



## Perception and acceptability of malaria vaccine among maternal and child health clinic attendees at the University of Calabar Teaching Hospital, Calabar, Nigeria

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### KEYWORDS

Malaria  
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### ABSTRACT

#### Background

Ninety percent of the world's malaria cases occur in sub-Saharan Africa. Because of challenges with ongoing malaria control strategies there is need for newer strategies such as malaria vaccine. Nigeria's immunization program has suffered series of setback in recent times due to misperception that marred its acceptability. Malaria vaccine trials have already commenced in some countries. The aim of this study was to assess the perception and acceptability of malaria vaccines among maternal and child health clinic attendees.

#### Methodology

This was a descriptive cross-sectional study. A semi-structured pre-tested interviewer-administered questionnaire was used for data collection from maternal and child health clinic attendees in Calabar, Nigeria. Respondents were selected using systematic random sampling. Data was collected on socio-demographic characteristics, sources of information regarding malaria vaccine and perception and acceptability of malaria vaccine.

#### Results

Majority of respondents, 90.5%, were females, 93% were married and 77.5% were educated up to tertiary level. Civil servants constituted 35.1% of respondents. Majority, 157(60%) of respondents had heard about malaria vaccine prior to the study. Eighty-four percent of respondents indicated that they believe malaria vaccine is necessary for malaria control. Fifty-three percent of respondents agreed that they would allow their children to be volunteers for malaria vaccine trial. Eighty-six percent of respondents would recommend that malaria vaccine be made part of the country's National Programme on Immunization.

#### Conclusion

Majority of respondents had good perception of malaria vaccine. However, there is need for more advocacy and health education so as to debunk all myths and misperceptions.

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### INTRODUCTION

Malaria remains a public health problem in many parts of the world, affecting almost 109 countries and territories. Almost half of the world's population is at risk with nearly 243 million cases and 863,000 deaths due to malaria in 2008. <sup>1</sup> Malaria is a major cause of public health expenditure, up to 40%, in sub-Saharan Africa where over 90% of the world's malaria and malaria-related deaths occur. <sup>2,3</sup> Majority

of those who bear the greatest brunt of malaria are among the world's most vulnerable.

The burden of malaria is not limited to health only as it equally takes a toll on economic development of most malaria endemic countries. Malaria caused a loss of at least US\$12 billion per year to Africa alone in terms of direct losses due to illness, treatment cost and pre-mature death. It also cost Africa much more than that in terms of loss to

economic growth in the form of loss of man-hours and loss of farm produce and low productivity.<sup>4</sup>

In the education sector, malaria leads to loss of productivity due to loss of man hours as teachers who are down with malaria would not be able to teach and due to work absenteeism. Pupils and students equally suffer due to school absenteeism, poor performance during examinations; examination failure and high school drop-out rate.

Malaria is responsible for about 50 per cent of the fever cases in highly endemic areas and accounts for about 30 per cent of out-patient consultation and about 15 per cent of hospital admissions. Children under five years of age and pregnant women are the most vulnerable to the disease. One out of every five children born in sub-Saharan Africa die of malaria -related illness before the age of five, with a total of about 3,000 deaths every day.<sup>5</sup>

A number of strategies are currently being implemented in malaria control. Firstly, the use of Insecticide Treated Bednets (ITNs). ITNs have been shown to reduce malaria morbidity and mortality when correctly and consistently used.<sup>6,7</sup> In order to tackle some of the observed pitfalls of retreatable bednets, Long Lasting Insecticidal Nets (LLINs) were devised. LLINs are impregnated with insecticides, thus taking care of the need for regular re-treatment which may sometimes not be possible due to unavailability of insecticides.

Indoor residual spraying (IRS), a process whereby mosquito insecticides are sprayed indoors in people's homes, has also been shown to reduce malaria morbidity and mortality just as is larviciding and environmental management.

Artemisinin-based Combination Therapy (ACT) is the current first line treatment for uncomplicated malaria.<sup>8</sup>

Intermittent Preventive Treatment during pregnancy (IPTp) where Sulfadoxine/Pyrimethamine is administered to pregnant women also reduces malaria morbidity and mortality among this vulnerable group.<sup>9</sup>

New diagnostic methods like the use of Rapid Diagnostic Tests have been devised to augment microscopy, especially in resource-poor sub-Saharan African settings where there may not be electricity for microscopy in addition to inadequacy of trained microscopists.<sup>10</sup>

Between the 1950s and the 1970s, the world made remarkable attempts at eradicating malaria.<sup>11</sup> However, these efforts met with limited successes, especially in sub-Saharan Africa, due to a combination of technical, administrative and financial difficulties. This problem was (and is still) compounded by weak health systems due to endemic corruption, political instability and incessant conflicts and tribal wars.<sup>[11]</sup> Changes in the biting habit of the female anopheles mosquito, widespread resistance to insecticides and development of multi drug resistance of the malaria parasite to chloroquine and other anti-malarial drugs, have contributed, amongst other factors, to making the dream of malaria eradication a huge challenge.

In response to the draw-backs of current malaria control strategies, the UNDP/World Bank/WHO-TDR/PATH, in collaboration with pharmaceutical industry experts have explored other novel approaches to malaria control, one of which is the use of vaccination.<sup>[12]</sup> Vaccination is a public health strategy which has been found very effective in disease control and which has even been successfully exploited in eradicating an infectious disease, smallpox, and is currently very promising in the eradication of another infectious disease, poliomyelitis.<sup>13</sup>

The past two decades have witnessed tremendous advancement in the development of malaria vaccines. A number of vaccine candidates are at various phases of clinical trials.<sup>14</sup> With the hope that a malaria vaccine will soon be licensed for routine use, it is necessary to determine caregivers' perception and acceptability of malaria vaccines because sub-Saharan Africa often lacks behind in the uptake of new health interventions and technologies.

## STUDY OBJECTIVES

### General Objective

To determine the perception and acceptability of malaria vaccines among Maternal and Child Health Clinic attendees at the University of Calabar Teaching Hospital, Calabar, Nigeria

### Specific Objectives

1. To determine the awareness of caregivers regarding malaria vaccines.
2. To determine the perception of caregivers regarding malaria vaccines.
2. To identify factors that affect acceptability of malaria vaccines among caregivers.

## MATERIALS AND METHODS

### Study setting

This study was carried out at the Maternal and Child Health (MCH) clinic of the Department of Community Medicine of the University of Calabar Teaching Hospital, Calabar, Nigeria. The hospital is a tertiary health centre and research institution.

Calabar is located in the Southern part of Nigeria within the rain-forest belt. Southern Nigeria is characterized by all year round malaria transmission. All parts of Calabar have favourable conditions for the breeding and survival of the malaria vector

because of the city's high precipitation and high temperature.

## SAMPLE SIZE DETERMINATION

A study in by Molyneux et al (2007) showed that 20% of respondents had the right perception about malaria vaccine<sup>15</sup>. Therefore, using the formula for single proportions, the sample size is calculated as follows:

$$n = \frac{Z^2 pq}{d^2}$$

Where n=desired sample size

Z=standard normal deviate

P=the proportion of the target population estimated to have the particular characteristic.

In this case p=0.20.

$$q = 1 - p$$

d=degree of accuracy, in this case this is set at 0.05

Thus,

$$n = \frac{1.96^2 \times 0.20 \times 0.80}{0.05^2}$$

$$n = 245$$

Allowing for 10% non-response,

n=approximately 280

### Study instrument and study variables

The study utilized a semi-structured interviewer-administered questionnaire to collect information on respondents' socio-demographic variables, sources of information regarding malaria vaccine, willingness to recommend malaria vaccine to be part of the National Program on Immunization and willingness to allow the respondent's child to be part of malaria vaccine trial.

### Participant selection

Systematic sampling was used to select

participants from amongst caregivers attending the clinic. Every 5<sup>th</sup> caregiver visiting the MCH clinic was recruited into the study until the sample size was arrived at.

### Data analysis

Data obtained were analyzed using EPI-Info statistical software 3.5.1.

**Ethical Approval:** Ethical approval for this study was obtained from the Research Ethics Committee of the University of Calabar Teaching Hospital. Informed consent was obtained from the study participants who were adult caregivers.

## RESULTS

### Socio-demographic characteristics of respondents (Table I)

**Table I: Socio-demographic characteristics of the respondents**

Variables	Frequencies	Percentages
<b>Sex</b>		
Male	25	9.5
Female	237	90.5
<b>Total</b>	262*	100
<b>Religion</b>		
Christianity	231	93.9
Islam	13	5.3
African Traditional religion	2	0.8
<b>Total</b>	246*	100
<b>Occupation</b>		
Trading	20	7.7
farming	35	13.5
civil servant	91	35.1
House wife	39	15.1
Business	70	27
Others	4	1.6
<b>Total</b>	259*	100
<b>Marital status</b>		
Never married	16	6.2
Married	241	93
Separated	1	0.4
widowed	1	0.4
<b>Total</b>	259*	100
<b>Education</b>		
No formal education	1	0.4
Primary	6	2.3
Secondary	52	19.8
Tertiary	203	77.5
<b>Total</b>	262*	100

\*Only valid percentages are shown because of non-response

Two hundred and thirty seven (90.5%) respondents were females while 25 (9.5%) were males. Christians made up 93.9% while Muslims made up 5.3% with 0.8% being of the African Traditional Religion. Civil servants constituted 35.1% of respondents. Majority of respondents (93.1%) were married while 6% were never married. Majority of respondents (77.5%) were educated up to the tertiary level while 0.4% had no formal education. The Efiks constituted 27.5% of respondents, 25.1% were of the Ibibio (and Annang/Oron) extraction while the Igbos constituted 18.8% of respondents and the Ejagham's constituted 7.8%.

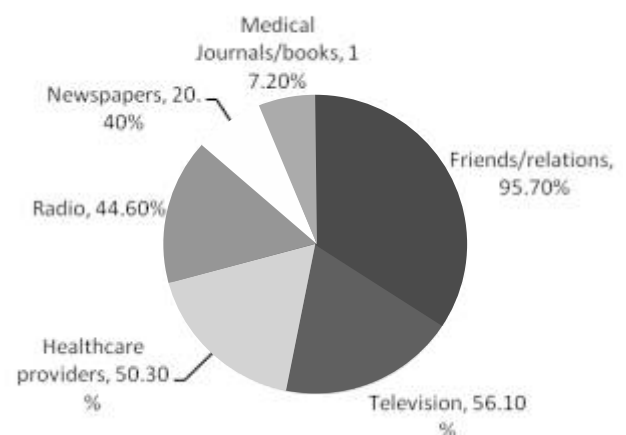
### Relationship of caregiver with the child

Majority of the respondents (87.4%) were mothers of the children they brought to the clinic while 6.9% were fathers and 4.6% were siblings. (Table II)

**Table II: Relationship of caregiver with the child**

Relationship of caregiver with the child	Frequency	Percent
Father	18	6.9
Mothers	229	87.4
Sibling	12	4.6
Others	3	1.1
<b>Total</b>	262*	100

\*Only valid percentages are shown because of non-response



**Figure 1: Sources of information regarding malaria vaccine.**

\*Total percentages add up to more than 100 because multiple responses were allowed.

**Table III: Relationship between academic qualification of caregivers and awareness of malaria vaccine**

Academic qualification	Awareness of malaria vaccines			c <sup>2</sup> tab	P-value
	Aware (n=155)*	Not Aware (n=94)*	Total		
No formal education	1(0.6)	0(0)	1(0.4)	9.88	0.020*
Primary	5(3.2)	1(1.1)	6(2.4)		
Secondary	21(13.5)	27(28.7)	48(19.3)		
Tertiary	128(82.6)	66(70.2)			

Values in the parentheses are percentages; P<0.05, significant at 5%.  
\*Only valid percentages are shown because of non-response

**Table IV: Perception and acceptability of malaria vaccines**

Variables	Frequencies	Percentages
<b>Perception</b>		
<b>Do you think malaria vaccines are necessary for malaria control?</b>		
Yes	193	84
No	37	16
<b>Total</b>	<b>230</b>	<b>100</b>
<b>Acceptability</b>		
<b>Would you allow your child to be a volunteer for malaria vaccine trial ?</b>		
Yes	119	53
No	106	47
<b>Total</b>	<b>225</b>	<b>100</b>
<b>Would you recommend malaria vaccines to other family members and friends ?</b>		
Yes	212	94.6
No	12	5.4
<b>Total</b>	<b>224</b>	<b>100</b>
<b>Would you recommend that malaria vaccine be made part of the national Program on Immunization ?</b>		
Yes	199	86
No	33	14
<b>Total</b>	<b>232</b>	<b>100</b>

**Table V: Multiple logistic regression showing association between acceptability of malaria vaccines and its possible factors**

Factors	Wald Statistics	df	P- value
Awareness	0.163	1	0.686
Education	1.207	3	0.751
Occupation	0.994	5	0.963
Religion	0.783	1	0.676

P>0.05, not significant

## Sources of information regarding malaria vaccine

Majority of respondents (60%) had heard about malaria vaccines while 40% had not. With respect to source of information regarding malaria vaccines, multiple responses were allowed. Friends/relations were the major source of information regarding malaria vaccines for 95.7% of respondents who were aware of malaria vaccine, 50.3% heard about it from healthcare providers, 44.6% from radio, 56.1% from Television and 17.2% from medical journals and books. (Figure 1)

## Perception and acceptability of malaria vaccine.

Majority of the respondents (84%) were of the opinion that malaria vaccine was necessary for malaria control. With respect to vaccine trial, 53% of respondents indicated their willingness to allow their children volunteer in malaria vaccine trials while 33% indicated their unwillingness. Majority of respondents, (94.6%), indicated their willingness to recommend malaria vaccine to other family members and friends while 5.4% indicated that they would not. Majority of respondents (86%) indicated that they would recommend that malaria vaccine be made part of the National Programme on Immunization while 3% indicated a contrary opinion. Lack of knowledge of malaria vaccine was the reason for non-acceptability given by majority of respondents (66.8%). There was a statistically significant relationship between educational status of caregivers and level of awareness of malaria vaccine (P=0.020). Tables III and IV

## DISCUSSION

The proportion of respondents who had heard about malaria vaccine in this study was high compared to the 35% of respondents who mentioned malaria vaccine as a prevention method in a study by Pistone et al.<sup>16</sup> In a related qualitative study

on community perceptions of malaria and vaccines in two districts of Mozambique, Bingham et al found that few caregivers spoke about malaria vaccine.<sup>17</sup> The concept of malaria vaccine is a new one. It is therefore not surprising that not all caregivers are aware of it. Just as this study found that majority of the respondents (84%) considered malaria vaccines necessary for malaria control, Ojaka et al found that most community members in Kenya would welcome the malaria vaccine although they would have questions and concerns about the intervention.<sup>18</sup>

Considering the degree of morbidity and mortality caused by malaria, it would have been expected that all caregivers would readily and excitedly embrace the idea of vaccine trial and allow their children to participate in the trial. That only 53% of respondents indicated their willingness to allow their children volunteer in malaria vaccine trial may not be unconnected with the myths and misconceptions that have marred uptake of immunization services in Nigeria for over a decade now. Some studies have demonstrated that as high as 70% of caregivers have misconceptions regarding immunization in Nigeria.<sup>19,20</sup> Myths and misconceptions, including religious influences, led to the halting of polio immunization in Northern Nigeria in 2003 and caused serious setback to the country's polio elimination efforts.<sup>21,22</sup> Reluctance of caregivers to allow their children volunteer for malaria vaccine trial may also be fueled by some bitter experiences such as that of the infamous Trovan disaster. Trovafloxacin (Trade name Trovan) assumed to have anti-meningitis properties, was tested among 100 children in Kano, Nigeria. At the end of the trial, 5 of the children that received Trovan died while 6 of the children who received the gold –standard anti-meningitis treatment, ceftriaxone also died. This led to a protracted court case between Pfizer and the Kano State government

and an eventual out-of-court settlement by Pfizer with millions of dollars.<sup>23,24</sup>

The study reported a statistically significant relationship between educational status of caregivers and level of awareness of malaria vaccine ( $P=0.020$ ). This is in keeping with several other studies that have found general relationship between literacy and good health. Some other studies have found that the health status of caregivers influence their health seeking behavior for children in their care. Literacy also improves access to accurate and appropriate health information.<sup>25,26,27,28</sup>

## CONCLUSION

Majority of the respondents had good perception of malaria vaccine. Although acceptability of malaria vaccines among the respondents was high, there is need for more advocacy and health education in order to ensure wider acceptability thereby addressing some of the problems that have marred the country's immunization program in recent times.

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