Antecedent Factors Relating to Malaria Among Secondary School Students in Ibadan, Nigeria

Joy D. Famoyegun and Akintayo O. Ogunwale

ABSTRACT

Nigeria is a malaria-endemic country, and the disease is responsible for a high-rate of morbidity and mortality among various segments of the population. The aim of this study was to assess the living situation, knowledge, and perception relating to malaria among secondary school students. This descriptive cross-sectional study employed a multi-stage sampling technique to recruit 430 students from private and public secondary schools in Ibadan North Local Government Area, Oyo State, Nigeria. Data were collected using a semi-structured questionnaire that included questions on socio-demographic characteristics; respondents’ living conditions; a 66-point scale on knowledge of causes, transmission route, symptoms, prevention, and consequences of malaria; and a 22-point scale on perceptions of malaria. Data were analysed using descriptive statistics, t-test, and ANOVA at a confidence level of 95%. Respondents’ mean knowledge score was 27.0±7.9, with a majority (76.1%) having poor knowledge. The type of school attended influenced respondents’ knowledge. The mean perception score was 12.3±4.2 with 61.0% of the respondents having favourable perceptions. Students in private schools had a lower knowledge of malaria as compared to those in public schools (p<0.05). Age was significantly associated with perception as younger students had a better perception towards malaria compared to students in older age groups. Respondents had inadequate knowledge relating to malaria and several of them had perceptions that can put them at risk of the disease. Appropriate school-based health promotion strategies such as peer education, and training are needed to address the identified gaps in knowledge, and perceptions not in line with the biomedical worldview.

Keywords: In-school adolescents, malaria knowledge, malaria perception, malaria prevention, secondary school students.

1. INTRODUCTION

Malaria is a mosquito-borne disease caused by an intraerythrocytic protozoan parasite belonging to the genus Plasmodium [1], [2]. Plasmodium falciparum is the most severe malaria parasite in Africa, and it causes the most serious and life-threatening form of the disease. Malaria is a severe public health issue that affects individuals of all ages and is found all over the world [3]–[4]. The disease has a huge impact, with 303 people per 1000 at risk in 2019 [5]. Nigeria is the country with the highest malaria burden in the world, according to the 2020 World Malaria Report [6]. Malaria threatens about 97 percent of Nigeria's population. Malaria is responsible for around 60% of outpatient visits and 30% of hospital admissions in Nigeria. It is estimated to be associated with up to 11% of maternal death, 25% of infant mortality, and 30% of under-5 mortality [7], [8]. Notably, the disease overburdens Nigeria's already fragile health system and places a significant social and economic strain on the country [9].

Antecedent factors that influence the involvement of adolescents in the prevention, treatment, and control of malaria include their living situation, knowledge, and perception [10], [11]. These characteristics also influence their malaria-related health-seeking behavior, and should be taken into account during malaria-control intervention programs. Some studies focusing on Secondary School Students (SSS), the majority of whom are adolescents, have indicated knowledge gaps and misconceptions about malaria [12]–[14]. As this population group is prone to the disease, further research is needed to investigate the knowledge pattern and probable misconceptions among them.

In-school adolescents in the Ibadan North Local Government Area (IBNLGA) like other population groups are being burdened by malaria and its associated health complications. However, the disease burden and infection implications in this age group have not been thoroughly investigated [15]. In fact, it has been emphatically noted that this age group is rarely covered in household-based cluster surveys [16]. The massive impact of malaria on young children and pregnant women has largely overshadowed the problem of malaria in adolescents. This explains why this study focused on the knowledge and perceptions of malaria among in-school adolescents in the IBNLGA. The study aimed to investigate the living situation, knowledge, and perception relating to malaria among secondary school students. The specific objectives were to assess the living conditions of SSS, assess the level of knowledge of malaria
among SSS, and determine the perception of the SSS relating to malaria in IBNLGA.

II. MATERIALS AND METHODS

A. Study Design and Setting

A descriptive cross-sectional design was adopted in this study. It investigated the antecedent factors relating to malaria among secondary school students in IBNLGA, Oyo state.

B. Study Population and Setting

The study population consists of 430 male and female students aged 10–19 years in selected private and public secondary schools in IBNLGA. In this investigation, a 5-stage sampling procedure was used. The sampling process started with the random selection of 50 percent of the wards in the LGA from the available 12 wards with the aid balloting procedure (this amounts to a selection of 6 wards). For stage two of the sampling, the schools in the selected wards were stratified into public and private schools, and a school was chosen at random from each stratum across the wards (i.e., one public and one private school were selected in each ward). The population of the chosen schools was established in stage three, and proportionate sampling was employed to choose research participants from each school based on the sample size. Following that, in stage four, a class was chosen at random from each available arm in the schools via balloting. The sampling process ended with a systematic sampling of respondents from each designated class with the aid of their class records as a sampling frame.

C. Instrument and Method for Data Collection

A pre-tested researcher-designed semi-structured questionnaire was used to collect data. A 66-point malaria-related knowledge scale, a 22-point malaria perceptions scale, and information on respondents’ living conditions/situations relevant to malaria risk transmission and socio-demographic variables were all included in the instrument. An interviewer-administered technique was used for data collection. Each selected school was visited during its break period. Prior to collecting data in each chosen school, permission to conduct the study was obtained from the school principal. The Vice Principals (academics) were contacted in the majority of cases for access to the class rosters of the available classes for selection. In each arm, one class was randomly chosen, and respondents were systematically selected from the class register based on the pre-calculated number of respondents required from the class. Data were collected from 9 a.m. to 2 p.m. on weekdays over a period of three weeks.

D. Data Management and Analysis

The copies of the questionnaires were double-checked for completeness and accuracy to ensure that they were properly filled, each properly checked and cleaned copy of the questionnaire was assigned a serial number for easy identification and retrieval. To make data entry into the computer easier, a manual coding guide was created. Poor, fair, and good knowledge of malaria were classified as 33 points (≤50 percentile), 33–49 points (>50–75 percentile), and 50–66 points (> 75 percentile), respectively. Perception scores of 0–11 points (≤50 percentile) were classified as unfavorable, while scores of >11–22 points (> 50 percentile) were classified as favourable perception. Univariate data were analyzed using descriptive statistics such as percentages, frequency counts, and means, while bivariate data were analyzed with Student’s t-test and One-way ANOVA (F-test).

E. Ethical Considerations

The Oyo State Ministry of Health Ethical Review Committee (AD 13/479/981) granted the ethical approval for this study. Issues relating to the study's objective, benefits, risks, and voluntary nature, which were included in informed consent forms were thoroughly communicated to the study participants prior to the study. Participants were briefed about the following: Confidentiality of data, Beneficence to Participants, Non-maleficence to participants and rights to decline/withdrawal from the study without loss of benefits. The study only included students who provided their informed consent voluntarily. For adolescents aged < 18 years, permission was obtained from their school principals and assent obtained from such adolescents.

III. RESULTS

The questionnaire was completed by 423 participants, yielding a response rate of 98.3%. The respondents were within the age range of 10 to 19 years, with a mean age of 14.5±2.2 years. The respondents aged 13–14 years old led the list (35%), followed by those aged 15–16 years old (26.0%). Males made up 49.6% of the population. All of the respondents (100.0%) were from mixed schools, with public schools accounting for the majority (82.7%). Table I shows an overview of the demographic characteristics of the study participants. Over half of the respondents (51.3%) lived in flats, followed by those who lived in a ‘Face-me-I-face-you’ kind of home (19.6%). The mean number of people in each respondent’s household was 5.8±1.8 persons. As much as 46.6% of the respondents were living in households of 4 – 8 persons and 42.2% of the respondents were living in households with 6–8 persons. Open gutters (47.8%), empty containers/cans (29.1%), and cleared bush (29.1%) were among the environmental conditions identified by respondents as potentially promoting mosquito breeding in their homes. In the various houses where they were dwelling, the majority (81.1%) of the respondents had windows with mosquito screens and 65.7% had doors with mosquito screens.

Information relating to respondents’ knowledge of malaria is presented in Fig. 1 and Table III. The mean knowledge score of the respondents was 27.0±7.9 and 76.1% of them had poor knowledge of malaria-related issues. As much as 70.3% of the respondents did not know that malaria is caused by Plasmodium falciparum. There were also occasions where respondents attributed factors other than Plasmodium falciparum as being responsible for the causation of malaria. The proportions of respondents that incorrectly attributed the causation of malaria to stress, inadequate sleep, overwork, and exposure to too much sun were 41.6%, 38.3%, 35.7%, and 35.2% respectively. However, more than two-third (79.7%) of the respondents correctly stated that malaria is transmitted through a mosquito bite and 51.1% correctly stated that blood transfusion is a method of transmission. Respondents’ knowledge of symptoms of simple malaria was also captured.
The respondents who correctly mentioned headache, high body temperature, and bodily pains as signs of uncomplicated malaria were 79.9%, 78.3%, and 64.8% respectively. While exploring the knowledge of respondents on the symptoms of complicated malaria, more than half (54.4%) correctly stated that a symptom of complicated malaria is dark and limited urine. Breathing difficulties (53.7%), Fainting/loss of consciousness (47.5%), convulsion (35.9%), and coma (27.4%) were also correctly identified as typical symptoms of complicated malaria. The use of insecticide-treated nets (84.9%), clearing of bushes around dwelling units (86.5%), insecticide spray (75.9%), removal of stagnant water near dwelling units (75.4%), and mosquito coils (72.6%) were among the accurately stated strategies of preventing malaria cited by the respondents. Some respondents wrongly stated that malaria can be prevented by avoiding working under the sun (51.1%) as well as through prayers (41.1%). Some of the consequences of malaria which were correctly listed by respondents included anemia (52.5%), death (47.8%), impaired consciousness (41.4%), and coma (27.9%).

The respondents’ knowledge of malaria treatment medications was assessed. As much as 66.7% of respondents correctly mentioned Artemether-Lumefantrine as appropriate malaria medicine, while some (30.7%) respondents also identified Artesunate-Modamiquine as medicines for treating malaria. Some (43.3%) respondents identified Sulphadoxine Pyrimethamine (SP) brands as appropriate malaria treatment medications. This antimalarial, on the other hand, is typically taken for malaria prevention, particularly by expectant mothers. It may also be used as a medicine for treating malaria. Quinine, a drug that is typically taken for malaria prevention, more than two-thirds of respondents (66.7%) opined that anti-malarial medications should be taken as soon as possible after a mosquito bite. The majority (71.2%) of the respondents expressed the perception that malaria can be prevented. However, 39.7% were of the appropriate view that orthodox medicines are better options for treating malaria compared to traditional medicines. Slightly over half (52.2%) of the respondents shared the view that the use of mosquito net can prevent one from having malaria. About a quarter (25.3%) of the respondents perceived themselves not to be susceptible to malaria because they do not live in areas where mosquitoes breed. Likewise, 25.1% also claimed not to be vulnerable because they often use herbal medicines. Most (90.0%) respondents were of the perception that malaria has serious effects on secondary school students as malaria can make one absent from school (90.3%). Similarly, 82.7% explicitly expressed the perception that malaria can reduce a student’s concentration in class (82.7%).

Table V shows a comparison of respondents’ knowledge scores with selected variables (perception, age, gender, and school type). The mean knowledge scores observed among the various age groups (10–12 years 25.8±8.4; 13–14 years 26.7±7.4; 15–16 years 28.2±7.6; 17–19 years 27.4±8.8) were not significantly different. The mean knowledge score (24.9±8.1) among respondents in private schools was lower compared with that of their counterparts in public schools (27.5±7.9) with a significant difference. There was no

**TABLE I: Respondents’ Socio-Demographic Characteristics**

<table>
<thead>
<tr>
<th>Demographic Characteristics</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of Respondents** (in years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-12</td>
<td>79</td>
<td>18.7</td>
</tr>
<tr>
<td>11-13</td>
<td>148</td>
<td>35.0</td>
</tr>
<tr>
<td>14-15</td>
<td>110</td>
<td>26.0</td>
</tr>
<tr>
<td>16-17</td>
<td>86</td>
<td>20.3</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>210</td>
<td>49.6</td>
</tr>
<tr>
<td>Female</td>
<td>213</td>
<td>50.4</td>
</tr>
<tr>
<td>Type of School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>73</td>
<td>17.3</td>
</tr>
<tr>
<td>Public</td>
<td>350</td>
<td>82.7</td>
</tr>
</tbody>
</table>

*Mean Respondents’ Age= 14.5 ± 2.2 years.

**TABLE II: Respondents’ Living Situation**

<table>
<thead>
<tr>
<th>Types of dwelling unit</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat (3 or more bedrooms)</td>
<td>217</td>
<td>51.3</td>
</tr>
<tr>
<td>‘Face-me-I-face-you’ house</td>
<td>83</td>
<td>19.6</td>
</tr>
<tr>
<td>A room and parlour</td>
<td>65</td>
<td>15.4</td>
</tr>
<tr>
<td>Two-bedrooms apartment</td>
<td>37</td>
<td>8.7</td>
</tr>
<tr>
<td>One room self-contained (single room ensuite)</td>
<td>21</td>
<td>5.0</td>
</tr>
<tr>
<td>Number of people living in the same household**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td>32</td>
<td>5.2</td>
</tr>
<tr>
<td>4-5</td>
<td>196</td>
<td>46.6</td>
</tr>
<tr>
<td>6-8</td>
<td>177</td>
<td>42.2</td>
</tr>
<tr>
<td>&gt; 8</td>
<td>53</td>
<td>9.5</td>
</tr>
</tbody>
</table>

Environmental factors that can promote mosquito breeding/proliferation

| Presence of unclear bushes near house | 120 | 9.8 |
| Presence of open gutters near house | 202 | 16.4 |
| Presence of stagnant water or pools of water around the house | 80 | 6.5 |
| Heap of refuse near house | 96 | 7.8 |
| Presence of empty containers or cans around the house | 123 | 10.0 |
| Presence of windows with mosquito screens | 343 | 27.9 |
| Presence of doors with mosquito screens | 265 | 21.6 |

**X² = 5.8 ± 1.8.

*Multiple responses present.
Symptoms of Complicated malaria:
- Dark and limited urine
- Breathing difficulties
- Fainting
- Febrile Convulsion*
- Prostration/Inability to sit
- Coma*+

Ways of preventing malaria:
- Use of insecticide treated net
- Clearing of bushes in the environment
- Use of insecticide spray
- Removal of stagnant water
- Use of mosquito repellent cream
- Praying
- Avoidance of overwork
- Avoiding Stress
- Avoiding work under the sun
- Avoiding Stress
- Drinking a lot of water regularly
- Eating fruits
- Eating a lot of water regularly
- Avoiding Stress
- Amodiquine (eg Camosunate)
- Lumenfanthrine (eg Coartem)
- Chloroquine
- Artemether
- Sulphadoxine
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- Removal of stagnant water
- Use of insecticide spray
TABLE IV: RESPONDENTS’ PERCEPTION OF MALARIA

<table>
<thead>
<tr>
<th>Respondents Perception</th>
<th>Agree (%)</th>
<th>Undecided (%)</th>
<th>Disagree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria is a serious disease</td>
<td>335 (79.2)*</td>
<td>36 (8.5)</td>
<td>52 (12.5)</td>
</tr>
<tr>
<td>Without treatment, symptoms of malaria disappear after some days</td>
<td>80 (18.9)</td>
<td>92 (21.7)</td>
<td>251 (59.3)*</td>
</tr>
<tr>
<td>Malaria is a mild disease</td>
<td>191 (45.2)</td>
<td>117 (27.7)</td>
<td>115 (27.2)*</td>
</tr>
<tr>
<td>Malaria cannot kill or lead to death</td>
<td>134 (31.7)</td>
<td>87 (20.6)</td>
<td>202 (47.8)*</td>
</tr>
<tr>
<td>Malaria can’t prevent one from doing well at school</td>
<td>201 (47.5)</td>
<td>62 (14.7)</td>
<td>160 (37.8)*</td>
</tr>
<tr>
<td>Malaria is only serious in children not among adolescents</td>
<td>95 (22.5)</td>
<td>74 (17.5)</td>
<td>254 (60.0)*</td>
</tr>
<tr>
<td>Mosquito repellent creams cannot prevent mosquito bite</td>
<td>146 (34.5)</td>
<td>86 (20.3)</td>
<td>191 (45.2)*</td>
</tr>
<tr>
<td>One should take anti-malarial immediately after a mosquito bite</td>
<td>282 (66.7)</td>
<td>77 (18.2)</td>
<td>64 (15.1)*</td>
</tr>
<tr>
<td>Malaria cannot be prevented</td>
<td>72 (17.0)</td>
<td>50 (11.8)</td>
<td>301 (71.2)*</td>
</tr>
<tr>
<td>Orthodox medicines are better for treating malaria compared with traditional medicines or herbs</td>
<td>168 (39.7)*</td>
<td>129 (30.5)</td>
<td>126 (29.8)</td>
</tr>
<tr>
<td>Mosquito nets cannot prevent one from having malaria</td>
<td>127 (30.0)</td>
<td>75 (17.7)</td>
<td>221 (52.2)*</td>
</tr>
<tr>
<td>Chloroquine is the main drug used for treating malaria</td>
<td>124 (29.3)</td>
<td>159 (37.6)</td>
<td>140 (33.1)*</td>
</tr>
<tr>
<td>I cannot have malaria because mosquitoes do not breed in our area</td>
<td>107 (25.3)</td>
<td>76 (18.0)</td>
<td>240 (56.7)*</td>
</tr>
<tr>
<td>Mosquitoes are not in any way associated with malaria</td>
<td>73 (17.3)</td>
<td>57 (13.5)</td>
<td>293 (69.3)*</td>
</tr>
<tr>
<td>People get malaria when they are short of blood</td>
<td>94 (22.2)</td>
<td>94 (22.2)</td>
<td>235 (55.6)*</td>
</tr>
<tr>
<td>We use herbal medicine in our house, so we cannot have malaria</td>
<td>106 (25.1)</td>
<td>80 (18.9)</td>
<td>237 (56.0)*</td>
</tr>
<tr>
<td>It is only very young children get malaria</td>
<td>41 (9.7)</td>
<td>64 (15.1)</td>
<td>318 (75.2)*</td>
</tr>
<tr>
<td>We can’t get malaria because we live in a beautiful house</td>
<td>45 (10.6)</td>
<td>55 (13.0)</td>
<td>323 (76.4)*</td>
</tr>
<tr>
<td>Malaria can make one absent from School</td>
<td>382 (90.3)*</td>
<td>22 (5.2)</td>
<td>19 (4.5)</td>
</tr>
<tr>
<td>Malaria can reduce a student’s concentration in class</td>
<td>350 (82.7)*</td>
<td>34 (8.0)</td>
<td>39 (9.2)</td>
</tr>
<tr>
<td>Malaria can lead to low intelligence level</td>
<td>217 (51.3)*</td>
<td>89 (21.0)</td>
<td>117 (27.7)</td>
</tr>
<tr>
<td>Frequent episodes of malaria can affect one’s school grades</td>
<td>239 (56.5)*</td>
<td>87 (20.6)</td>
<td>97 (22.9)</td>
</tr>
</tbody>
</table>

*Perception in line with biomedical world view/appropriate

TABLE V: COMPARISON OF RESPONDENTS’ KNOWLEDGE SCORES WITH SELECTED VARIABLES

<table>
<thead>
<tr>
<th>Variables</th>
<th>No</th>
<th>X̄ knowledge score</th>
<th>Std. Deviation</th>
<th>df</th>
<th>F/t-test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (in years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10–12</td>
<td>79</td>
<td>25.77</td>
<td>8.411</td>
<td>3,419</td>
<td>1.572**</td>
<td>0.195</td>
</tr>
<tr>
<td>13–14</td>
<td>148</td>
<td>26.68</td>
<td>7.364</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15–16</td>
<td>110</td>
<td>28.17</td>
<td>7.619</td>
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</tr>
<tr>
<td>17–19</td>
<td>86</td>
<td>27.40</td>
<td>8.841</td>
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<td>School Type</td>
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<tr>
<td>Private</td>
<td>73</td>
<td>24.86</td>
<td>8.052</td>
<td>421</td>
<td>2.590*</td>
<td>0.010*</td>
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<tr>
<td>Public</td>
<td>350</td>
<td>27.50</td>
<td>7.880</td>
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<tr>
<td>Gender</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Male</td>
<td>210</td>
<td>27.66</td>
<td>8.299</td>
<td>421</td>
<td>1.580*</td>
<td>0.115</td>
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<tr>
<td>Female</td>
<td>213</td>
<td>26.44</td>
<td>7.588</td>
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<td>Perception</td>
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<tr>
<td>Unfavourable</td>
<td>165</td>
<td>25.36</td>
<td>8.459</td>
<td>421</td>
<td>3.530*</td>
<td>&lt;0.0001*</td>
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<tr>
<td>Favourable</td>
<td>258</td>
<td>28.12</td>
<td>7.448</td>
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TABLE VI: COMPARISON OF RESPONDENTS’ PERCEPTION SCORES WITH SELECTED VARIABLES

<table>
<thead>
<tr>
<th>Variables</th>
<th>No</th>
<th>X̄ perception score</th>
<th>Std. Deviation</th>
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<th>F/t-test</th>
<th>P value</th>
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<td>Age group (in years)</td>
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<tr>
<td>10–12</td>
<td>79</td>
<td>13.35</td>
<td>3.843</td>
<td>3,419</td>
<td>4.021**</td>
<td>0.008*</td>
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<td>13–14</td>
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<td>12.58</td>
<td>4.025</td>
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<td>17–19</td>
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<td>4.382</td>
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<tr>
<td>Private</td>
<td>73</td>
<td>13.45</td>
<td>3.559</td>
<td>421</td>
<td>2.658*</td>
<td>0.008*</td>
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<tr>
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<td>12.03</td>
<td>4.277</td>
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<tr>
<td>Gender</td>
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<tr>
<td>Male</td>
<td>210</td>
<td>12.21</td>
<td>4.307</td>
<td>421</td>
<td>0.315*</td>
<td>0.753</td>
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<tr>
<td>Female</td>
<td>213</td>
<td>12.34</td>
<td>4.086</td>
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</table>

* Based on t-test analysis.

** Based on F-test analysis.

*statistically significant (<0.05).

Fig. 1. Respondents’ level of knowledge of malaria.

Fig. 2. Categorization of respondents ‘perception of malaria.
significant difference between the mean knowledge scores of males (27.7±8.3) and females (26.4±7.5). Conversely, the mean knowledge scores among respondents with unfavourable perceptions (25.36±8.5) compared with those with favourable perceptions (28.12±8.5) were significantly different.

IV. DISCUSSION

The mean number of persons living in respondents’ households was 5.8±1.8. This has implications for the average number of mosquito nets that should be in each household or dwelling unit. Some of the dwelling units are houses of the “face-me-I-face-you” room design. This type of housing design coupled with the presence of bushes, stagnant water bodies in many of the dwelling units as well a lack of door and window screen in the majority of the houses have great potential to enhance the vulnerability of the study population to malaria. As a result, environmental control measures are required to supplement other technologies such as medications, mosquito nets, and door and window screens in the prevention and control of malaria among the study participants. The findings reveal that respondents’ understanding of malaria is lacking in various areas. For example, mosquitoes are mistakenly thought to be the cause of malaria whereas they are actually the vector of the pathogen that causes the sickness. The perception of malaria with “too much sun/excess sun exposure and “stress” as causes of malaria noted among several respondents constitute evidence of misconceptions about the disease’s causation among the study population. Similar misconceptions were noted in previous research done among similar populations [12], [17]–[19].

Only 29.3% of the respondents could correctly identify the causative organism as Plasmodium falciparum. Previous research reported that respondents’ understanding of plasmodium and the malaria causal agent is extremely limited [19]–[22]. For instance, research conducted among students in boarding Secondary Schools in Igembe District, Kenya, it was reported that only a few respondents had a correct understanding of the causal agent for malaria [18]. In a study of primary school children in Zimbabwe, 8.6% of respondents said they knew about the organism that causes malaria [20]. Also, in a study conducted among in-school teenagers in India only 19.2% of them had a correct understanding of the malaria causal agent [22]. In comparison to the symptoms of complicated malaria, the majority of the respondents in the survey were more familiar with the common symptoms of uncomplicated malaria. This is a gap in knowledge that needs to be bridged because complicated malaria readily leads to death. Complicated (severe) malaria is a serious concern, especially among the under-five-children; it becomes less common in older children and adults as they acquire some immunity over time [24].

Several respondents were able to identify ways of preventing malaria. Nearly half of the respondents, on the other hand, lacked a thorough knowledge of malaria prevention methods. Several respondents incorrectly named basic healthy living behaviours as malaria preventative methods, such as drinking plenty of water on a regular basis, eating fruits, and avoiding overwork. Previous research [12], [25]–[27] undertaken in similar populations reported a lack of knowledge about malaria prevention related issues. For instance, a previous similar study reported that almost 30% of students were unable to identify preventive measures such as the use of ITN [12]. Knowledge of malaria consequences was generally low among the respondents. Only less than half of the study participants recognized death as a possible outcome of untreated malaria. This pattern of findings underscores the need to furnish secondary school students with the necessary information and education on the consequences of malaria and other related issues in order to upgrade their knowledge. This is very crucial for the initiation of appropriate preventative and health-seeking behaviours. Overall, the level of knowledge of malaria among the respondents is poor.

The majority of respondents held views that were consistent with the biomedical worldview [28]–[31]. Similar pattern was observed in a previous conducted among students in Uganda where 79% of respondents opined that malaria is a severe and life-threatening disease [26]. Despite the fact that the majority of respondents perceived that malaria can be prevented, 30% of respondents shared the perception that mosquito nets are ineffective in preventing malaria. A qualitative investigation is needed to probe deeply into why people believe mosquito nets are ineffective in preventing malaria. This is especially pertinent given that earlier research in Nigeria has found that ITN adoption is not encouraging [30]–[33]. The majority (66.7%) of respondents expressed the perception that anti-malarial drugs should be taken after being bitten by a mosquito. This is not only inappropriate, but it will also be an example of irrational self-medication, which might lead to malaria drug resistance. Only 39.7% of those interviewed perceived that orthodox (western) medications are superior to indigenous treatments of malaria. This reflects the respondents’ preferences for malaria drugs, with a priority on the use of traditional treatments. The perception of vulnerability is quite favourable; this may be associated with their previous experience of bouts of malaria. Several respondents opined that they were vulnerable to the disease with the majority (69.3%) being able to associate mosquitoes with malaria. However, around a quarter were of the notion that they are not vulnerable to malaria due to their practice of use of herbal medicines. Previous studies have reported the use of herbal medicines for treating malaria among various age groups including children and young people in Southwest Nigeria [30], [31]. While some people use herbs exclusively to treat malaria [33], others use them in conjunction with orthodox medications [34]. This points to the need for more research into the safety and efficacy of herbs in the treatment of malaria [35].

The social burden of the disease with special reference to how it is perceived to adversely affect students’ education has been revealed in this study. For example, the majority of the participants shared the viewpoint that malaria could cause them to miss school and cause them to lose concentration in class. A survey conducted among students Tanzanian reported that nearly all of the students had missed school due to malaria, with absences ranging from a few days to weeks depending on the severity of the sickness [24]. However, in a study in Thai-Myanmar, the association between malaria infection and school performance was not significant after adjusting for potential confounders, including gender, school
sabotageism over a semester or term, and emotional intelligence [36]. This pattern of finding underscores the need to tackle the problem of malaria among in-school adolescents using various appropriate school health programme opportunities and initiatives.

The findings of this study revealed a significant variation in adolescents’ mean knowledge scores based on their perception. Those with a higher level of knowledge had a more positive perception than those with a lower level of knowledge. This implies that adolescents’ perceptions of malaria are influenced by their knowledge. There was also a substantial variation in respondents’ perceptions based on their age group, with younger respondents having a more favourable perception; this is important to note for educational interventions. Based on the findings of this investigation, the following suggestions were made: Secondary school students should receive educational interventions on the causes, modes of transmission, symptoms, prevention, suggested treatment procedures, and consequences of untreated malaria. Malaria-related behavioural change communication materials should be developed for schools and made available to students in order to improve their understanding and foster a positive attitude toward malaria. In schools and in communities, factors that have the potential to promote mosquito breeding should be identified and addressed.

V. CONCLUSION

The antecedent factors (living conditions, knowledge, and perception) associated with malaria among secondary school students in Ibadan North LGA were investigated in this study. The findings revealed that the respondents had a fair knowledge of malaria symptoms and preventive methods. There are gaps in respondents’ knowledge relating to complicated malaria, treatment, and consequences of untreated malaria. There were major misconceptions relating to malaria with special reference to the cause and mode of transmission of malaria, preventive measures, and perception of prevention and treatment. School-based health education and promotion interventions should be employed to update knowledge of malaria and encourage appropriate malaria-related perceptions and preventive behaviours among in-school adolescents in the study setting.

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CONFLICT OF INTEREST

The authors declare that they do not have any conflict of interest.

REFERENCES


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