

Prevalence of Malaria Parasite and Evaluation of Effectiveness of Long Lasting Insecticide Treated Nets Among Students of Uratta Secondary School

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Abstract: Malaria is one of the major public health challenges in sub Sahara Africa which include Nigeria, particularly among school age children and pregnant women. This study investigates malaria prevalence and evaluates the efficacy of long lasting insecticide treated nets in the control of malaria among student of uratta secondary school. A cross sectional survey design which includes five hundred student of uratta secondary school was adopted. Structured questionnaires, blood sample analysis, were also involved. The result obtained indicated a malaria prevalence rate of 21.8% amongst the whole student, 1.8% rate of prevalence among student consistently using long lasting insecticide treated nets and a higher incidence of 20% amongst student not sleeping under the nets. Proper usage of LLIN remained sub-optimal due to factors such as high night temperatures, discomfort while sleeping and unpleasant skin reaction. Statistical analysis showed clear reduction in malaria cases among regular users of LLINS. The findings established the relevance of LLINS in achieving the project of malaria control and eradication via vector control.

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I. INTRODUCTION

➤ Background of Study:

Malaria remains a major threat to public health and is caused by Plasmodium species despite decades of control efforts. It is a devastating disease that affects productivity and the economy of endemic countries. Globally, there were about 214 million new cases of malaria in 2015 and approximately 438,000 deaths were recorded (World Health Organization [WHO], 2015).

Over the last century, several efforts have been made to control malaria. One of the most important advances in malaria prevention is the use of insecticide-treated nets (ITNs), particularly long-lasting insecticidal nets (LLINs). LLINs are known to kill mosquitoes and possess repellent properties that reduce the number of mosquitoes entering households. They are estimated to be twice as effective as untreated nets and provide over 70% protection compared to no net use (Van den Berg et al., 2014).

These nets have significantly contributed to malaria control, accounting for a large proportion of prevented malaria cases in sub-Saharan Africa (WHO, 2015).

In the past decade, malaria incidence has declined significantly in many endemic countries. This progress has been achieved through combined interventions such as early diagnosis, effective treatment with antimalarial drugs, and widespread use of LLINs (WHO, 2015).

However, ownership and utilization of LLINs remain a challenge in many malaria-endemic regions. Although millions of LLINs have been distributed, a substantial proportion of households still lack adequate access, and even where nets are available, proper usage is not always ensured (WHO, 2014; WHO, 2015).

Ownership alone is not sufficient to reduce malaria morbidity and mortality; individuals must consistently use mosquito nets to achieve the desired health benefits. Studies have shown that utilization rates are often lower than ownership rates, limiting the effectiveness of LLIN interventions (National Malaria Elimination Programme [NMEP], 2014).

Therefore, recommended measures for malaria prevention include the consistent use of LLINs, prompt diagnosis, effective treatment, and public health education on preventive practices.

The present study is aimed at assessing the acceptability and effective use of LLINs on the prevalence of malaria among students of Uratta Public Secondary School, Imo State, Nigeria.

➤ *Scope of Study:*

The study was restricted to public secondary school in Uratta Imo State. The study focused on the evaluation of the utilization of bed net in malaria control, using descriptive, experimental and inferential survey design to determine the relevance of the LLINs to national goals of health. The researcher will use chisquare for analysis.

For this study the relevance of WHO & CDC objectives in relation to that of the national goals will be considered and the attainability of the objective by students will also be studied. It is aimed at finding empirical oriented answers to such-questions as: what is the true worth of LLINs objectives in the light of societal criteria with respect to national goals for improved health system of people in Nigeria.

➤ *Statement of Problem*

As society needs change, government of any nation adjust its health objective to achieve a greater height of citizens healthiness. Due to the desire for scientific and technological advancement in health sector, the WHO and the NCDC showed concern towards reducing the morbidity and mortality of malaria in the country. Malaria and other arboviruses are known to contribute to economic disparity within the country.

This increase in probability of being infected increases the demand for self protection which allows for higher pricing and uneven distribution of self and enlightened on the usage of mosquito nets especially in adolescence age bracket.

Also low income earners are seen to be victims of malaria when the alternative ways of malaria control are not used and whereby the utilization of mosquito nets are poor.

Hence the problem under study is:

- How effective is the use of LLINs
- How relevant is the use
- What is the nature of efficacy of LLINs

This research is a comparative study between students who sleep under well fitted bed net, not well managed bed net and others who do not involve in the use, to determine the relevance and appropriateness of insecticide bed nets to people in the control of malaria parasites.

➤ *Significance of the Study*

It is hoped that the findings would be immense benefits to the citizens, health personnel and the government Health literatures will also benefit from the study.

Since public health workers assess, diagnose and examine people on malaria incidence and also having learnt

about the prevention, causes and control of malaria, it is believed that they are in better position to provide worthwhile information on the adequacy of LLINs as a means in achieving the needs for which it is designed to achieve.

The government who is always working very hard to achieve its goals and who assembled the team of experts that developed (NMCP) on the adequacy of LLINs as a good measure in eradicating malaria.

Further More it is hoped that this study will provide a guide or reference to future researchers in a similar/ related study.

➤ *Aim of Studies*

To determine the prevalence of malaria parasite infection and evaluate the effectiveness of long-lasting insecticide-treated nets (LLINs) in the prevention of malaria among students of Uratta Secondary School.

➤ *Objectives:*

The specific objectives of the study

- Determine prevalence of malaria among randomly selected students of the secondary school under study.
- Investigate the effectiveness of LLINs in the control of malaria
- Determine number of students actually sleeping under the free mass distributed LLINs in their various homes among the randomly selection group of the students.
- Find out reasons for sleeping or not sleeping under the LLINs among the randomly selected students.
- Investigate the effectiveness of LLINs in the control of malaria

II. MATERIALS AND METHOD

➤ *Study Area:*

The study was conducted at Uratta, Owerri North L.G.A of Imo State.

➤ *Study Population.*

The study population consist of students of Uratta secondary school.

➤ *Instruments or Materials for Data Collection:*

Well structured questionnaires was used to collect data on the use of LLINs among students in their various homes.

➤ *Laboratory Investigation and Microscopic Examination Materials/Reagents*

Students blood-samples, syringe, EDIA, cotton and saline, glass slides, compound light microscope, giemsa stain.

• *Procedure*

Thick and thin blood films were prepared, stained with Giemsa for 10mins and examined under x100 (oil immersion) objective of compound light microscope for identification of malaria parasites.

✓ *The Thick Blood Films were Prepared:*

Small sample of the blood was dropped on the glass slides using pastures pipette make an even, thick film. The blood were not excessively stirred but spread in a circular form with 3-6 movement.

✓ *For the Thin Film*

Using another clean slide as a spreader and with the slide with the blood drops resting on a flat, firm, surface, the small blood drop was touched with the spreader and the blood allowed to run along its edge.

The spreader was firmly pushed along the side, away from the largest drops, keeping the spreader at angle of 45°,

The films were allowed to dry in a flat, level position protected from files, dust and extreme heat and the slides labeled with a pencil.

✓ *After the Films Got Dried Giemsa Stain was used for Staining*

The thin film was fixed by adding 3 drops of methanol for few seconds, but the thick wasn't fixed to avoid dehaemoglobinization.

The slides were placed back to back in a staining dish 3% Giemsa . solution to buffered distilled water with PH 7.2

in sufficient quantity to fill the number of dishes "being used was prepared. The stain was mixed well.

- The stain was gently poured into the dish, until the slides were totally covered.
- It was allowed to stain for 30-45 minutes out of sunlight
 - > Clean water was gently poured into the dish to flout off the iridescent scum on the surface of the stain water for few seconds:.
- The slides were removed and placed on slide rack to drain and dry while downward.

After careful examination under the microscope, slides were detected negative if no parasites trophozoite, schizonts, or gametocyte were found. The parasites in thick blood film were enumerated using the plus system. This indicates the relative parasite count and entails using a code of 1 - 4 plusses as follows:

- + - 1 - 10 parasites per 100 thick film fields
- ++11 - 100 parasites per 100 thick film fields
- +++ = 1-10 parasites per thick film field
- ++++ = more than 1 0 parasites per thick film field

➤ *Method of Data Analysis:*

Data was analysed using chisquare test

III. DATA ANALYSIS AND PRESENTATION

Table 1 Result from Parasitological Diagnosis

Number of students	<i>P. falciparum</i>	<i>P. vivax</i>	<i>P. ovale</i>	<i>P. Malaria</i>
3	++++	-	-	-
7	+++	-	-	-
21	++	-	-	-
78	+	-	-	-
39.1	-	-	-	-

Table 1: Shows total number of students with *P. falciparum* to be 109 while students negative of *P. falciparum* are 391

Table 1 Overall no. of students positive & negative for *P. falciparum* malaria respectively Average.

Number of student Positive for <i>P. falciparum</i> malaria	109	4.5
Number for students negative of <i>P. falciparum</i> malaria	391	1.27

➤ *Using*

Total No examined	No, sleeping under LLINS	No. sleeping under ordinary net	No. net
500	400	10	90

Table 2 Prevalence of Malaria in the Study Population

Category	Number of students	Number sleeping under LLINS	Number infected			Total	Total Prevalence of malaria	
			Using LLINS	Ordinary net	No net	Using LLINS	Using LLINS	Without LLINS
Junior	230	190	6	3	35	44	1.8	20%
Senior	270	210		3	7		55	65
Total	500	400		9	10		90	109

Table 2: This shows that out of 230 students in the junior section only 190 were using LLINS and 6 students using LLINS got infected with *P. falciparum*, 3 got infected using ordinary net while 35 got infected without any at all.

In the senior section, out of 270 students, 210 were using LLINS and 3 students using LLINS got infected with *P. falciparum*, 7 using ordinary net were infected and 55 without any net were infected.

The prevalence of malaria in category of students using LLINS was 1.8%, 20% for students without LLINS.

Table 3 Associated Demographic Information of Participants

Demographic	Number	%
Characteristic		
Gender: male	215	43
Female	285	57
Age: under 15 years	295	59
15 - 20 years	205	41
Education level		
Junior section JS.S 1 - 3	230	46
Senior section SSS1-3	270	54

Table 3; Entails the socio demographic information where by total male figure accessed was 215 and 285 were females. Students under 15 years of age were 295 while those

from 15 to 20 years were 205. With 230 students in the junior section and 270 in the senior.

➤ Source:

Bought	4
Freely given by govt	493
Reasons for not sleeping in LLINS	
Too hot	61
Skin reaction	15
Not comfortable	6
Dimming eyes	8
Prefer non treated	10

Table 4 Summary of the Students x (Chisquare) Test $P = 0.05$

Category	Observed	Expected	X^2_{cal}	df	X^2_{tab}	Decision
Under LLINS	9	27.25	16.22			Accept
No LLINS	100	81.75		1	3.84	HA

Table 5 shows the x^2 calculated value (16.22) and x^2 tabulated ($t(1) = 3.84$).

The table reveals that, the x^2_{cal} is greater than the x^2 tabulated 1 degree of freedom and 0.05 significant level. Hence alternative hypothesis of a significant difference between the usage of LLINS and non usage of LLINS in malaria control. See detailed computation in appendix (1)

IV. DISCUSSION OF RESULTS

One of the main aim of this study is to determine the relevance of LLINS in malaria control. The results on tables 1 shows the malaria test indicating 109 people positive of malaria parasite (*P. falciparum*) and 391 negative of malaria when compared with table 2 shows that almost 100 people that do not sleep under LLINS contracted malaria parasite while only 9 people that sleep under LLINS contracted malaria thereby giving a very clear difference. These findings gave a clear information on the truth behind the effectiveness of LLINS in malaria prevention and control as the prevalence of malaria in the category using LLIN is far less than in the category not using LLIN. The study reveals

greater number of students using LLINS as table 2 shows that 400 students both in junior and senior section are utilizing LLINS for sleeping this is traced to proper orientation and degree of education as regards to malaria prevention through vector control with the aid of LLINS. Thus the source of accessibility through government made the acquisition high as table 4 reveals 493 freely given by the government while 4 was bought from the market. This entails that almost all the students have LLINS apart from 3 and majority was gotten from the 2017 distribution by the Federal government. From the study based on table 4 it shows that limitations to the usage of LLINS is basically on demographic factors relating to hotness of the net during hot weather, here the findings was that 61 students exempted themselves from using LLIN because of issue of hotness while some had no good knowledge concerning the chemical thereby developed fear of being hurt by the chemical while some indicated having skin reactions and being uncomfortable while in the LLINS. From research, it was observed that most of the LLINS were given by WHO and distributed in the school and primary health centers in 2021, that is why a greater number was found using LLINS.

V. CONCLUSION

The study evaluated the usage of LLIN in the control of malaria. The study established that LLIN is very relevant, valid in achieving the work of malaria control and protects the user from malaria. Hence people should also be encouraged to efficiently use LLINS as it is a major means of eradicating malaria via vector control.

RECOMMENDATIONS

Based on the findings and implication of the research, the following are recommended.

- The Nigeria Federal Ministry of Health should continue to strive at distributing the LLINS to all nook and crannies of the country.
- The Nigeria Health Sector should also ensure proper orientation on the beneficial impact of LLIN utilization.
- LLINS should be manufactured for use as windows & door screen in houses

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