

# Prevalence of *Schistosomiasis* in a neglected community, South western Nigeria at two points in time, spaced three years apart

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## Abstract

**Background:** In recent years, the prevalence of *schistosomiasis*, a neglected tropical infection, has increased in underprivileged rural communities characterized by poverty.

**Objective:** This cross-sectional community-based study was carried out to determine the prevalence of urinary *schistosomiasis* in a neglected community of Apojola community, South-Western Nigeria at two points in time, spaced three years apart

**Method and results:** A total of 145 participants were screened and 44.1% were diagnosed to have urinary *Schistosoma haematobium* infection after sedimentation and microscopy. The prevalence of *schistosomiasis* among females was higher (45.3%) than that among males (42.4%) but not significantly different (0.723). The prevalence of participants with light infection (26%) was significantly higher than those with heavy infection (11.0%). The predisposing factors with statistically significant association with *Schistosoma haematobium* infection were age (0.000), level of education (0.002), eating/selling of snails (0.037), occupation (0.000), drinking water (0.001), swimming (0.008), and washing in a river (0.019).

**Conclusion:** These findings indicate that the study area is still endemic to urinary *schistosomiasis* after three years of research and school-age children and teenagers are the populations at risk of urinary *schistosomiasis*. Community health education on the cause, mode of transmission, prevention, and prompt treatment of *schistosomiasis* is recommended.

**Keywords:** Urinary *Schistosomiasis*, neglected community, Nigeria.

**DOI:** <https://dx.doi.org/10.4314/ahs.v19i1.5>

**Cite as:** Otuneme OG, Obebe OO, Sajobi TT, Akinleye WA, Faloye TG. Prevalence of *Schistosomiasis* in a neglected community, South western Nigeria at two points in time, spaced three years apart. *Afri Health Sci.* 2019;19(1): 1338-1345. <https://dx.doi.org/10.4314/ahs.v19i1.5>

## Introduction

*Schistosoma haematobium* infection is known worldwide as an important chronic and debilitating disease mainly affecting underprivileged rural Communities characterized by poverty, poor sanitation and hygiene<sup>1,2</sup>.

*Schistosomiasis* is one of the occupational associated infection that can be transmitted to a susceptible host or through recreation that involves contact with water infested with the free living *cercariae* that penetrate the skin and develops to maturity in the human<sup>3,4</sup>. Other probable

factors that influence transmission include environmental factors, water development schemes and people migration<sup>3</sup>.

*Schistosomiasis* has been effectively controlled in many countries but its burden remains high especially in sub Saharan Africa including Nigeria.<sup>4,5,3</sup>

In Nigeria, the burden of *Schistosomiasis* is enormous with an estimate of 101.3 million people at risk<sup>6-9</sup>. The huge burden has been associated with water resources and development schemes such as irrigation projects, rice/fish farming and dams<sup>10,11</sup>.

Chemotherapy, water, sanitation and hygiene, education and behaviour change programs; and occasionally, snail control has been suggested as an important aspect of *schistosomiasis* control programmes<sup>12</sup>. However, a better understanding of prevalence and risk factors for *schisto-*

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*somiasis* is important in controlling the disease. The high prevalence of urinary *schistosomiasis* obtained from Apojola community 3 years ago justified the need to assess the extent of control measures. As at the time of visit, Apojola still lack basic amenities such as sanitation facilities, a non-functional water borehole, good roads, health centre and electric power distribution. The present study was designed to determine the prevalence of *schistosomiasis* in a neglected community of Apojola, south-western Nigeria at two points in time, spaced three years apart

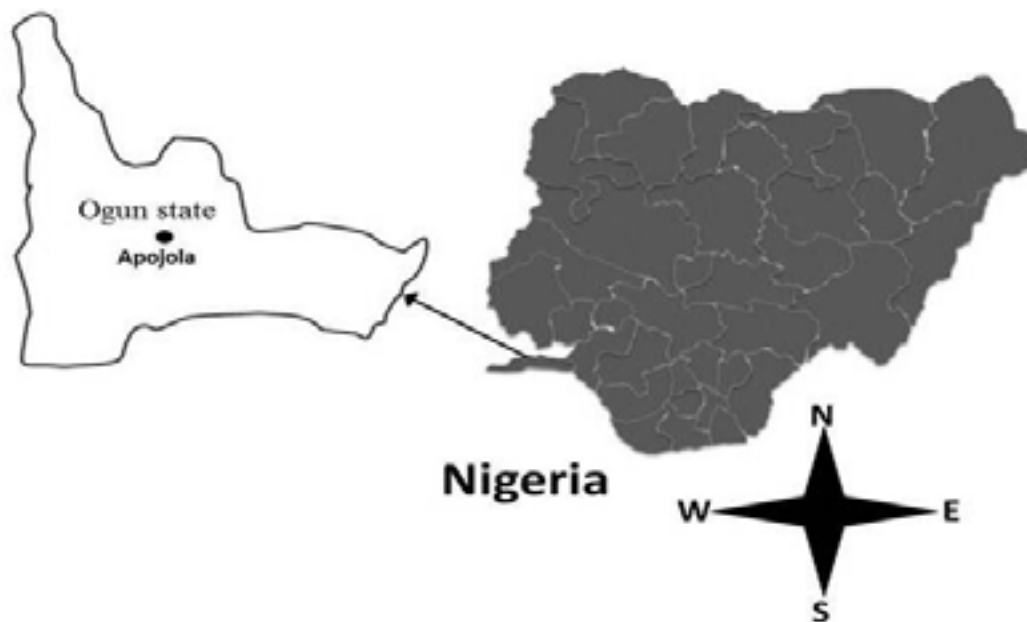
#### Study area

This study was conducted between May and July 2017 in Apojola community located around Oyan dam reservoir in Abeokuta North local Government Area, Ogun State,

Nigeria. Oyan river is located 07° 58'N and 03° 02'E with a catchments area of 1610km<sup>2</sup>. The reservoir has a length of 27km with a maximum width of 67km and was primarily built to provide hydroelectric power and provide water for domestic and industrial uses. It also meant to supply water for an irrigated project of about 3,000 ha as well as provide fishing ground for the adjoining communities. Inhabitants are immigrant fishermen, a mixture of Moslem Hausas and Christian Idomas (figure 1)

#### Ethical, recruitment, enrolment and sample collection

Before the beginning of the study, the objectives and plan were explained to the village authorities to get their



**Figure 1:** Map showing the sampling sites in South-western Nigeria

cooperation and permission to conduct the survey. The heads informed all the residents to gather at the village square where they received explanation about the objectives of the survey, benefits and their involvement. A total of 181 participants gathered at the village square and only 145 adults who agreed voluntarily to participate and children with parental consent were included in the study. They received labelled containers and were instructed to bring urine samples. Structured questionnaire was administered to each participant to obtain socio-demo-

graphic, sanitation and water hygiene information which was then analysed to determine associated risk factors to *Schistosoma* infection. The protocol for this study followed ethical procedures/guidelines and was approved by the Olabisi Onabanjo University Teaching Hospital, Sagamu (OOUTH) research ethics committee with protocol no OOUTH/HREC/57/2016.

#### Parasitological procedures

Urine samples were stored in closed containers using ice pack and transported to the laboratory to determine the prevalence and intensity of *S. haematobium* infection. In

the laboratory, 10ml of each urine sample was centrifuged at 5000 rpm for 5 min. The supernatant was discarded to leave the sediment, which was placed on a clean glass slide and covered with a coverslip. These slides were observed microscopically using x40 objective lens for the presence of terminal-spined ova of eggs of *S. haematobium*. A positive sample was indicated by the presence of ova of *S. haematobium* and expressed as number of eggs/10ml of urine<sup>13</sup>, and the intensity of infection was graded as heavy (> 50 EP10 mL), moderate (10-49 EP10mL) and light (1-9 EP10 mL). A negative sample was indicated by the absence of parasite eggs<sup>13</sup>.

### Data analysis

Data entry and analysis were carried out using SPSS version 18.0 (SPSS Inc., Chicago, IL, USA). Appropriate univariate and bivariate statistics were employed. Frequency tables and percentages were used to display categorical data. The Chi square was used to compare categorical

data. Statistical significance was determined at the level of  $p < 0.05$ .

### Sociodemographic characteristics of study participants

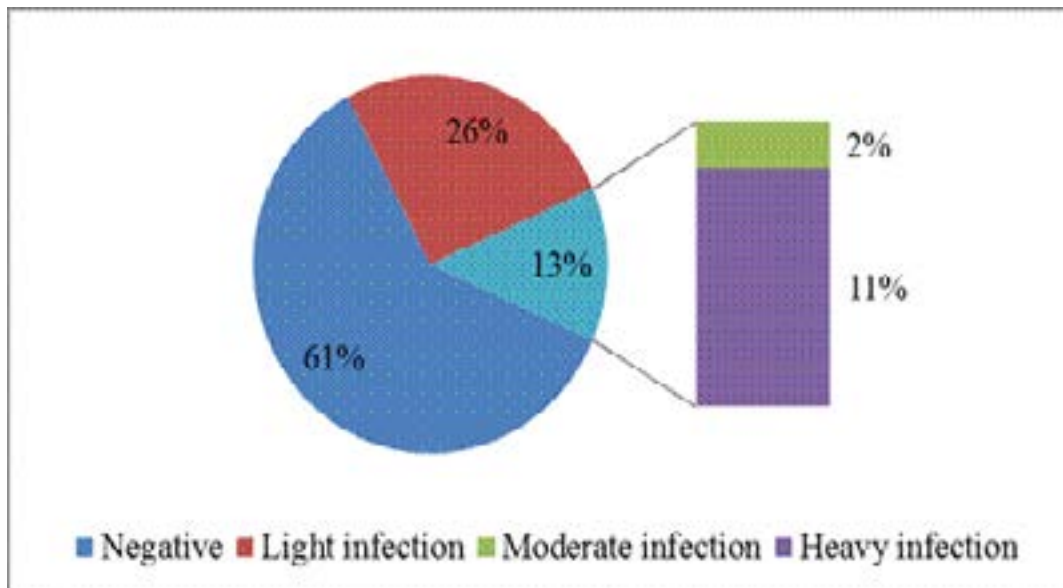
A total of 145 urine samples were collected and analysed for urinary *Schistosomiasis*. The characteristics of the study participants are shown in Table 1. The age range of the study participants was (5–59 years). Of the 145 participants, 59.3% (86/145) were female and 40.7% (59/145) were male, giving a gender ratio of 1.46: 1 (females: males). The majority (55.2%) of the participants were of the age range 5–15years (figure 2). 68.3% of the study participants had primary school education and 58.6% of the participants are students (Table 1)

### Prevalence of *Schistosoma haematobium*

The overall prevalence of *Schistosoma haematobium* infection in the study population is 44.1%. Urinary *schistosomiasis* was more prevalent among females (45.3%; 39/86)

**Table 1: Socio-demographic characteristics of participants in a neglected community, Nigeria**

Variables	Frequency	%
<b>Age (years)</b>		
5-15	80	55.2
16-26	16	11.0
27-37	20	13.8
38-48	16	11.0
49-59	13	8.9
<b>Gender</b>		
Male	59	40.7
Female	86	59.3
<b>Education</b>		
None	19	13.1
Primary	99	68.3
Secondary	25	17.2
Graduate	2	1.4
<b>Occupation</b>		
Farming	35	24.1
Housewife	11	7.6
Student	85	58.6
Trading	14	9.7



**Figure 2:** intensity of *Schistosoma haematobium* infection among participants

than in males (42.4%; 25/59). However, there was no significant difference between *Schistosomiasis* and gender (0.723). There was an association between *Schistosoma haematobium* infection and variables such as age (0.000), level of education (0.002), eating/selling of snails (0.037),

occupation (0.000), drinking water (0.001), swimming (0.008), and washing in river (0.019) (Table 2)

#### **Intensity of *Schistosoma haematobium***

The intensity of infection of participants is shown in Figure 2. Light, moderate and heavy infections were detected in the study using centrifugation method for the egg

**Table 2: Factors influencing *Schistosoma haematobium* infection in a neglected community, Nigeria**

Factor	Subcategory	<i>S. haematobium</i> No. negative	Status No. Positive	<i>p</i> value
<b>Gender</b>	Male	34	25 (42.4)	<b>0.723</b>
	Female	47	39(45.3)	
<b>Age</b>	5-15	28	52(65.0)	<b>0.000</b>
	16-26	12	4(25.0)	
	27-37	16	4(20.0)	
	38-48	14	2(12.5)	
	49-59	11	2(15.4)	
<b>Level of education</b>	None	16	3(15.8)	<b>0.002</b>
	Primary	45	54(54.5)	
	Secondary	18	7(28.0)	
	Graduate	2	0(0.0)	
<b>Occupation</b>	Farming	28	7(20.0)	<b>0.000</b>
	Housewife	10	1(9.1)	
	Student	30	55(64.7)	
	Trading	13	1(7.1)	
<b>Sell/eating of snail</b>	Yes	39	34(53.9)	<b>0.037</b>
	No	52	30(36.6)	
<b>Drinking water</b>	Sachet	2	2(50.0)	<b>0.001</b>
	Stream	64	62(49.2)	
	Well	15	0(0.0)	
<b>Swimming</b>	Yes	61	59(49.1)	<b>0.008</b>
	No	20	5(20.0)	
<b>Washing in river</b>	Yes	65	60(48.0)	<b>0.019</b>
	No	16	4(20.0)	

count. Of the 145 persons examined for urinary *Schistosomiasis* in the study area, 61% (n=88) were found to be negative for the presence of *Schistosoma haematobium* egg, 2% (n=3) were excreting between 1-9eggs/10ml, 26% (n=38) were excreting between 10-49eggs/10ml urine, while 11.0% (n=16) were excreting above 50 eggs/10ml urine.

### Discussion

The study showed a high prevalence of *Schistosoma haematobium* infection among resident of Apojola community, Nigeria. Previous studies in Nigeria<sup>14-17</sup> and other countries like Ghana<sup>18</sup> and Cameroon<sup>19</sup>, reported a comparable prevalence of *Schistosoma haematobium* infection.

However, data from various parts of Nigeria<sup>20-22</sup>, showed lower prevalence than that obtained in the present study. Factors including poverty, ignorance, poor living conditions, inadequate sanitation and water supplies as well as deplorable personal and environmental hygiene characteristic of many rural communities have been suggested as reasons for variation in prevalence of infection<sup>23</sup>.

The frequency of infection was higher among the female participants compared to the male counterpart, although there was no statistical significance in the association. A study carried out in Nigeria found similar results<sup>24</sup> while others reported the opposite<sup>25,26</sup>. The fact that fetching water and washing clothes are seen as female responsibilities in Nigeria, suggests the likely reason for *Schistosoma*

haematobium infection preponderance among females. In the present study, prevalence was higher among school-aged participants and the association was statistically significant. Previous studies reported higher infections among younger age group in Nigeria<sup>27</sup>, Malawi<sup>28</sup> Cameroon<sup>29</sup> and Cote d'Ivoire<sup>30</sup>. The higher prevalence among younger age group is not surprising. This is because this same group are the most commonly found in persistent and unrestrained water contact activities such as bathing and swimming. In addition, participants' levels of education and occupation showed a statistical association with urinary *schistosomiasis*. This is supported by the findings of some previous study that associated higher infections with different level of education and occupation<sup>31,32</sup>. The higher prevalence may be suggestive of their frequency of going to the river. In addition, the high illiteracy and neglect levels of the parents, observed in the study area, can lead to the non-education of preventive measures to their children, therefore influencing transmission pattern

Eating/selling of snails, using the stream as a source of drinking water, swimming, and washing in a river were significantly associated with *Schistosoma haematobium* infection. In accordance with our findings, previous studies reported similar observations<sup>9,33,28</sup>. Water contact activities and traditional agricultural practices such as washing, fishing, bathing, and farming may influence the transmission of the disease in many parts of Nigeria.

Furthermore, the prevalence of participants with light infection was significantly higher than those with heavy infection. The higher prevalence of light infection reported here was in accordance with findings of Uneke et al.,<sup>34</sup> an indication that the distribution of *schistosomiasis* in endemic communities fits a negative binomial curve, with most infected individuals harbouring low worm burdens and only a small proportion having heavy infections<sup>35</sup>. However, according to Secor et al.,<sup>36</sup>, the aggregation of worm load in a small percentage of infected individuals may have various explanations including genetic vulnerability and the implication of these epidemiologic results are important to our understanding of the dynamics of the *Schistosoma haematobium* infection and its control in the populations studied.

We acknowledge some limitations of our methodology. This study had to rely on sedimentation method instead of the ideal filtration technique. In addition, our study was conducted on a smaller scale instead of the ideal larg-

er scale. Thus, the prevalence rates of *schistosomiasis* are likely to be underestimated

## Conclusion

The prevalence of 62%<sup>37</sup> obtained 3 years ago compared with present 44.1% prevalence obtained in the study area shows that participants in Apojola community and its environ are still plagued with urinary *Schistosomiasis*. It seems that adequate control measures had not been deployed to this endemic zone of *schistosomiasis*. Therefore, there is an urgent need for Government to mount successful control interventions such as the provision of safe water supply, development of recreational water bodies to avoid contact with present infested water, control of snail vector, public awareness and education regarding urinary *schistosomiasis* in the area.

Also, the report from our study is an indication that the school age children and teenagers are the population at risk of *schistosomiasis*. Control measures should, therefore, be targeted more on this at-risk group in the study area.

## Acknowledgments

The authors would like to express their appreciation to Apojola community for given consents prior to sample collection

## Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors

## Competing interests

The authors declare that they have no competing interests.

## References

1. Yamey G, "The world's most neglected diseases," *BMJ*. 2002; 325: 176–177
2. Zhang Y, MacArthur C, Mubila L, Baker S. Control of neglected tropical diseases needs a long-term commitment. *BMC Medicine*. 2010; 8:67
3. WHO, "Investing to overcome the global impact of Neglected Tropical Diseases. Third WHO report on Neglected Tropical Diseases 2015, Geneva: Author; 2015; 191

4. Steinmann P, Keiser J, Bos R, Tanner M, Utzinger J. *Schistosomiasis* and water resources development: systematic review, meta-analysis, and estimates of people at risk. *Lancet Infect Dis.* 2006; 6 (7): 411–25
5. Adenowo AF, Oyinloye BE, Ogunyinka BI, Kappo AP. Impact of human *schistosomiasis* in sub-Saharan Africa. *Braz J Infect Dis.* 2015; 19 (2):196–205
6. Hotez PJ, Kamath A. Neglected tropical diseases in Sub-Saharan Africa: review of their prevalence, distribution and disease burden. *PLoS Negl Trop Dis.* 2009; 3:e412,
7. Sulyman MA, Fagbenro-Beyioku AF, Mafe MA, Omotola BD, Adedoyin JA, Akande DO. *Schistosoma haematobium* and concurrent parasitic infections in school aged children. *Niger J Parasitol.* 2009; 30(2):79-85
8. Fana SA, Ekejindu IM, Nnamah AK. Urinary schistosomiasis among school children in Argungu, Kebbi State. *Niger J Parasitol.* 2009; 30(2):152-155
9. Akinboye DO, Ajisebutu JU, Fawole O, Agbolade OM, Akinboye OM, Amosu AM, Atulomah NOS, Awodele O, Oduola O, Owodunni BM, Rebecca SN, Falade M, Emem O. Urinary *Schistosomiasis*: Water contact frequency and infectivity among secondary school students in Ibadan, Nigeria,” *Niger J Parasitol.* 2011;32(1):129-134
10. Ofoezie IE. Human health and sustainable water resources development in Nigeria: *Schistosomiasis* in artificial lakes. *Natural Resources Forum.* 2002; 26:150-160
11. Okpala HO, Agwu E, Agba MI, Chimezie OR, Nwobu GO, Ohihoin AA. A survey of the prevalence of *Schistosomiasis* among pupils in Apata and Laranto areas in Jos, Plateau State. *Online J Health Allied Scs.* 2004; 1:1-4
12. Stothard JR, French MD, Simba Khamis I, Basa n̄ez MG, Rollinson D. The epidemiology and control of urinary *schistosomiasis* and soil-transmitted *helminthiasis* in schoolchildren on Unguja Island, Zanzibar. *Trans R Soc Trop Med Hyg.* 2009; 103: 1031–1044
13. Cheesbrough M. District laboratory practice in tropical countries, part 1. 2<sup>nd</sup> ed. Cambridge: Cambridge University Press; 2005.
14. Duwa MR, Oyeyi TI, Bassey SE. Prevalence and intensity of urinary *schistosomiasis* among primary school pupils in Minjibir local government area of Kano State, Nigeria. *Bayero J Pure Appl Sci.* 2009;2:75-8.
15. Babatunde TA, Asaolu SO, Sowemimo OA. Urinary *schistosomiasis* among preschool and school aged children in two pre-urban communities in Southwest Nigeria *J Parasitol Vector Biol.* 2013; 5(7):96-101.
16. AmehIG. Urogenital *schistosomiasis* and proteinuria in Kebbi State, Nigeria,” *Niger J Parasitol.* 2008; 29 (2): 88 – 91
17. Oniya MO, Olofintoye LK. The prevalence of urinary *schistosomiasis* in two endemic Local Government Areas of Ondo State. *Niger J Parasitol.* 2008; 30:147 – 151
18. Yirenya-Tawiah DR, Annang T, Otchere J, Bentum D, Edoh D, Amoah C, Bosompem KM. Urinary *Schistosomiasis* among Adults in the Volta Basin of Ghana: Prevalence, Knowledge and Practices. *Trop Med Parasitol.* 2011; 34:1-16
19. Kimbi HK, Wepnje GB, Anchang-Kimbi J, Tonga C, Ayukenchengamba B, Njabi C, Nono LK, Nyabeyeu HN, Lehman LG. Active Case Detection and Prevalence of Urinary *Schistosomiasis* and Malaria in Pupils of Kotto Barombi, Southwest Cameroon Using the CyScope® Fluorescence Microscope. *IJTDDH.* 2015; 8(1):1-12
20. Houmsou RS, Agere, H, Wama BE, Bingbeng JB, Amuta EU, and Kela SL, “Urinary *Schistosomiasis* among Children in Murbai and Surbai Communities of Ardo-Kola Local Government Area, Taraba State, Nigeria,” *Trop Med Parasitol.* 2016, doi:10.1155/2016/9831265
21. Chidozie EU, Danijan SY. Urinary *schistosomiasis*, epidemiological survey of Urinary schistosomiasis among children in selected schools: a preliminary study in Minna, Niger State, Nigeria. *Afr. J. Biotechnol.* 2008; 7(16): 277 – 36
22. Ekwunife CA, Agbor VO, Ozumba AN, Eneanya CI, Ukaga CN. Prevalence of urinary *schistosomiasis* in Iyede-Ame community and environ in Ndokwa East local government area, Delta State, Nigeria. Book of Abstracts of Parasitology and Public Health Society of Nigeria. 2008; 32:22
23. World Health Organization, Report of the WHO Informal Consultation on “*Schistosomiasis* Control,” WHO/CDS/CPC/SIP/99.2. 1998. World Health Organization, Geneva.
24. Oluwasogo OA, Fagbemi OB. Prevalence and risk factors of *Schistosoma haematobium* infections among primary school children in Igbokuta Village, Ikorodu North Local Government, Lagos State. *J Nurs Health Sci,* 2013; 2 (6) 62–68
25. Augusto G, Nala R, Casmo V, Sabonete A, Mapaco L, Monteiro J. Geographic distribution and prevalence of *schistosomiasis* and soil-transmitted *helminths* among school children in Mozambique,” *Am J of Trop Med Hyg.* 2009; 81(5):799– 803
26. Geleta S, Alemu A, Getie S, Mekonnen Z, Erko B.

- Prevalence of urinary *schistosomiasis* and associated risk factors among Abobo Primary School children in Gambella Regional State, Southwestern Ethiopia: a cross sectional study. *Parasit Vectors*. 2015; 8 (1):1106-1114.
27. Mbah M, Useh MF. The relationship between urinary *schistosomiasis* and the prevailing socio-economic factors of a rural community in Cameroun. *Nigerian Journal of Parasitology*. 2008 29(1): 5 – 10
28. Chipeta MG, Ngwira B, Kazembe LN. Analysis of *schistosomiasis haematobium* infection prevalence and intensity in Chikhwawa, Malawi: An application of a two-part model. *PLoS Negl Trop Dis*. 2013; 7(3): e2131. DOI: 10.1371/journal.pntd.0002131
29. Sama MT, Oyono E, Ratard RC. High risk behaviours and *schistosomiasis* infection in Kumba, South-West Province, Cameroon. *Int. J. Environ. Res. Public Health*. 2007; 4(2):101-105.
30. Yapi YG, Briet OJT, Diabate S, Vounatsou P, Akodo E, Tanner M, Teuscher T. Rice irrigation and *schistosomiasis* in savannah and forest areas of Co<sup>^</sup>te d'Ivoire. *Acta Trop*. 2005; 93: 201–21.
31. Bala AY, Ladan MU, Mainasara M. Prevalence and intensity of urinary schistosomiasis in Abarma village, Gusau, Nigeria: a preliminary investigation. *Science World Journal*. 2012; 7(2)
32. Amuta EU, Houmsou RS, “Prevalence, intensity of infection and risk factors of urinary *schistosomiasis* in pre-school and school aged children in Guma Local Government Area, Nigeria. *Asian Pac J Trop Med*. 2014; 34-39
33. Dawaki S, Al-Mekhlafi HM, Ithoi I, Ibrahim J, Abdulsalam AM, Ahmed A, Sady H, Atroosh WM, Al-Areqi MA, Elyana FN, Nasr NA, Surin J. Prevalence and risk factors of *schistosomiasis* among Hausa communities in Kano State, Nigeria. *Rev Inst Med Trop Sao Paulo*. 2016; 58:54
34. Uneke C, Oyibo P, Ugwuoru C, Nwanokwai A, Iloegbunam R. Urinary *Schistosomiasis* among School Age Children in Ebonyi State, Nigeria. *The Internet Journal of Laboratory Medicine*. 2007; 2 (1)
35. Mahmond AAF. *Trematodes (Schistosomiasis)* and other Flukes, in: Mendel, G. L., Bennett, J. E., Dolin, R. (Eds.), Mendel, Douglas and Bennett Principles and practice of Infection Diseases. Churchill Livingstone, New York 2000; 2950-295
36. Secor WE, del Cerral H, dos Reis MG, Ramos EA, Zimon AE, Matos EP, Reis EA, Do Carmo TM, Hirayama K, David RA, JDavid JR, Harn DA. Association of hepatosplenic *schistosomiasis* with HLA - DOB1\* 0201 *Journal of Infectious Disease*, 1996; 174:1331-1135. PubMed.
37. Otuneme OG, Akinkuade FO, Obebe OO, Usiobeigbe OS, Faloye TG, Olasebikan AS, Akinleye WA, Koku OD. A study on the prevalence of *Schistosoma Haematobium* and *Schistosoma Intercalatum* in a rural community of Ogun State, Nigeria,” *South East Asia Journal of Public Health*. 2014; 4 (1); 67-71