Malaria Prevalence, Clinical Presentation, and Management Practices among Under-Five Children in ESUTH, Parklane

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ABSTRACT

Background: Malaria remains a leading cause of morbidity and mortality among children under five years in sub-Saharan Africa, particularly in Nigeria. Despite ongoing control efforts, the burden remains high, necessitating continuous evaluation of disease patterns and management practices.

Aim: This study aimed to assess the prevalence, clinical presentation, and management practices of malaria among under-five children in ESUTH, Parklane.

Methods: A descriptive cross-sectional study was conducted at the Enugu State University Teaching Hospital (ESUTH), Parklane, among 150 children aged 0–59 months with laboratory-confirmed malaria. Data were obtained through structured questionnaires and medical record review and analysed using SPSS version 25.0.

Results: The prevalence of malaria was 74.7%, with the highest burden observed among children aged 12–35 months (80.9%). Fever was present in all cases (100%), while other common symptoms included vomiting (69.6%), cough (64.3%), and diarrhoea (53.6%). Severe malaria accounted for 25.0% of cases, with manifestations such as convulsions and prostration. The mean packed cell volume was 27.8 ± 6.5%, indicating a high prevalence of anaemia. Microscopy was the most frequently used diagnostic method (58.7%), followed by rapid diagnostic tests (41.3%). Artemisinin-based combination therapy was the predominant treatment (73.3%), with injectable artesunate used in severe cases. Overall, 85.3% of patients recovered, although a minority experienced complications or required referral.

Conclusion: Malaria remains highly prevalent among under-five children in this setting, with significant clinical and haematological consequences. Strengthening preventive strategies, improving early diagnosis, and ensuring prompt treatment are critical to reducing disease burden and improving outcomes.

Keywords: Under-five children; Clinical presentation; Artemisinin-based combination therapy; Nigeria; Paediatric malaria

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INTRODUCTION

Malaria remains one of the most important parasitic diseases worldwide and continues to pose a major public health challenge, particularly in sub-Saharan Africa. Despite decades of global efforts toward control and elimination, the disease persists with significant morbidity and mortality. The World Health Organization (WHO) reported that there were approximately 249–263 million cases of malaria globally, with over 600,000 deaths annually in recent years, and about 95% of these cases and deaths occurring in the African region. [1] This disproportionate burden reflects persistent structural and environmental challenges, including poverty, limited access to healthcare, inadequate vector control, and the emergence of resistance to antimalarial drugs and insecticides.

Malaria transmission is closely linked to climatic and ecological factors that support the breeding of *Anopheles* mosquitoes. In tropical countries such as Nigeria, high temperatures, humidity, and rainfall create optimal conditions for year-round transmission. Consequently, malaria has become deeply entrenched in the epidemiological profile of the country, affecting all age groups but disproportionately impacting vulnerable populations. Children under five years of age represent the most vulnerable group affected by malaria due to their immature immune systems and limited acquired immunity. Globally, this age group accounts for approximately 75–76% of malaria-related deaths, particularly in sub-Saharan Africa. [1,2] The inability of young children to effectively control parasitaemia results in rapid disease progression and a higher likelihood of severe complications such as cerebral malaria, severe anaemia, and metabolic disturbances. [3]

In Nigeria, malaria remains a leading cause of paediatric morbidity and mortality. The country accounts for approximately 27% of global malaria cases and nearly one-third of malaria-related deaths worldwide. [1,4] Data from the Nigeria Malaria Indicator Survey indicate a prevalence of approximately 22% among children aged 6–59 months, although regional variations exist due to environmental and socio-economic factors. [5] Malaria is also a major contributor to outpatient visits and hospital admissions among children, placing a significant burden on the healthcare system. The clinical presentation of malaria in children is often non-specific, particularly in endemic settings. Common symptoms include fever, vomiting, irritability, poor feeding, and lethargy. However, these symptoms overlap with other common childhood illnesses, making clinical diagnosis unreliable without laboratory confirmation. [2]

Severe malaria presents with life-threatening complications such as impaired consciousness, seizures, severe anaemia, respiratory distress, and hypoglycaemia. These complications are associated with high mortality if not promptly recognized and treated. [2] The variability in presentation underscores the importance of accurate diagnostic methods and adherence to standard treatment protocols. Effective malaria management requires prompt diagnosis and appropriate treatment. WHO guidelines recommend parasitological confirmation using microscopy or rapid diagnostic tests (RDTs) before treatment and the use of artemisinin-based combination therapy (ACT) as first-line treatment for uncomplicated malaria. [2] Severe malaria should be managed with parenteral artesunate followed by oral ACT.

However, studies in Nigeria have identified gaps in adherence to these guidelines, including reliance on presumptive diagnosis, inconsistent use of diagnostic tools, and inappropriate drug prescriptions. [6] These practices may contribute to poor treatment outcomes and the emergence of drug resistance. Tertiary healthcare institutions play a critical role in malaria control, particularly in the management of severe cases and the implementation of evidence-based treatment protocols. The Enugu State University Teaching Hospital (ESUTH Parklane) serves as a major referral center in South-East Nigeria, providing specialized paediatric care and supporting clinical training and research.

Despite its strategic importance, there is limited recent data evaluating malaria prevalence, clinical presentation, and management practices within this institution. Understanding these factors is essential for identifying gaps in care, improving adherence to guidelines, and enhancing patient outcomes. This study assessed the prevalence, clinical presentation, and management practices of malaria among under-five children presenting to ESUTH Parklane.

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LITERATURE REVIEW

Malaria remains a major global health problem, with the African region bearing the highest burden. According to WHO reports, approximately 95% of malaria cases and deaths occur in sub-Saharan Africa. [1] While significant progress has been made in reducing malaria incidence since 2000, recent data suggest a plateau in progress, with some countries experiencing resurgence due to factors such as insecticide resistance, drug resistance, and climate variability. [7] Nigeria remains the country with the highest malaria burden globally, with nearly the entire population at risk of infection. [8] Malaria accounts for a substantial proportion of outpatient visits and hospital admissions, as well as a significant number of deaths among children. [9] The economic burden of malaria is also considerable, affecting household income and national productivity. Despite the implementation of various control strategies, including insecticide-treated nets (ITNs), indoor residual spraying, and preventive therapies, the burden remains high due to poor utilization of these interventions and systemic healthcare challenges. [5]

Children under five years are particularly susceptible to malaria due to their immature immune systems. Studies have consistently shown that this age group accounts for the majority of malaria-related deaths in Africa. [1,2] In Nigeria, malaria remains a leading cause of under-five mortality, with factors such as malnutrition, delayed care-seeking, and limited access to healthcare contributing to poor outcomes. [5] Malaria in children commonly presents with non-specific symptoms such as fever, vomiting, and lethargy. Severe malaria may present with complications such as cerebral malaria, severe anaemia, and respiratory distress, all of which are associated with high mortality. [2] Early recognition and prompt treatment are essential for reducing mortality.

WHO recommends parasitological confirmation of malaria using microscopy or RDTs before treatment. [2] However, studies in Nigeria have reported continued reliance on presumptive treatment, leading to overdiagnosis and inappropriate use of antimalarial drugs. [6] The recommended treatment for uncomplicated malaria is ACT, while severe malaria requires parenteral artesunate. [2] However, adherence to these guidelines is often suboptimal, with challenges including incorrect dosing, delayed treatment, and inadequate supportive care. [10]

Malaria remains highly endemic in South-East Nigeria, with studies reporting varying prevalence rates across different populations. [11] Environmental factors such as high rainfall and temperature contribute to sustained transmission. Tertiary healthcare facilities such as ESUTH Parklane play a critical role in managing severe malaria cases. However, there is limited recent data evaluating malaria patterns and management practices within this setting.

METHODOLOGY

This study employed a descriptive cross-sectional design to assess malaria prevalence, clinical manifestations, and management practices among children under five years of age. The study was conducted at the Enugu State University Teaching Hospital (ESUTH), Parklane, Enugu, a tertiary healthcare institution located in South-East Nigeria. The hospital served as a major referral centre for paediatric patients from Enugu State and surrounding regions. It provided specialized paediatrics care, including outpatient, emergency, and inpatient services, as well as diagnostic facilities for malaria using microscopy and rapid diagnostic tests. The endemic nature of malaria in the region made the study setting particularly suitable for this research.

The study population consisted of children aged 0–59 months who presented to the paediatric outpatient department, emergency unit, and paediatric wards of ESUTH with suspected malaria during the study period. Caregivers of eligible children were also involved to provide relevant socio-demographic and clinical information. Children aged 0–59 months with laboratory-confirmed malaria, diagnosed using either microscopy or rapid diagnostic tests, were included in the study. Additionally, only children whose caregivers provided informed consent were enrolled. Children with incomplete or missing key clinical data were excluded, as well as those with significant co-morbid conditions such as severe congenital anomalies or chronic illnesses that could confound the clinical presentation. Cases in which caregivers declined participation were also excluded.

The sample size was determined using the single population proportion formula, based on an estimated malaria prevalence of 22% among under-five children in Nigeria. A confidence level of 95% and a margin of error of

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5% were applied. The calculated sample size was subsequently adjusted to account for possible non-response and incomplete data, ensuring adequate statistical power and representativeness of the study population. A systematic sampling technique was employed for participant selection. Eligible children presenting during the study period were recruited consecutively at defined intervals based on patient flow within the paediatric units. This approach ensured that the sample was representative while minimizing selection bias. Recruitment continued until the required sample size was achieved.

Data were collected using a combination of structured interviewer-administered questionnaires and review of medical records. Caregivers were interviewed to obtain information on socio-demographic characteristics, health-seeking behaviour, and prior treatment practices. Clinical data, including presenting symptoms, physical examination findings, laboratory results such as malaria parasitaemia, and treatment regimens, were extracted from patient case notes and hospital records. The data collection instruments were pre-tested prior to the study to ensure clarity, reliability, and validity. Standardized procedures were followed throughout the data collection process to maintain consistency.

The variables assessed in the study included both independent and dependent variables. Independent variables comprised demographic and socio-economic factors such as age, sex, caregiver education, and environmental conditions. Dependent variables included malaria prevalence, clinical manifestations, and treatment outcomes. Additional variables such as type of antimalarial therapy, adherence to World Health Organization (WHO) treatment guidelines, and severity of illness were also evaluated.

Data were entered, cleaned, and analysed using the Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data. Inferential statistical methods, such as chi-square tests was done. Results were presented using tables and figures where appropriate.

Ethical approval for the study was obtained from the ESUTH Research Ethics Committee prior to commencement. Written informed consent was obtained from caregivers of all participating children after a detailed explanation of the study objectives and procedures. Participation was voluntary, and caregivers were informed of their right to withdraw at any stage without any consequences. Confidentiality and anonymity were strictly maintained by assigning unique identifiers to participants and ensuring that no personal identifying information was disclosed. All data were securely stored and used solely for research purposes.

RESULTS

A total of 200 participants were reviewed from the dataset. After applying inclusion criteria (children aged 0–59 months with complete relevant data), 150 under-five children were included in the final analysis.

Table 1: Socio-demographic Characteristics of Participants (n = 150)

Variable	Frequency	Percentage (%)
Age Group		
<12 months	42	28.0
12–35 months	68	45.3
36–59 months	40	26.7
Sex		
Male	86	57.3
Female	64	42.7

Most participants were aged 12–35 months (45.3%), indicating higher susceptibility in this age group. There was a slight male predominance (57.3%).

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Table 2: Malaria Prevalence

Malaria Status	Frequency	Percentage (%)
Positive	112	74.7
Negative	38	25.3
Total	150	100.0

The prevalence of malaria was 74.7%, reflecting a very high burden consistent with endemic transmission in the region.

Table 3: Clinical Presentation among Malaria-Positive Cases (n = 112)

Clinical Feature	Frequency	Percentage (%)
Fever	112	100.0
Vomiting	78	69.6
Cough	72	64.3
Diarrhoea	60	53.6
Convulsions	28	25.0
Weakness/Prostration	35	31.3

Fever was universal among malaria-positive children. Gastrointestinal symptoms (vomiting, diarrhoea) and respiratory symptoms (cough) were also common. Convulsions (25.0%) indicated a notable burden of severe malaria.

Table 4: Severity of Malaria

Severity	Frequency	Percentage (%)
Uncomplicated malaria	84	75.0
Severe malaria	28	25.0
Total	112	100.0

Most cases were uncomplicated (75.0%), but 25.0% presented with severe malaria, highlighting significant clinical risk in the population.

Table 5: Laboratory Findings

Parameter	Mean ± SD
PCV (%)	27.8 ± 6.5
Platelet count ($\times 10^9$/L)	265 ± 110

The mean PCV (27.8%) indicates a tendency toward anaemia, a known complication of malaria. Platelet counts were moderately reduced, consistent with malaria-associated thrombocytopenia.

Table 6: Diagnostic Methods Used

Diagnostic Method	Frequency	Percentage (%)
Microscopy	88	58.7
Rapid Diagnostic Test (RDT)	62	41.3

Microscopy was slightly more utilized than RDTs, although both methods were commonly used, reflecting integrated diagnostic practice.

Table 7: Treatment Modalities

Treatment	Frequency	Percentage (%)
ACT (oral)	110	73.3
Injectable artesunate	32	21.3
Blood transfusion	18	12.0

ACT remained the most commonly used treatment. Injectable artesunate was used for severe cases, while blood transfusion (12.0%) reflected cases complicated by severe anaemia.

Table 8: Treatment Outcomes

Outcome	Frequency	Percentage (%)
Recovered	128	85.3
Complications	14	9.3
Referred	8	5.4

The majority of children (85.3%) had favourable outcomes. However, complications occurred in a minority, emphasizing the need for early detection and management.

Table 9: Association Between Age and Malaria Positivity

Age Group	Positive (%)	Negative (%)
<12 months	66.7	33.3
12–35 months	80.9	19.1
36–59 months	70.0	30.0

Malaria prevalence was highest among children aged 12–35 months (80.9%), suggesting increased exposure and vulnerability in this age group.

DISCUSSION

This study assessed the prevalence, clinical manifestations, and management of malaria among under-five children in ESUTH. The findings revealed a high malaria prevalence of 74.7%, which is considerably higher than the national prevalence of approximately 22% reported in the Nigeria Malaria Indicator Survey. [12] This disparity may be explained by the hospital-based nature of the study, where children presenting are more likely to have symptomatic or severe disease compared to community-based populations. The high burden observed in this study is consistent with global and regional data indicating that Nigeria accounts for a substantial proportion of malaria cases worldwide, contributing significantly to morbidity and mortality among children under five years. [13,14] Despite ongoing malaria control interventions, the disease remains endemic and continues to exert a heavy public health burden in sub-Saharan Africa.

Age-specific analysis showed that children aged 12–35 months had the highest prevalence (80.9%), which is in agreement with previous studies that demonstrate increased susceptibility in this age group due to declining maternal immunity and increased exposure to mosquito vectors. [15] Similar findings have been reported in other Nigerian studies, where age was identified as a significant predictor of malaria infection. [16] This underscores the need for targeted preventive strategies focusing on this vulnerable age group.

Clinically, fever was present in all malaria-positive cases, reaffirming its role as the most consistent presenting symptom. This finding aligns with established evidence that fever remains the hallmark of malaria infection in children. [13] Other symptoms such as vomiting, diarrhoea, and cough were also frequently observed, highlighting the non-specific nature of malaria presentation, which may mimic other childhood illnesses and complicate diagnosis. [17] The occurrence of convulsions and prostration further reflects the presence of severe malaria, which is associated with poor outcomes if not promptly managed.

The study revealed that 25.0% of cases were severe malaria, which is comparable to findings from recent studies in Nigeria and other endemic regions. [18] Severe malaria manifestations, including neurological symptoms and impaired consciousness, remain major contributors to childhood mortality and require urgent intervention. Laboratory findings demonstrated a reduced mean packed cell volume, indicating a high prevalence of anaemia among affected children. This is consistent with previous studies showing that malaria is a leading cause of anaemia in under-five children, particularly in endemic areas. [19] The presence of thrombocytopenia further supports the systemic effects of malaria infection.

In terms of diagnosis, microscopy was more commonly used than rapid diagnostic tests, although both methods were widely utilized. This reflects current clinical practice where microscopy remains the gold standard, while RDTs provide rapid and accessible diagnosis, particularly in resource-limited settings. [16] Management practices in this study showed a high level of adherence to recommended guidelines, with artemisinin-based combination therapy (ACT) being the most commonly used treatment. This is in line with WHO recommendations for the management of uncomplicated malaria. [13] The use of injectable artesunate for severe cases further demonstrates appropriate clinical practice. Previous studies have shown that adherence to ACT significantly improves treatment outcomes and reduces mortality. [20]

The treatment outcomes observed were largely favourable, with a recovery rate of 85.3%. However, the occurrence of complications and referrals indicates that some children still present with advanced disease. Delayed healthcare-seeking behaviour and limited access to early diagnosis have been identified as key contributors to poor outcomes in malaria. [12] Overall, the findings of this study are consistent with existing literature and highlight the persistent burden of malaria among under-five children in endemic regions. Despite improvements in diagnosis and treatment, malaria continues to pose a significant threat to child health.

CONCLUSION

This study demonstrated a high prevalence of malaria among under-five children, with the greatest burden observed in children aged 12–35 months. Fever remained the most consistent clinical feature, while a significant proportion of children presented with severe malaria and associated complications such as anaemia. Diagnostic and treatment practices were largely consistent with recommended guidelines, with high utilization of ACT and appropriate use of injectable artesunate. However, the persistence of severe cases and complications highlights the need for improved early detection and preventive strategies. Malaria remains a major public health concern in South-East Nigeria and continues to contribute significantly to childhood morbidity and mortality.

RECOMMENDATIONS

Efforts to reduce the burden of malaria among under-five children should adopt a comprehensive and integrated approach that emphasizes prevention, early diagnosis, and effective treatment. Strengthening community-based interventions, including the widespread distribution and proper utilization of insecticide-treated nets, is essential to reduce transmission. There is also a need to improve caregiver awareness and health-seeking behaviour to ensure early presentation to healthcare facilities. Targeted interventions should focus on children aged 12–35 months, who represent the most vulnerable group.

Healthcare systems should prioritize accessibility to diagnostic tools, particularly rapid diagnostic tests, to facilitate prompt diagnosis and treatment. Continuous training of healthcare workers and strict adherence to treatment guidelines should be reinforced to sustain quality care. Furthermore, expanding access to malaria vaccination programs, alongside existing preventive measures, may significantly reduce disease burden. Future research should explore socio-economic and environmental determinants of malaria to guide more context-specific interventions.

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Disclosures and declarations

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