

Prevalence of Malaria in Children Aged 5-17 years Attending Nnamdi Azikiwe University Teaching Hospital Akamili, Nnewi between November 2024 and July 2025

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ABSTRACT

Background: Malaria in children remains a major public health concern, particularly in tropical Africa where it disproportionately affects children under five and pregnant women. **Objectives:** This study determined the prevalence of malaria infection among children aged 5–17 years attending Nnamdi Azikiwe University Teaching Hospital, Nnewi, between November 2024 and July 2025. **Materials and Methods:** This hospital-based cross-sectional study recruited 156 children (71 males, 85 females) using random sampling. A structured questionnaire was administered to caregivers. Blood samples were collected in EDTA bottles, and malaria parasites were detected using microscopy and rapid diagnostic tests (RDTs). **Results:** Out of the 156 samples screened by Microscopy, 19 (12.2%) were positive. Out of the 71 males, 8 (5.1%) were positive while out of the 85 females, 11 (7.1%) were positive. The prevalent rates differed according to the gender, age group, location of residence, occupation and level of education of the parents or care givers even though the differences were not statistically significant ($P > 0.05$). Out of 156 samples screened by RDT, 25 were positive giving a prevalent rate of 16%, whereas, out of 85 females screened 15 were positive giving a prevalence of 9.6% as 71 males against 6.4% obtained from 71 males. **Conclusion:** Malaria prevalence was relatively high in the study population, with females more affected than males. Strengthening preventive measures such as environmental sanitation, consistent use of insecticide-treated nets, and prompt treatment is essential to reduce malaria burden and complications in children.

Key words: malaria, prevalence, children, teaching hospital, Nnewi.

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INTRODUCTION

Malaria in children remains a major public health concern and continues to attract global research attention, particularly in Africa, including Nigeria. The disease exerts its greatest pathological effects on children and pregnant women, especially those under five years of age. It has been reported that about 97% of Nigeria's population is at risk of malaria infection, with children and pregnant women constituting the majority [1]. The World Malaria Report also indicates that Nigeria bears the highest global malaria burden [2]. The risk of malaria in children has been linked to several socioeconomic factors such as age, gender, place of residence, and the occupation and educational level of caregivers [3].

A study conducted in Edo State, Nigeria reported a malaria prevalence of 55.2% among children [4]. Similarly, studies in Anambra State have shown wide variations in prevalence, ranging from 5.8% to 83.3%, depending on study design, timing, location, and sample size [5–8]. A hospital-based study in Abuja reported a prevalence of 17.5% [9], while Yohanna et al. reported 8.6% in Jos, Plateau State, with males more affected than females [10]. Other studies in southern Nigeria, including Port Harcourt and Emohua LGA, reported higher prevalence rates of 35.5% and 53%, respectively [11].

An earlier study at Nnamdi Azikiwe University Teaching Hospital (old site) reported age-related prevalence rates: 16.7% (<5 years), 26.7% (5–9 years), 29.9% (10–15 years), and 46.2% (>15 years) [12]. Studies in other African countries have reported prevalence rates ranging from 0% to 15% depending on location and population studied [13].

This study was therefore designed to determine the prevalence of malaria among children aged 5–17 years presenting with symptoms at the new hospital site in Akamili, Nnewi, Anambra State, Nigeria.

MATERIALS AND METHODS

Study area

This study was carried out at Nnamdi Azikiwe University Teaching Hospital, Nnewi, a tertiary hospital in Anambra State, and a major referral center in South-East Nigeria, thus attracting clients from different parts of South-Eastern Nigeria. Anambra State is located in the South-Eastern region of the country. It is located on latitude 6.011°N and longitude 6.910°E. The state was created on 27 August 1991. Anambra state is bounded by Delta State to the west, Enugu State to the east, Imo State and Rivers State to the south, and Kogi State to the north. The State's Capital is Awka, while the State's largest city is Onitsha, which is regarded as one of the largest metropolis areas in Africa. [16].

Nnewi is a commercial and industrial city in Anambra State, South-Eastern Nigeria. It is the second largest city in Anambra state after Onitsha. Nnewi, as a metropolitan area has two local government areas, which are Nnewi North and Nnewi South, all centered around the Nnewi town.

Study design

The study is a descriptive cross-sectional one with participants drawn from male and female children aged 5–17 years who presented as patients at Nnamdi Azikiwe University Teaching Hospital, Akamili, Nnewi, between November 2024 and July 2025.

Study Population/Sample size

Using the Cochran's (1963) formula for sample size calculation, the sample size for this study was calculated with reference to a study by Ogolo *et al.* (2015) in Anambra, having a prevalence of 10.3% among 300 venous blood samples thus;

$$N = Z^2 (PQ)$$

$$\frac{d^2}{4}$$

Where;

N = minimum sample size required

z = reference of normal distribution for the desired confidence interval at 1.96% for 95% confidence interval

p = standard of deviation/ maximum expected prevalence

q = 1-p

d = desired level of precision (i.e margin of error which is 0.05)

$N = (1.96)^2 \times 0.103 \times 0.897$

$$= \frac{(0.05)^2}{3.841 \times 0.103 \times 0.897}$$

$$0.0025$$

N = 141.9 ~ 142

N+10% attrition = 156

Sample Collection

Blood samples were randomly collected from the patients. Two milliliters of blood was collected from each patient through the vein under aseptic conditions and dispensed into ethylene diaminetetraacetic acid (EDTA) container and mixed. The container was labeled properly with the patient's information. It was racked before being used for analysis.

Inclusion criteria

All patients from 5-17years with signs and symptoms of malaria were included after obtaining informed consent.

Exclusion criteria

Those with severe malaria or those who are taking or have taken anti-malaria medication three weeks prior to study commencement were excluded. Also, all patients outside the age bracket were excluded.

Statistical Analysis: Data obtained were analyzed using SPSS and Chi square test was used to check for significance. Simple percentages were used to express quantitative variables. $P \leq 0.05$ was considered statistically significant.

Consent and ethical consideration

Ethical clearance was obtained from Institutional Ethics Board (IRB) of the Nnamdi Azikiwe University teaching Hospital's Research Ethics Board (NAUTH-REC). Consultation and permission to conduct this study was obtained from Health Offices as appropriate. Written informed consent was obtained from every study participant. To ensure confidentiality participants information, anonymous typing was used, and any identifier of participant was not written.

Malaria Detection using thick film method (Microscopy)

Two drops of blood was placed on a slide and spread to cover an area of about 15 mm in diameter and allowed to dry. The unfixed film was then stained for 15 minutes using Giemsa stock solution diluted 1:20 with distilled water at pH 7.2. The slide was gently washed with a few drops of distilled water dried and examined under the microscope using x100 oil immersion objective lens to detect the presence of Plasmodium. The film will be positive for malaria parasite if the presence of the ring form trophozoites or any other blood stage of erythrocytes schizogony was detected.

Malaria Detection Using Rapid Diagnostic Test Kit

The test sample was applied to the RDT device, followed by the addition of an assay buffer to lyse red blood cells. The mixture then migrated along the nitrocellulose strip by capillary action. If malaria antigens were present in the sample, antigen-antibody complexes formed and were captured at the test line containing immobilized antibodies, producing a visible pink-purple band, which indicated a positive result. The absence of a coloured

band in the test region indicated a negative result, as described by Keiser in 2002.

RESULTS

Out of the 156 samples screened by microscopy, 19 were positive giving a prevalent rate of 12.2%. Out of the 71 males, 8 were positive giving a prevalent rate of 5.1%, while out of the 85 females, 11 were positive giving a prevalent rate of 7.1%. The prevalent rates differed according to the gender, age group, location of residence, occupation and level of education of the parents or care givers even though the differences were not statistically significant ($P > 0.05$). (Tables 1-5)

Out of 156 samples screened by Rapid Diagnostic Test (RDT table 6), 25 samples were positive giving a prevalent rate of 16%. Out of 71 males screened, 10 were positive giving a prevalent rate of 6.4% while out of the 85 females screened, 15 were positive giving a prevalence of 9.6%.

Out of the 156 samples screened, 19 were positive giving a prevalent rate of 12.2%. Out of the 71 males, 8 were positive giving a prevalent rate of 5.1%, while out of the 85 females, 11 were positive giving a prevalent rate of 7.1%. Females were more affected by males.

Table 1: Prevalence of Malaria Infection by Gender (Microscopy)

Gender	No. Examined	No. Positive	Percentage (%)
Male	71	8	5.1
Female	85	11	7.1
Total	156	19	12.2

$$\chi^2 = 1.24, df = 1, P > 0.05$$

Table 2: Prevalence of Malaria Infection by Age Group (Microscopy)

Age Group	No. Examined	No. Positive	Percentage (%)
5-7	54	8	5.1
8-10	44	8	5.1
11-13	30	2	1.3
14-17	28	1	0.6
Total	156	19	12.2

$$\chi^2 = 3.68, df = 3, P > 0.05$$

Table 3: Prevalence of Malaria Infection by Residence (Microscopy)

Residence	No. Examined	No. Positive	Percentage (%)
Duplex	29	3	1.9
Flat	89	13	8.3
Single room	38	3	1.9
Total	156	19	12.2

$$\chi^2 = 2.84, df = 2, P > 0.05$$

Table 4: Prevalence by Occupation (Microscopy)

Occupation	No. Examined	No. Positive	Percentage (%)
Petty trading	98	14	6.3
Farmers	18	2	1.2
Teachers	31	2	1.2
Prof/Exec	9	1	0.6
Total	156	19	12.2

$$\chi^2 = 2.57, df = 3, P > 0.05$$

Table 5: Prevalence by Parental Education (Microscopy)

Education Level	No. Examined	No. Positive	Percentage (%)
Primary	36	4	2.5
Secondary	62	9	5.8
Tertiary	58	6	3.8
Total	156	19	12.1

$$\chi^2 = 1.96, df = 2, P > 0.05$$

Table 6: Prevalence by Gender (RDT)

Gender	No. Examined	No. Positive	Percentage (%)
Male	71	10	6.4
Female	85	15	9.6
Total	156	25	16.0

$$\chi^2 = 1.24, df = 1, P > 0.05$$

DISCUSSION

The findings of this study showed an overall malaria prevalence of 12.2% among the study population. Female children were more affected (7.1%) than males (5.1%), although this difference was not statistically significant ($P > 0.05$). A previous study by Nwaneli et al. [12] in the same institution reported a higher prevalence. This difference may be attributed to the larger sample size (382 vs. 156) used in the earlier study, as well as differences in study

settings, since the previous work was conducted at the old hospital site with different environmental conditions compared to the more modern Akamili Teaching Hospital Complex. Additionally, the earlier study relied solely on microscopy, whereas the present study incorporated rapid diagnostic tests (RDTs). The inclusion of younger children (<5 years), who are known to have higher malaria susceptibility [14,15], may have also contributed to the higher prevalence previously reported.

The highest malaria prevalence in this study was observed among children aged 5–7 years and 8–10 years (5.1% each). Variations in prevalence across studies have been linked to differences in geographical location, sample size, and diagnostic methods [4,7,10,11,13]. Older children may experience higher exposure to mosquito bites due to increased outdoor activities at home and school.

Malaria prevalence was also influenced by socioeconomic factors such as housing type and parental occupation. Children living in flats and those whose parents were petty traders or farmers had higher prevalence rates, while children of professionals had the lowest (1%), although these differences were not statistically significant. Poor housing conditions and limited access to preventive measures, such as insecticide-treated nets, may increase exposure to mosquito bites [7,8,11,15]. Similarly, residence in swampy or waterlogged areas may heighten infection risk.

Parental education also showed variation in malaria prevalence, with the highest rates among children of parents with secondary education (5.8%) and the lowest among those with primary education (2.5%), though not statistically significant ($P > 0.05$). This finding may reflect differences in healthcare-seeking behavior, as those with lower education levels may be less likely to access tertiary care. Previous studies have also reported variations based on caregivers' educational status [8,9].

In conclusion, malaria prevalence remains relatively high among children in this population.

Strengthened interventions such as improved environmental sanitation, increased use of insecticide-treated nets, prompt treatment, and chemoprophylaxis are essential to reduce malaria incidence and its associated complications.

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Authors Contributions:

USN and MLN conceptualized and designed the study. USN and AIN proof read the work. and contributed to funding, MLN, EDA and AKN did laboratory analysis and also contributed to funding.

Data Availability: The data used to support the findings of this study are available from the corresponding author upon reasonable request.

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Ethical Approval: The study was approved by the institutional ethics committee.

REFERENCES

1. National Population Commission (NPC) [Nigeria] and ICF. Nigeria Demographic and Health Survey 2018. Available from: <https://www.dhsprogram.com/publications/publication-fr359-dhs-final-reports.cfm>
2. World Health Organization. World malaria report 2014. Available from: <https://www.who.int/publications/i/item/9789241564830>
3. Isaac I, Simon N, Daniel KB, Jackson MA, Lenz NO, Nana AE, et al. Factors associated with the risk of malaria among children: analysis of the 2021 Nigeria Malaria Indicator Survey. *Malar J.* 2024;23:109.

4. Oluwaremilekun G, Ajakaye MR. Prevalence and risk of malaria, anaemia and malnutrition among children in IDP camps in Edo State, Nigeria. *Parasite Epidemiol Control*. 2020;8:Feb.
5. Ukibe SN, Mnanugo JI, Ukibe NR. Prevalence of malaria in children aged 0–13 years in Awka South LGA of Anambra State, Nigeria. *J Environ Health*. 2009;5(2).
6. Chiefobi CB, Nwankwo IS, Okweogu AJC, Ahanonu IMO, Ahanonu GE, Nwankwo BC. Prevalence of malaria in Awka metropolis. *South Asian J Parasitol*. 2024.
7. Nwaorgu OC, Orjiakor BN. Prevalence of malaria in children aged 1–10 years in communities in Awka North LGA. *World J Pharm Res Med*. 2020. Available from: <https://wjprm.com>
8. Okeke OP, Imagwu CA, Eyo JE, Okafor FC. Prevalence of malaria infection in children in Anambra State, Nigeria after change of policy from presumptive/clinical to confirmed diagnosis. *Anim Res Int*. 2016;13(1):2385–2391.
9. Nmadu PM, Peter E, Alexander P, Koggie AZ, Maikanti JI. The prevalence of malaria in children aged 2–15 years attending Gwarinpa General Hospital, Abuja, Nigeria. *J Health Sci*. 2015;5(3):47–50.
10. Yohanna JA, Gau VA, Adejoli VA. Prevalence of malaria parasites in children at Vom Christian Hospital, Jos South, Plateau State, Nigeria. *Niger J Parasitol*. 2019;40(2):1–4.
11. Richard A, Nduka FO, Awi-Wadu AOB, Wogu MN. Malaria parasitaemia among residents of Emohua LGA and Port Harcourt metropolis, Rivers State, Nigeria. *Niger J Parasitol*. 2019;40(1).
12. Nwaneli EI, Eguonu J, Ebenebe JC, Osuorah CO, Ofili OC, Nri-Ezedi CA. Malaria prevalence and its sociodemographic determinants in febrile children: a hospital-based study in South-East Nigeria. *J Prev Med Hyg*. 2020;61(2):E173–E180.
13. Mamoudu T, Fouseyini K, Dauda S, Souba K, et al. Prevalence of *Plasmodium falciparum* infection in school-aged children in urban and semi-urban areas of Bamako, Mali. *Malar J*. 2025;3.
14. Isaac I, Simon N, Daniel KB, Jackson MA, Lenz NO, Nana AE, et al. Factors associated with the risk of malaria among children: analysis of the 2021 Nigeria Malaria Indicator Survey. *Malar J*. 2024;23:109.
15. Tayo B, Alexander S. Social determinants of malaria prevalence in children under five years: a cross-sectional analysis of Akure. *Sci Afr*. 2022;16.