



# Indicators of Utilization of Insecticide Treated Nets (ITNS) in Malaria Control and Elimination in Under-Fives in A Fast-Developing Urban Fringe in South-South Geographical Zone, Nigeria

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## Research Article

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## Abstract

Malaria still remains an important public health concern in most parts of the world. Insecticide treated nets (ITNs) have been found to be one of the most cost effective and inexpensive specific control measures of preventing malaria. The study aimed at the assessment of malaria parasitemia under five-year-old children, awareness, accessibility, availability, and utilization of Insecticide Treated Nets (ITNs) in the control and elimination of malaria in under five-year-old children (under-fives) in Ikot Ekpene, Nigeria. Blood samples were taken from a total of 450 under-fives in 250 randomly selected households and screened for malaria parasites using thin/thick blood film method. Pre-tested structured questionnaires were administered to heads of selected households. Descriptive statistics were used in analyzing the data obtained based on the stated objectives. Analysis of the blood samples showed that the prevalence of *Plasmodium falciparum* malaria parasitemia in under-fives was 64.4% overall and 57.1 – 69.2% among the clans in the study area. The study also revealed relatively high awareness, accessibility, availability, and affordability of ITNs but low utilization of ITNs in the study area, which was attributable to some negative beliefs by the respondents. This study shows that there is a high level of malaria parasitemia among under five children in the study area in spite of high ownership of insecticide treated bed nets suggesting that there may not be proper use of insecticide treated nets for children of this age group. Interventions in this area should include strategies to encourage proper use of insecticide treated nets.

**Keywords:** Malaria; Insecticide Treated Nets (ITNs); Utilization; Indicators; Under-fives

## Introduction

Malaria is a common but a serious tropical infection and one of the oldest diseases known to mankind. Even one

hundred years after its recovery, malaria still remains an important public health concern all over the world. More than three quarters of global malaria deaths occur in under-five years old children (under-fives) in countries in sub-

Saharan Africa [1], and 25% of all childhood mortality below the age of five (about 800,000 young children) is attributable to malaria [2]. And of those children who survive cerebral malaria (a severe form of the disease) more than 15% of them often suffer neurological defects characterized with weakness, partial blindness, speech problems and epilepsy and where such children are properly managed or have access to specialized education and good medical care, it may interfere seriously with their future learning and development [3]. The disease is also associated with 1.1 to 2.2 million deaths annually in the world, and out of that about 1 million are under-five year old children in the affected areas. It is also the major cause of infant mortality and the only insect-borne parasitic disease comparable in impact to the world's major killer transmissible diseases [4].

Every year, an estimated 300-500 million clinical cases of malaria occur making it one of the most common infectious diseases globally [5] including Ikot Ekpene LGA in Akwa Ibom State of Nigeria. Malaria constitutes 10% of the continent's overall disease burden, accounting for 40% of public health expenditure, 30-50% of in-patient hospital admissions, and up to 50% of out-patient visits in areas affected with high transmission [6]. The under-fives and pregnant women are particularly vulnerable to the disease because of undeveloped immunity in them and reduce immunity due to psychological changes that normally takes place in a women during pregnancy respectively. Malaria often contributes to neonatal and maternal mortality, and also causes low birth weight in infants.

In Nigeria, malaria is the leading cause of mortality in under-fives, contributing 33% of all childhood deaths and 25% infant mortality. When children are typically sick of malaria between 3-4 times in one year, it becomes a major disease which usually leads to long absenteeism from school, thus impeding their educational and social development and subsequently robbing the country of its future human resources [7]. The malaria situation in Ikot Ekpene Local Government Area of Akwa Ibom State is not different, the disease ranks highest among the endemic notifiable diseases, and its transmission is throughout the year with more prevalence during rainy season, and stagnant water provides suitable habitat for the breeding of the larvae of mosquito vector of the disease. In addition, the area being a tropical and industrial zone is prone to malaria transmission especially in the urban fringe clan due to overcrowding of the population, which results in poor living environment. This in turn, results in indiscriminate waste disposal, etc. that attracts the breeding of the vector which leads to greater transmission of the disease in the study area.

Globally, and especially in Nigeria, the efficacy of malaria drugs for its treatment and insecticides used for

the control of the disease vector are being threatened due to malaria parasite resistance to anti-malaria drugs and the emergence of mosquito vector resistance which leads to an increased incidence of the disease, including gross infant anemia. Several global and regional attempts have been made at controlling the disease in the past with little success as a result of ineffective strategies used, and insufficient resources [8]. Insecticide treated nets (ITNs) has been found to be one of the most cost effective and inexpensive specific control measures of preventing malaria. This has been proven universally with the capacity to reduce malaria burden significantly [9]. Its other associated benefits are, improved growth and weight gain in infants; reduced maternal mortality, placental malaria and maternal anemia, resulting in reduced risk of low birth weight [10].

Malaria control with ITNs in the prevention of infection has been recommended for adoption as an important component of the anti-natal clinic [11]. Insecticide treated nets (ITNs) have been shown to reduce the number of malaria episodes as much as 50%, and childhood mortality by 20% [12]. Therefore, promoting its use can be a key approach towards the reduction of morbidity and mortality among the most at risk. In April, 2000 African Heads of State met in Abuja, Nigeria where they set among other targets in the Roll Back Malaria (RBM) Programme, a 60% use of ITNs among the vulnerable groups (under-fives, pregnant women and the aged), by the year 2005. That is, to ensure that they have access to sleep under insecticide treated nets (ITNs). At this historic Malaria Summit, African Heads of State made a declaration to bury the burden of malaria by the year 2010 [13].

Also, recently, all continents endemic with malaria are strengthened to scaling up ITNs distribution with particular reference to these groups in all malaria endemic areas, and this has been widely promoted as a means of preventing man-vector contact in the control of malaria [7]. Net ownership is an important instrument used in assessing the effectiveness of the distribution channels of the RBM programme, it aids in offering useful suggestions where there are lapses. Equity is also a major issue in ITNs' ownership though generally found to be low among the poorest households universally. In order to increase access to ITNs, certain perception concerning ITNs' use, the cost and the chemical used for its treatment must be seriously handled by providing important lessons for malaria programme that aims at assessing utilization of ITNs among mothers [5].

Previous studies carried out on utilization of ITNs by other researchers revealed various factors influencing ITNs use to include cultural, behavioural and demographic factors, ethnicity, accessibility, gender relations and seasonality of malaria [14,15]. The researchers pointed out that, even if

ITNs are purchased and used correctly, its local acceptance may still be influenced by the assumed toxicity from chemical used in its re-treatment. The present study aimed to ascertain the prevalence of malaria in under-fives, assess the availability, accessibility and utilization of Insecticide Treated Nets (ITNs), and malaria control in this vulnerable age group in an Urban Fringe in Ikot Ekpene Local Government Area, Akwa Ibom State, Nigeria.

## Methodology

### Study Location

This study was conducted in Ikot Ekpene, Amayam, and Otoro Uboe clans of Ikot Ekpene Local Government Area of Akwa Ibom State, South-south Nigeria.

### Instrument Used for Data Collection and Study Sample

Pre-tested structured questionnaire prepared by the researchers was administered to selected heads of households or their representatives (in their absence). A total of 250 questionnaires were distributed among the selected household heads or their representatives. Additional information was gathered through a total of three Focus Group Discussions (FGDs) that were held in the study area with separate groups of men, women and youths comprising at least nine members in each session. A total of 450 under-fives from the randomly selected households in the study area were screened for malaria parasite. Every under-five in the selected households had their blood sample taken from their finger thumbs for the malaria screening. Any household without under-five was not sampled.

### Screening for Malaria Parasite

Households were randomly selected from the three communities studied. Every under-five in the selected households was screened for malaria parasites in their blood samples. These were later taken to the laboratory for analysis.

A total of 450 blood samples were considered for malaria parasite examination. Each blood sample was screened for malaria parasites by using the thick film method.

### Thick Film Method

Thick blood films were prepared as described by Ersley, et al. It was later stained with 1:10 dilution of Giemsa solution and air dried. The slide was gently washed with few drops of distilled water, and air dried again for few minutes, and examined under x10 oil immersion objective microscopic lens to determine the presence or absence of *Plasmodium species*. The film was considered to be positive with malaria parasite, if there were presence of the ring form trophozoites or any other blood stage of erythrocytic schizogony detected. A film is also considered negative, if no parasite was seen after scanning for at least 100-200 fields.

### Statistical Analysis

Descriptive statistics such as frequency counts, percentages and ranks were used in analyzing the set objectives of the study. The chi-square analysis was used to assess the association between respondents' knowledge of the cause of malaria and the utilization of Insecticide Treated Nets (ITNs) for under-fives. The chi-square analytical technique was also used to ascertain the association between the respondents' knowledge of the mode of transmission of malaria to man and utilization of ITNs for under-fives in Ikot Ekpene Local Government Area.

## Results

### Malaria Parasitemia in Under-Fives

A total of 450 children aged five years and below were recruited in this arm of the study out of which 200 were males. The number of malaria positive children were 180 (69%), 80 (57%), and 30 (60%) from Ikot Ekpene, Amayam and Otoro Uboe Clans, respectively (Table 1).

Study area	No. Examined	No. Infected	Gender		No. Uninfected	Gender	
			Male (%)	Female (%)		Male (%)	Female (%)
Ikot Ekpene Clan	260	180(69)	62 (34)	118 (66)	80 (31)	50 (62)	30(38)
Amayam Clan	140	80(57)	30 (38)	50 (62)	60 (43)	24 (40)	36(60)
Otoro Uboe Clan	50	30(60)	18 (60)	12 (40)	20 (40)	12 (60)	8 (40)
Total	450	290(64)	110(38)	180(1.8)	160(36)	90(56)	70(44)

M - Male F - Female

**Table 1:** Prevalence of under-fives infected with malaria parasites in the study area.

### ITN Utilization Survey

The survey questionnaire was administered to 250 individuals across the 3 communities. There were 39 (15.6%) participants who admitted to having no ITNs in their households while 20 (8%) said there were more than 5 ITNs in their households. Most participants (53.1%) said they got

their ITNs from government hospitals, while 12.8% obtained theirs from house to house distribution by health workers. Most respondents (48,8%) said that ITNs were mainly used by children under 5 years followed by (14.8%) who said they were mainly used by pregnant women and 11.2% who said they were mainly used by older children (Table 2).

Number of ITNs owned by Respondents	Frequency (n)	Percent (%)
None	39	15.6
1-5	191	76.4
Above 5	20	8
Source of obtaining ITNs		
Government Hospitals/ Clinics	112	53.1
House-house distribution by Health workers	27	12.8
Bought from Private Clinics	21	10
Bought from shop/ market vendors/ community ITNs sellers	19	9
NGOs subsidized price outlets	20	-9.5
Others	12	-5.6

**Table 2:** Study participants' access and utilization of Insecticide Treated Nets (ITNs).

The Table 3 results show that, greater number (46.8%) of under-fives who suffered from malaria are being diagnosed by medical doctors in the hospitals/ clinics as compared

to 5.6% being diagnosed by others such as friends, family members or neighbors.

Who diagnosed children of malaria	Frequency	(%)
In Hospitals/ Clinics by Medics	117	46.8
Other Health Workers in Hospitals/ Clinics	57	22.8
Traditional Birth Attendants (TBAs) at home	36	14.4
Parents of the under-fives	26	10.4
Others (Neighbors/ family members/ friends)	14	5.6

**Table 3:** Sources of malaria diagnoses by study participants.

According to Tables 3&4, while most participants sought malaria diagnosis from hospitals, a significant number

sought opinions from unqualified community members.

Major causes of malaria	Frequency(n)	Percentage (%)
Mosquito Bites	147	58.8
Unsanitary environment	56	22.4
Too much palm oil in the meal	40	16
Mid-day sunshine/ sunlight	7	2.8
Methods of prevention/ control of malaria		
By using anti-malarial drugs	49	19.6
By sleeping under ITNs	52	20.8
By wearing protective clothes such as trousers, long sleeves, etc.	10	4
By using insecticides	28	11.2
By always keeping one's environment clean	75	30
Others (using "Dongoyaro" leaves and keeping in tune with the gods of the land)	36	14.4

**Table 4:** Study participants' opinions on cause and prevention of malaria.

On the cause of malaria, 58.8% of participants were aware that mosquito bites were the cause, but 22.4% thought it was due to unsanitary environment, 16% to too much palm oil and 2.8% to sunshine. On methods of preventing malaria, 30% selected keeping environment clean, followed by sleeping under ITNs (20.8%) and using antimalarial drugs (19.6%).

## Discussion

This study revealed that over half of children surveyed had parasitemia in this population. Previous studies have found lower rates in Calabar and elsewhere [16]. Although several studies have shown that detectable parasitemia is associated with a lower risk of symptomatic malaria and therefore important in maintaining protective immunity suggesting that treating them might predispose to more severe infections, a recent study has shown that treatment of asymptomatic infections was not associated with an increased risk of symptomatic malaria [17].

While most participants said they sought diagnosis and treatment from governmental health institutions, it is worrying that a sizeable number of participants still sought diagnosis and treatment from traditional attendants and neighbours. The high confidence in diagnoses and treatment in hospitals may be a result of the free health care policy for under-fives in Akwa Ibom State. Studies have shown that cultural and religious beliefs among caregivers affect their health seeking behavior [16,18]. This was consistent with the findings of this study. Cultural factors must be considered in strategies for malaria prevention and treatment to achieve high acceptance rates in communities.

The great majority of respondents said they had ITNs in their households. High levels of ITN ownership in communities have been attributed to level of education, wealth index, family size among other factors [19]. Nonetheless, ITN ownership does not always correlate with bed net use nor does good knowledge of malaria prevention [20,21]. This possibility could be corroborated by the high prevalence of malaria parasitemia among children surveyed in this study. For the remaining percentage of respondents without ITNs, more aggressive house-to-house distribution may be required to reach them as this approach was not one of the most common sources for respondents. Several studies in different parts of Nigeria have shown moderate to dramatic increase in ITN ownership where there have been ITN distribution campaigns [23-45].

On the assessment of utilization of ITNs in the selected households with under five years old children in malaria endemic area of Ikot Ekpene LGA, it was crucial to understand the respondents' behavior and attitude towards

the actual usage of ITNs, for example, facts from several studies revealed some negative behavior of respondents toward ITNs use despite the increasing provision of free nets [46-51]. Some respondents, precisely mothers, were not using ITNs for their original purpose, for example some instead of using it on their under five years old children while sleeping, rather use it to cover their vegetable gardens, others use it as filter and so on. This shows that most of the mothers do not appreciate the usefulness of ITNs at all and when demonstrated to them on how to hang it by health workers. Instead of appreciating it, some mothers gave some flimsy excuses. This is because their minds were still set at traditional medicines, fetish beliefs that those nets cannot prevent or control malaria [52-59].

## Conclusion

This study shows that there is a high level of malaria parasitemia among under five children in Ikot Ekpene in spite of high ownership of insecticide treated bed nets suggesting that there may not be proper use of insecticide treated nets for children of this age group. This finding will definitely impair the attainment of the ambitious goals for reduction in case incidence and death rates of at least 90% by 2030, a strategy set by WHO and adopted by the World Health Assembly (WHA) in May 2015. Interventions in this area should include strategies to encourage proper use of insecticide treated nets.

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