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## **Malaria prevention and treatment practices among care-givers of under-fives in urban slums South-East Nigeria**

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### **Abstract**

**Aim:** The study was done to determine malaria prevention and treatment practices among care-givers of under-fives in urban slums South-East Nigeria.

**Methods:** A community-based cross-sectional study involving 145 care-givers of under-fives recruited via multistage sampling method using a semi-structured questionnaire in selected urban slums of Enugu north LGA of Enugu state.

**Results:** The prevalence of Malaria prevention and treatment practice was 19.3% and 17% respectively. Association between the age group of the under-five and the malaria prevention practice was ( $p=0.034$ ) while the associations between the age of care-givers' spouse, educational level of caregivers' spouse and malaria treatment practice in under five was also statistically significant with p-values of 0.003 and 0.047 respectively.

**Conclusion:** Malaria prevention and treatment practice among care-givers of the under-fives was low. Hence, the need for the government, non-governmental organizations and health care workers to collaborate so as to improve malaria outcome in the Nigeria society.

**Keywords:** Plasmodiasis, early childhood, Nigeria

### **Introduction**

Malaria is a major public health problem that has affected many nations and populations. Malaria in children is very severe and leads to serious health conditions and sometimes death especially in children below the age of five years.

It has been recognized in Nigeria that malaria is the most common cause of hospital attendance amongst all age groups with 60% of outpatient visits and 30% all hospitalization<sup>[1, 2]</sup>. At least half of the population experience one episode of the disease while children under five have an average of 2-4 attacks in a year and 2% of children that recover from cerebral malaria suffer from learning impairments and disabilities due to brain damage<sup>[3, 4]</sup>.

One in 8 children die before their fifth birthday in Nigeria<sup>[5]</sup>. Malaria contributes up to 33% of all childhood deaths and 25% infant mortality<sup>[6]</sup>. In under-fives, Malaria could cause anemia or low birth weight in children<sup>[6]</sup>. Seizures, cerebral malaria or death could arise due to repeated infections in children<sup>[7]</sup>. Repeated malaria infection in children could reduce the immunity of the child making them more susceptible to diseases such as diarrhea which may lead to death. Congenital malaria has been recognized hence the possibility of malaria in infants below 6 months<sup>[8]</sup>. A cross sectional study carried out in three west African countries namely; Gambia, Benin and Guinea it was observed that young infants are not adequately protected against malaria because of their limited coverage by current preventive strategies, such as seasonal malaria chemoprevention and intermittent preventive treatment during infancy, which are not widely implemented<sup>[9]</sup>. In Nigeria, the proportion of under-fives sleeping under insecticide Treated nets are 28%<sup>[10]</sup>, which has increased to 39% in 2015<sup>[11]</sup>. Artemisinin derivatives are safe and well tolerated by young children, so the choice of ACT will be determined largely by the safety and tolerability to the drug. For infants weighing less than 5 kg with uncomplicated *P. falciparum*, WHO recommends treatment with an ACT at the same mg/kg body weight dose as for children weighing 5 kg.

Factors that influence malaria prevention and treatment practice are cost, religion, ethnicity, educational status<sup>[12]</sup>.

Despite the programs and policies created, funds invested, which was all for the elimination of malaria in this special group of the population and the country at large, the incidence, morbidity and mortality associated with malaria cases in under five is still high. This study is aimed at determining malaria prevention and treatment practices among under-fives in urban slums in Enugu north L.G.A, South-East Nigeria as well as the influencing socio-demographic factors.

## Material & Methods

### Study area

Enugu State is in the South East geo-political Zone of Nigeria. It is located at 6°30' North of Equator, and 7°30' East of Latitude. Enugu State has a good climatic condition all the year round. The hottest month is February with about 87.16 °F (30.64 °C), while the lowest temperature is recorded in November/December, reaching about 60.54 °F (15.86 °C)<sup>[13]</sup>. Enugu State has a total of (17) seventeen local government areas, of which Enugu North L.G.A. is one of them.

Enugu north L.G.A has a total number 74 licensed hospitals which includes Federal, State and a Local government owned hospital namely: University of Nigeria Teaching Hospital (Institute of Child Health (ICH), Enugu State University Teaching Hospital (ESUTH), and Poly sub district hospital located at Asata respectively<sup>[14]</sup>.

### Study design and data collection instrument

This was a cross-sectional study and a semi-structured questionnaire was used to collect data. The questionnaires were pre-tested in one of the slum settlements not chosen for the actual study and necessary corrections made before the study began.

The questionnaire comprised three sections

Section A which explored the socio-demographic characteristics of the care givers; namely age, marital status, educational status, occupation, average monthly income.

Section B explored the malaria prevention practices in under-fives.

Section C explored malaria treatment practice in under-fives.

### Study population

The study population comprised under-five children in urban slums in Enugu north L.G.A.

### Inclusion criteria

- All under five children whose mothers gave consent

### Exclusion criteria

- Temporary residence in the study area.

### Sample size determination

The minimum sample size for the survey was determined using the formula.

$$n = \frac{Z^2 \alpha * p * q}{d^2}$$

Where

n = Minimum sample size

Z $\alpha$  = standardized normal deviate corresponding to the probability  $\alpha$  (which is 1.96 at 95% confidence limit for a two tailed test)

P= 91.5% (Proportion of under-fives that use ITN in Delta state)(1)

$$n = \frac{(1.96)^2 \times 0.915 \times 0.085}{(0.05)^2} = 119.5$$

Factoring in a non-response of 20%, final sample size used in this study was 145 under-fives.

### Sampling technique

Study participants were recruited using the multi-stage sampling technique.

Stage 1 involved selection of urban slums. Three out of five slums in Enugu north were selected randomly by balloting. The selected settlements were Ngeneevu, Ugwu Aaron and Ologo/ Jamboline.

In Stage 2, households were selected using data obtained from National Primary Health Care Agency during NIPDs (National Immunization Plus Days); 36 households out of 309 living in Ngeneevu were selected, 45 households out of 380 living in Ugwu Aaron and 64 households out of 544 households from Ologo/Jamboline were selected. The point to start was determined by spinning a bottle at a central area in the slum, the area which the bottle was pointing was marked as the starting point, and subsequently every 8<sup>th</sup> house was selected for study.

Stage 3 involved selection of eligible respondents. Every eligible respondent in each household was recruited and interviewed until the required numbers of respondents were obtained in each slum settlement.

### Data collection

Nine research assistants made up of community health extension workers, were trained by the researchers for a day on effective questionnaire administration and malaria prevention and treatment practices. The questionnaires were self-administered for the literate respondents and interviewer-administered for the illiterate ones.

The interview site was in the respondents' households. Eligible respondents who were absent on the data collection day were revisited once before being declared lost and another respondent recruited to replace the lost one. The questionnaires were checked for completeness before collection.

### Data analysis

Data analysis was done using Statistical Package for Social Sciences (SPSS) version 23.0. Data was summarized using frequency tables, means, standard deviations and charts. Chi square, as a statistical test of significance, was used in the analysis. Level of significance was determined at a p-value of less than 0.05.

### Definition of variables

#### Predictor/ Independent variables

Socio-demographic variables:

- Age: Age in the year of study
- Marital status: single, married, divorced, separated,

- widowed
- Education: Educational level completed: none, primary, secondary and tertiary
- Occupation:
  - professionals (doctors, lecturers, nurses etc),
  - managerial (business men)
  - skilled manual (masons, carpenters, etc)
  - skilled non manual (receptionists, etc)
  - Unskilled manual (office messenger, cleaners, etc).
- Income level per month: This was grouped based on Enugu state civil service classification.<sup>12</sup>
  - Executives- (≥#101,000)
  - Senior staff- (#28,000-#100,000)
  - Junior staff- (#18,000-#27,900)
  - Poorest poor- (<#18,000)

**Outcome/ Dependent variable**

**Malaria prevention practices**

This refers to all practices adopted by the respondent in the last 14 days to either prevent malaria or mosquito bite.

Adequate malaria prevention entails:(2)

- use of Insecticide Treated Net with any other preventive practice listed below:
  - Use of mosquito repellent lotion/cream
  - Use of mosquito coils
  - Use of insecticide sprays like Mortein, Shelltox, Baygon, Raid, Good Knight and other
  - Wire gauzing of windows and doors of apartment
  - Clearing of bushes in the environment
  - Removal of stagnant water from the environment

**Malaria treatment practice**

This refers to treatment practice used in the last episode of malaria. Malaria treatment is classified as adequate if it is according to the National Malaria Policy.(2)

Adequate treatment for uncomplicated malaria;

- ACT's given as home remedy for 3days. ACT's namely; arthemether/lumefantrine, artesunate/amodiaquine, artesunate/mefloquine, dihydroartemisinin/piperazine or artemisinin/piperazine.

**Quality control**

- Data collectors were trained on survey methods.
- Proficiency of the interviewers was verified through role playing and pre-testing.
- Field monitoring and supervision was carried out to check the quality and consistency of the data.
- All data collected was securely stored.

**Ethical considerations**

Ethical clearance was obtained from the Ethics Committee of University of Nigeria Teaching Hospital (UNTH), Enugu. Requests for permission were sought from the community heads. Verbal informed consent was also obtained from study participants after brief description of the study. The cost of the research was borne by the researchers. Confidentiality was ensured at all times. No harm came to any respondent for participation in this research. Respondents were also free to withdraw from the study at any time without repercussions. Those deemed to have inadequate malaria preventive practices were counseled at the end of data collection by the researchers.

**Results**

**Demographic Characteristics of under-five children**

The demographic characteristics of the under-five children whose caregivers participated in this study. Most children were 2 years of age (66, 45.5%) followed by 4 years old (30, 20.7%), the least were 1-year old (20, 13.8%). Majority of the children were males (62.8%) and mostly the first in terms of birth order (58.6%), the least birth order was 5 (2, 1.4%). (Table 1)

**Table 1:** Demographic characteristics of under-five children

	Frequency	Percentage %
<b>Variable</b>		
<b>Age (years):</b>	n=145	
1	20	13.8
2	66	45.5
3	29	20.0
4	30	20.7
Mean: 2.48 , SD: 4.191, Range: 1-4		
<b>Sex</b>		
Male	91	62.8
Female	54	37.2
<b>Birth order</b>		
1	85	58.6
2	32	22.1
3	17	11.7
4	9	6.2
5	2	1.4

**Use of different malaria prevention strategies among under-five children**

Wire gauzing of doors and windows were the highest method used - (118, 81.9%) and (128, 88.3%) respectively. This is followed by clearing of bushes (87, 60%), the use of ITNs (81, 57.4%) and fumigation of houses and surroundings at (15, 10.3%) and (14, 9.7%) respectively. Use of mosquito repellent cream was the least (6, 4.1%). (Table 2)

**Table 2:** Use of different malaria prevention strategies among Under-five children

	Frequency	Percentage %
<b>Prevention strategy n= 145</b>		
Insecticide spray	58	40.3
Mosquito coil	27	18.6
Mosquito repellent cream/ lotion	6	4.1
Wire gauzing of windows	128	88.3
Wire gauzing of doors	118	81.9
Fumigation of house	15	10.3
Fumigation of surroundings	14	9.7
Clearing of bushes	87	60.0
Use of ordinary nets	30	20.8
Draining of potholes	69	47.6
Use of ITNs	81	57.4

**Association between Demographic characteristics of under-five children and malaria prevention practice.**

The association between the age group of the under-five and the malaria prevention practice was (p=0.034). Two years had the highest adequate prevention practice (15, 54%), with the least being 4 years (1, 4%). For the birth order 1<sup>st</sup> children had the highest prevention practice (12, 43%) with 5<sup>th</sup> as the least (1, 4%) followed by 4<sup>th</sup> (2, 7.5%) p=0.340. (Table 3)

**Table 3:** Association between Demographic Characteristics of under-five Children and Malaria Prevention Practice

Socio demographic characteristic Variable	Malaria prevention practice			X <sup>2</sup>	p-value
	Adequate n= 28 (%)	Inadequate n=117 (%)			
<b>Age (years):</b>					
1	7(25)	13(11.1)		8.649	0.034
2	15(54)	51(43.6)			
3	5(18)	24(20.5)			
4	1(4)	29(24.8)			
<b>Sex</b>					
Male	18(64)	73(62.4)		0.035	0.852
Female	10(36)	44(37.6)			
<b>Birth order</b>					
1	12(43)	73(62.4)		4.519	0.340
2	9(32)	23(19.7)			
3	4(14.3)	13(11)			
4	2(7.5)	7(5.9)			
5	1(4)	1(0.9)			

#### Association between the socio-demographics of the care-givers and malaria treatment practice of under-five children

There is a significant association between the age of care-givers' spouse and malaria treatment practice in under five ( $p=0.003$ ). The age group with the highest level of adequate

practice was >40 years (7, 41.2%) and least at 21-30(1, 2.5%). Educational level of the caregivers' spouse was found to have a statistically significant association with malaria treatment strategies with tertiary education (9, 52.9%) being the highest among those with adequate practice and primary level (1, 5.9%) being the least. (Table 4)

**Table 4:** Association between the socio-demographics of the care-givers and malaria treatment practice of under-five children

Variables	Adequate n=17(%)	Inadequate n=83(%)	X <sup>2</sup>	P value
<b>Age of care giver(years)</b>				
21-30	0	22(68.8)	2.372	0.305
31-40	1(100.0)	9(28.1)		
>40	0	1(1.2)		
<b>Educational level of caregiver</b>				
Primary	1(5.9)	3(3.6)	4.655	0.098
Secondary	7(41.2)	56(67.5)		
Tertiary	9(52.9)	24(28.9)		
<b>Monthly income</b>				
Executive level	1(12.5)	10(27.0)	1.409	0.703
Senior staff level	6(75.0)	19(51.4)		
Junior staff level	1(12.5)	7(18.9)		
Poorest poor	0(0.0)	1(2.7)		
<b>Caregivers spouse's age category</b>				
21-30 years	1(2.5)	14(16.9)	11.343	0.003
31- 40 years	6(52.9)	61(73.5)		
Above 40 years	7(41.2)	1(2.7)		
<b>Caregiver's spouse's education</b>				
Primary	1(5.9)	1(1.2)	6.102	0.047
Secondary	3(17.6)	39(47.6)		
Tertiary	13(76.5)	42(51.2)		
<b>Caregiver's spouse's occupation</b>				
Professional	8(47.1)	22(18.8)	3.679	0.451
Managerial	6(35.3)	35(41.5)		
Skilled manual	0(0.0)	4(4.9)		
Skilled non manual	3(17.6)	19(23.2)		
Unskilled manual	0(0.0)	3(3.7)		
<b>Caregiver's spouse's monthly income</b>				
Executive level	6(54.5)	18(40.0)	0.923	0.630
Senior staff level	5(45.5)	26(57.8)		
Junior staff level	0(0.0)	1(2.2)		

#### Discussion

The importance of malaria prevention can never be over emphasized. Malaria prevention and treatment practice is important especially in special groups like under five children which is the population of this study. From the study, more of the under five were two years of age, 57.4% of under five

children use ITNs while 20.8% use ordinary mosquito net. This is low compared to 64.3% obtained in another study in Enugu state <sup>[16]</sup>. The difference in this finding could be as a result of the study site; Bisi-Onyemachi *et al.* <sup>[16]</sup> carried out their study in two health facilities in Enugu North and in Nkanu West L.G.A, but this study was done as a house hold

survey in an urban slum, hence wider range of people will be reached. Another study conducted in Lagos, Nigeria [17] had 61.8% of the respondents who used ITN as a preventive strategy for malaria. Similarly, another study carried out in Democratic Republic of Congo [18], observed that the utilization rate of ITN in under five children was high at 68.2% when compared to the present study. The difference in utilization could be associated with the high literacy rate of the care givers involved in the study.

From this study also it was observed that the utilization rate of insecticide sprays by under-five is still low 40.3%. Most of the respondents, gave reasons like it was expensive, bad effect on respiration and its ineffective to the non- use of this method. Similarly, a study carried out in Ghana in this same population group observed the use of insecticide sprays was also low 2.7% [19], this could be related no proper use of this of these sprays, hence more work has to be done in educating the care givers on the proper usage of insecticide sprays to avoid those bad health effects.

Mosquito repellent cream awareness is very low and this could be the cause of the poor utilization of it as a preventive measure. Only 3.2% of South Easterners knew that mosquito repellent is a means of malaria prevention [11]. The poor utilization of this method could be associated with poor information and knowledge about this method and most people were scared of possible skin irritations that could arise. Therefore, more work should be put in to let people know about this method of malaria prevention and assure of them of the health benefit of using it since this item is very affordable. From this study, 88.3% of under five children sleep in a room with wire gauzed windows, and 81.9% of under five children wire gauze their doors respectively. This is a good effort towards malaria prevention and the efforts which was put in such as community awareness health education, to ensure that this increase was achieved should be encouraged.

Draining of pot holes or removal of stagnant water in the environment is very necessary to avoid breeding of mosquito parasites. In this study, 47.6% of caregivers of the under five children, applied this as a preventive measure. This could probably be due to the fact that there was no need to drain or remove stagnant water in the environment because some of the care givers gave reasons such as, there was no water in the environment due to the weather condition of the stat. The data was collected during the dry season in the country.

On a general note, from this study, only 19.3% of under five children practice good malaria prevention practice this is very low when compared to a similar study conducted in the same locality which found the good malaria prevention practice in under five children to be 64.3% [16]. The gap between the two studies could be due the study methods used in both studies of which theirs was a facility-based study. Hence, the tendency of being more informed is high.

Uzochukwu *et al.* [20], also reported that people in rural settings in Enugu state, prefer, monotherapies to use of ACTs, this is probably due to the high cost of the ACTs when compared to others, the availabilities of monotherapies are more in the area due to the influence of medical representatives, the choice of the retail outlet owner etc. [20] In this study, only 17% of the under five children in this study took the right drug for malaria treatment. This is low when compared to 47.3% of under five children in South East of Nigeria that use ACT in management of malaria based on NMIS 2015 [11]. Therefore, much work is still needed to

ensure majority of the population use this type of medication efficiently at the community level.

On the influence of socio demographic factors on malaria prevention and treatment practice, some studies [21, 22] have shown that income most especially, has influence on malaria prevention and treatment practice, but it is not so in this study. For the under five children, age of the child has an association with malaria prevention practice. This could be due the fact that the older children (3-5 years) are perceived to be grown and hence much measures are not put to prevent malaria around that age group. Also, age and educational level of the care givers spouse had an association with the treatment practice of under five children. This implies that parents that are literate and experienced can influence malaria treatment practice in under five children. For the treatment practice of under five children, men should be carried along with malaria prevention and treatment practice to improve its outcome in the country.

### Conclusion

This study reveals that only a very small proportion of under-five children use good level of malaria prevention and treatment practice. Age of the child had a significant association with malaria prevention practice while the age and educational level of the care giver's spouse had an influence on the malaria treatment practice.

### Recommendations

For targets in the objectives of Nigeria Malaria Strategic Plan to be met, it is therefore recommended that health education on the importance of use of ITNs should be directed to the populace, the price of ITNs subsidized, mothers and caregivers need to be sensitized on malaria prevention and the need for it, churches and unions should be involved in this project as they could reach a wider range of the population and also the men should be involved in the malaria control project.

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