



## **Perception of Malaria Transmission and Preventive Strategies among Adolescents in Rivers State, South-South Nigeria**

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### **Authors' contributions**

*This work was carried out in collaboration between both authors. Author NGJ designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Both authors managed the analyses of the study. Author JO managed the literature searches. Both authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/JAMMR/2019/v31i1130278

#### Editor(s):

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Complete Peer review History: <https://sdiarticle4.com/review-history/52527>

**Original Research Article**

**Received 02 September 2019**  
**Accepted 07 November 2019**  
**Published 18 November 2019**

### **ABSTRACT**

**Introduction:** Malaria is a cause of mortality in African. Though preventable it has remained a public health issue in sub-Saharan Africa where more than 90% of all malaria cases occur. The study is intended to determine the perception of malaria transmission and prevention among adolescent in Rivers State.

**Materials and Methods:** A cross-sectional survey was conducted among adolescents in secondary schools in Port Harcourt. A Self-administered questionnaire was employed for data collection. Descriptive analysis was carried out. Comparing two mean was by t-test while test for significance was by chi square. In all a p value of  $\leq 0.05$  was regarded as significant.

**Results:** Results of the 969 subjects 445 (45.9%) were males while 524 (54.1%) were females. The mean age was  $14.3 \pm 1.2$  years. All the respondent (100%) had heard of malaria, 957 (98.8%) were aware that mosquito was the vector, 923(95.3%) reported that the mode of transmission was through a bite by mosquito. Misconception regarding transmission of malaria was identified among

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46(4.7%) participants. 760 (78.4%) of them possessed Insecticidal Treated Nets (ITN). Factors that enhanced ITN use among the respondents includes being a Junior student ( $p < 0.001$ ,  $OR = 12.48$ ,  $CI = 8.07-19.31$ ), higher socioeconomic class ( $p < 0.001$ ,  $OR = 2.39$ ,  $CI = 1.71-3.33$ ) while age and family size were not significantly associated.

**Conclusion:** Adolescents in Rivers State have considerable information on malaria transmission and prevention however utilization of ITN is poor. Health education is needed to enhance the use of ITN among adolescents in Rivers State.

*Keywords: Malaria; transmission; prevention.*

## 1. INTRODUCTION

Malaria is an important cause of mortality and morbidity among sub-Saharan Africans, especially among children [1]. It is a disease that is preventable [2] but has remained a subject of public health concern particularly in sub-Saharan Africa where more than 90% of all malaria cases occur [3].

Malaria can be transmitted by a female anopheles mosquito which transmits plasmodium following a bite. Though there are different species of Plasmodium, more than half of the malaria cases in sub-Sahara Africa are caused by plasmodium Falciparum [3].

Malaria is endemic in Nigeria with more than 70% of the populace residing in high transmission areas and 25% in low transmission area [4]. Nigeria accounts for 25% of the burden of malaria in African, in 2017, Nigeria contributed to 19% of deaths caused by malaria in the world [3].

Several organizations have put in effort to control and possibly eliminate malaria in Africa, despite this it has remain a scourge with its effects seen more in children and pregnant women [5]. Multiple methods of preventing malaria have been purposed, this includes clearing of bushes and stagnant water, spraying of insecticides, use of long lasting insecticidal treated nets (ITN). For this, there has been massive distribution of ITN, despite these control have remained poor. Several factors including climatic changes, resistance of the vectors to drugs, host vulnerability as well as the behavioural and life style of the populace have been linked to the poor control of malaria [6].

Nigeria utilizes the WHO control method which focuses on the use of long lasting ITN, use of insecticides, intermittent preventive treatment of at risk persons and early diagnosis and treatment [3].

Brooker, et al. [7] had reported that malaria was attributed to loss of 4-10 million days of school absenteeism in children. Furthermore, school absenteeism was reduced by 62.5% when malaria prophylaxis was given to children in Sri Lanka [8], similarly use of ITN was found to reduce anaemia prevalence among adolescents by half in Kenya [9].

During the adolescent period, children gain more independence and parents may not ensure that they use their bed nets. Therefore, adequate knowledge on the prevention of malaria will increase the practice of the various control methods particularly the use of ITN among these adolescents. This study is intended to determine the perception of malaria, its control and the utilization of insecticidal treated nets (INT) among adolescent in secondary students so as to highlight the common drawbacks noticed on the preventive strategies and to seek for ways to enhance the use of the preventive approaches available among adolescents.

## 2. MATERIALS AND METHODS

This was a cross sectional school based study carried out between May-July 2019 in Obio/Akpor Local Government Area of River State among adolescent in secondary school. A pre-tested self-administered questionnaire was used for data collection. The questionnaire had 3 sections -The socio demographic variables of the participants, their knowledge, attitudes and practice of malaria and its preventive measure.

The minimum sample size was calculated using the formula for population [10].

$$n = \frac{z^2(pq)}{e^2}$$

79.5% was the proportion of persons who had ITN in a study in Nigeria [11] with an error margin tolerated at 2.5% and allowance for non response set at 5%, sample size used was 1050.

Permission for the study was obtained from the Rivers State Ministry of Health and education. Consent and assent was sort for and obtained from all participants. Four public schools were selected randomly from the listed secondary schools in the area; from each school 262 students were selected. A total of 1050 adolescents were selected by multistage sampling method.

Data was entered in a Microsoft excel and analysed using the SPSS version 25. Descriptive analysis was done, comparing two mean was by t- test while test for significance was by chi square in all p values of  $\leq 0.05$  was significant.

### 3. RESULTS

One thousand and fifty questioners were distributed, 81 of them were rejected for incomplete information giving a response rate of 92.3%. Of the 969 subjects 445 (45.9%) were males while 524 (54.1%) were females. There was a near equal representative of both the junior and the senior secondary classes. 639 (65.9%) of respondent were from a family size of less than 5 while 330(34.1%) from a larger family size of greater than or equal to 5. The ages ranged from 10–19 years with a mean of a  $14.3 \pm 1.2$ . The mean age for the males was  $14.4 \pm 1.20$ , while that of the females was  $14.3 \pm 1.2$ . There was no statistical difference in the ages based on gender ( $t= 1.58$ ,  $P = 0.12$ ) as seen in Table 1.

Of the 969 respondent all of them (100%) had heard of malaria, 957 (98. 8%) were aware that mosquito was the vector, 923(95.3%) reported that the mode of transmission was through a bite by mosquito. Use of bed nets (94.7%), cleaning of gutter (93.9%), spraying of insecticides (81.5%) wearing of long clothing (72.1%) and clearing of the bushes (74.2%) were the common methods of prevention of malaria mentioned by the respondents.

Common symptoms mentioned include fever (87. 4%), body pain /joint pain (81.9%) bitter taste (70.1%), loss appetite and vomiting (>60.0%) As seen on Table 2.

As seen on Table 3, of the 969 respondents, 760 (78.4%) of them possessed ITN this was significant  $p < 0.001$

Only 299 (39.3%) use ITN daily while 10(1.3%) never used it despite possessing it. Reasons given for non-usage of ITN daily includes

363(47.8%) forgetfulness, 244 (32.1%) due to heat, while 153 (20.1%) because they reacts to the nets as shown on Table 4.

**Table 1. Socio-demographic variables of the respondents**

Variables	Frequency (n=969)	Percentage
<b>Sex of respondents</b>		
Males	445	45.9
Females	524	54.1
<b>Class in school</b>		
JSS 1-3	512	52.8
SSS 1-3	457	47.2
<b>Social class</b>		
Upper	427	44.1
Lower	542	55.9
<b>Family size</b>		
< 5	639	65.9
$\geq 5$	330	34.1
<b>Ages in years</b>		
10 - $\leq 14$	528	54.5
>14-19	441	45.5
<b>Total</b>	<b>969</b>	<b>100.0</b>
<b>Mean age <math>14.32 \pm 1.22</math></b>		

Factors that enhanced ITN use among the respondents includes being a junior student ( $p < 0.001$  OR=12.48 CI= 8.07-19.31) , higher socioeconomic class ( $p < 0.001$ , OR= 2.39, CI= 1.71-3.33) while age and family size were not significantly associated.(Table 5)

### 4. DISCUSSION

The finding of this study shows that all (100.0%) of the study participants were aware of malaria and 98.8% of them named mosquito as the vector. This finding is higher compared to the 66.0% reported by Deressa, Ali & Emmsellesae [12] and the 47.5% by Legasse, et al. [13] These two studies were community based studies, the study participants may have been a mixture of illiterates and literates compared to this present study which was conducted in secondary schools and malaria treatment and control measures may have been taught to the students at schools.

On findings revealed that 96.4% of the participants mentioned that malaria is a preventable disease, this finding is similar to the 97.0% reported by Anene-Okeke, Isah, Aluh & Ezeme [6].

The similarities could be due to the study population mentioned as both study involved students attending schools.

**Table 2. Awareness of mode of transmission, prevention and symptoms of malaria among respondents**

Variables	Number of respondents N=969	Percentages
<b>Ever heard of Malaria</b>		
Yes	969	100.0
No	0	0.0
<b>Vector for malaria</b>		
Mosquitoes	957	98.8
No response	12	1.2
Don't know	0	0.0
<b>Mode of transmission</b>		
Eating of contaminated food	5	0.5
Breathing bad air	7	0.7
Eating oily food	18	1.9
Bite by mosquito	923	95.3
Close contact with a patient	2	0.2
Change in weather	14	1.4
<b>Malaria can be prevented</b>		
Yes	934	96.4
No	35	3.6
<b>*Methods of preventing malaria</b>		
Use of bed net	918	94.7
Wearing long clothes	699	72.1
Avoiding certain food	142	14.7
Spraying insecticide	790	81.5
Clearing bushes	719	74.2
Cleaning gutters	910	93.9
Use of insect repellents	62	6.4
Don't know	17	1.8
<b>*Symptoms</b>		
Fever	847	87.4
Body pain/joint pain	794	81.9
Bitter taste	679	70.1
Loss of appetite	653	67.4
Vomiting	589	60.8
Weakness	451	46.5
Chills and rigors	265	27.3
Dizziness	220	22.7
Excessive sweating	124	12.8
Don't know	12	1.2

\*Multiple responses

**Table 3. Proportion of adolescents who possess ITN**

Gender	Possession of ITN		Total (%)
	Yes	No	
Males	384(86.3)	61(13.7)	445(100.0)
Females	376(71.8)	148(28.2)	524(100.0)
Total	760(78.4)	209(21.6)	969(100.0)

 $\chi^2 30.03, p\text{-value}, DF 1, < 0.001$ 

On the methods of malaria prevention, ITN was the most mentioned methods used for preventing malaria as about 95.0% of the participants mentioned that ITN can be used for the prevention. This finding was similar to the finding by Anene-Okeke et al. [6]. In addition to the use of ITN, most of the participants mentioned other methods of prevention. This is important because they did not only know how to prevent

the mosquitoes from coming in contact with them but also method of reducing their breeding sites.

Concerning the symptoms of malaria, our finding from this study shows that majority of the participants were aware of the common symptoms of malaria, this finding is similar to the findings by Deressa, et al. [12]. The possible explanation for this could be due to the awareness created through the media on the common symptoms of malaria by different organizations.

Our study indicates that population of adolescents who owned ITN was 78.4%. However, only 39.5% of them used it every day. This finding is low compared to the 53.5% reported by Anene-Okeke, et al. [6]. This

disparity could be attributed to the age of the study participants, while Anene- Okeke, et al. [6] used adults who were in higher institutions who may have better knowledge and benefits of sleeping under an ITN, this study participants were adolescents in secondary schools who may not want to use ITN except when forced to do so.

The reason given for non-usage of ITN were several, however , the commonest reason given was forgetfulness, followed by excessive heat while no reason was given by some participants. Probably if adequate health education was given before the distribution of the nets or at the point of purchase, there may have been a more effective utilization of ITN by all the adolescents that had them.

Our study finding showed that being in junior class and coming from a higher social class positively and significantly determined utilization of ITN, this finding is similar to Belay & Deressa's finding [14] were it was reported that higher level of education significantly determined the use of

ITN, though their study was among pregnant women in Ethiopia. The finding in this present study is not surprising because it could have been made compulsory for junior students to sleep under the net, also coming from a high social class means that their parents were educated hence knew the benefit of sleeping under the ITN.

In sub-Saharan Africa where malaria is prevalent, misconceptions are still common,[15] misconceptions regarding transmission of malaria were identified in this study though among few participants (4.7%). The misconceptions includes that malaria is caused by eating oily, contaminated food, that malaria can be transmitted from person to person and can be due to change in weather. These misconception need to be addressed and the correct information about the transmission of malaria through health education should be ensured if we are to achieve malaria control and prevention through the utilization of ITNs and other preventive strategies.

**Table 4. Use of insecticide bed nets**

Variables/Percentages	Male	Female	Total (%)
<b>Frequency of net use</b>			
Every day	162(42.2)	137 (36.4)	299( 39.3)
2-3 times/week	91(23.7)	120(31.9)	211(27.8)
Once a week	118(30.7)	112(29.8)	230(30.3)
Once in a while	6(1.6)	4(1.1)	10(1.3)
Never	7(1.8)	3(0.8)	10(1.3)
Total	384(50.5)	376(49.5)	760(100.0)
<b>*Reasons for not using it every day</b>			
Forgets	153(42.1)	210(57.9)	363(100.0)
Causes heat	132(54.1)	112(45.9)	244(100.0)
Reacts to it	96(62.7)	57(37.3)	153(100.0)
Dislikes it	45(40.2)	67(59.8)	112(100.0)
No enough space	76(85.4)	13(14.6)	89(100.0)
No reason	56(62.2)	34(37.8)	90(100.0)

\*Multiple responses

**Table 5. Determinants of ITN use among adolescents**

Variables	Use of ITN		Total (%)	χ <sup>2</sup>	p-value	OR (Crude)	95% CI
	YES	NO					
<b>Class in school</b>							
JSS	486(94.9)	26(5.1)	512(100)	174.5	<0.001	12.48	8.07-19.31
SSS	274(60.0)	183(40.0)	457(100)				
<b>Social Class</b>							
Upper	368(86.2)	59(13.8)	427(100)	27.1	<0.001	2.39	1.71-3.33
Lower	392(72.3)	150(27.7)	542(100)				
<b>Family size</b>							
<5	498(77.9)	141(22.1)	639(100)	0.27	0.60	0.92	0.66-1.27
≥5	262(79.4)	68(20.6)	330(100)				
<b>Ages in years</b>							
≤14	401(76.0)	127(24.0)	528(100)	4.23	0.04	0.72	0.53-0.99
>14	359(81.4)	82(18.6)	441(100)				

## 5. CONCLUSION

The finding from this study revealed that adolescents attending secondary school in Obio/Akpor LGA in Rivers State, Nigeria have considerable information on the mode of transmission and prevention of malaria although there is still some misconception about malaria transmission among adolescents. More than half of them possessed ITN however utilization was poor. Therefore, there is need for health education aimed towards enhancing effective malaria control by the use of ITN and environmental sanitation.

## CONSENT

The authors declare that a written informed consent was gotten from the parents/guardians of the participants and permission for the study was obtained from the ministry of education and principal of the schools involved in this study.

## ETHICAL APPROVAL

Approval was from the Rivers State Ministry of Health.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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*The peer review history for this paper can be accessed here:*  
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