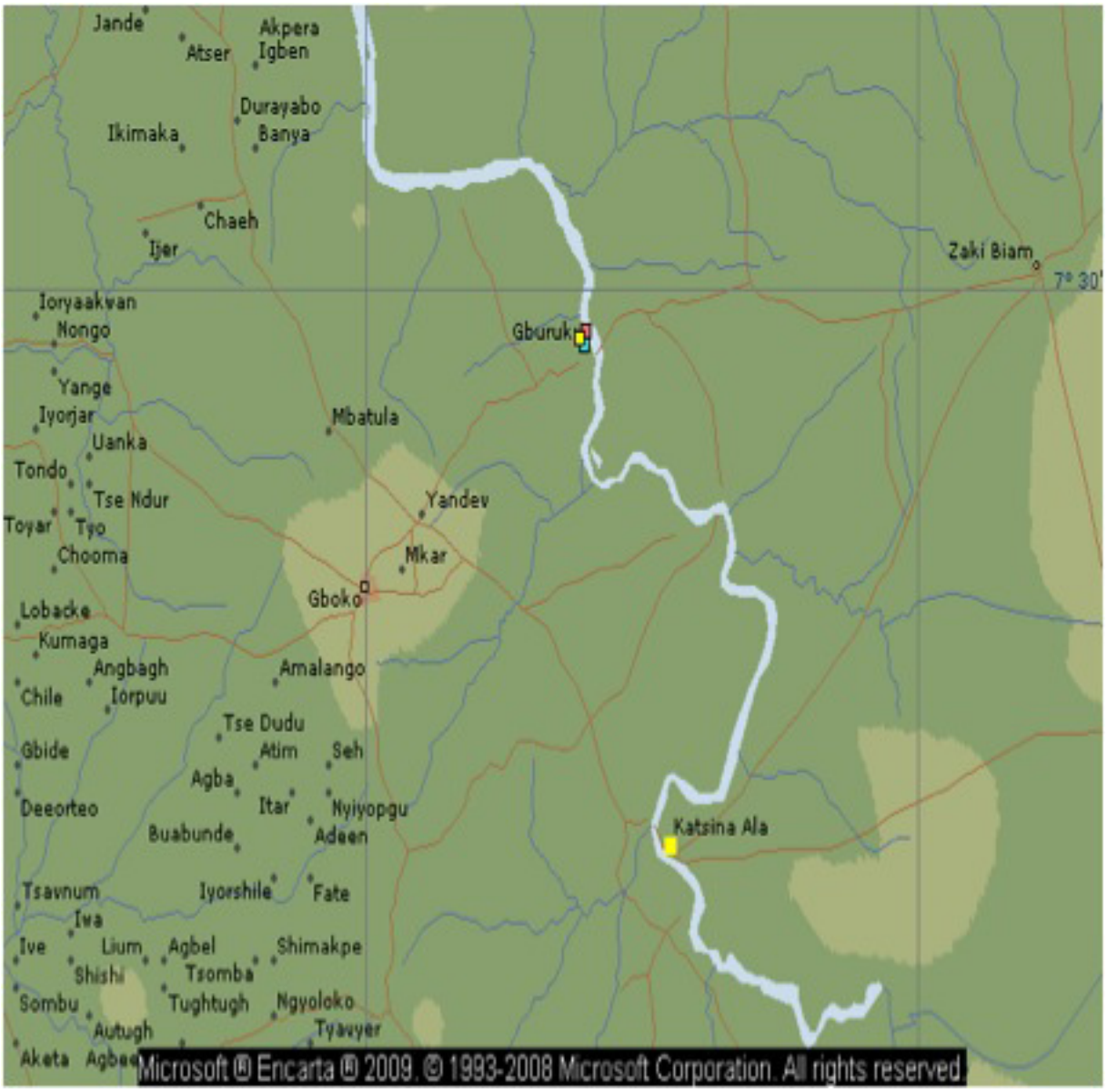

Figure 1. Physical Map of Buruku and Katsina-Ala LGAs of Benue State, Nigeria (Encarta 2009)

ment Education Authority (LGEA) primary school Tavachan, LGEA primary school Ikowe, Government Secondary School Abaji, UBE central secondary school from Katsina-Ala LGA. In each local government, school children were screened during school hours. However, pre-school children in the communities were screened in the house of community' heads.

School children were randomly selected from different classes, from class 3 to class 6 for primary schools and from junior class 1 to senior class 3 for the secondary schools. Their ages ranged from 1 year among the pre-school to > 18 years among the school children.

Questionnaire Administration

A questionnaire consisting of questions relevant to urinary schistosomiasis was issued to each child to obtain information on: age, sex, level of education and occupation of parents, water contact activities, different complaints related to urinary schistosomiasis and knowledge, attitudes and practices (K.A.P) regarding schistosomiasis. Pre-school children that participated in the study were excluded for interview and their mothers were asked to provide relevant information on their water contact activities. Using the form, some of the primary school children in lower classes (Class 3, 4 & 5) and

adults in the communities were interviewed individually and some of the questions were communicated to them in the local language for ease of understanding with the assistance of a local health worker and teachers, while those in higher classes (primary six and those in secondary schools) were grouped in the respective classes and were directed to fill the form appropriately.

Sampling Technique and Laboratory Analysis

A total of 1,124 urine samples were collected from pre-school, primary and secondary school children and between November 2008 and March 2009. About 20ml of clean-catch, midstream urine samples was collected in a 20ml capacity autoclaved wide mouthed, leak, proof universal containers by participants themselves who were carefully instructed. Samples were obtained between 10:00hrs and 14:00hrs as described by` Cheesbrough (2000). The specimens were appropriately labeled with identification numbers and placed in a cold.

The standard parasitological method, the filtration technique using a 10 ml syringe, swinney filter holder (13mm diameter) and polycarbonate membrane filters (13µm porosity and 13mm diameter) was employed to recover *Schistosoma haematobium* eggs in the laboratory (Cheesbrough, 2000). Examination was done under the 10x and 40x objectives.

Statistical Analysis

Microsoft Excel 2007 and SPSS version 18.0.were used to perform data analysis. Frequency distribution tables, percentage prevalence of infection attributed to urinary schistosomiasis were estimated using standard formulae. Chi-square test was used to compare the differences in prevalence of infection between groups of children, sex and age groups as well as socio-demographic variables. Multinomial logistic regression was used to test association between water contact activities considered as risk factors and prevalence of infection.

Results

Table 1 outlines the general prevalence rate of urinary schistosomiasis among pre-school, primary and secondary school children in Buruku and Katsina-Ala LGAs of Benue State, Nigeria. An overall prevalence of 41.5% was recorded. The prevalence varied between 37.1% - 45.4% among the three groups children. There was, however, a statistically significant difference in prevalence between the different groups of children (χ^2 = 92.8, p = *0.000*).

Table 1. Prevalence of urinary schistosomiasis among pre-school, primary and secondary school children in Buruku and Katsina-Ala LGs of Benue State, Nigeria

Distribution	No. examined	No. infected (%)
Pre-school	124	46(37.1)
Primary school	500	193(38.6)
Secondary school	500	227(45.4)
Total	1,124	466(41.5)

Table 2. Prevalence of urinary schistosomiasis in relation to sex among pre-school, primary and secondary school in Buruku and Katsina-Ala LGAs of Benue State, Nigeria Sex No. examined No. infected

Male	583	265(45.5)
Female	541	201(37.2)
Total	1,124	466(41.5)

Table 2 shows the prevalence rate of urinary schistosomiasis in relation to sex among pre-school, primary and secondary school children in Buruku and Katsina-Ala LGAs of Benue State, Nigeria. Males recorded higher prevalence rate of 45.2% than females (37.2%). There was a statistically significant difference in prevalence between males and females (χ^2 = 7.9, p = *0.005*).

Figure 2 shows the prevalence rate of urinary schistosomiasis in relation to age among pre-school, primary and secondary school children in Buruku and Katsina-Ala LGAs of Benue State, Nigeria. The age group >18 years had the highest prevalence rate of 48.6%, while the least prevalence rate (37.0%) was observed in the 3-7 years age group. However, there was no significant difference in prevalence rate between age groups (χ^2 = 8.9, p = *0.31*).

Figure 3 shows the monthly prevalence of urinary schistosomiasis in Buruku and Katsina-Ala LGAs of Benue State, Nigeria. Prevalence rate of urinary schistosomiasis varied between 31.9%-52.7% with the month of January 2009 having the lowest rate (31.9%) and the month of June 2009 having the highest rate (52.7%). However, there was no significant difference in prevalence between months (χ^2 = 20.6, p = *0.14*).

Table 4 shows the prevalence of urinary schistosomiasis in relation to the education of the parents of the children examined in Buruku and Katsina-Ala LGAs of Benue State, Nigeria. It was observed that children whose parents had no formal

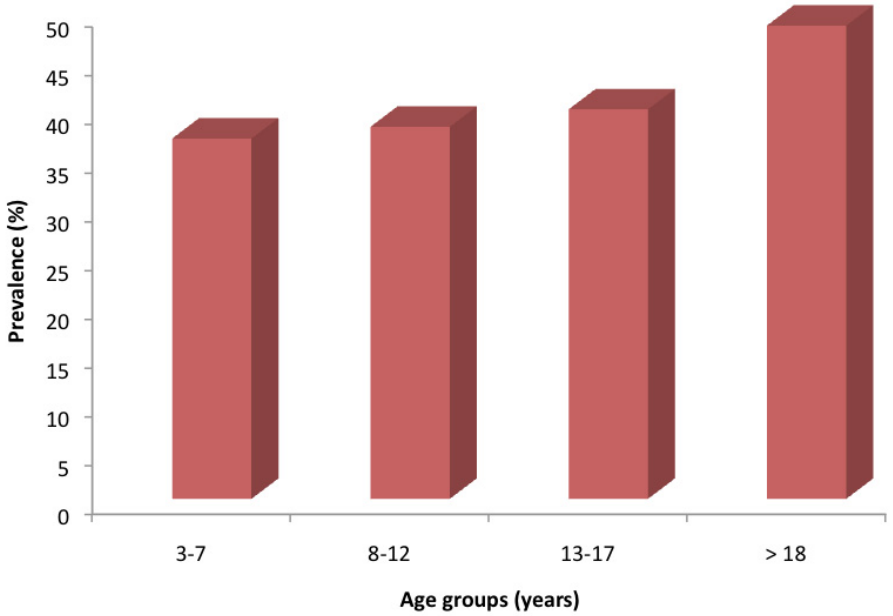

Figure 2. Prevalence of urinary schistosomiasis in relation to age among pre-school, primary and secondary school children in Buruku and katsina-Ala LGAs of Benue State, Nigeria.

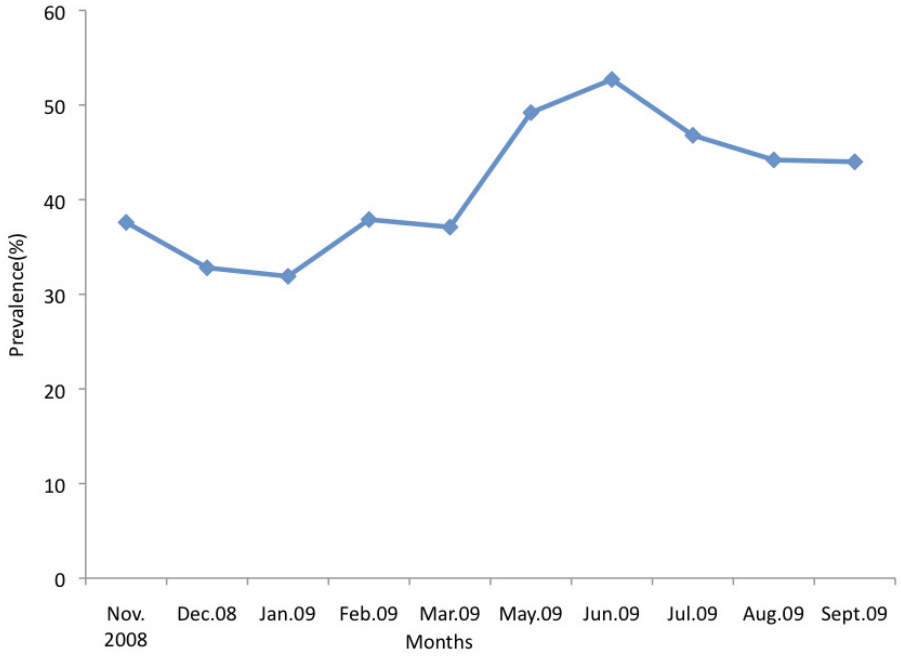

Figure 3. Monthly prevalence of urinary schistosomiasis in Buruku and Katsina- Ala LGAs of Benue State , Nigeria.

education recorded the highest prevalence of 47%, while the least prevalence was observed among children whose parents had post-secondary education (27.0%). A statistically significant difference was also observed in prevalence between the different level of education of the children parents (χ^2 = 20.0, *p = 0.000*). With regards to occupation, children whose parents were farmers had the highest prevalence rate of infection (44.0%), while the prevalence rate of 35.0% was observed among children of non-farmers. However, a statistically significant difference was observed in prevalence between children of farmers and non-farmers (χ^2 = 33.7, *p = 0.000*).

Table 5 summarizes the various activities of the children that are associated with water contact in Buruku and Katsina-Ala LGAs of Benue State. Children that washed in water bodies had the highest rate of urinary schistosomiasis with 87.1%, while the least prevalence rate was observed among children

Table 4. Prevalence of urinary schistosomiasis in relation to the level of education and occupation of the parents of the children in Buruku and Katsina-Ala LGAs of Benue State, Nigeria.

Parameters	No. examined	No. infected	χ^2-value	*p*-value
Level of education			20.0	*0.000*
No formal education	460	216(47.0)		
Primary education	219	96(43.8)		
Secondary education	297	114(38.4)		
Post-secondary education	148	40(27.0)		
Total	1,124	466(41.5)	33.7	*0.000*
Occupation				
Farmers	821	361(44.0)		
Non-farmers	303	106(35.0)		
Total	1,124	466(41.5)		

Table 5. Summary of water contact activities of participants in Katsina-Ala and Buruku LGAs of Benue State, Nigeria.

Water contact activities	No. examined	No. negative (%)	No. infected (%)	OR (odd ratio)	(C.I), 95%]	*p-value*
Swimming						
Yes	466	155(33.3)	311(66.7)	0.99	0.71-1.36	*0.958*
No	658	269(40.9)	389(59.1)			
Fishing						
Yes	466	242(51.9)	224(48.1)	0.92	0.55-1.36	*0.764*
No	658	384(58.4)	274(41.6)			
Swimming & fishing						
Yes	466	267(57.3)	199(42.7)	1.02	0.58-1.78	*0.946*
No	658	424(64.4)	234(35.6)			
Playing/Bathing						
Yes	466	61(13.1)	405(86.9)	2.16	1.51-3.10	*0.000*
No	658	197(29.9)	461(70.1)			
Washing						
Yes	466	60(12.9)	406(87.1)	1.65	1.13-2.39	*0.008*
No	658	181(27.5)	477(72.5)			
Collection of snails						
Yes	466	118(25.3)	348(74.7)	2.00	1.45-2.76	*0.000*
No	658	572(86.9)	86(13.1)			
Rice farm						
Yes	466	215(46.1)	251(53.9)	1.03	0.79-1.34	*0.812*
No	658	354(53.8)	304(46.2)			

Key: C.I = Confidence Interval

that swam & fished in water bodies (42.7%). Children that played/bathed and those that collected fresh water snails from infested water were at higher risk of becoming infected with urinary schistosomiasis in the area with odd ratios (OR) of 2.16 [1.51-3.10, $p = 0.000$] and 2.00 [1.45-2.76, $p = 0.000$] respectively.

Discussion

The prevalence of urinary schistosomiasis (41.5%) as indicated in this study suggests that Buruku and Katsina-Ala LGAs of Benue State fall within the W.H.O classification as endemic (W.H.O, 2002). The present study supports studies conducted in other parts of Nigeria which have shown endemicity of *S. haematobium* infection in the rural areas (Bello and Edungbola, 1992; Okoli and Odaibo, 1999; Uneke *et al.*, 2007). The major factors that might have been responsible for this endemicity of urinary schistosomiasis in the areas are low literacy, presence of infested water bodies like streams, ponds and the biggest river (River Katsina-Ala) where daily chores activities like washing, fetching of water for domestic purposes, fishing, bathing and swimming take place. Activities like collecting edible snails for feeding or selling is also common in the area. Such predisposing factors have been also reported to putting individuals at risk of infection in a study conducted by Mbata *et al.* (2008) who also found similar prevalence (45.7%) in Ogbadibo LGA of Benue State, Nigeria. The prevalence rate in the present study is similar to various reports across Nigeria, 37.9% in Sankwala, Cross-River State, Nigeria (Akeh *et al.*, 2010), 43.7% and 41.6% in two endemic areas of Ondo State and in the Danjarima community of Kumbotso LGA, Kano State by Oniya and Olofintoye (2009) and Sarkinfada (2009) respectively; 46.2%) in four local government areas of Benue State (Okwosa and Banke, 2001), 41.5% in Bende LGA of Abia State (Nwosu *et al.*, 2005). In contrast, the result obtained in this study is lower than the reports of Sulyman *et al.* (2009) and Nmorsi *et al.*(2005) who recorded 71.1% in four states (Borno, Niger, Ondo and Ogun) of Nigeria and 65.0% in Edo State respectively. However, Akinwale *et al.* (2010) and Agi and Awi-waadu (2008) obtained higher prevalences of 54.6% and 51.9% in Ogun State and the Niger-Delta respectively. Ugbomoiko *et al.* (2010) also reported higher prevalence of 62.0% in two peri-urban communities of south-western, Nigeria. The prevalence recorded in this present study is higher than findings of Okoli *et al.* (2007) and Ejima and Odaibo (2010) who reported prevalences of 11.3% and 18.7% in Ohaji/Egbema LGA, Imo State and the Niger-Benue basin of Kogi State respectively.

Similar studies in other sub-Saharan areas of Africa have been reported. These include a prevalence of 47.6% (Ndyomugyenyi and Minjas, 2001) in Dar-es-Salam, Tanzania, 50.8% (Nkengazong *et al.*, 2009) in South-west Cameroon, 32.1% (Sama *et al.*, 2007) in Kumba, Cameroon, 60.0% (Brouwer *et al.*, 2004) among Zimbabwean school children, 10.4% (Kapito-Tembo *et al.*, 2009) among school children in Blantyre district, Malawi.

Few studies have dealt with urinary schistosomiasis among secondary and pre-school children and this is because researchers assume that at that period, children have less contact with water bodies or are still under the custody of their parents, hence preventing them from infection. The prevalence rate observed among the secondary school children in this study is higher than 17.1% reported among two secondary schools in Minna, Niger State, Nigeria (Chidozie and Daniyan, 2008). Oniya and Olofintoye (2009) found slightly higher prevalence (53.4%) among secondary school children in Ipogun and Ifedore LGAs of Ondo State, Nigeria than the present study. With regards to the prevalence of urinary schistosomiasis among primary school children, a prevalence rate of 38.6% was observed. The lower prevalence observed in this study among primary school pupils might be because children at that level of study are cared for more (restricted, monitored and supervised) than their counter part in secondary schools. However, 38.6% is unacceptably high and this may be attributed to their care-free attitudes towards swimming, fishing, bathing and playing in infested water bodies which encourage infection.

Prevalence recorded in primary school children contrasts other studies conducted within and outside Nigeria which reported peak prevalence of urinary schistosomiasis among primary school children (Bundy *et al.*, 1992; Abubakar *et al.*, 2006, Oniya, 2007). Children of pre-school age were found to have a considerable number of urinary schistosomiasis (37.1%). Several studies of urinary schistosomiasis have tended to focus on school-age children and adults, with little or no emphasis on pre-school children and where pre-school children were part of the study, information about them was always subsumed (Akogun and Akogun, 1996; Ofoezie *et al.*, 1998; Kabatereine *et al.*, 2005). Prevalence recorded among the pre-school children in this study (37.1%) is lower than 58.1% and 71.8% in a rural community near Abeokuta and settlements around Oyan reservoir in Ogun State, but higher than 19.8% found among pre-school children in a rice farming community of Adim in Cross-River State, Nigeria (Mafiana *et al.*, 2003; Opara *et al.*, 2007; Ekpo *et al.*, 2010). The considerable prevalence in this group could be the result of early exposure to infested water bodies when these children were taken along with their mothers. It was also observed that pre-school children in the areas were also exposed to infection through the learning process of swimming. The non-significance in prevalence among three groups simply indicates a common pattern of behaviour and susceptibility

to *S. haematobium* for these children. The lower prevalence rate of 37.2% among the females when compared to the males 45.5% can be attributed to higher tendencies of water contact among the males through swimming, playing and engagement in other activities like the making of burnt bricks along the streams and ponds besides the primary domestic activities of washing and fetching water which expose both sexes to infection. The findings of the present study corroborates with those reported earlier by Sulyman *et al.* (2009) and Odaibo *et al.*(2004) who found higher prevalence in males than females in Lagos and Ondo States respectively. Agi and Awi-waadu (2008) in the Niger-Delta, Uneke *et al.* (2006) and Uneke *et al.* (2007) in Ebonyi State also found similar results reporting males having higher prevalence than females. This study, however, disagrees with the findings of Etim (1995) who stated that more females are exposed to urinary schistosomiasis than males in rural communities of Nigeria. However, other studies reported that sex related prevalence is not significant in the distribution of urinary schistosomiasis but could differ due to some variations in behaviour and cultural practices regarding water uses and contact (Udonsi, 1990; Anosike, 1992; Emejelu *et al.*, 1994; Verle *et al.*, 1994; Aboagye and Edoh, 2009). This could to some extent explain the non-significance in prevalence between males and females in this study. Thus, the variations in the infection pattern may be attributed to differences in geographic and environmental settings or in cultural and religious beliefs.

The study has indicated similar prevalences in the < 18 years; this shows similar behavioural habits of exposure of these children to infested water bodies. From other parts of Nigeria peak prevalence of *S. haematobium* was reported from children aged 10-20 years (Bello *et al.*, 2003; Ibidapo *et al.*, 2005; Anosike *et al.*, 2006). The prevalence rate of 38.2% found in the 8-12 years in this study contrast findings of Agi and Awi-waadu (2008) and Ugbomoiko *et al.* (2010) who found high prevalence rates of 62.0% and 66.5% respectively in the similar age group. However, prevalence rate of 40.0% observed in the 13-17 years corroborates with the findings of Okanla *et al.* (2003) and Sama *et al.* (2007) who reported similar prevalence rates in the same age groups among subjects in Cape coast Region of Ghana and Kumba in the South west Region of Cameroon respectively. Older children (> 18 years) tend to be more infected than their younger ones; this is because of their exposure to infested water through water related activities.

The high prevalence of *S. haematobium* infection observed during the month of June and the rainy season (May 2009-September 2009) may be due to the increased agricultural activities during the season. In the area, people are found to be working in swampy areas commonly known as "fadama". The rainy season in the area is also a period of intense fishing where people are found in ponds and streams hunting for fish. The fact that spending time in infested water bodies with *S. haematobium* increases the rate and endemicity of schistosomiasis corroborates the reports of Nmorsi *et al.* (2005) observed in a rural community of Edo State, Nigeria. The observed high prevalence during rainy season may also coincide with the breeding time, attainment of maturity and abundance of the snail vectors. Akogun and Okin (1993) in an ecological study of fresh water snails in an agro-industrial estate in Yola found that snail vectors infectivity with cercariae depends on seasons with the peak of infectivity during the beginning of rainy season (May, June). This could to some extend explain the highest prevalence observed during the months of May and June 2009. The low prevalence observed during the months of December 2008 and January 2009 may be due to the reduced water contact activities of the inhabitants as water remains high in the river bed, streams and ponds. This could be also due to the cold-dry period known mostly as "harmattan period" in the area where people have less contact with water. The relatively high prevalence during the months of November 2008, February 2009 and March 2009 may be due to the fact that during the month of November inhabitants are engaged in the collection of edible snails from the ponds and streams and the months of February and March corresponding to the beginning of the hot season where inhabitants sought for water and increased contact with streams, ponds and rivers through recreational or domestic activities. The high prevalence of urinary schistosomiasis during rainy season observed in this study is similar to reports of Sarkinfida *et al.* (2009) in Danjarima community of Kano State. This study also agrees with findings of Biu *et al.* (2009) who reported peak prevalence during rainy season in Konduga LGA of Borno State. However, this study is in contrast to reports of Nwabueze and Opara (2007) who found higher prevalence of urinary schistosomiasis during dry season among school children of some riverine communities in Delta State. Their reason was that during rainy season the small ponds and lakes are merged with river Niger and Ase creek forming a continuous body of water around the communities. As a result of the increased volume of water, inhabitants are scared of swimming and fishing and other related activities are reduced to the heavy rainfall which could actually meet these needs. Thus differences in prevalence may be influenced by peculiar ecological characteristics of the snail vectors, climate and level of water contact activities with infested water bodies.

In this study, urinary schistosomiasis does not have a seasonal transmission though with peak prevalence during rainy season, this means that transmission is perennial in the area.

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

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