# PATTERN OF URINARY SCHISTOSOMIASIS AND ASSOCIATED RISK FACTORS AMONG SCHOOL-AGED CHILDREN IN OYO STATE, NIGERIA

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DOI : https://doi.org/10.5281/zenodo.15716326

## Abstract

Schistosomiasis, also referred to as bilharziasis, poses a significant global public health threat, especially in sub-Saharan Africa. The predominant species contributing to schistosomiasis include Schistosoma haematobium, which is widely distributed in Sub-Saharan Africa causing urinary schistosomiasis. Additionally, Schistosoma mansoni, S. intercalatum, S. japonicum, and S. mekongi are accountable for intestinal schistosomiasis. The elevated occurrence of urinary schistosomiasis is attributed to various factors, including inadequate sanitation, poverty, lack of awareness, restricted access to health facilities, and limited availability of social amenities. Therefore, study examined the pattern of urinary schistosomiasis and associated risk factors among school-aged children in Oyo State, Nigeria.

The study is a Retrospective study that deployed the use of secondary data. The secondary data collected was based on puporsive sampling selection of all LGAs to ensure a representative and diverse sample from the population of school-aged children in Oyo State. This design is chosen to comprehensively explore the pattern of urinary schistosomiasis and identify associated risk factors among school-aged children in Local Government Areas (LGA) of Oyo State, Nigeria, covering the period from 2020 to 2023. data was collected on Oyo state schistosomiasis disaggregation data (2020-2022) for all LGA or endemic LGA (LCDA) affected. And also randomly collated data of year 2020- 2022 from PHCs record for specific data on socio-demographic characteristics, and number of cases examined.

The results identified Local government area provided insight to the disease distribution and intensity by age group and gender for SAC in the surveyed area. There are 33 LGAs in Oyo state but about 26 LGAs had confirmed cases of Schistosomiasis. Some wards within the same LGA that have wards with low endemicity are highly endemic. The findings on schistosomiasis revealed that the overall prevalence was within the low-risk range (74%) and moderate risk range (25.2%). Therefore, it can be inferred that gender, age, education level, occupation status were independent factors for pattern of urinary schistosomiasis among school-aged children (SAC). The prominent causes for increasing endemicity is contamination of fresh water through the continuous visit of herds of cattle in rural area.

In conclusion, It was inferred that gender, age, education level, occupation status were independent factors for pattern of urinary schistosomiasis among SAC. The prominent causes for increasing endemicity is contamination of fresh water through the continuous visit of herds of cattle in rural area. It was recommended

that Oyo state ministry of health should take actions on Improving and Maximising community participation through multi-sectoral strategy, advocacy, and mobilisation.

**Keywords:** Prevalence,Schistosomiasis, Schistosoma haematobium, School-aged children,Urinary.

## Introduction

Schistosomiasis, also referred to as bilharziasis, is a parasitic disease transmitted through water, caused by parasites belonging to the genus Schistosoma. It poses a significant global public health threat, especially in Sub-Saharan Africa.( Adebayo, 2022). Consequently, the transmission of schistosomiasis is intricately linked to social-ecological sy stems, including conditions of poverty and residing in close proximity to open freshwater bodies (Angora et al., 2019). The eggs of schistosomes are expelled by humans through feces or urine. Upon hatching, miracidia infect specific snails, leading to the production of cercariae. Schistosome cercariae penetrate the intact skin of humans during every day domestic activities, such as washing clothes or dishes, as well as recreational pursuits like bathing and swimming in unprotected open freshwater bodies.Worldwide, approximately 239 million individuals are presently afflicted by this condition, with the associated burden exceeding 3.5 million disability-adjusted life years (DALYs) (Abubarkar et al., 2022).

Recent findings indicate a continuous rise in infections across all geographical zones in the country, especially among schoolchildren, due to their tendency to participate in household tasks and regular exposure to polluted water, such as communal swimming and fishing in snail-infested water bodies after school, communities in Nigeria often partake in these activities (Kabuyaya et al., 2019). Epidemiological investigations in various endemic communities have linked persistent infections to factors such as regular agricultural practices, human behavior, and unsuccessful water projects designed to fulfill the community's needs.

S. haematobium is accountable for various infections, including hematuria, dysuria, nutritional deficiencies, and growth retardation (Mansur, Abubakar, & Hassan, 2020). The elevated occurrence of urinary schistosomiasis infections in Nigeria and other sub-Saharan regions, akin to other parasitic infections, is linked to factors such as the absence of safe drinking water, insufficient sanitation, poverty, and limited awareness of infection risks, particularly in rural areas (Abubakar, Wabi, Gagman, & Aminu, 2020; Mansur, Abubakar, & Hassan, 2020). Despite the recognized hazards and the prevalent incidence of urinary schistosomiasis in specific regions of Nigeria, there is a dearth of information on this infection in the present study area. Hence, this retrospective study was undertaken to investigate the pattern of urinary schistosomiasis and the associated risk factors among school-aged children in Oyo State.

Schistosomiasis, a clandestine yet profoundly destructive parasitic ailment, afflicts more than 250 million individuals globally, imposing an estimated burden of 1.4 million disability-adjusted life years (DALYs) in the year 2017 (Kyu et al., 2018; McManus et al., 2018). The disease claims the lives of over 200,000 individuals annually. Schistosomiasis prevalence and morbidity is highest among schoolchildren, adolescents and young adults . Thus, the negative impacts on school performance and the debilitation caused by untreated infections demoralize both social and economic development in endemic areas .(Ojo et al., 2021)

Nigeria has the greatest number of cases of schistosomiasis worldwide , with about 29 million infected people, among which 16 million are children, and about 101 million people are at risk of schistosomiasis . In 1988, the Federal Ministry of Health (FMOH), in collaboration with the National Schistosomiasis Control Program (NSCP), deliberated on the possibility of bringing down the prevalence by 50% within 5 years in operational areas . However, these efforts were hampered by the lack of baseline data on the distribution of the disease in a broad scale. According to the Nigeria master plan for NTDs 2013-2017, out of the 37 states of Nigeria, mapping and baseline surveys on schistosomiasis have been conducted in a total of 19 states, all located in southern and western parts of Nigeria, so that schistosomiasis has been completely mapped in only 9 of those states 13 . Apart from several reports on the prevalence of schistosomiasis, there is a scarcity of research on the risk factors associated with this infection in the majority of the federation, particularly in Oyo State. (WHO,2020)

School-age children present an optimal demographic for the examination of urinary schistosomiasis within endemic communities. This is attributed to their well-documented behaviors characterized by suboptimal hygiene practices and engagement in water-related activities, factors that significantly elevate the susceptibility to parasitic infections. These habits, such as inadequate hygiene and recreational water activities, notably increase the likelihood of exposure to schistosoma parasites, making this age group particularly relevant for an in-depth investigation (Umoh et al., 2020). These habits not only expose them to the risk of schistosoma infection but also contribute significantly to the perpetuation of the disease within the community. As such, a focused examination of this vulnerable demographic is imperative for understanding the intricate dynamics of the disease transmission and its impact on the health of the community. This study employs the use of the Health Belief Model (HBM) to extensively elucidate the issue surrounding the prevalence, pattern and associated risk factors leading to the infection

This study holds paramount significance in the realm of public health, particularly for the selected Local Government Areas (LGA) of Oyo State. By delving into the pattern of urinary schistosomiasis and its associated risk factors among school-aged children, the research aims to offer invaluable insights that can directly inform and shape public health interventions. Tailoring measures to the specific characteristics and needs of selected LGAs is a crucial aspect, as the findings will guide the development of community-specific interventions to curtail the prevalence of urinary schistosomiasis. Prioritizing school-aged children as the focal demographic acknowledges their heightened vulnerability due to behaviors such as poor hygiene and engagement in water-related activities. Through shedding light on the impact of schistosomiasis on this age group, the study aims to pave the way for targeted health education programs and interventions aimed at safeguarding their well-being. Furthermore, the research contributes to the existing body of knowledge by addressing the dearth of information on urinary schistosomiasis in the study area, laying the groundwork for future research endeavors and evidence-based policymaking. Ultimately, this study aspires to offer evidence that guides policymakers in formulating effective public health policies, thereby advancing the collective effort to combat urinary schistosomiasis in LGAs and contributing to the broader global health discourse.

**Research Design**

The research design selected for this study was a retrospective study that deployed secondary data. This design chosen to explore the pattern of urinary schistosomiasis and identify associated risk factors among school-aged children in Local Government Areas (LGA) of Oyo State, Nigeria, covering the period from

2020 to 2023. The study population comprises all vulnerable age group with special focus on school-aged children, ranging from 6 to 16 years old, who are actively enrolled in formal education within All LGA during a period from 2020 to 2022.

**Sample size determination**

The sample size was based on secondary data collected. The first data is on Oyo state schistosomiasis disaggregation data (2020-2022) for all LGA affected. The second data revolves around randomly collated data of year 2022 from PHCs record for specific data on socio-demographic characteristics, and number of cases examined. The data collected was based on puporsive sampling technique selection of All LGAs to ensure a representative and diverse sample from the population of school-aged children in Oyo State.

**Method of data collection and Data Analysis**

Data collection involved a combination of secondary data from NTDs unit, selected PHC centres on Schistosomiasis across all LGAs in Oyo state. Trained research assistants and healthcare professionals were deployed in collating data from the field. A letter of consent and approval to collate data was presented to the Oyo state Primary Healthcare board, Ibadan.

The data collected for the study was collated, entered and coded using the Statistical Product for Social sciences (SPSS) version 23. The data was cleaned by running a frequency analysis on each item and checking responses to ensure that the values were accurately coded. Missing data were recoded and treated as missing values in the software. Data analysis encompassed descriptive statistics to determine the prevalence of urinary schistosomiasis. Inferential statistics, such as chi-square tests, and logistic regression was employed to identify associations between risk factors and schistosomiasis prevalence. Statistical software which SPSS version 23 was be utilized for data analysis.

**Ethical Consideration**

For this study, Ethical approval was obtained from (Babcock University's Health Research Ethics Committee (BUHREC) and the relevant state ministries of health to obtain ethical approval before the study can be conducted. ensuring adherence to ethical guidelines outlined in the Declaration of Helsinki, that is, permission was gotten from the PHC board of Oyo state.

**Results**

**Number of LGA with confirmed cases of Schistosomiasis**

The Local government areas with the highest number of wards having confirmed cases of schistosomiasis are Ibarapa, Ibadan south and Ogbomosho based on the final data for 2023. There are also LGA with just one ward (Ogo Oluwa and Akinyele ) have a confirmed case while the other wards have no cases recorded such as Afijio and Ogo Oluwas LGAs. Having just one ward does not imply a low endemicity rather the number of infected people in a given area and time compare with the total number examined determined that (see Figure 4.1).

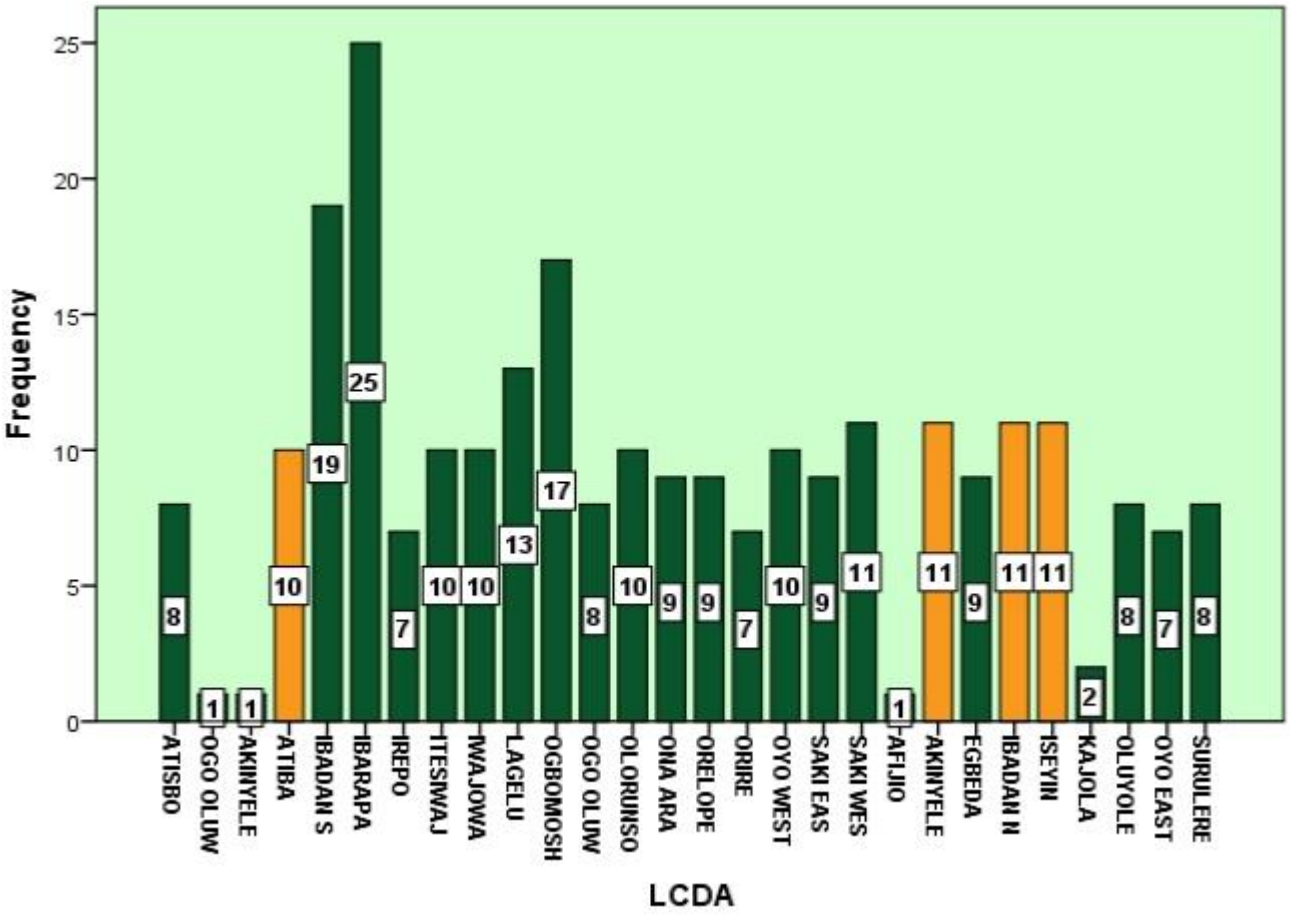

**Figure 4.1: LGA with confirmed cases of Schistosomiasis**

### Endemicity Category

According to Figure 4.2, the endemicity of the local government area was identified for each ward. Though Ibarapa has the highest number of wards with cases of schistosomiasis, the endemicity in each of this political ward is mostly low which implies <10% by parasitological methods of urogenital schistosomiasis. Similar trend is also observed in Ibadan south LGA. Saki west and east are the LGAs that has more moderate endemicity of >=10% but <50% by parasitological methods of urogenital schistosomiasis in more political ward than any other LGA. While Ogo Oluwa LGA and Atisbo LGA showed a high endemicity some areas which is >=50% by parasitological methods of urogenital schistosomiasis.

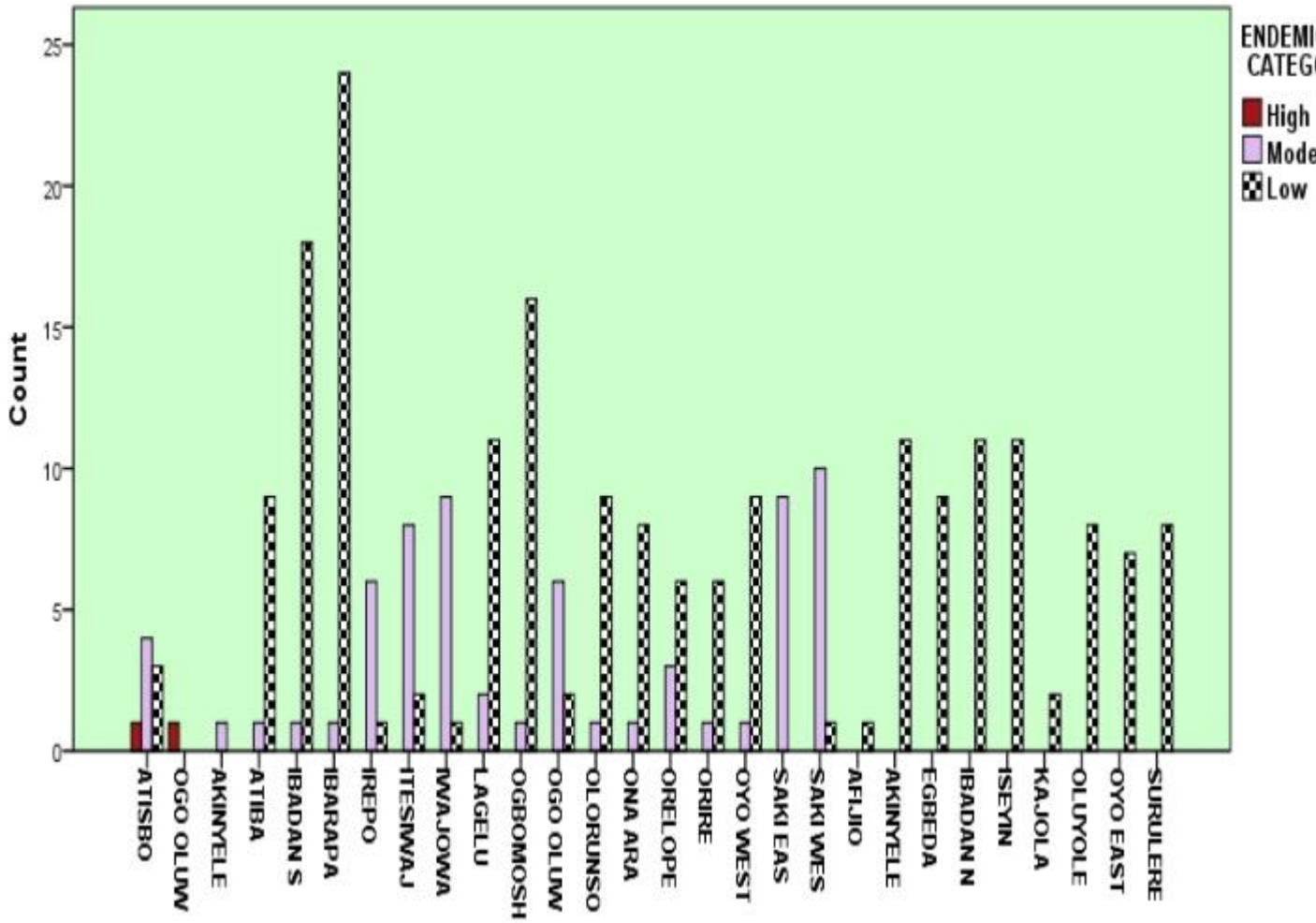


**Figure 4.2: Schistosomiasis endemicity category of wards in LGA**

**Level of endemicity in wards across all LGA**

Table 4.1. revealed that 50% of the ward in Atisbo LGA has a moderate level of endemicity or intensity of infected individuals in wards while 12.5% of the ward has High endemicity (≥50% by parasitological methods). It is evident that Afijio, Akinyele, Egbeda, Ibadan north, Iseyin, Kajola, Oluyole, Oyo East, and Surulere LGA have a low Schistosomiasis endemicity (<10% by parasitological methods of urogenital schistosomiasis). Majority of the wards in Itesiwaju, Iwajowa, Ogo Oluwa, Saki East and Saki West LGA/LCDA are faced with moderate endemicity (≥10% but <50% by parasitological methods).

**Table 4.1: Percentage of endemicity individuals in wards across all LGA**

| Ward endemicity (Low-High) within each LGA [N (%)] | | Endemicity of Schistosomiasis | | | Total |
|---|---|---|---|---|---|
| | | Low (<10% by parasitological methods) | Moderate (≥10% but <50% by parasitological methods) | High (≥50% by parasitological methods) | |
| ATISBO | Ward within LCDA | 3(37.5%) | 4(50.0%) | 1(12.5%) | 8(100%) |
| OGO OLUW | Ward within LCDA | 0 | 0 | 1(100.0%) | 1(100%) |
| AKINYELE | Ward within LCDA | 0 | 1(100.0%) | 0 | 1(100%) |
| ATIBA | Ward within LCDA | 9(90.0%) | 1(10.0%) | 0 | 10(100%) |
| IBADAN S | Ward within LCDA | 18(94.7%) | 1(5.3%) | 0 | 19(100%) |
| IBARAPA | Ward within LCDA | 24(96.0%) | 1(4.0%) | 0 | 25(100%) |
| IREPO | Ward within LCDA | 1(14.3%) | 6(85.7%) | 0 | 7(100%) |
| ITESIWAJ | Ward within LCDA | 2(20.0%) | 8(80.0%) | 0 | 10(100%) |
| IWAJOWA | Ward within LCDA | 1(10.0%) | 9(90.0%) | 0 | 10(100%) |
| LAGELU | Ward within LCDA | 11(84.6%) | 2(15.4%) | 0 | 13(100%) |
| OGBOMOSH | Ward within LCDA | 16(94.1%) | 1(5.9%) | 0 | 17(100%) |
| OGO OLUW | Ward within LCDA | 2(25.0%) | 6(75.0%) | 0 | 8(100%) |
| OLORUNSO | Ward within LCDA | 9(90.0%) | 1(10.0%) | 0 | 10(100%) |
| ONA ARA | Ward within LCDA | 8(88.9%) | 1(11.1%) | 0 | 9(100%) |
| ORELOPE | Ward within LCDA | 6(66.7%) | 3(33.3%) | 0 | 9(100%) |
| ORIRE | Ward within LCDA | 6(85.7%) | 1(14.3%) | 0 | 7(100%) |
| OYO WEST | Ward within LCDA | 9(90.0%) | 1(10.0%) | 0 | 10(100%) |
| SAKI EAS | Ward within LCDA | 0 | 9(100%) | 0 | 9(100%) |
| SAKI WES | Ward within LCDA | 1(9.1%) | 10(90.9%) | 0 | 11(100%) |
| AFIJIO | Ward within LCDA | 1(100%) | 0 | 0 | 1(100%) |

| | | | | | |
|---|---|---|---|---|---|
| AKINYELE | Ward within LCDA | 11(100%) | 0 | 0 | 11(100%) |
| EGBEDA | Ward within LCDA | 9(100%) | 0 | 0 | 9(100%) |
| IBADAN N | Ward within LCDA | 11(100%) | 0 | 0 | 11(100%) |
| ISEYIN | Ward within LCDA | 11(100%) | 0 | 0 | 11(100%) |
| KAJOLA | Ward within LCDA | 2(100%) | 0 | 0 | 2(100%) |
| OLUYOLE | Ward within LCDA | 8(100.0%) | 0 | 0 | 8(100%) |
| OYO EAST | Ward within LCDA | 7(100%) | 0 | 0 | 7(100%) |
| SURULERE | Ward within LCDA | 8(100.0%) | 0 | 0 | 8(100%) |
| Total | Ward within LCDA | 194(74.0%) | 66(25.2%) | 2(0.8%) | 262(100%) |

**Three (3) years prevalence rate of schistosomiasis in each LGA/LCDA**

Table 4.1a is an extension of table 4.1 because it shows the prevalence rate of schistosomiasis for each of the LGA/LCDA in Oyo state with addition of the trend since 2020. The table 4.1a revealed an increase in prevalence pattern of schistosomiasis from 2020 to 2021, and 2021 to 2022. Lagelu LGA showed the highest prevalent rate for schistosomiasis in 2020 while Afijio LGA recorded the highest prevalent rate in 2021 and also in 2022.

**Table 4.1a: Table on Prevalent rate over the year-2020 to 2022**

| | Prevalent level | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| 1 | AFIJIO | 28.7011 | 29.4220 | 30.1566 |
| 2 | AKINYELE | 28.7004 | 29.4186 | 30.1525 |
| 3 | ATIBA | 28.6992 | 29.4173 | 30.1535 |
| 4 | ATISBO | 28.7009 | 29.4175 | 30.1529 |
| 5 | EGBEDA | 28.6992 | 29.4185 | 30.1527 |
| 6 | IBADAN N.E. | 28.6993 | 29.4176 | 30.1526 |
| 7 | IBADAN SOUTH | 28.7005 | 29.4176 | 30.1534 |
| 8 | IBARAPA | 28.7004 | 29.4178 | 30.1530 |
| 9 | IREPO | 28.6990 | 29.4156 | 30.1538 |
| 10 | ISEYIN | 28.7009 | 29.4178 | 30.1534 |
| 11 | ITESIWAJU | 28.6999 | 29.4175 | 30.1541 |
| 12 | IWAJOWA | 28.6992 | 29.4171 | 30.1511 |
| 13 | KAJOLA | 28.7009 | 29.4185 | 30.1543 |
| 14 | LAGELU | 28.7022 | 29.4182 | 30.1551 |
| 15 | OGBOMOSHO | 28.6988 | 29.4152 | 30.1506 |
| 16 | OGO OLUWA | 28.7019 | 29.4193 | 30.1526 |
| 17 | OLORUNSO | 28.6997 | 29.4181 | 30.1527 |
| 18 | OLUYOLE | 28.7018 | 29.4179 | 30.1535 |
| 19 | ONA ARA | 28.6988 | 29.4168 | 30.1532 |
| 20 | ORELOPE | 28.7021 | 29.4183 | 30.1544 |
| 21 | ORIRE | 28.6997 | 29.4172 | 30.1532 |
| 22 | OYO EAST | 28.6963 | 29.4143 | 30.1514 |
| 23 | OYO WEST | 28.7010 | 29.4182 | 30.1548 |
| 24 | SAKI EAST | 28.7001 | 29.4169 | 30.1536 |
| 25 | SAKI WEST | 28.6996 | 29.4174 | 30.1525 |

| | | | | |
|---|---|---|---|---|
| 26 | SURULERE | 28.7002 | 29.4182 | 30.1537 |

**Discussion of Findings**

The results of the Schistosomiasis epidemiological data in the identified Local government area provided insight to the disease distribution and intensity by age group and gender for SAC in the surveyed area. There are 33 LGAs in Oyo state but about 26 LGAs had confirmed cases of Schistosomiasis. Some wards within the same LGA that have wards with low endemicity are highly endemic. The findings on schistosomiasis revealed that the overall prevalence was within the low-risk range (74%) and moderate risk range (25.2%). For instance, majority of the wards in LGA/LCDA are faced with low and moderate endemicity. The finding of this present survey agrees with other studies. (Kefford and Nugegoda, 2016), which revealed that most LGAs had moderate risk for states bordering Benue State where the infection was also moderate. The low prevalence in Ekiti State could be explained by the deworming programme for schistosomiasis which was launched in 2010 although treatment has not been consistent over the years.

In this research study it was revealed that the prevalence of infection in males are higher compare to prevalent rate of female. There was a statistically significant association with schistosomiasis infection by gender. Prevalence of schistosomiasis across education level for School age Children shows is higher among those with no education. However, there is no significance difference between different category of educational level and prevalence of schistosomiasis. Findings of analysis showed that male gender, age group of 10-14, no education status, childhood status in terms of occupation are likely to be infected with urinary schistosomiasis school-aged children (SAC). The study of Ngong et al (2021) affirmed that UTIs caused by Schistosoma haematobium and bacteria, respectively, are highly prevalent among children in tropical regions.

The water bodies often are the only source of water for domestic uses and also serve as social centres for the communities. Dams and other freshwater bodies have been implicated in epidemiology of schistosomiasis in Nigeria and Africa (Steinmann et al., 2006). Nigeria is still endemic for schistosomiasis and scale-up provision of infrastructure especially potable water may reduce contact with infected waters and further support the elimination programme of the government. The prevalent nature of schistosomiasis in Nigeria is also associated with poor infrastructure and unsanitary habits. The presence of multiple infections with these worms in school age children has been observed in similar studies globally including Nigeria ( Ojurongbe et al., 2014). These impose high burden on the infected pupils causing chronic morbidity, cognitive impairment and school absenteeism (Lobato et al., 2012). By implication of the findings of this survey for treatment intervention for schistosomiasis at the LGAs' level is to guide aggressive creations of more resources at primary level to tackle the increasing endemicity of schistosomiasis using educational, services and regulatory approaches in Oyo state.

## Conclusion

This research study with the main aim to comprehensively examine the pattern of urinary schistosomiasis and identify associated risk factors among school-aged children in Oyo State, Nigeria revealed an increasing prevalent rate since 2020. Though Ibarapa has the highest number of wards with cases of schistosomiasis, while Afijio LGA recorded the highest prevalent rate in 2021 and also in 2022. It can be inferred that gender, age, education level, occupation status were independent factors for pattern of urinary schistosomiasis among school-aged children (SAC). The prominent causes for increasing endemicity is contamination of fresh water through the continuous visit of herds of cattle in rural area. As the cattle drink from the water or crosses water, they pass out excretes that may contain eggs of disease-causing organism. Others are ignorance and lack of borehole for safe water cause. Major water contact activities are due to playing, swimming, crossing of water, washing, among others. Urgent government and community driven programmes are needed because area that were not endemic are now faced increasing number of cased. Such interventions should use approaches that are educational, services and regulatory in nature.

## Recommendations

1. School aged children should be monitored at school and parent should be encouraged to monitor and ensure children hygiene and access to water

2. Government should Provide proper documentation of the prevalence of cases, transmission, storing, and analysis of data on schistosomiasis and STH interventions in the future at the FMOH office.

2. Improved Maximising community participation through multi-sectoral strategy, advocacy, and mobilisation for the reduction of the risk factors of schistomasis

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