

# Malaria morbidity among under-five Nigerian children: A study of its prevalence and health practices of primary care givers (mothers) in a resource-poor setting of a rural hospital in Eastern Nigeria

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**Abstract:** Background: Malaria disease, a preventable and treatable disease has continued to plague under-five children in rural Nigeria. Unhealthy health practices contribute to increased morbidity from malaria especially in a resource-poor setting. Aim: This study was aimed at determining the prevalence of malaria among the under-five Nigerian children in a resource-poor setting of a rural hospital in Eastern Nigeria and evaluating the health practices of their mothers as regards home antimalaria and herbal medication practices, awareness and use of insecticide treated nets (ITNs) and the practice of abdominal wall scarification. Materials and Methods: This was a descriptive hospital-based study carried out on 196 out of 244 mothers of under-five children who were treated for malaria and met the selection criteria. The mothers were interviewed using a pretested, structured researcher administered questionnaire which elicited information on home antimalaria and herbal medication practices, awareness and use of insecticide treated nets (ITNs) and the practice of abdominal wall scarification. The period of assessment was in the previous six months for ITNs usage. An under-five child was defined to have malaria if the mother gave complaints of fever, vomiting and other symptoms suggestive of malaria, had body temperature exceeding 37.5°C with the asexual forms of *Plasmodium falciparum* detected on the peripheral blood film. The data collected included age, sex and diagnosis made. Results: One hundred and ninety six (80.3%) out of a total of 244 under-five children were treated for malaria. Of the 196 under-five children; 128 (65.3%) had home antimalaria treatment, 53(27.0%) received herbal remedies while 15 (7.7%) had antibiotics. The awareness of ITNs was 87.2% while user rate was 11.7%. Eighty three (42.4%) had upper abdominal wall scarification marks. Conclusion: This study has shown that malaria still constitutes a significant health problem in the study area and home treatment of malaria with antimalaria drugs or local herbal remedies and abdominal wall scarification were practised. The awareness of ITNs was high but user rate was low. There is urgent need for effective methods to enlighten primary child care givers (mothers) on appropriate under-five child health practices that are safe, timely, effective and under-five child health friendly and centred.

**Keywords:** Health Practices, Hospital, Malaria Morbidity, Mothers, Under-Five Children, Rural Nigeria

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## 1. Introduction

Malaria diseases, a preventable and treatable disease has continued to plague under-five children in Nigeria. [1,2] It accounts for about one million deaths in Africa and 9 out of 10 cases of malaria worldwide occur in Africa, south of the Sahara.[3] As a major cause of ill health in Africa, malaria

is responsible for over 10% of the overall African disease burden. [4] Malaria is also the reason for outpatient hospital attendance in 7 out of every 10 patients seen in Nigerian hospitals and occurs in younger children up to 3 to 4 times a year and is responsible for 25% of infant

mortality and 30% of childhood death in Nigeria.[5]

Non-immune individuals, under five children and pregnant women bear most of the morbidity and mortality due to malaria in sub-Saharan Africa. [1,4] Malaria has been reported as the most common cause of morbidity among under-five children in urban [6,7], and rural [1,8,9] communities in Nigeria. It is associated with considerable morbidity with life threatening complications among the under-five children which manifest as severe malaria; severe anaemia and cerebral malaria among other complications.[9]

Globally, several interventional programs have been introduced to promote the health of the child aimed at reducing childhood morbidity and mortality from malaria infection. [10, 11] These interventional strategies focus primarily on the wellness and health of the whole child with the aim of reducing morbidity and mortality from diseases. World Health Organisation (WHO) in partnership with United Nations Children Fund (UNICEF), other world development and financial bodies and heads of governments of United Nations established the Roll Back Malaria (RBM) Initiative in 1998 [11] aimed at halving the malaria mortality in the year 2010 using prompt diagnosis and effective antimalaria treatment and the use of insecticides treated nets (ITNs) among under-five children who had malaria. The African Malaria summit held in Abuja, Nigeria in April 2000, declared that at least 60% of the persons at risk of malaria especially the under-five children will benefit from ITNs and at least 60% of persons suffering from malaria will have access to rapid, adequate and affordable treatment within 24 hours after the beginning of the symptoms.[3,11] More so, the Primary Health Care (PHC) component of the Alma Ata declaration advocates the accessibility of a health post within 5 kilometre distance or 30 minutes walk from where the patient lives. Furthermore, one of the strategies for reducing childhood morbidity and mortality from malaria is presumptive treatment of fever in under-five children in malaria endemic areas with effective anti-malaria drugs. [11,12] This is in consonance with WHO recommendation for malaria endemic and resource-poor countries where the availability and use of laboratories for diagnosis of malaria infection are limited. Surprisingly, most of these interventional programmes on child health have been elucidated for more than a decade now. However, eradication and elimination of malaria particularly in Nigeria where it remains endemic is still largely elusive.[1,2,8,9]

The objectives of under-five child health include: promotion of optimal physical and emotional growth, survival and development of the child; prevention and reduction of diseases, illnesses, injuries, disabilities and death as well as prompt diagnosis and treatment of diseases especially malaria disease among under-five children.[1,8] Several factors have been identified as important contributors to under-five morbidity and mortality. [13-15] These factors are broadly classified into:- child care-givers-

related factors, health services, environmental and genetic factors. [13] Among the childcare givers-related factors are home management of malaria disease by the child primary care givers particularly the mothers; utilization of herbal remedies; utilization of available healthcare services such as the use of ITNs [16, 17] and cultural practices and beliefs such as abdominal wall scarification practices for malaria splenomegaly and hepatomegaly.

Under-five child health is an important component of integrated maternal, neonatal and child health services and ensures that a child once born grows satisfactorily through infancy, preschool and adolescent periods. In Nigeria, the cornerstone of malaria control has been early detection, diagnosis and treatment of malaria in the community and health facilities. However, it has been observed that many cases of malaria are not brought to the formal health sector for treatment [1,9] and that antimalaria drugs are widely available in the market place and children are often treated at home with over-the-counter (OTC) medications bought from Patent Medicine Dealers (PMDs) and Patent Medicine Vendors (PMVs). [18-20] More so, various herbal medications have been administered to the febrile and convulsing children by the child care givers which in most instances by primary care givers particularly the mothers. In some instances multiple scarification marks are made on the abdominal walls of sick children by traditional medical practitioners as a form of treatment for malaria splenomegaly and hepatomegaly.

Unhealthy health practices contribute to poor treatment and prevention of malaria infection and invariably cause a rise in family healthcare costs. Clinicians therefore should be alert to these unhealthy health practices because most children's care givers may be unwilling to admit that they have health practice problems. It is against the background of malaria disease among the under-five children, the most vulnerable group of children in the rural endemic Nigerian communities that the researchers were motivated towards ascertaining the health practices of mothers of the under-five children in the study area. In this regard, mothers being very close to the under-five children are usually the first to notice abnormal symptoms in them. Often times mothers respond by carrying out various health practices they believe will alleviate and ameliorate the ill health of the under-five children. This study was therefore aimed at determining the prevalence of malaria among the under-five Nigerian children in a resource-poor setting of a rural hospital and evaluating the health practices of their mothers as regards home antimalaria drug treatment, herbal medication practices, awareness and use of Insecticide Treated Nets (ITNs) and the practice of abdominal wall scarification.

## 2. Materials and Methods

### 2.1. Ethical Consideration

Ethical certificate was obtained from the Ethics

Committee of the hospital. Informed consent was also obtained from respondents included in the study.

## 2.2. Study Design

This was a hospital-based cross sectional descriptive study carried out from June 2008 to June 2009 on 196 out of 244 consecutive under-five children who were treated for malaria at St. Vincent De Paul Hospital, Amurie-Omanze, a rural General Hospital in Isu Local Government Area of Imo state, South-Eastern Nigeria. The hospital renders twenty four hours service daily including public holidays to the community and its environs.

## 2.3. Study Setting

Amurie-Omanze is a rural community in Imo State, South-East Nigeria. Imo State is endowed with abundant mineral and agricultural resources with supply of professional, skilled, semi-skilled and unskilled manpower. Economic and social activities are low compared to industrial and commercial cities such as Onitsha, Port Harcourt and Lagos in Nigeria.

The climate of Imo State is essentially tropical with very high temperature within the months of November to March and seasonal rainfall. Two seasons are prominent in the State, namely rainy and dry seasons. The dry season starts in November and lasts until March while rainy season starts in April and ends in October. The mean monthly temperature of Imo State during the dry season is 34<sup>o</sup>c while it is 30<sup>o</sup>c in rainy season. It has relative humidity of about 60% to 80% throughout the year. Its mean annual rainfall is between 2000 and 2500 millimeters.

## 2.4. Inclusion and Exclusion Criteria

The study population were recruited from among mothers whose under-five children were managed for confirmed malaria at the study centre during the study period. The under-five children who were brought to the hospital by other care givers other than the biological mothers were excluded from the study. More so, under-five children who needed specialized diagnostic investigations and care were referred out and excluded from the study.

## 2.5. Sample Size Determination

Sample size estimation was determined using the formula [21] for calculating minimum sample size for descriptive studies when studying proportion with entire population less than 10,000 using estimated population size of 500 under-five patients based on the previous annual under-five children population hospital attendance:  $N = Z^2 pq / d^2$  [21] where N=Minimum sample size, Z=Standard normal deviation usually set at 1.96 which corresponds to 95% confidence interval, P=Proportion of the population estimated to have a particular characteristic. Proportion was taken from prevalence of malaria from previous study in Owerri South-east Nigeria [7] = 60.7%. The estimated minimum sample size was 211. However,

selected sample of 196 under-five children was used based on the time frame for the study.

## 2.6. Methods

The clinical records of the under-five children who presented each day to the hospital were collected and entered into a data collection schedule sheet. A proven diagnosis of malaria was based on blood film examination for malaria parasites. Thick blood film was carried out on all the patients who had presumptive diagnosis of malaria. [15] The thick blood film was made immediately on the slide and processed by standard staining technique using Giemsa stain.[15] The demonstration of asexual forms of Plasmodium falciparum on peripheral blood film was taken as a proven diagnosis of malaria infection. A film was considered negative after fields were well examined and no malaria parasite seen.[15]

The age, sex and diagnosis made were extracted daily from the clinic records. A pretested, structured and interviewer administered questionnaire was used to collect information from the patients' mothers. Information on home antimalaria medication practice and herbal medication practice were obtained from the patients' mothers. Awareness of information on ITNs and its use were also obtained from the patients' mothers. The use of ITNs was assessed in the previous six months before presentation to the hospital and was coded as yes for utilization and no for non use. Information on scarification practice was also obtained from the mothers of the under-five children who had scarification marks on the upper abdominal wall.

The questionnaire was pre-tested externally at St. Damian Hospital Okporo, a similar General Hospital in Orlu, Imo state using five mothers of under-five children who met the selection criteria. The respondents for the pre-testing were selected haphazardly. The pretesting was done to find out how the questionnaire would interact with the respondents and ensure that there were no ambiguities. However, no change was necessary after the pre-test as the questions were interpreted with the same meaning as intended.

## 2.7. Operational Definitions

An under-five child was defined to have malaria if the mother gave complaints of fever, vomiting and other symptoms suggestive of malaria, had body temperature exceeding 37.5<sup>o</sup>c with the asexual forms of Plasmodium falciparum detected on the peripheral blood film.[15] Health practice refers to the action mothers take when dealing with an ill health in under-five child with malaria. The success of healthcare interventions for the under-five Nigerian children with malaria in malaria control needs proper and appropriate health practices especially by the primary care givers particularly the mothers. Primary care giver refers to care givers who give informal care such as the mothers of under-five children. Awareness of ITNs

refers to awareness of information on ITNs and was described as high when the awareness was  $\geq 50\%$  and low when less than 50%. High ITNs user rate refers to the utilization of ITNs in the previous six months and described as high when  $\geq 50\%$  and low when less than 50%.

### 2.8. Statistics

The results generated were analysed using software Statistical Package for Social Sciences (SPSS) version 13.0, Inc. Chicago, IL, USA for the calculation of frequencies and percentages for categorical variables.

## 3. Results

One hundred and ninety six out of a total of 244 under-five children studied had malaria giving a prevalence of 80.3%. The ages of the study population ranged between 4 days and 58 months with mean age of  $30.4 \pm 5.6$  months. There were 116(59.2%) males and 80(40.8%) females giving a male to female ratio of 1.5:1(Table 1). The age group specific prevalence of malaria ranged between 11.2% and 49.0% in different age groups with the highest prevalence of 49.0% in patients between 37-60 months and lowest prevalence of 11.2% in patients aged 0-12 months.(Table 1).

**Table 1.** Age and sex distribution of the under-five children with malaria

Age(months)	Sex	
	Male(Number(%))	Female(Number(%))
0-12	16(13.8)	6(7.5)
13-36	49(42.2)	29(36.3)
37-60	51(44.0)	45(56.2)
Total	116(59.2)	80(40.8)

Of the 196 under-five children who had malaria, one hundred and twenty eight (65.3%) had antimalaria treatment at home, fifty three (27.0%) had treatment with herbal remedies while fifteen (7.7%) had antibiotics. (Table 2)

One hundred and seventy one (87.2%) out of the 196 mothers of the study population was aware of ITNs. However, twenty three (11.7%) out of the 196 under-five children who had malaria use ITNs in their homes. Eighty three (42.4%) out of the 196 patients who had malaria had scarification marks on the upper abdominal wall. (Table 2)

## 4. Discussion

The prevalence of malaria of 80.3% in this study is higher than 60.7% reported in Owerri, South east Nigeria, [7] 57.3% reported in Jos, Northern Nigeria,[27] and 39.4% reported in other topical African countries such as Uganda.[22] This study has demonstrated that malaria is still an issue of serious medical importance among under-five children in the study area.[1, 9, 15] This finding has buttressed the reports that malaria accounts for most of the under-five morbidity in tropical African countries.[1, 6, 7, 9,

11, 12, 15, 22] The outcomes of malaria in under-five children have been documented to be influenced by interplay of epidemiological[15-17, 22] and immunological factors.[23-25] The malaria related health practices of primary care givers especially the mothers of under-five children are among the epidemiological factors that influence malaria disease. Through the activities of WHO/UNICEF and other UN agencies there has been a remarkable reduction of morbidity and mortality from malaria disease globally. However, despite these gains and outstanding achievements in malaria control in other tropical countries, under-five childhood morbidity in the study area [1,9] and other parts of Nigeria is largely attributed to malaria.[6,7] Malaria has therefore remained as significant in under-five child health in the present century in Nigeria as they were in the early 1900s in developed countries. Despite years of formulation and implementation of malaria control programmes such as RBM initiative, the impact of programme targets in general and under-five childhood morbidity specifically have been below expectation especially in rural Nigerian communities. [1, 8, 9] The high prevalence of malaria among the study population could be attributed to its rural conduct in a holoendemic and stable malaria area of Nigeria. More so, the under-five children have been documented as special group at risk of malaria, even in stable malaria areas where some degree of acquired immunity for most adult population is offered. [24-26]

The prevalence of malaria was highest in patients aged 37-60 months and lowest in age group 0-12 months. This pattern of age distribution of prevalence of malaria among the under-five children in this study is in keeping with the reports that age and exposure to malaria infection are essential to the development of natural immunity to malaria disease.[24, 25] Although several factors have been documented that predispose the under-five children to morbidity from malaria.[12-14] However, among the under-five children in endemic malaria areas, there is transient resistance to malaria infection from birth to 6 months of age due to transplacentally transferred IgG antibodies from the mother to the child.[24-26] The 6 months to 3 years age group are especially regarded as non-immune when they have lost the immunity(maternal antibodies) transferred from their mothers in highly endemic areas. More so, even when surviving children develop their own immunity between the ages of 3-5 years, they will still be particularly vulnerable because they have not developed the partial immunity conferred upon surviving repeated malaria infections.

Home treatment of malaria with antimalaria drug was practised by 65.3% of the mothers of the study population. Home treatment of malaria with antimalaria drugs is reportedly practised in several households in Nigeria [18-20] and elsewhere in Africa.[27-29] Home treatment of malaria with antimalaria drugs was reported in Nnewi, South-east Nigeria(15.6%)[18], Ile-Ife, South-west Nigeria(83.2%)[19], Jos, Northern, Nigeria(48.1%)[20] and other African

countries such as Kenya(47%)[27], Malawi(72%)[28], and Burkina Faso(59%)[29]. Studies in Nigeria [18, 19] and other African countries [30, 31] have also shown that the initial treatment of malaria fever often takes place at home. In malaria endemic areas, the main strategy for reducing under-five childhood morbidity and mortality from malaria disease is presumptive treatment of all fevers in under-five children with antimalaria drugs.[12,32] This strategy is in consonance with WHO recommendation for malaria endemic countries where the availability and use of laboratories are limited. For many years, the cornerstone of malaria control across Nigeria has been early detection, diagnosis and treatment through primary health care services. However, studies in Nigeria[18,20] and other African countries[30,31] have shown that many cases of malaria are not brought to the formal health sector for treatment, and that antimalaria drugs are widely available in the market place and that under-five children are often treated at home with over-the-counter medications bought from patent medicine stores. More so, most under-five children dying from malaria do so within 24 hours to 72 hours of the onset of severe symptoms,[9] the speed with which malaria is diagnosed and treated is critical in reducing mortality. By minimizing the delay before treatment, effective treatment with antimalaria drugs at home can save many lives of the under-five children in malaria endemic areas. Home treatment of malaria with effective antimalaria drugs also circumvents any inadequacies in the formal health care system. Although, home-based malaria treatment has the potential of positively impacting on malaria control, in terms of prompt recognition and treatment to prevent complications and also reduce childhood mortality, there can be problems with the antimalaria drug use, particularly where there is inadequate education of child care givers especially the mothers on the use of antimalaria drugs. The home antimalaria medication practice by mothers of the study population coupled with inadequate dosing may lead to irrational drug use and development of resistance to commonly used antimalaria drugs. With this high rate of home treatment of malaria in this study, there is need for effective methods to educate mothers of the under-five children on the use and the potential dangers of irrational home antimalaria medication practice. Rationally, home treatment of malaria in malaria endemic areas with effective antimalaria drugs is a strategy that if properly done will reduce morbidity and mortality from malaria. [32-34]

This study has demonstrated that 27.0% of the study population had home treatment with local herbal remedies. The use of local herbs to treat childhood malaria was reported in Ile-Ife(1.9%), South-west Nigeria,[19] Jos(2.3%), Northern Nigeria [20] and other African countries such as Uganda(48.4%).[34] These reports have shown that the use of local herbs for treatment of malaria is practised in Nigeria [19,20] and other parts of Africa such as Uganda.[34] The use of local herbs for the treatment of malaria among the study population could be due to lack of access to formal health facilities in the study area.[9] More

so, there appeared to be seemingly reduced trust in the formal public health care delivery system in Nigeria [1,9,19,20] and apparently more reliance on the informal health sector especially the use of herbal medicines in the treatment of malaria. Furthermore, the use of herbs is probably a reflection of much level of financial incapability (direct and indirect costs of treatment) to access, afford and avail treatment from formal health sector [1,9] as the locally available and accessible herbs can probably be gathered at no cost. Although, some of these herbal remedies overtly may be beneficial, many of them are harmful to the sick under-five children that they are supposed to help as their active ingredients are unspecified, dosages not clearly defined and their side effects may be grave and inimical to the under-five child health. Moreover, the actual efficacy of most of these local herbs in the treatment of malaria has not been conclusively determined. Despite common use of herbal remedies in the treatment of malaria, physicians and pharmacists in particular and the public in general are often uninformed as regards herbal medicines efficacy and safety. Therefore, in the absence of organized oversight lies the potential for harm. It is therefore important to sensitize medical practitioners and pharmacists practising in study area and the rural populace on the use of local herbs and its dangers. This calls for basic research to widely investigate, identify and confirm the efficacy, effectiveness and safety of local herbal remedies used in the treatment of malaria.

This study showed that 87.2% of the mothers of the study population were aware of the use of ITNs to prevent malaria infection in under-five children but the ITNs user rate for the study population was 11.7%. This finding has buttressed the reports in Nigeria that awareness of ITNs is high but the user rate is low and inadequate.[16,17,19,26,35] The low and inadequate ITNs user rates have been reported in Ile-Ife, South-west, Nigeria(2.1%),[19] Sagamu, South-west, Nigeria(22.8%)[35] and other African countries such as Malawi(20.5%)[37]. The low user rate of ITNs in this study negates the tenets and precepts of RBM initiative of the Federal Government of Nigeria.[5,11] At the African Summit on RBM held in Abuja, Nigeria in April 2000,[3,11] African leaders committed themselves to ensure that by the year 2005, at least 60% of those at risk of malaria infection such as under-five children have access to an effective means of malaria prevention like the use of ITNs. More so, the national malaria control programme in Nigeria identified ITNs as a key strategy to malaria control.[5] To achieve this, the Federal Government of Nigeria tried to improve net coverage by promoting awareness through social marketing with emphasis on providing free ITNs for under-five children and pregnant women. Despite the efforts of WHO[10] and Federal Ministry of Health of Nigeria[5] the morbidity and mortality of the under-five children from malaria remained high especially in rural Nigeria.[1,8,9] The low and inadequate user rate of ITNs among the study population calls for family and community wide campaign on the benefits of ITNs since

widespread use of ITNs has been documented to significantly reduce morbidity and mortality from malaria in Nigeria[26] and in other parts of the tropics such as Kenya.[37].

This study has demonstrated high abdominal wall scarification practices for the treatment of upper abdominal swelling due to malaria splenomegaly and hepatomegaly among the study population. If there is any malaria control strategy that will greatly impact on the quick deterioration of sick under-five children and reduce the rapid development of malaria-related anaemia or other severe malaria outcomes, passionate thoughts should be given to the education of child's care givers particularly the mothers in malaria endemic areas with the ability to recognize malaria in every case of febrile illness in under-five children.[9,32] The abdominal wall scarification practice may also cause delay in seeking and obtaining prompt and effective treatment for malaria and can result in serious illness and ultimately death of the affected under-five child. Identification and exploration of indigenous traditional beliefs of different cultures on the aetio-pathogenesis of malaria as a means to educate the people and the insistence on their replacement with modern knowledge, attitude and practice should be explored in the study area.

#### 4.1. Implications of the Study

The burden of malaria among the under-five Nigerian children in study area can be influenced by health practices of the primary care givers particularly the mothers. The unhealthy health practices by the mothers of the study population may predispose the under-five children to the risk of disability and mortality from malaria. However, regular health education and promotion activities are limited in clinical consultation in Nigerian health facilities particularly in rural Nigeria due to time constraints. Hence, there is stronger need more than ever before to re-enforce the importance of clinicians inquiring for malaria-related unhealthy practices by mothers of under-five children and instituting facility-based health education and counselling to promote the culture of appropriate health practice for malaria. This study is therefore quintessential to clinicians attending to this special group of the population in this era of health promotion, health maintenance and risk reduction for malaria.

#### 4.2. Limitations of the Study

The limitations imposed by the study are recognized by the researchers. First and foremost, the sample was drawn from hospital attendees in the community. Hence, this may not be general conclusions regarding the health practices of every mother of the under-five children in the study area, thus extrapolation and generalization of the results of the study to the entire community and its environ should be done with utmost caution. More so, part of the study was based on self-report alone and may therefore be prone to under- or over-reporting of the studied health practices of the mothers of the study population. However, their effects

were minimized by structuring the questions as well as assuring the mothers of the study population of confidentiality prior to the conduct of the interview.

## 5. Conclusion

This study has shown that malaria still constitutes a significant health problem among the under-five children in the study area. Home treatment of malaria with antimalaria drugs or local herbal remedies and abdominal wall scarification practices were practised by the mothers of the study population. The awareness about ITNs was high but user rate was low. Clinicians attending to under-five children in the study area should screen for the obnoxious health practices as these affect the quality of care rendered to these under-five children who are living in resource poor setting of a rural hospital in South-east Nigeria.

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**Table 2.** Frequency of malaria-related health practices among mothers of the under-five children

Health practices	Number	Percentage(%)
Home antimalaria practice	128	65.3
Herbal remedies practice	53	27.0
Antibiotics administration	15	7.7
Insecticide treated nets use	23	11.7
Abdominal wall scarification practice	83	42.4

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