



Research Article

Malaria infection; Knowledge, Attitude and perception among inhabitants of Oluyole Local Government Area of Ibadan

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ABSTRACT

Malaria remains a major public health concern in Nigeria, which accounts for 27% of global malaria cases and 32% of global malaria deaths in 2022. Despite intensified control efforts, the disease continues to impact communities such as Oluyole Local Government Area (LGA), Ibadan, where environmental and socio-economic factors favor persistent transmission. This study assessed the knowledge, attitudes, and perceptions (KAP) of residents toward malaria infection to identify community-level gaps that may hinder effective control. A cross-sectional survey was conducted among inhabitants of Oluyole LGA using a structured questionnaire. Findings revealed that 85.0% of respondents correctly identified mosquito bites as the primary mode of transmission, while 72.0% recognized fever as a major symptom. However, 18.0% still associated malaria with incorrect causes such as exposure to sunlight or consumption of certain foods. Attitudes toward treatment were largely positive: 60.0% reported they would seek medical care within 24 hours of symptom onset, whereas 15.0% would delay treatment for more than three days. Trust in conventional medicine was high, with 75.0% expressing confidence in prescribed antimalarial drugs, compared with 25.0% who still preferred herbal remedies. Regarding preventive practices, 70.0% expressed favorable attitudes toward measures such as indoor residual spraying and mosquito coil use, although regular use of insecticide-treated nets remained suboptimal. The study demonstrates relatively high awareness and positive attitudes toward malaria prevention and treatment, though misconceptions and inconsistent preventive behaviors persist. Strengthening community-based sensitization, improving access to preventive tools, and addressing traditional treatment preferences will support Nigeria's broader malaria elimination efforts.

Keywords: Insect-Treated Nets (ITNs); Knowledge, Attitudes and Perception (KAP); Malaria

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INTRODUCTION

Malaria remains one of the most persistent public health challenges in sub-Saharan Africa, with Nigeria carrying a disproportionately high share of the global burden. Despite being both preventable and treatable, the disease continues to cause significant

morbidity and mortality, particularly among vulnerable groups such as pregnant women and children under five. Recent estimates show that Nigeria accounted for about 27% of global malaria cases and 32% of malaria deaths in 2022 (World Health Organization, 2023). This heavy burden

reflects not only biological and environmental factors but also deep socioeconomic inequalities. Malaria continues to undermine productivity, educational attainment, and household income, especially in semi-urban and rural communities where access to timely diagnosis, treatment, and preventive measures is limited (Federal Ministry of Health, 2021; NMEP, 2022).

Malaria transmission in Nigeria is driven primarily by *Plasmodium falciparum*, the most virulent and dominant species in the region (WHO, 2023). Transmission intensity is influenced by climatic conditions such as rainfall, humidity, and temperature, which shape the breeding patterns of female *Anopheles* mosquitoes. In areas such as Oluyole Local Government Area (LGA) in Ibadan, environmental challenges including poor drainage, stagnant water accumulation, and inadequate waste management create ideal breeding sites that sustain transmission throughout the year (NMEP, 2022). These local ecological factors underscore the importance of understanding community-level knowledge, attitudes, and perceptions (KAP) toward malaria control.

Several studies across Nigeria have highlighted the critical role of KAP in shaping malaria prevention and treatment behaviors. High levels of awareness do not always translate into appropriate practices, with gaps often linked to socio-cultural beliefs, misconceptions, and limited access to preventive tools (Nassai *et al.*, 2022). In some settings, traditional and herbal remedies continue to be preferred or used alongside conventional treatment, reflecting long-standing cultural perceptions about malaria and illness (Nassai *et al.*, 2022). Understanding these contextual dynamics is essential for designing effective public health interventions tailored to specific communities. Against this, the present study aims to investigate the knowledge, attitudes, and perceptions of residents in Oluyole LGA, Ibadan, regarding malaria infection. By documenting community understanding and behavioral patterns, this study seeks to provide evidence that can support more targeted and responsive malaria control strategies at the local level.

MATERIALS AND METHODS

This study adopted a descriptive cross-sectional survey design. The research was conducted in Oluyole Local Government Area (LGA), Ibadan, Oyo State and samples were taken from two private hospitals and one primary health center. Oluyole LGA is known for its mix of residential, semi-industrial, and commercial zones. The area has a tropical climate with a rainy season and dry season, both contributing to conditions that support the breeding of malaria-carrying mosquitoes. The population for the study consisted of adult patients and caregivers (18 years and older) who visited these centers during the study period. Oluyole LGA lies within the Ibadan metropolis and is located between approximately latitudes 7.300° N and 7.400° N and longitudes 3.830° E and 3.920° E. It is bounded to the north by Ibadan South-West Local Government Area, to the east by Ibadan South-East Local Government Area, to the west by Egbeda Local Government Area, and to the south by Ido Local Government Area. The area is predominantly urban and semi-urban, with a high concentration of residential settlements, commercial activities, educational institutions, and health facilities.

The study sites comprised three health facilities all located within Oluyole Local Government Area, namely Adeoyo State Hospital, Oluyole Primary Health Care Centre, and the Lead City Hospital/Clinic located within the Lead City University campus, Toll Gate. Adeoyo State Hospital is situated at latitude 7.35102° N and longitude 3.86257° E. The Oluyole Primary Health Care Centre, within the Challenge–Oluyole axis, is located at approximately latitude 7.36906° N and longitude 3.85972° E. The Lead City Hospital/Clinic lies at latitude 7.327° N and longitude 3.880° E. These coordinates were used to generate the map of the study area showing the spatial distribution of the selected facilities. The coordinates of the study locations were obtained from reliable geospatial sources, including OpenStreetMap-based platforms (Mapcarta), peer-reviewed geospatial studies, and official institutional location records.

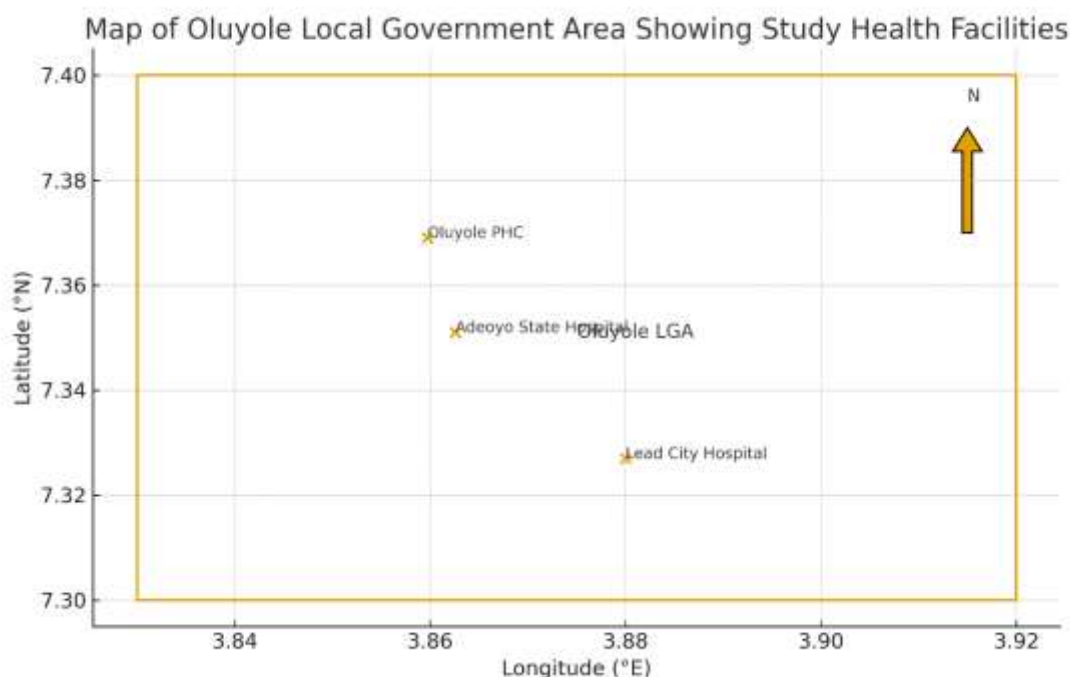


Figure 1: Map of Oluyole Local Government Area, Oyo State, Nigeria, showing the locations of Adeoyo State Hospital, Oluyole Primary Health Care Centre, and Lead City Hospital/Clinic

The sample size for this study was determined using the formula for estimating a single population proportion, based on the prevalence reported by Awosolu et al. (2021) in urban communities of Ibadan. In their cross-sectional study, 300 participants were examined, of whom 165 (55.0%) tested positive for *Plasmodium falciparum*, with a mean parasite density of 1814.70 ± 1829.12 parasites/ μL of blood. Prevalence varied significantly with age group ($p < 0.05$), making it a suitable reference for the current study. Using a prevalence (p) of 0.55, a 95% confidence level ($Z = 1.96$), and a margin of error (d) of 0.07, the minimum sample size was calculated using the formula:

$$N = Z^2 P (1-P) / d^2 = 194$$

This yielded a minimum sample size of approximately 194 participants. Adjusting for a 3% non-response rate resulted in a final sample size of 200 participants, which was adopted for this study. This sample size balances statistical precision with feasibility in the study setting. The sample size for this study was a total of 200 respondents, and simple random sampling was employed to select participants into this study.

A well-structured questionnaire, was administered to the respondents and translation was done to Yoruba language for respondents who were not proficient with the English language. The questionnaire was divided into five sections. Section A elicited information on Socio-demographic characteristics which included age, sex, marital status, occupation, education, and length of residence in Oluyole LGA. Section B gathered data on knowledge of malaria, causes, symptoms, and prevention methods. Section C was for data on attitudes toward malaria, participants' views on malaria's seriousness, treatment methods, and prevention strategies. Section D gathered information on perceptions of malaria risk and severity and lastly, Section E examined the behaviors and practices respondents use to prevent malaria, such as using insecticide-treated nets (ITNs), environmental sanitation, and seeking medical treatment.

Before administering the questionnaire, the questionnaire was validated by conducting a small pilot study with ten participants comprising of academic supervisors and experts in the field to ensure the instrument's validity and reliability. These

experts provided valuable input to ensure that the questions were appropriate and comprehensive. Informed consent was sought from the respondents before they were enrolled in the study. Ethical approval was also sought and obtained from the Lead City University Ethical Review committee with reference number LCH/ERC/25/2341. The data collection process took place over a two-week period and two trained research assistants were used for the administration of the questionnaire.

Data were analyzed using both descriptive and inferential statistics. Frequencies and percentages were summarized using demographic characteristics, and data was generated on knowledge, attitudes, perceptions, and treatment-seeking behaviors of respondents. Inferential analyses were employed in the analysis of the data used in this study significance levels were set at $\alpha = 0.05$. Chi-square tests were used to examine the associations between categorical variables (e.g., gender, education, and malaria knowledge/attitudes). Independent t-tests and one-way ANOVA compared mean scores across groups. Logistic regression models (binary, multinomial, and ordinal) were employed to identify predictors of good knowledge, positive attitudes, accurate perceptions, and prompt treatment-seeking behavior. Odds ratios with 95% confidence intervals were calculated where appropriate. All analyses were performed using SPSS version 24.

RESULTS

Demographic Characteristics

The demographic characteristics of the respondents are presented in Table 1. The study included 200 participants, with a higher proportion of females (60%) than males (40%). The majority were aged 26–35 years (40%) and had secondary education (50%). Chi-square goodness-of-fit tests indicated significant differences in distributions across age ($p < 0.001$), gender ($p = 0.0047$), education level ($p < 0.001$), and occupation ($p < 0.001$). These results indicate that the sample was not evenly distributed across demographic categories, with greater representation of young adults, females, and respondents with secondary education.

The chi-square goodness-of-fit tests were conducted to determine whether the observed demographic distributions significantly deviated from an equal distribution (Table 2). Results indicated statistically significant differences across all demographic variables at the $p < 0.005$ threshold. Specifically, age ($\chi^2 = 70.0$, $df = 4$, $p < 0.001$), gender ($\chi^2 = 8.0$, $df = 1$, $p = 0.0047$), education level ($\chi^2 = 90.0$, $df = 3$, $p < 0.001$), and occupation ($\chi^2 = 34.0$, $df = 4$, $p < 0.001$) all showed significant deviations. These findings confirm that the sample was not evenly distributed across demographic categories, with greater representation of young adults, females, and respondents with secondary education. Findings of this study shows the proportion of respondents who gave correct responses to key knowledge questions (Table 2).

Table 1: Demographic characteristics of respondents (N=200)

Demographic Variable	Category	Frequency (n)	Percentage (%)	p-value
Age (years)	18–25	50	25.0	<0.001
	26–35	80	40.0	
	36–45	40	20.0	
	46–55	20	10.0	
	56+	10	5.0	
Gender	Male	80	40.0	0.0047
	Female	120	60.0	
Education Level	No formal education	10	5.0	<0.001
	Primary education	30	15.0	
	Secondary education	100	50.0	
	Tertiary education	60	30.0	
Occupation	Student	40	20.0	<0.001
	Civil servant	30	15.0	
	Trader	60	30.0	
	Farmer	30	15.0	
	Unemployed/Other	40	20.0	

Table 2: Chi-Square Goodness-of-Fit Test for Demographic Variables (N = 200)

Variable	χ^2 (Chi-Square)	df	p-value	Significance (p < 0.005)
Age	70.00	4	<0.001	Significant
Gender	8.00	1	0.0047	Significant
Education	90.00	3	<0.001	Significant
Occupation	34.00	4	<0.001	Significant

Knowledge of malaria was generally high among respondents (Table 3). Most respondents correctly identified mosquito bites as the mode of transmission (90%), fever and chills as common symptoms (85%), and malaria as curable with antimalarial drugs (95%). Knowledge about preventive measures such as sleeping under insecticide-treated nets was also high (80%), but 25% of respondents did not recognize stagnant water as a breeding site for mosquitoes. Chi-square analysis by gender indicated no statistically significant differences in knowledge across all items ($p > 0.05$ for all comparisons) (Table 3).

Respondent Attitudes toward Malaria

Respondents' attitudes toward malaria prevention and treatment were positive (Table 4). Most (60%) reported seeking treatment within 24 hours of fever

onset, and 75% preferred doctor-prescribed antimalarial medications over traditional/herbal remedies. Approximately 70% supported indoor spraying or use of mosquito coils. Chi-square tests by gender showed no significant differences for any attitude item ($p > 0.05$ for all comparisons).

Respondent Perceptions about Malaria

Perceptions about malaria were generally accurate (Table 5). Most respondents (90%) correctly believed that mosquitoes are the sole cause of malaria, while only a few attributed malaria to non-scientific causes such as evil spirits (5%). A majority also recognized the effectiveness of insecticide-treated nets (85%) and indoor residual spraying (80%). Gender comparisons revealed no significant differences in perceptions ($p > 0.05$ for all items).

Table 3: Respondent knowledge of malaria (N=200)

Knowledge Statement	Frequency (n)	Percentage (%)	p-value (Gender)
Malaria is transmitted by mosquito bites	180	90.0	0.45
Fever and chills are symptoms of malaria	170	85.0	0.32
Sleeping under an insecticide-treated net prevents malaria	160	80.0	0.28
Malaria can be cured by taking antimalarial drugs	190	95.0	0.61
Stagnant (standing) water promotes mosquito breeding	150	75.0	0.14

Table 4: Respondent attitudes toward malaria (N=200)

Attitude Statement	Frequency (n)	Percentage (%)	p-value (Gender)
Would seek treatment within 24 hours of symptom onset	120	60.0	0.66
Prefer doctor-prescribed antimalarial medications	150	75.0	0.52
Consider traditional/herbal remedies effective for malaria	50	25.0	0.40
Support regular indoor spraying or use of mosquito coils	140	70.0	0.58

Table 5: Respondent perceptions about malaria (N=200)

Perception Statement	Frequency (n)	Percentage (%)	p-value (Gender)
Believe mosquitoes are the sole cause of malaria	180	90.0	0.48
Believe malaria can be caused by evil spirits or curses	10	5.0	0.52
Think insecticide-treated nets are effective for prevention	170	85.0	0.55
Think annual indoor spraying (IRS) is effective	160	80.0	0.59

DISCUSSION

This study assessed the knowledge, attitudes, and perceptions related to malaria among residents of

Oluyole Local Government Area (LGA), Ibadan, and the results demonstrate generally high levels of awareness and positive health-seeking behavior. The

demographic pattern, dominated by young adults, females, and individuals with at least secondary education, aligns with the socioeconomic distribution reported in similar Nigerian community-based malaria studies (Alao *et al.*, 2025; Duodu *et al.*, 2022). Chi-square analyses of demographic variables indicated significant differences across age ($p < 0.001$), gender ($p = 0.0047$), education level ($p < 0.001$), and occupation ($p < 0.001$), confirming that the sample was not evenly distributed across categories.

Knowledge levels in this study were remarkably high. Nearly all respondents correctly identified mosquito bites as the cause of malaria (90%) and recognized key symptoms such as fever and chills (85%). Chi-square tests comparing responses by gender revealed no statistically significant differences for any knowledge item (p -values ranged from 0.14 to 0.61), indicating that both males and females had similar levels of malaria knowledge. This finding is consistent with the Nigeria Malaria Indicator Survey (NMEP, 2022) and World Malaria Report (WHO, 2023), which indicate that national awareness of malaria transmission is generally above 80%. Similar high knowledge scores have been reported in Shongom LGA (Nassai *et al.*, 2022), Ogun State (Wakai *et al.*, 2025), Lagos (Omotayo *et al.*, 2021), and Plateau State (Nwibari *et al.*, 2024), confirming a nationwide pattern of strong basic malaria literacy.

Despite the high overall knowledge, about 25% of respondents did not recognize stagnant water as a mosquito breeding site. This gap mirrors observations by Olorunniyi and Idowu (2021), who found that environmental risk awareness remains weaker than symptom or transmission knowledge. The persistence of this gap suggests the need for targeted public health messaging emphasizing environmental management as a core component of malaria prevention.

Respondents demonstrated generally positive attitudes toward malaria prevention and treatment. Early care-seeking behavior was common, with 60% indicating they would seek care within 24 hours of symptom onset. Similarly, trust in conventional medicine was high (75% preference for prescribed antimalarials), while only a minority (25%) expressed belief in herbal remedies. Chi-square analyses showed no significant gender differences in any attitude item (p -values ranged from 0.40 to 0.66),

suggesting that males and females shared similar attitudes toward malaria prevention and treatment. These findings are consistent with Emmanuel *et al.*, (2024), who reported prompt treatment-seeking among Nigerian caregivers when malaria is suspected in children, and with similar studies across Nigeria and The Gambia (Okafor *et al.*, 2025; Muhammad *et al.*, 2021).

Support for vector control interventions, including insecticide spraying and mosquito coils (70%), aligns with patterns documented in Lagos State, where community endorsement of vector control was also high (Omotayo *et al.*, 2021). However, although 88% were aware of insecticide-treated nets (ITNs), only 40% used them consistently. This gap between awareness and utilization is well-documented in Nigerian malaria literature (NMEP, 2022; Wakai *et al.*, 2025), with common barriers such as heat and discomfort noted both in this study and in previous research (Alao *et al.*, 2025).

Perceptions of malaria causation were accurate in the majority of respondents, with 90% correctly attributing the disease solely to mosquitoes. Only 5% endorsed non-scientific explanations, which is notably lower than in studies from rural communities, where misconceptions persist at higher levels (Oyeleye, 2024; Duodu *et al.*, 2022). Gender comparisons revealed no significant differences in perceptions (p -values 0.48–0.59), suggesting that males and females similarly understood malaria causation and the effectiveness of preventive interventions. This reflects the urban-peri-urban context of Oluyole LGA, where access to health information through media, schools, and health facilities may be better than in rural areas.

Confidence in preventive measures was also strong. Most respondents believed in the effectiveness of ITNs (85%) and indoor residual spraying (80%), consistent with findings from Canaan land (Wakai *et al.*, 2025) and previous Nigerian Demographic and Health Surveys (NMEP, 2022). However, very low use of chemoprophylaxis (7–12%) reflects a national pattern in which prophylactic drug use is uncommon except in pregnant women or travelers (WHO, 2023). The cross-tabulation of gender and treatment-seeking behavior revealed no significant differences ($\chi^2 = 0.81$, $df = 2$, $p = 0.66$), as both males and females sought treatment promptly (approximately 60% each). Although slightly more females delayed

treatment beyond three days, the difference was minimal and not practically significant. This aligns with findings from Mokola Community in Ibadan, where gender was not a major determinant of malaria care-seeking (Muhammad et al., 2021). The shared pattern of early care-seeking suggests a general community norm favoring timely medical response.

Collectively, these findings indicate that malaria knowledge in Oluyole LGA is strong, attitudes toward treatment are largely positive, and perceptions are aligned with scientific understanding. However, notable gaps such as low ITN usage despite high awareness, incomplete knowledge of mosquito breeding sites, and reliance on local herbs by a minority persist. These gaps mirror national and regional trends reported in the literature and highlight specific areas where community health education should be strengthened.

CONCLUSION

This study shows that residents of Oluyole LGA possess strong knowledge of malaria transmission, symptoms, and treatment, with most respondents demonstrating positive attitudes toward early care-seeking and the use of recommended interventions. However, gaps persist in environmental awareness particularly understanding mosquito breeding sites and in the consistent use of insecticide-treated nets. A small proportion also continues to rely on herbal remedies or delays treatment. Overall, the community's malaria literacy is high, but practical preventive behaviors require further strengthening. Increase awareness on environmental management, especially eliminating stagnant water. Promote regular ITN use by addressing barriers such as heat and discomfort. Strengthen community health education through local campaigns and media engagement. Encourage prompt treatment-seeking, reinforcing the importance of early diagnosis. Expand access to preventive tools, including ITNs and indoor spraying. Address reliance on herbal remedies by promoting evidence-based malaria treatment.

Author's Contribution

Adegbehingbe K.O.: Conceptualization, study design, and field data collection and Supervision. **Bamidele I.C.:** Methodology, data analysis, and critical manuscript review. ***Umezurike E.T.** (Corresponding

Author)**: Supervision, data interpretation, manuscript writing, and final editing. **Bakare O.C.:** Investigation, laboratory analysis, and technical support. **Salami B.A.:** Data curation, statistical support, and manuscript refinement. **Ajayi, A.A.:** Technical support and manuscript review. **Ogunniran A.E.:** Literature review, visualization, and proofreading. All authors approved the final manuscript.

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CONFLICTS OF INTEREST: There are no conflicts of interest.

ETHICS APPROVAL AND INFORMED CONSENT

This study received ethical clearance from the Lead City University Ethical Review committee with reference number LCH/ERC/25/2341. Consent for this study was sought from the

Head of the Health Centers and hospitals. Verbal and written informed consent to participate in the study were also sought from the participants. All participants were duly informed of the objectives of the study.

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