



## **Evaluation of Public Health Interventions in Reducing the Burden of Malaria Infection in Emohua Community, Rivers State, Nigeria**

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### **ABSTRACT**

It is assumed that just a few persons are beneficiaries of one or more public health interventions in local communities. The aim of this study was to evaluate public health interventions in reducing the burden of malaria infection in certain communities in Emohua in Rivers State. A cross-sectional community-based study was conducted on the study population. A pre-tested questionnaire was designed to gather information from the participants in the communities. As part of the study design, blood samples were collected with consents from the participants and were examined for the presence of malaria parasites with the use of rapid diagnostic test (RDT) kits. The result obtained from the information gathered from the participants, showed that 98 % of the participants have pre-knowledge (sensitization) of malaria, 15%, 41 % and 44 % said they were sensitized through TV, radio and medical outreach respectively. 40 % admitted having benefitted from public health interventions. From the 40 % who benefited from public interventions, 20 % said they received mosquito nets, 6 % said they received insecticides, 10 % said they received counseling and 4 % said they received malaria

**drugs. Furthermore, 46 % of the participants said the interventions were effective in the reduction of malaria while 54 % were not certain about the effectiveness of these interventions. Furthermore, the prevalence of malaria was 8%. In conclusion, the distributions of public health interventions across these communities studied were poor. Less than 50 % of the participants have one way or the other benefited from public health malaria interventions. The malaria prevalence may be due to malaria sensitization preventive measures undertaken by the individuals. There is a need for even distribution of public health intervention in Emohua.**

**Keywords: Malaria, Evaluation, Public Health, Intervention.**

## INTRODUCTION

Humans and other animals can contract malaria, an infectious disease spread by mosquitoes [1]. Symptoms of malaria usually include headaches, vomiting, fever, and exhaustion. In extreme situations, it may result in death, coma, convulsions, or jaundice. Symptoms usually begin 10 to 15 days after being bitten by an infected mosquito [2]. Patients may experience disease recurrences months later if they are not given the right treatment. In those who have recently survived an infection, re-infection usually causes milder symptoms. This partial resistance disappears over months to years if the person has no continuing exposure to malaria [3].

Although malaria is still spread in 99 nations worldwide, sub-Saharan Africa is the region mostly affected by this illness. In 2010, an estimated 219 million new cases of malaria and 660,000 deaths, 80% and 91%, respectively (with up to 86% of deaths occurring in children under the age of five) was recorded [4]. Over the past decade, there have been unparalleled attempts to combat malaria worldwide. For example, access to insecticide-treated mosquito nets (ITNs) has risen from 3% in 2000 to 53% in 2012 within households in sub-Saharan Africa owning at least one ITN [5].

Additionally, there is a steady increase in the quantity of artemisinin-based combination treatments (ACTs) and rapid diagnostic tests (RDTs) that are acquired and utilized. Nonetheless, there are some concerning indications that the sharp rise in intervention coverage seen up until 2010 started to level up in 2012 and might potentially start to decline, if necessary, steps are not taken in 2013 to replace ITNs [3]. Funds committed to malaria control from international sources increased up to the year 2010 (\$1.71 billion) but have subsequently elevated (\$1.66 billion in 2011 and \$1.84 billion in 2012) [6]. Increased funding, together with relative socio-political stability, improvements in the functioning of health systems and the use of control tools, have all contributed to reductions of more than 75% between 2000 and 2011 in recorded malaria case incidence rates (data sourced from 44 nations where malaria is still spreading, and data deemed sufficient to make inferences about malaria burden trends). Between 2000 and 2010, malaria-related mortality rates fell by 26%, resulting in an estimated 1.1 million malaria deaths averted [7].

The balance between feasible and inspirational aims is threatened by a funding gap compared to the projected \$5.1 billion annually needed for the years 2010–2015. To date, 50 countries with ongoing malaria transmissions are considered to be on track to reduce their malaria case incidence by 75% in 2015; although these countries account for only 3% of the total estimated malaria cases [2].

Malaria is a global health challenge and is a major cause of death in sub-Saharan Africa, Asia and Latin America. According to WHO predictions, there were 247 million new cases of malaria in 2021, which resulted in 619,000 deaths. Children less than 5 years old are the most affected, accounting for 67% of malaria deaths worldwide in 2019. Every year, an estimated 125 million pregnant women are at risk of contracting malaria; in Sub-Saharan Africa, maternal malaria is linked to up to 200,000 projected child deaths [8]. Malaria is presently endemic in a broad band around the equator, in areas like America, many parts of Asia, and much of Africa; in Sub-Saharan Africa, 85–90% of malaria fatalities occur. Sometimes statistic about malaria prevalence may be inaccurate due to poor sensitization and public health interventions reaching our remote villages and communities. It is reported that just a little percent of people in remote areas benefit from public health interventions compared to people in the urban areas [9].

In a world where there is an increase in the rate of malaria infection due to various factors of which geography is one of them, there is an increasing and urgent need for research to be carried out to tackle what is a global challenge. The study intends to evaluate public health interventions in reducing malaria burden in local communities in Emohua Local Government Area which should serve as a guide to the general population in Rivers State, Nigeria.

The aim of this study therefore, is to evaluate public health interventions in reducing the burden of malaria infections in certain communities in Emohua, Rivers State.

## **MATERIAL AND METHODS**

### **Study Design**

The study incorporated a random sampling technique in the selection of participants in the study, Subject that fell within the age of 18-60 years old were selected for the study across the three communities in Emohua LGA. Well-structured questionnaire which was tested and validated using face validity, pilot testing, Principal component analysis and Cronbach's alpha was used to obtain necessary information. The study captured three communities in Emohua LGA, Rivers State.

### **Study Area**

The study covered three different communities in Emohua Local Government Area Rivers State, Nigeria. The communities included Elele-Alimini, AgbaNdele, and Mgbuelia. Emohua is one of the recognized local government areas in Rivers State, Nigeria. It has an area of 831 km<sup>2</sup> (321 sq. mi).

### **Study Population**

A total of one hundred (100) participants were recruited in this study. Data Collection Methods: Raw data were collected with the aid of structured questionnaire. The questionnaire was designed in a flexible manner to gather necessary information on malaria intervention impacts in the communities.

### **Sample Selection**

Capillary blood sample was collected from the participants through finger pricking technique.

## Detection of Malaria Parasite using ParaHIT® f ver. 1.0 (Device / Dipstick)

### Principle:

The principle is based on antigen detection assay that detects *P. falciparum* specific histidine rich protein II (PfHRP II) and Pan- malaria species (*P. falciparum*, *P. malaria*, *P. vivax*, *P. ovale*) specific aldolase in human blood.

### Procedure:

Malaria test cassette was brought out from its packet and placed horizontally on a table and the participant's name written on it. Alcohol was used to swab the participant's fourth finger and was allowed to air dry. A sterile lancet was used to prick participant's finger to get a drop of blood. After successful pricking, the lancet was discarded into a Sharps Box immediately. The blood from the pricked finger was allowed to drop into the test pad, then buffer was added to the cassette pad and result was read 15 minutes after adding the buffer. Red lines on the control and test zone were read as positive case while no line on the test zone was read as negative case. The test cassette was disposed appropriately after testing.

### Statistical Analysis

All raw data obtained from the questionnaires and malaria tests were computed in an organized manner in a Microsoft sheet, statistical analysis was done by Microsoft excel sheet data tool. The results were expressed in percentage, bar charts and pie charts respectively.

## RESULTS

### Demographic Characteristics of Study Subjects in Emohua

The demographic characteristics of participants included 60 males and 40 females. The age categories of the participants were 18-28 years with 33 participants in this category, 29-39 years with 31 participants in this category, 40-50 years with 16 participants in this category and 51-61 years with 20 participants in this category. Based on job description, the participants were 23 farmers, 17 civil servants, 37 traders, and 23 others. Based on education characterization, 30 of the participants had primary education, 60 participants had secondary education and 10 had tertiary education.

**Table 1: Demographic Characterization of Study Subjects in Emohua LGA**

| Characteristics    | No. of Subjects |
|--------------------|-----------------|
| <b>Sex</b>         |                 |
| Male               | 60              |
| Female             | 40              |
| <b>Age (Years)</b> |                 |
| 18-28              | 33              |
| 29-39              | 31              |
| 40-50              | 16              |
| 51-61              | 20              |
| <b>Occupation</b>  |                 |
| Farmer             | 23              |
| Civil Servant      | 17              |
| Trader             | 37              |
| Others             | 23              |
| <b>Education</b>   |                 |

|                  |    |
|------------------|----|
| Primary School   | 30 |
| Secondary School | 60 |
| University       | 10 |

### Result of Public Health Interventions in Elele-Alimini, AgbaNdele and Mgbuelia in Emohua LGA

The information gathered from the questionnaires on malaria sanitization showed that 98 (98 %) participants were sensitized. On the method of sensitization, 15 (15%) of the total participants were sensitized through TV, 41 (41%) of the participants were sensitized through radio and 44 % were through medical outreach and visit to the hospital. The information gotten from the participants if they knew their malaria status before screening showed that all the participants did not know their malaria status at the time of the interview. The information gathered on place of diagnosis of malaria from the participants showed 18 (18 %) of participants got their diagnosis from the hospital, 47 (47 %) got their diagnosis from the pharmacy and 35 (35 %) got self-diagnosis.

The responses from the participants on the methods of treatments showed that 18 (18 %) got their treatments through the doctor's prescription, 58 (58 %) got their treatments from the pharmacy (chemist), and 24 (24 %) got self-medications. The participants' responses to malaria prevention awareness showed that 34 (34 %) participants were aware of some of the ways of malaria prevention, while 66 percent do not have an idea.

Responses from the participants, if they had received malaria intervention before, showed that 38 (38%) had received at least one form of public health interventions, while 62 (62 %) of the participants admitted not to have received any intervention. Also, the type of intervention received by the participants were 20 (20 %) received mosquito net, 6 (6 %) received insecticides, 10 (10 %) received counseling, and 4 (4 %) received malaria drugs. Furthermore, the responses of the participants on how effective (impactful) the interventions were to them; 46 (46 %) admitted the intervention was helpful and 54 (54 %) were not satisfied with the effectiveness.

**Table 2: Result of Public Health Interventions from Participants in Emohua LGA**

| <b>Malaria Preventive Measure</b> | <b>Respondents (n=100)</b> | <b>% Respondents</b> |
|-----------------------------------|----------------------------|----------------------|
| <b>Malaria sensitization</b>      |                            |                      |
| Yes                               | 98                         | 98                   |
| No                                | 2                          | 2                    |
| <b>Method of Sensitization</b>    |                            |                      |
| TV                                | 15                         | 15                   |
| Radio                             | 41                         | 41                   |
| Outreach                          | 44                         | 44                   |
| <b>Malaria Status</b>             |                            |                      |
| Yes                               | 0                          | 0                    |
| No                                | 100                        | 100                  |
| <b>Place of Diagnosis</b>         |                            |                      |
| Hospital                          | 18                         | 18                   |
| Pharmacy                          | 47                         | 47                   |
| Self-diagnosis                    | 35                         | 35                   |

|                                                    |    |    |
|----------------------------------------------------|----|----|
| <b>Method of treatment</b>                         |    |    |
| Doctor's Prescription Pharmacy                     | 18 | 18 |
| Self-medication                                    | 58 | 58 |
|                                                    | 24 | 24 |
| <b>Malaria prevention awareness</b>                |    |    |
| Yes                                                | 54 | 54 |
| No                                                 | 46 | 46 |
| <b>Benefitted from malaria intervention before</b> |    |    |
| Yes                                                | 40 | 40 |
| No                                                 | 60 | 60 |
| <b>Type of intervention</b>                        | 20 |    |
| Mosquito net                                       | 6  | 20 |
| Insecticides                                       | 10 | 6  |
| Counseling                                         | 4  | 10 |
| Drugs                                              |    | 4  |
| <b>Effectiveness of Intervention</b>               | 40 |    |
| Yes                                                | 60 | 40 |
| No                                                 |    | 60 |

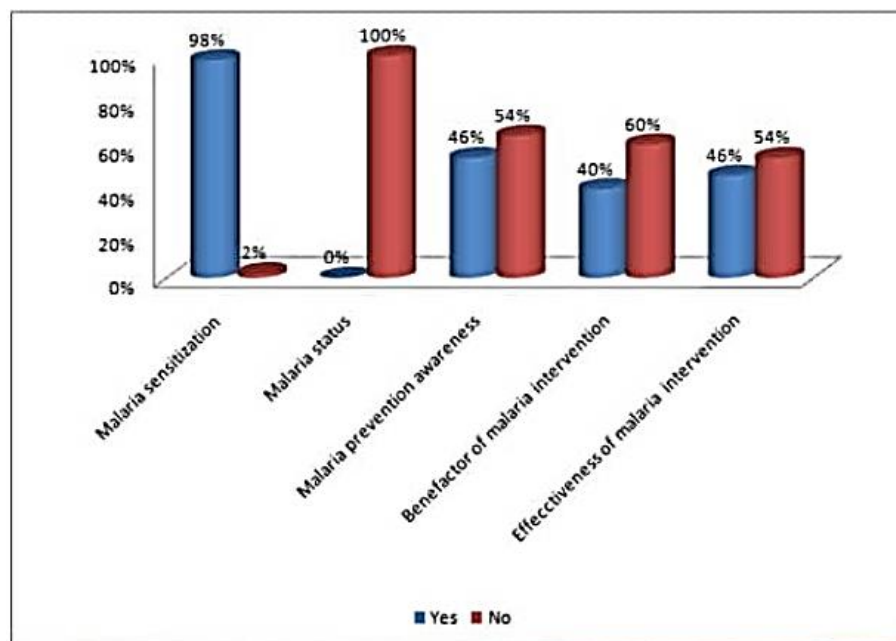


**Figure 1: A Bar Chart showing the Percentage of Respondents to the Different Parameters**

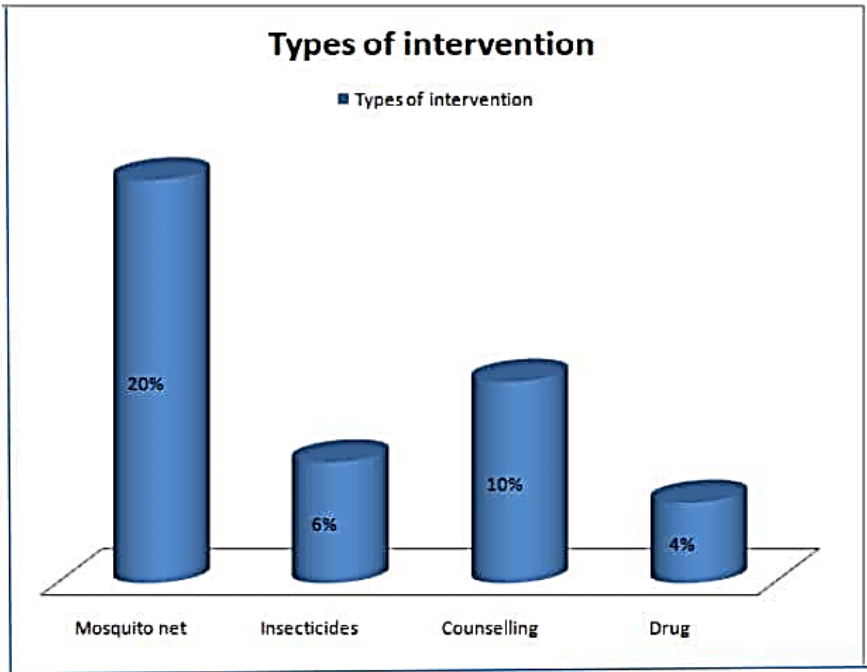


Figure 2: A Bar Chart Showing the Percentage of Beneficiaries of the Different Types of Malaria Interventions

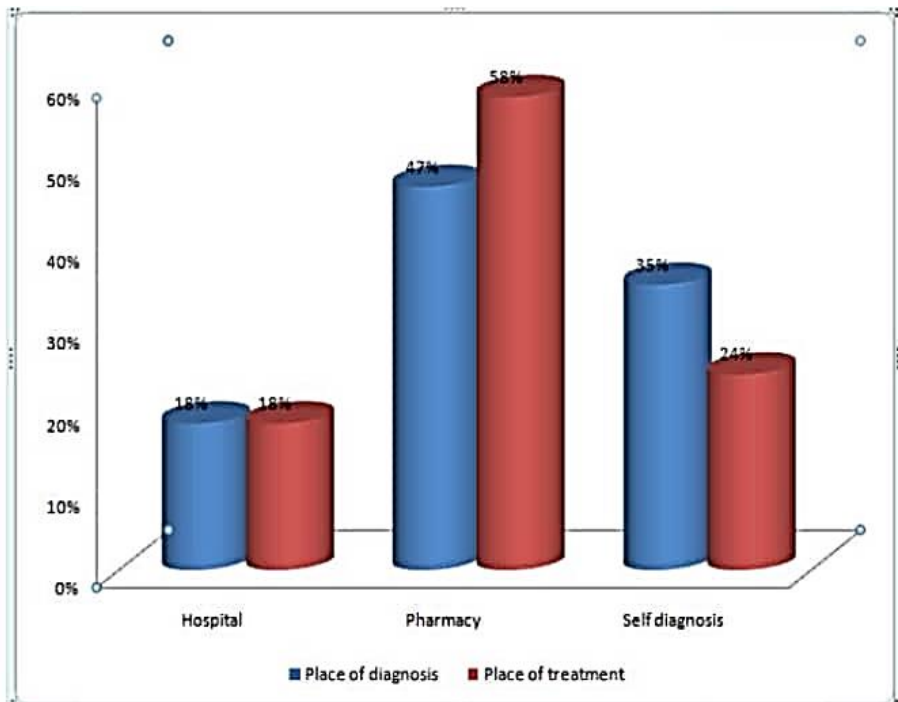


Figure 3: A Bar Chart Showing the Percentage of Respondents to the Different Place of Diagnosis and Methods of Treatments of Malaria

**Result of Positive and Negative cases of Malaria Tests in Participants from Emohua LGA**

The malaria test results in the participants showed 8 (8 %) tested positive for malaria while 92 (92 %) were negative for malaria.

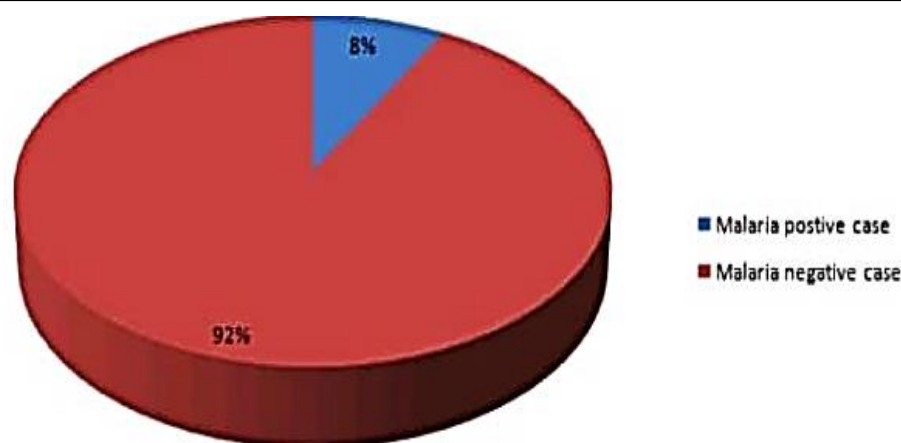


**Figure 4: A Pie Chart, Showing Result of Positive and Negative Cases of Malaria Test from Participants in Emohua LGA**

### DISCUSSION

The respondents in this study, included men and women from Elele-Alimini, AgbaNdele and Mgbuelia communities in Emohua who fall within the age range of 18-61 years. Some of the participants were farmers, civil servants, traders and other occupations, with educational level of primary, secondary and tertiary education across the three villages.

A well-structured questionnaire was used to gather information on the evaluation of malaria interventions across these communities and participants were interviewed on their knowledge (sensitizations) of malaria and the responses of the participants, was 92 %. This means that majority of the participants had idea of what malaria is. In relations to similar geographical studies done in Nigeria, our finding was similar to the findings reported from related studies [10, 11].

Apart from being taught in schools; Television, radio, medical outreach and counseling are also ways people are sensitized about malaria. A higher percentage of participants seemed to be sensitized about malaria through medical outreach. However, in other studies, the medium of sensitization was higher with Television and radio presentations [10]. This could be as a result of availability of electricity which is the challenging situation in the study area because in most part of Emohua, there is shortage of electricity due to vandalized electric polls, hence the dwellers do not have their TV and radio on to listen to news, advertisements and events and be educated frequently. In the North, most average men move about with their battery powered radio and this gives them edge on the sensitization of malaria in their localities.

As procedure to malaria blood screening, 100 % of the participants admitted not knowing their malaria status at the time of interview. Most people do not go to the hospital for routine testing until they have signs and symptoms of malaria. Furthermore, the participants said they most times go to the pharmacist (chemist) or carryout a self-diagnosis when they have malaria than visiting the hospital. In Elele-Alimini, higher respondents admitted self-diagnosis, while in AgbaNdele, a higher percentage of respondents admitted going to the pharmacy and this was same in Mgbuelia community. In this study, 18% respondents visit the hospital while 47 % visit the pharmacist and 35 % carry out self-diagnosis; this is comparable with the study of done by Adeneye where 39.7 % visit the hospital, 38.5% visit the pharmacist and 16% carry out self-

diagnosis [11]. In response to the method of treatments for malaria, a higher percentage of the respondents visit the pharmacist for their medications instead of getting a doctor's prescription. The reason may be due to anticipation of immediate treatment, access to a close place of medication and availability of money. Getting a doctor's prescription by the respondents may be tasking, delaying, involving many protocols. To boycott this, respondents may prefer visiting a chemist or administering self-medications.

On the other hand, the response of participants about their awareness and practice of malaria preventive measures were low. As earlier stated, the poor response to malaria preventive measures may be due to inadequate sensitization across the communities; this was similar to the result recorded in Lagos and Niger state few years ago [11].

The findings of this study on the benefit of malaria intervention were very poor, as less than 50 % respondents have benefitted from public malaria interventions across the villages in Emohua over time. There were most persons in the communities that have not yet received any form of malaria interventions over the years and till now. The use of malaria intervention reported in the study are below the targets of the 2014-2020 National Malaria Strategic Plan of ensuring at least 80% of the targeted population utilizes appropriate preventive measures [12].

The interventions received by some of the respondents included mosquito net, insecticides, counseling and drugs. Distribution of insecticide treated nets has shown prospects in malaria control in Nigeria. It is noteworthy to state that indoor residual spraying practice is relatively new in Nigeria and not all households have benefited from it [13]. Agencies like UNICEF and the Federal Ministry of Health are propagating the distribution of these effective and long lasting ITNs to primary health centers where its delivery to the local community level will be affected. Unfortunately, the distribution of these inventions is yet to be strongly felt by these villages. Also, the response by the participants to the effect of the intervention in decreasing the burden of malaria was below 50 %, this was similar with the study of Adedokun and Uthman [13].

As part of the study design, the respondents were screened for malaria; the prevalence of malaria was 8 %. The outcome may be due to degree of malaria sensitization which was also the findings carried out by Adeneye in Lagos State [11].

### CONCLUSION

Nigeria has recorded laudable strides in malaria control through integrated vector management, prompt and effective case management. Despite these gains, majority of Nigeria's population is at risk of malaria according to World Health Organization. In conclusion, the respondents of Emohua community were sensitized of malaria, and the most received and used intervention was mosquito nets. The impact of public intervention was poorly felt by this community.

The findings from this study will be beneficial in determining how best to allocate resources for anti-malaria initiatives and in identifying effective methods that can be implemented throughout Emohua and other rural communities. In order to better address health needs and improve programming in the fight against malaria infections, health organizations can benefit from the evaluation's valuable information. It is therefore recommended that frequent

sensitization and provision of malaria interventions to rural communities are critical in reducing the burden of malaria infections.

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