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Article

Perception about malaria and understanding of malaria prevention information in selected rural communities of Nigeria

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Abstract: Studies have shown that social and cultural factors affect how people perceive diseases. Thus; the area of perception about malaria has been the focus of several scholarly interventions. However there has been limited investigation of the perception of people and their understanding of malaria prevention information in Nigeria. This study; anchored on the Health Belief Model; investigated the perception of selected rural dwellers in Oyo and Osun states; Nigeria; about malaria and their understanding of available malaria prevention information provided by Roll Back Malaria (RBM) in the two states. The study used Survey; Focus Group Discussion and analysis of secondary data. There were 2120 survey respondents selected through multi-stage sampling across 10 local government areas of Oyo and Osun states and 96 participants in 16 focus groups involving men; women and expectant mothers. The results show that while the symptoms of malaria are well understood; the etiology is incorrectly believed. The respondents' recollection of the malaria prevention messages was low due to their limited exposure to the available information. Pearson Chi-Square test indicated significant relationship between perception of the rural dwellers and their utilisation of malaria prevention information. It is important to understand the perception dynamics that drive attitude towards malaria prevention as part of efforts towards achieving the SDG Goal3. Government should encourage broadcast stations to air malaria prevention jingles regularly; not based on programme funding; but as a part of social service among other efforts at devoting more resources to communication activities on the disease.

Keywords: malaria; perception; prevention; information; Nigeria; Roll Back Malaria

1. Introduction

Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected Anopheles mosquitoes [1]. The mosquitoes bite mostly between sunset and dawn. There are four types of malaria parasites: Plasmodium falciparum; Plasmodium vivax; Plasmodium malariae; and Plasmodium ovale.

Malaria is one of the major public health problems in Africa; and Nigeria is no doubt the most affected in the continent [2]. Data from the World Health Organisation [1] indicates that globally; there were 249 million cases of malaria in 2022. Out of this figure; the African Region accounted for 233 million (94%) cases and 580,000 (95%) of deaths from the disease. The data indicates that Nigeria recorded 62.2 million cases; representing 26.7% of all cases reported among the four countries mostly affected by malaria in the region. Nigeria also shared the highest number of all malaria deaths (31.1%) in the period; followed by the Democratic Republic of the Congo (11.6%); Niger (5.6%) and the United Republic of Tanzania (4.4%). The risk of transmission exists throughout the country; all year round. However; the incidence of malaria is highest in the northern and north-eastern parts of thecountry [3].

WHO Regional Office for Africa [3] identified Ogun; Ondo; Osun; Ekiti and Lagos among the 24 states that have registered increased cases of malaria since 2010. Data from the [3] indicates that in 2021 Lagos recorded a total of 2.5 million cases of malaria; but only 9.6% of its residents reported sleeping under Insecticidal Treated Nets (ITN). In Ogun state; with 1.7 million cases during the same period; only 21.7 % of the population reported sleeping under ITN. Ondo state had a total of 1.6 million cases of malaria in the same period but only 17.7% of the population reported using ITN. In Osun state had a total of 1.7 million cases but only 35.3% of the population reported using ITN. Oyo state had a total of 2.8 million cases and only 31.2% of her population reported using ITN. In Ekiti state with a total of 1.2 million cases; only 9.9% of the population reported using ITN. Thus; the use of ITN is still comparatively very low in the south west region of Nigeria; thus, creating a challenge to the attainment of SDG Goal 3.

Nigeria's response to the malaria challenge is coordinated by the Nigerian national secretariat of Roll Back Malaria (RBM) Partnership; also known as the National Malaria Elimination Programme (NMEP) office. The RBM Partnership is a joint initiative of the World Health Organisation; the United Nations Children's Fund (UNICEF); the World Bank and the United Nations Development Program (UNDP). It was launched in 1998 and has Partner organisations and bodies that undertake specific tasks; such as initiating Advocacy; Communication and Social Mobilisation (ACSM) activities on malaria prevention in targeted communities [4].

Like many other health conditions; social-cultural factors affect the perception about the causes of malaria and subsequently attitude to its control [5]. People in different societies hold a variety of beliefs about the cause and transmission of malaria that vary according to cultural; educational; and economic factors. Such beliefs have direct consequences for both preventive and treatment-seeking behaviour as well as for activities to control malaria. This is why there is need to understand people's perceptions of malaria; and the social; political; cultural factors in which the disease occur as a critical element in mounting successful interventions (communication) programmes [6]. It is therefore imperative that people's perception and some of their cultural associations must be well understood in tackling the incidence of malaria. Also;the whole context of lives that give shape to these perceptions and behaviours must be clearly identified and accepted for a successful (behaviour) change to take place [7].

In south-eastern and south-western Nigeria; for example; excessive heat; over–work; sunlight; excessive sex; too much sun; mosquitoes; fried food; cold weather; dirty environment; weakness; alcohol; noise as well as witchcraft are perceived as possible causes of malaria [8]. Okeke and Okafor [9] found a correlation between education and correct knowledge of mosquitoes as cause of malaria. Their study also reported perception that the disease can be transmitted through breast milk; bodily contact; drinking dirty water; inhalation and sharing the same cup. Okwa and Ibidapo [10] found that 7.3 % of respondents from a Nigerian universitywho were Christians expressed confidence that prayer is the best cure for malaria while others; predominantly Muslims from Awori tribe; believed that local remedies were the best

cure. Muhammad et al. [11] also found widespread wrong perception about the disease among Hausa Married Men in Mokola Community of Ibadan; Oyo State; Nigeria.

To tackle the challenge posed by malaria; the Nigerian government adopted the Global Strategic Plan on Roll Back Malaria (2005–2015) and domesticated its recommendations into her National Malaria Strategic Plan (2014–2020). The Strategic Plan included the creation of awareness; demand and appropriate use of malaria prevention products and the development of country-level advocacy and communication. It is therefore apt to examine the current state of perception about malaria; especially among rural people who have been exposed to the communication materials; vis-a-vis the goals of the Strategic Framework. None of the available studies on malaria perception examined the preventive information against which they investigated the perception and attitude of their respondents. This study is therefore able to fill that gap in the scholarly investigations about malaria and perception of selected populations. A positive perception about malaria will enhance the acceptance and utilisation of preventive measures and the achievement of the SDG Goal 3 of ensuring healthy lives and promoting well-being for all at all ages; among others.

In doing this; this study sought to achieve the following objectives:

1) examine how the Strategic Framework for Malaria Communication addresses wrong perception about malaria among the rural population
2) Investigate prevailing perception of rural dwellers in Oyo and Osun states about malaria and;
3) examine how the prevailing perception affect their attitude to the available prevention information.

2. Literature review

Many scholars have investigated various aspects of perception abut malaria among diverse populations in Nigeria with varied findings. Okwa and Ibidapo [10] studied the perception of cause and treatment of malaria among undergraduate students of Lagos State University and found that only about half of the respondents understood the cause of malaria while 25% attributed the disease to exposure to sunlight. In their own study; Omole et al. [12] assessed perceptions of malaria and the utilisation of long-lasting insecticide treated nets in a rural Niger Delta community in Nigeria. The study indicated a good perception of the cause of malaria among respondents but poor rate of ITN utilization. A subnational profiling analysis of regional differences as the main predictor of ITN ownership and use in Nigeria by Andrada et al. [13] using the Chi square automatic interaction detector (CHAID) model identified households in the South West; North Central and South-Central regions with low ITN ownership; and the general population in the South South; South East and North Central regions with low ITN use. Muhammad et al. [11] studied knowledge and perception of malaria among Hausa Married Men in Mokola Community of Ibadan; Oyo State; Nigeria and found very poor perception about the disease among the study population.

Duodu et al. [14] reviewed the 2018 Nigeria Demographic and Health Survey with their attention on Rural–urban dimensions of the perception of malaria severity and practice of malaria preventive measures and found that the association between

perceived malaria severity and use of a treated bed net was only significant for rural women. The authors noted unexpected results indicating that rural Nigerian women who perceive malaria to be severe have a lower likelihood of using treated bed nets. On their part; Abiodun and Ilori [15] investigated caregivers' perception and determinants of delayed presentation of children with severe malaria in an emergency room in Benin City; Nigeria. According to the authors; there was a negative correlation between caregivers' perception of treatment ($r = -0.113$; $P = 0.21$) of convulsion in severe malaria and timing of presentation.

Outside Nigeria; Portugaliza et al. [16] did a qualitative study that examined community perceptions of malaria to inform elimination efforts in Southern Mozambique. The results indicated that participants in the study had a fragmented perception of malaria etiology but still related mainly to mosquito-mediated transmission. In Ghana; Aberese et al. [5] identified how restocking of LLINs was organized in health facilities; content of health information on LLINs given to ANC; as socio-cultural; environmental; economic and individual factors as some of the 'multiple level factors' that influenced use of LLIN among their respondents. In Brazil; Murta et al. [17] investigated the perception of Brazilian gold miners about malaria. The study found that gold miners were subjected to prejudice from the community due to forest diseases that they can transmit; among them malaria. Most of the miners themselves did not know how malaria transmission occurs; and associated its occurrence with contaminated water and food and they believed in the use of medicinal plants for treatment of malaria.

Although Nigeria has made some progress in tacking her malaria challenge; WHO [3] has identified some key challenges that are inhibiting the fight against the disease in the country. As a result of these challenges; the international agency estimated that 20% of all deaths in children under age of 5 years in 2021 were traceable to malaria. The challenge was worsened by the disruption to public health services occasioned by COVID-19 pandemic which the body estimated added 490,000 cases and 10,000 deaths from malaria in Nigeria. Even before the pandemic; according to WHO; malaria cases and deaths have actually been on the rise in Nigeria; since 2016. This; the body claimed; could be due to 'a mix of reducing intervention coverage; the spread of insecticide resistance reducing the effectiveness of ITNs; humanitarian emergencies and relatively high population growth. Another challenge worthy of note is that despite recent improvements; malaria parasitological diagnosis remains low in Nigeria. This has led to inappropriate treatment of patients and irrational use of malaria drugs. As such; only a quarter of all children with fever are tested; and among those who seek care; only 39% are tested.

Governments in the region are concerned about the rate of malaria among the population. Ezediuno [18] reported the Programme Manager; Osun State Malaria Elimination Control; Dr Olufemi Oroge as lamenting that despite efforts by states and the federal government; malaria remains a public health burden. According to him Osun state is not making progress as intended in meeting with target of the global strategy for eliminating malaria. In 2021; Reckitt Nigeria; makers of Mortein insecticide Brand; introduced it's "Mortein Fight to End Malaria" campaign in conjunction with the Ogun state government and National Malaria Elimination

Programme (NMEP); to support in the education and awareness of malaria prevention in Nigeria [19]. The partnership was meant to be executed through three main platforms: On-ground market and Community engagement activities; Digital Education and Radio engagement as well as sustained efforts through malaria programmes in schools.

Adewole et al. [20] investigated the trend and seasonality of malaria fever in Ogun State; Nigeria over a five year period (2016–2021) and also predicted its prevalence in the year 2023 using seasonal decomposition of time series (STL) method and ARIMA (Autoregressive Integrated Moving Average) modelling. The data indicated that there would be a 50% percent reduction in trends of malaria in the state in 2023 provided stakeholders employed appropriate preventive and control measures. One of such measures would be to ensure that residents of various communities have a proper perception of the disease and its prevention.

3. Study area

The study covered ten local government areas in two states of south-west Nigeria. The local government areas are: Obokun; Ejigbo; Irepodun; Boluwaduro and Orolu for Osun State and Afijio; Egbeda; Surulere; Orire and Atiba for Oyo state. **Figures 1** and **2** are maps of the two states from which the study areas were sampled.

Figure 1. Map of Oyo state showing the local government areas including the study area from the state.
Source: Oyo state government.

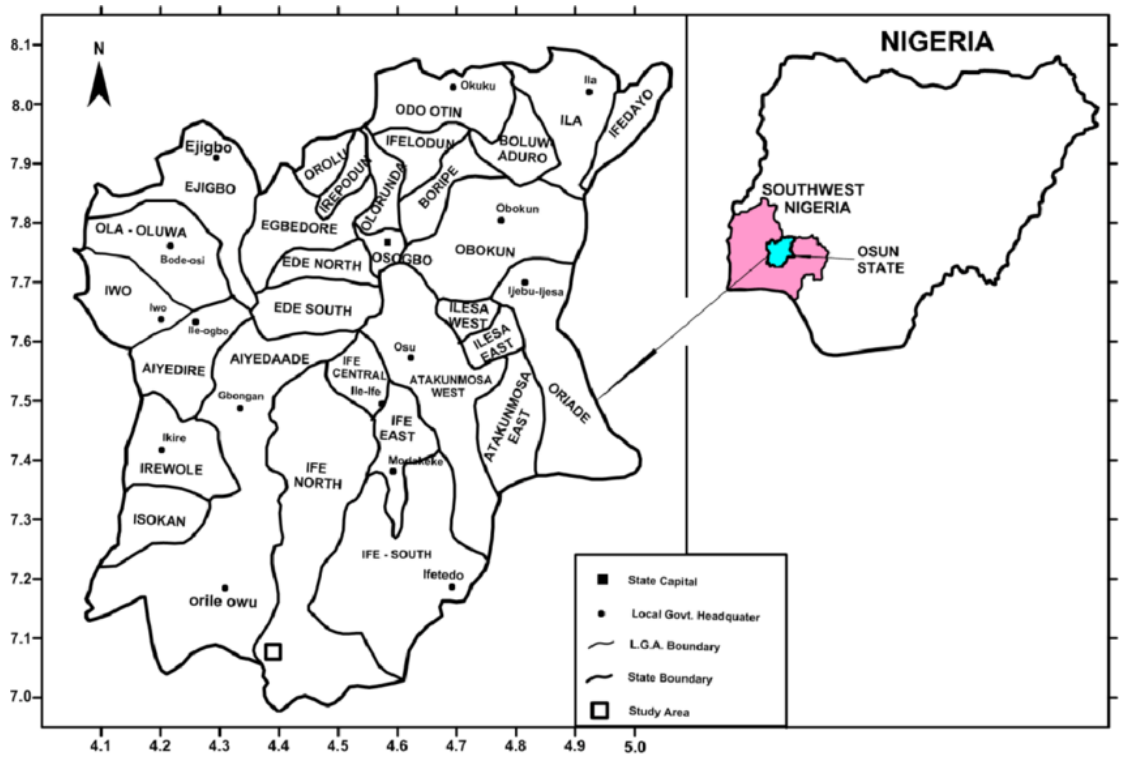

Figure 2. Map of Osun state showing the local government areas; including the study area from the state.
Source: Oyo state government.

4. Study design

This study employed the pragmatic paradigm of research design; which informed the choice of mixed methods of quantitative and qualitative. Pragmaticism approach of research design beliefs in the combination of quantitative and qualitative methods to generate data. The choice of this design is apt because it investigates the dynamics of perception about malaria; especially among rural dwellers in south-west Nigeria.

5. Sample size

The sample size for the survey was determined based on the population strength of the estimated population of 11,715,157. The survey therefore covered 2200 household members drawn from the 10 local government areas selected from Oyo and Osun states. The Focus Group Discussion (FGD) was made of 96 participants in 16 focus groups involving men; women and expectant mothers. Participants were selected through a multi-stage sampling procedure. Each discussion group comprised of six participants.

6. Sample technique/procedure

The sample for the survey was drawn using the multi-stage sampling procedure. The first step was to purposively select two neighbouring states from the six in the South-west zone which have contrasting features in their Advocacy; Communication and Social Mobilisation (ACSM) activities. Pre-field investigation indicated that while Oyo state had a functional ACSM team; Osun state did not. The two states therefore met the criterion for selection.

The second stage was through balloting; ten local government areas were selected from a list of 'rural local government areas' supplied by the Malaria Programme office/MAPS (for Oyo state) and Malaria Programme Office /ACCOMIN/AFRICARE (for Osun state) based on the definition of rurality by the National Population Commission. The balloting was done by two young girls; aged 7 and 10 years to eliminate the possibilities of bias from an adult. There was no provision for replacement since all the local government areas on the list were prequalified as rural and were supposed to have been exposed to malaria prevention messages through the various RBM Partner organisations working there; particularly Malaria Programme office/MAPS (for Oyo state) and Malaria Programme Office /ACCOMIN/AFRICARE (for Osun state). The result produced the following local government areas: Obokun; Ejigbo; Irepodun; Boluwaduro and Orolu for Osun State and Afijio; Egbeda; Surulere; Orire and Atiba for Oyo state.

In the third stage; two communities hosting Primary Health Centres (PHC) were purposively selected from each local government. They were chosen from a list of available PHCs in each of the selected local government areas on the basis of their being hosts to PHCs which was considered as a strong factor that would have exposed residents in the host communities more to malaria prevention information. The following communities were therefore selected in Osun state: Okeafola and Eyingbo (Irepodun LGA); Ilie and Owode (Orolu LGA); Masifa Ile and Ogbaagba (Ejigbo LGA); Ibokun and Imesi-Ile (Obokun LGA) while from Oyo state; the following communities were selected: Ilora and Awe (Afijio LGA); Igbonla and Ijawaya (Atiba LGA); Olodo and Kute (Egbeda LGA); Olorunda and Alapete (Orire LGA); Gambari and Igbon (Surulere LGA). From each community; the researcher employed the convenient sampling method to select available respondents for the survey questionnaire. The respondents were however in households and not within the PHCs.

For the Focus Group Discussion; the local government areas where the discussion took place were purposively selected on the recommendations of Malaria Programme Office/MAPS (for Oyo state) and Malaria Programme Office /ACCOMIN/AFRICARE (for Osun state) based on the perceived effectiveness of their malaria prevention activities. The result produced the following local government areas: Ogbomosho South; Oyo East; Afijio; Surulere in Oyo state and Irepodun; Orolu; Egbedore and Ejigbo in Osun state.From each local government; two PHCs were also selected purposively with the assistance of the Malaria Programme Officer (MPO) in each local government area based on the MPO's evaluation of the active malaria prevention activities of each PHC. The result produced the following PHCs: Ilogbo and Arowomole (Ogbomosho South); Jabata and Araromi (Oyo East); Fiditi and Akinmorin (Afijio); Iresaadu and Abaya Oje (Surulere) in Oyo state; Anwo and Afolu (Irepodun); Bolorunduro and Odo Oje (Orolu); Popo and Ola (Ejigbo) as well as Ido Osun and Olorunsogo (Egbedore) in Osun state.

Next; the MPO assisted the researcher in selecting six participants from the community hosting the PHC; made up of men; women and expectant mothers; who were duly informed one week ahead of their participation in the respective FGD session. They were men and women well known in the community for their

involvement in community activities. Hence the focus group participants were selected through purposive sampling technique. Each PHC hosted one focus group.

7. Primary data collection

The study employed both primary and secondary data. For the primary data; a questionnaire was developed in English and Yoruba Languages to take care of respondents who might not be able to read or write in English. A Focus Group Discussion Guide was also used to collect qualitative data from FGD participants The questionnaire was based on the constructs of the Health Belief Model developed by Hochbaum; Rosenstock and Kegels along with others in the U.S. Public Health Services in the 1950s.The HBM is based on the understanding that a person will take a health-related action if such a person:

(a) feels that a negative health condition can be avoided;
(b) has a positive expectation that by taking a recommended action; he/she will avoid a negative health condition; and
(c) believes that he/she can successfully take a recommended health action.

Six constructs; Perceived Threat; Perceived Benefits; Perceived Barriers; Cues to Action; Motivating Factors and Self-Efficacy constitute the main pillars of the theory. The Model assumes that an individual's action towards a preventive health measure will be based on his/her beliefs and attitudes. It acknowledges that that beliefs and attitudes are not spontaneous but the function of a progressive experience by the individual decision maker. It is for this reason that the model seeks to explain the demographic and socio-psychological variables which could influence the perception of an individual about his/her vulnerability to a health condition; the perceived severity of the health condition as well as the perceived benefits and barriers to the action.

Seven trained Research Assistants administered the questionnaire. Respondents were allowed to fill the questionnaire in the language of their proficiency while those who could not read or write in English or Yoruba were allowed to provide their answers to the trained Research Assistants who thereafter filled such answers on the questionnaire form. A total of 2200 copies of the questionnaire were distributed to respondents but only 2120 were retrieved; indicating a 96.3% return rate.

Data for the Focus Group Discussion were collected using a digital tape recorder by the Researcher. The use of a digital tape meant the tape could run on its own while the researcher observed and took notes of the participation. The Focus Group Discussions took place at the Primary Health Centres in the selected communities. The discussions were conducted in Yoruba language and later transcribed and translated into English language for analysis. Participants in the FGD and respondents to the survey questions were not made to disclose their names as part of measures at enhancing confidentiality and freedom in responding to questions.

8. Secondary data collection

The study accessed secondary data made up of six radio jingles on malaria prevention; one RBM Malaria IPC Guide; one Interpersonal Communication Flip Chart for Malaria Control in the Community and three generic posters; "Net Safe"; "Take Good Care of Your Long Lasting Nets"; and "Disease Prevention". These data

were expected to be available to people in the study area as at the time of the investigation. Five of the radio jingles were produced by MAPS/Oyo State Government/RBM; while the sixth was produced by Osun State/RBM. In terms of their themes; the six jingles focused on the use of LLN and general malaria prevention. Four of the jingles were in Yoruba while the remaining two were in Pidgin English.

8.1. RBM malaria IPC guide

The RBM Malaria IPC Guide was produced by Roll Back Malaria; Federal Government of Nigeria and Society for Family Health. It is a 26-page document printed in full digital colours. There is a "message page"; where the written message is displayed and an additional "illustration page" with a pictorial representation of the message. Each message page has the headline of the message in bold; black letters while additional points are written in smaller letters. The illustrations are hand drawn pictures. Page 1 is on "What is Malaria"; page 2 "Myths and Misconceptions" page 3 "Special groups at risk"; page 4 "Symptoms of malaria"; page 5 "Effects of Malaria"; page6 "Malaria in Pregnancy"; page 7 "IPT" page 8 "Integrated Vector Management"; page 9 "Long Lasting Insecticide Treated Nets"; page 10 "Effective malaria treatment"; page 11 "Is it malaria?"; page 12 "Malaria prevention" page 13 "ACTs most effective compared to older medicines like SP and CQ ". There is an additional page on "Management of severe malaria" but while the message page has no page number; the illustration page has the page number "1" as different from the original Page "1" that focuses on "What is Malaria".

8.2. Interpersonal communication flip chart for malaria control in the community

Interpersonal Communication Flip Chart for Malaria Control in the Community was another communication materials accessed for the study. It was produced by Centre for Disease Control (CDC); United States Agency for International Development (USAID); President's Malaria Initiative; Federal Government of Nigeria and fhi360 (THE SCIENCE OF IMPROVING LIVES) and was used by MAPS in Oyo state. It is a 24-page document printed in fully digital colours. There is a "message page"; where the written message is displayed and an additional "illustration page" with a pictorial representation of the message. The illustrations are hand drawn pictures. Each page is called CARD. Each CARD has the words IPC Conductor's Guide written boldly on top in bright blue colour. Each CARD contains a written message and a smaller version of the drawing used on the opposite page for illustration. The CARDs have no specific message headlines unlike the RBM IPC Guide.

9. Generic posters

a. Net Safe was produced by the United States Agency for International Development (USAID) and NetMark and distributed by Womankind FEI; Malaria Parasites: Africa Fights Back and DELIBIMB MALARIA FOUNDATION. It is printed in full digital colours. The Poster contains the message: "Insecticide Treated Net protects against Malaria; use it always. Be...Net Safe. While "Insecticide Treated

Net protects against Malaria; use it always. Be" is composed in black lower case letters; the slogan "Net Safe" is in light green. The logo of USAID is on the top left hand corner of the poster while the green coloured NetMark logo is on the right hand side. The NetMark logo as well as that of DELIBIMB MALARIA FOUNDATION contains a drawing of a mosquito with a green bold mark stretched across the mosquito. The Poster contains a picture /illustration of a mother sleeping inside a LLIN with her baby. The two appear to be fast asleep. Below the illustration are the logos of the three distributors of the LLIN mentionedearlier. A copy of the poster is attached to this study as annexure.

b. Take Good Care of Your Long Lasting Nets. This Poster was produced by RBM for the states. It is printed in full digital colours. The title is "Take Good Care of Your Long Lasting Nets" written in bold white letters reversed on black with the tag line; "They will protect you from Malaria" written in black below the picture used to illustrate the headline. The title is on the left hand side. A picture of a mosquito over which a 'stop-sign' in red was drawn; is on the right hand side of the poster. Beneath the headline and mosquito are the pictures of a woman holding a blue coloured net on her right hand and a white coloured net on the right hand. The poster also contains a small picture of a woman and her baby. The picture of the second woman is however faint while her baby is in bright white underwear. The first woman holding the net is dressed in what looks like Igbo apparel. It is however not clear if they are sleeping under a mosquito net. Across the tag line is a miniature drawing of two people sleeping inside a net while the words "Take Cover from Mosquitoes that spread malaria Sleep inside the NET" are written in a circle around the miniature drawing. The miniature illustration is marked positive in green colour. The Roll Back Malaria logo is printed at the bottom of the poster while the logo of Osun state and the Nigerian coat of arms are on the right hand side. There is also information on where readers can get more information on the subject matter of the poster. A copy of the poster is attached to this study as annexure.

c. Disease Prevention. This Poster was produced by the Ministry of Health; Osun state through Osun State Health Systems Development Project 11. The logo of Osun state is on the left hand side while the Nigerian Coat of Arms is on the right. The poster is printed in full digital colours. The Poster is an instructional material for health personnel providing information on malaria prevention to their audience. The headline is "Disease Prevention" written in bold red colourswith the tag line "Child sleep under Insecticide Treated Net (ITN)" written in black colours. Under the headline is a hand drawing showing a figure sleeping inside what looks like a net. A smaller size of the same drawing is repeated at the lower right hand corner of the poster and illustrated with the words "The picture shows a person asleep on a mattress around which ITN has been well tucked in." The poster contains four "Important Questions to Ask Caregivers" as follows: (1) What do you see in the picture? (Let the caregiver/group discuss); (2) What are the gains of sleeping under an insecticide treated net; (3) Do adults and children in the community sleep under ITN? (Probe the reasons why or why not); (4) Are there places one can buy and retreat ITNs in this community? (Discuss where to get ITNs and how to take care of them).

The Poster also contains a two–paragraph "Introduction" on malaria and how to prevent it as well as three "Notes for CORPs on the "Benefits of Using ITN" "For Maximum protection" and "Ensure you identify and retreat your net every 6 months at the nearest treatment centre". Five "Benefits of Using ITN" are provided in bullet points. They are; "Reduces man-mosquito contact thereby helping people sleep well/stopping transmission"; "Effective against other insects including bedbugs; cockroaches and lies"; "Promotes growth and development of children"; "ITN costs less than treating malaria" and "Use of ITN reduces sickness and death in children by reducing occurrence and severity of malaria". This last benefit is printed in bold black colour; Under "For Maximum Protection"; the poster contains the following points: "Have your mosquito nets re-dipped in insecticide every six months"; "Buy mosquito nets from reputable dealers" and "Ensure that all children under five years in your household sleep under ITN". A copy of the poster has been attached to this study as annexure.

10. Ethical consideration

The study received approval from the Ethical Boards of the Ministries of Health in Oyo and Osun states.

11. Data analysis

Data from the survey was analysed using simple percentages; Friedman non-parametric test and Pearson correlation. Voice notes from FGD participants were first translated into English language and thereafter analysed qualitatively by a team of panelists using the explanation building and thematic approaches to bring out their salient points relative to the objectives of the study. Each of the FGD participant was identified by a numerical number along with the name of their respective community; for ease of reference during analysis. Data in **Table 1** indicates that respondents with NCE/OND were in the majority (33.0%).

12. Results and discussion

The demographic breakdown also indicates that youths constituted the highest bracket of the respondents with a combined total of 70.5%. The data also indicates more female respondents (61.0%) than males (39.0%). In **Table 2**, the data indicates that while 54.2 of the respondents were married, 11.0% identified as single parents while 9.9% were divorcees. Also, the population of Christians among the respondents was 51.6% compared with Muslims (36.9%). The majority of the respondents were civil servants (30.8%), followed by traders (25.0%) (**Tables 1** and **2**).

Table 1. Educational; age and gender background of respondents.

Educational level		**Age**		**Gender**	
No education	165 (7.8%)	20–30	815 (38.4%)	Male	826 (39.0%)
Primary School	234 (11.0%)	31–40	680 (32.1%)	Female	1294 (61.0%)
Secondary School	480 (22.6)	41–50	352 (16.6%)	Total	2120 (100%)

Table 1. (*Continued*).

Educational level		**Age**	**Gender**
NCE/OND	698 (33.0%)	51–60	167 (7.9%)
HND/BSC/B.A	449 (21.2%)	60–above	106 (5.0%)
Others	94 (4.4%)	Total	2120 (100%)
Total	2120 (100%)		

Table 2. Marital status; number of children; religion and occupation of respondents.

Marital status		**No of children**		**Religion**		**Occupation**	
Married	1150 (54.2%)	1	700 (33.0%)	Christians	1094 (51.6%)	Civil servants	650 (30.8%)
Single parents	233 (11.0%)	2	172 (8.2%)	Muslims	783 (36.9%)	Artisans	235 (11.1%)
Divorced/separated	209 (9.9%)	3	328 (15.5%)	Traditionalists	214 (10.1%)	Farmers	258 (12. 2%)
Not married	528 (24.9%)	4	361 (17.0%	Others	29 (1.4%)	Traders	529 (25.0%)
Total	2120 (100%)	5	315 (14.9%)	Total	2120 (100%)	Others	441 (20.8%)
		6	244 (11.5%)			Total	2120 (100%)

13. Understanding of malaria prevention information among respondents and FGD participants

We investigated the exposure of respondents to the available communication materials on malaria prevention as mentioned in the two states over a period of twelve months prior to the study. Respondents could not identify the specific jingles but could recollect the thematic focus of available jingles in their state. This was accepted particularly where the thematic focus aligned with two key Roll Back Malaria messages; that is; use of ITNs/LLINs and living in a clean environment. Using this yardstick; the 'jingles' with the highest frequency of recall by respondents were the ones that taught the audience about the use of ITNs/LLINs. Five of the radio jingles collected from MAPS (Oyo state) and Osun State Malaria Programme Office focused on the use of LLIN. Also; the jingle from Osun state focused on living in a clean environment; the use of LLIN as preventive measures against the deadly malaria and visit to the clinic for those already down with the disease. The results are presented in **Figures 3** and **4**.

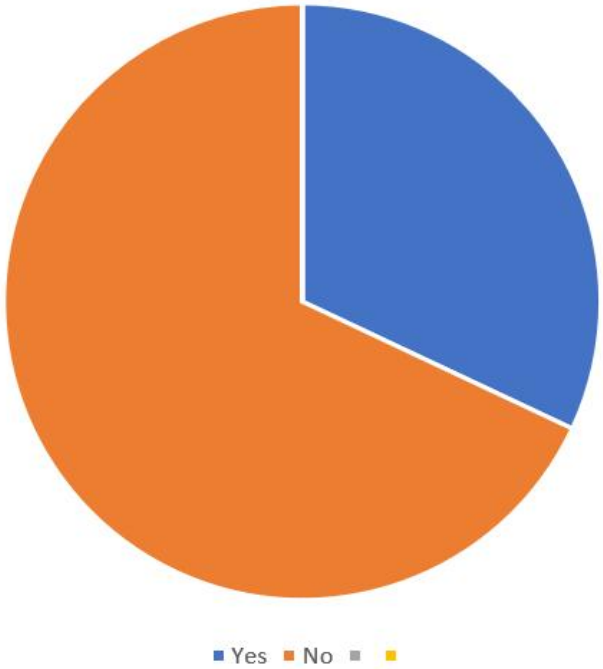

Figure 3. Recall of Malaria prevention jingles among respondents.

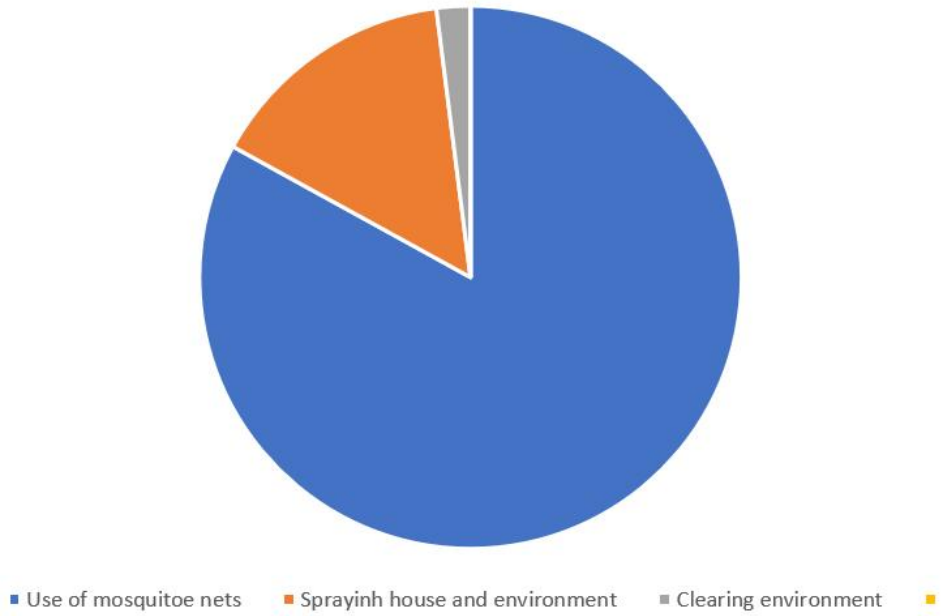

Figure 4. Types of jingles recalled among respondents.

In similar vein; it was observed that even when played to their hearing; most FGD participants in Osun state could not recall the jingle produced by the state's Ministry of Health and Malaria Programme Office. However; in majority of the sessions FGD participants in Oyo state indicated they had heard three of the jingles; 'Apo Apefon'; 'Baba Kemi' and 'Make Una Listen'. From observations during the sessions; 'Baba Kemi' had the highest rate of recall among the FGD participants. The limited recall could be linked to the fact that the jingles had stopped running on the various radio stations in the states due to financial constraints faced by the sponsors. Thus; although radio was a major source of information to most respondents the jingles on malaria

prevention that were supposed to spur them into taking preventive measures against malaria were no longer running on radio stations and therefore; they could not recall most of them during the study. This finding implies that withdrawing malaria preventive messages from the public when the expected behaviour change has not been imbibed is counterproductive.

This finding aligns with similar outcome from Ojebode [21] indicating that crafting a behaviour change messages is not enough. The audience must have the infrastructure to handle the recommended actions from the message to become effective. The finding also supports the constructs of the Health Belief Model as non-exposure to relevant information on the threat of malaria would reduce the level of action that an individual can take to prevent themselves from the disease.

The exposure of FGD participants to RBM IPC GUIDE; MAPS Inter-Personal Communication Flip Chart for Malaria Control in the Community as well as the three generic posters was also investigated in this study. Forty-four (92.0%) of the FGD participants in Osun state reported not to have seen the RBM IPC GUIDE when it was shown to them. Similarly; 40 (83.0%) of FGD participants in Oyo state reported not to have seen the MAPS Inter-Personal Communication Flip Chart for Malaria Control in the Community when it was shown to them during the sessions. For the generic posters; 82 (85.4%) of the 96 FGD participants in the two states; reported not to have seen the poster titled "NetSafe"; 56 (58.3%) reported not to have seen the one titled "Take Good Care of Your Long-Lasting Net" and 69 (72.0%) claimed not to have seen the poster titled "Disease Prevention".

One probable cause for the low level of exposure to the documents was that the Community Volunteers engaged to use them were not doing as expected. This challenge arose probably because since the documents were designed in the English Language; the volunteers did not make them directly available to the rural audience. Instead; they merely read the documents written in English and then disseminated the information in the local language. Laninhun and Oyeleye [2] pointed out this challenge in the production of IEC materials on malaria prevention and recommended that community members should be involved in such production.

This study went further to establish the level of understanding of respondents about the symptoms of malaria. An accurate understanding or knowledge of signs and symptoms of malaria would enable respondents to take the right steps towards proper treatment of the disease. Part of the contents of the malaria prevention information provided by RBM and Other Partners in the zone focused on understanding the signs and symptoms of malaria. Respondents as well as FGD participants in this study were therefore asked to mention five symptoms of malaria known to them.

Figure 5 reveals that respondents identified 12 symptoms of malaria. From the result; headache was the most common symptom identified by respondents; followed by fever; cold; vomiting; and body pain. During the FGD sessions participants also identified most of the symptoms of malaria. 'Fever' headache' and body pain' were the most frequently mentioned by FGD participants. These and the other symptoms mentioned in the survey; with the exception of insomnia; were also highlighted in MAPS Inter-Personal Communication Flip Chart for Malaria in the Community and RBM IPC GUIDE. Thus; it can be deduced that survey respondents and FGD

participants had a good understanding of the signs and symptoms of malaria. This finding aligns with similar findings by Muhammed et al. [11] among Hausa married men in Mokola community of Ibadan; Oyo sate. However; the finding here indicates the need for a review of the process employed by MAPS and ACCOMIN in communicating their malaria prevention information which currently makes it difficult for the rural dwellers to actually see and read the malaria prevention information provided in their respective Inter-Personal Communication Flip Charts for Malaria prevention.

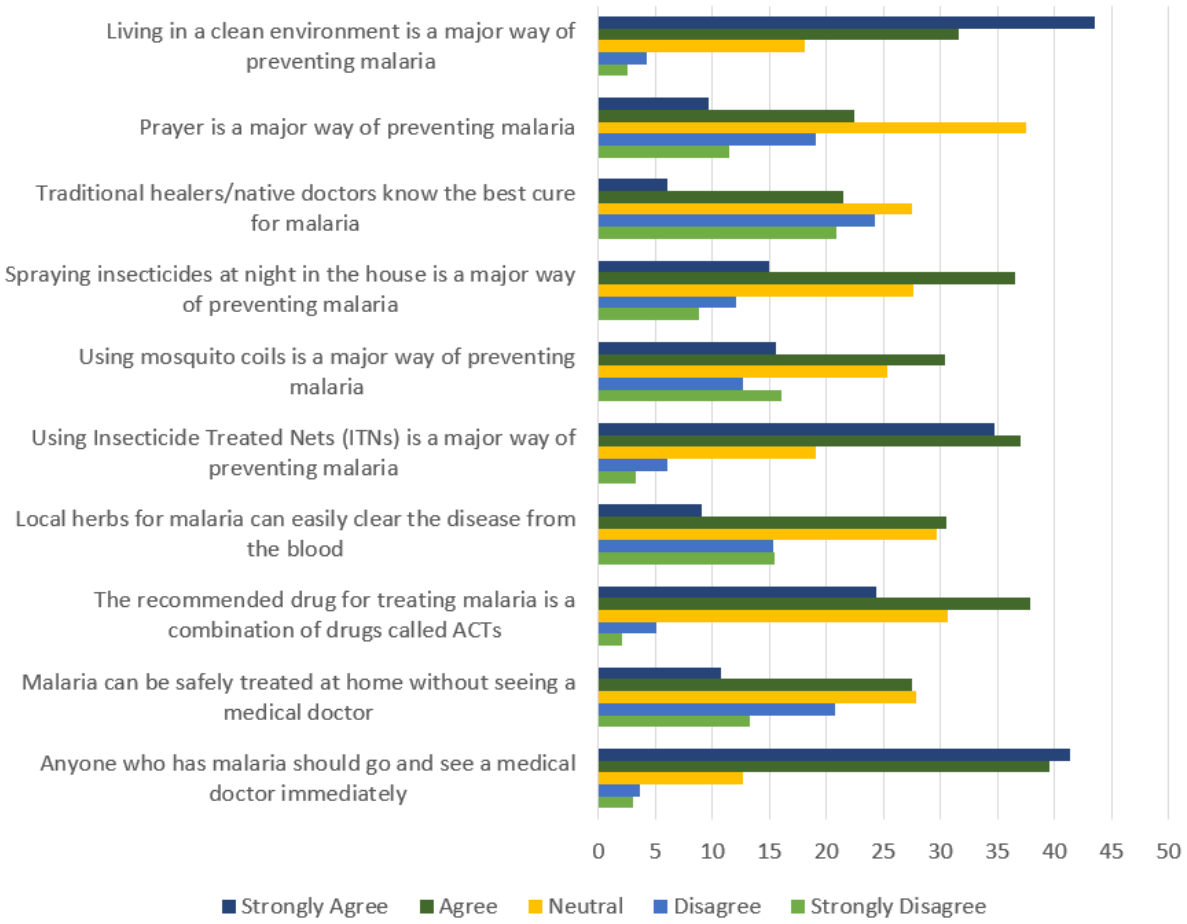

Figure 5. Level of understanding of malaria prevention and treatment among respondents.

We also investigated their level of understanding of the prevention and treatment of malaria as provided by RBM and Partners by asking them to indicate their level of agreement or disagreement with 10 statements on treatment. FGD participants were asked if they knew about ACT Therapy; if they understood what it meant and for those who said they understood; if they had been using it to treat malaria. The FGD participants were also asked if they understood the process of malaria treatment for pregnant women. The result is presented in **Figure 5**.

A Friedman test to evaluate the equality of mean scores of different ways to prevent and treat malaria as indicated by the respondents indicated significant differences in the knowledge of respondents about the different ways of preventing malaria (Chi square = 3730.708; df = 9; p = 0.000). However; one major observation

from the FGD sessions on the level of understanding of malaria prevention was that in most cases; participants were not familiar with the term ACT and thus would deny ever knowing or having heard about the 'drug' but soon after explanation of the term by the facilitator; most of them would chorus they had been using it. Thus; it could be deduced that respondents and FGD participants; knew about the use of ACTs as the recommended medicine for treating malaria but that their literacy level did not make them to understand the term ACT at first mention.

However; 39.6% of survey respondents still believed that local herbs could easily clear malaria from the human blood. This wrong perception about the treatment of malaria was also prominent among FGD participants in the study and confirms previous studies by Duodu et al. [14] which indicate disparity in perception about malaria between urban and rural dwellers in Nigeria. It is also the point at which culture and religion conflict with biomedical explanations for the cause and treatment of malaria; and in the development of malaria prevention information. While some participants agreed that visiting the clinic is a good step; several others expressed belief in the use of traditional means; particularly local herbs to treat malaria. For instance; a nursing mother at Akinmorin (AKIN4) said with all boldness during the session: once you notice you are feeling like having malaria;just as our forefathers have taught us; you enter into the bush; gather some herbs boil and drink and youwill sweat it out.

Another participant at AbayaOje (ABA3) said: there are two ways to treat malaria in my own understanding because those of us in the village; the old men will ask us to first try herbs andwhen we have done that for some days without result that is when we come here(clinic) and they will treat us.

These findings indicate that while respondents knew about the use of ITN to prevent malaria and the use of ACT for the treatment of the disease; a significant number still believed however that local herbs could be effective in treating the disease. This could be the result of fear or mistrust in western medicine as found in the study by Portugaliza et al. [16]. The finding also confirms previous studies by Okwa and Ibidapo [10]; Abiodun and Ilori [15] on the existence of a variety of beliefs about the cause and transmission of malaria which have negative impacts on activities to control the disease. It could also be the outcome of the promotion of alternative medical practices in Nigeria that has led to a renaissance of reliance on local treatment for many diseases. This type of misconception however could hinder the adoption of safe treatment behaviour among respondents and worsen the malaria situation as evident in the concerns expressed by the WHO (2023) on the increase in cases of malaria in the African Region after the COVID-19 pandemic.

14. Perception about causes and treatment of malaria

Respondents were asked to indicate their level of agreement or disagreement with 12 statements that covered perceived causes and treatments of malaria. The result is presented in **Figure 6**.

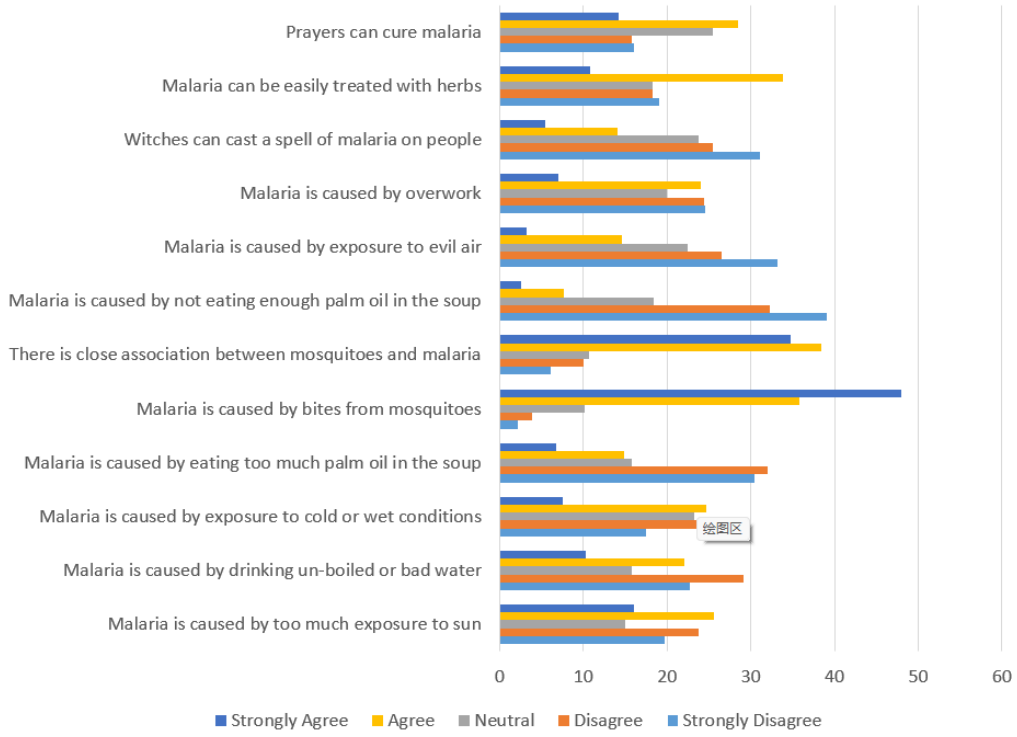

Figure 6. Respondents' perception of causes and treatment of malaria.

Friedman nonparametric test of the responses to the 12 statements indicated significant differences in the perception of survey respondents (Chi-Square = 5402; *p*-value =0.000). Responses from the FGD also indicated that while many participants understood the close link between mosquito bites and malaria; the majority nevertheless still attributed the disease to other non-orthodox factors. These include "staying under the sun for long"; "insufficient palm oil intake"; "attack by witches"; "dirty environment"; "exposure to evil air"; "working too long in the farm" and "bed bugs". For instance; according to an FGD participant (Akinmorin 1); someone can have malaria by inhaling a lot of dust during the dry season or while travelling on rural roads that are mostly untarred. Such line of thinking was supported by other participants such as a female trader (Iresaadu 5) and two farmers; (IdoOsun3;) and (Araromi1). Arowomole 4; a retired teacher also from Oyo East local government area of Oyo state; added another dimension to the misconception when he said: although mosquito is the prime cause of malaria; I still believe that malaria is also present in the air; may God no allow us to collide with evil.

These results therefore indicate that a significant percentage of rural dwellers in South-west Nigeria still have a wrong perception about the cause of malaria. This finding aligns with previous studies such as Portugaliza et al. [16]; Duodu et al. [14]. The implication of this finding is on the adoption of preventive measures by rural dwellers; underscoring the need for more effective communication that will address the misconceptions if the battle against malaria would be won in the mind of rural dwellers. The existence of a significant percentage of respondents who still linked the disease with exposure to sun and those who still considered non-orthodox method of treatment as valid should be of concern to developers of prevention messages as stakeholders strive towards achieving SDG Goal 3.

15. Perception about malaria and the religion matrix

Given the influence of religion in shaping opinions and perception and the finding that many respondents still believed that prayer; a religious exercise; is a major way of preventing malaria; four possible but medically wrong perceptions; "witches can cast spell of malaria on people"; "malaria can be caused by exposure to evil air"; "prayer can cure malaria" and "malaria can be easily treated with herbs" were statistically tested against the religious background of respondents. This became all the more important given the preponderance of FGD participants who also indicated that they believed witches could still cast spell of malaria on people and that prayers is a major weapon for treating malaria. During the FGD sessions; the researcher asked participants to close their eyes and raise their hands (as if in a voting process) whenever the question about witches and prayers were asked. This was done to safeguard their identity and ensure freedom of expression. During the sessions; 45 (47.0%) participants indicated with a raise of hands that they believed witches could cast a spell of malaria on people. Also 74 (77.1%) of the participants indicated they believe that prayers can cure malaria.

The result of the *t*-test on the perception that "witches can cast spell of malaria on people" and religion of respondents indicated a significant difference among survey respondents based on their religious background (Chi-square = 17.889; DF = 8; p = 0.022); The t-test comparing the means confirmed that the differences are significant at F (2; 2070) = 3.264; DF = 2; p = 0.038); thus indicating that there is a strong association between religion of respondents and the perception that links malaria and witchcraft. This confirms similar findings by Okwa and Ibidapo [10]. However; this association is stronger among those who subscribe to 'Other Religions' (mean score=2.53) than those who reported to be Christians (2.31) or Muslims (2.37). The category; 'Other Religions' could refer to atheists; traditional worshipers; or adherents of other religious movements.

The continued existence of this perception; despite the availability of information on malaria that denies any link between the disease and witches is an indication of the strength of the belief among the Yoruba people of South-west Nigeria despite their education; civilisation and exposure to technology. This attitude has been of concern to scholars such as Jayeola-Omoyeni et al. [22]; Prince [23]; Awolalu [24]; Ogungbemi [25] and Bohannan [26].

Yet; religious leaders appear to play insignificant roles in the communication of malaria prevention initiatives in the South-west zone; implying that those who designed the available malaria information for rural dwellers of in the area have not understood the religious views that shape the perception of the people about the disease or incorporated such adequately into the development of prevention information

16. Conclusion

Perception is a key behavioural element that communication activities must target to achieve successful malaria preventive measures. However; this study has been able to show there is disconnect between existing malaria prevention information available

to rural dwellers in south west of Nigeria; and the perception of the people. This has limited the effectiveness of the communication activities; especially the use of Information; Education and Communication (IEC) materials on malaria prevention. The study has shown the continued prevalence of some wrong perception about malaria despite the availability of preventive information to the rural communities in Oyo and Osun states of Nigeria. The disconnect has been brought about by lack of continuity in communication activities; language barriers inherent in the information brochure as well as cultural factors that still promote wrong perception that exposure to sun can cause the disease and that witches can cast it on their victims. Therefore; in the design of malaria prevention information; attention must be given to the perception of the people about malaria and the cultural factors that promote such perception. Such communication materials must also be produced in languages accessible to the populace. Particular attention must be given to elaborating on the causes and treatment of malaria. This will help in accelerating the achievement of the SDG Goal 3 of ensuring healthy lives and promoting well-being for all at all ages; among others.

17. Recommendations

Based on the outcome of this study; the following suggestions are made as recommendations for policy makers and practitioners:

1) Stakeholders in the fight against malaria should devote more resources to communication activities on the disease. Governments in south-west Nigeria should direct their broadcast stations to air malaria prevention jingles regularly as a part of social service.
2) Producers of malaria prevention information should focus more on correcting the misconceptions about the disease; especially with reference to its being transmitted by witches; among the rural populace more aggressively and systematically.
3) Producers of malaria prevention information should be conscious about the attitude of rural audience to the language; models and illustrations used in the production of communication materials for use among rural people.
4) RBM and other Partners should endeavour to produce enough copies of their respective interpersonal communication flip charts on malaria prevention and more importantly; such materials should be translated into local languages to enhance better access among rural people.

Ethical approval: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Osun State Health Research Ethics Committee; Osogbo; Osun state (OSHREC/PRS/569T/42) and Oyo State Research Ethical Review Committee; Ibadan; (AD/13/479/871). Informed consent was obtained from all subjects involved in the study.

Availability of data and materials: The datasets used and/or analysed during the current study are available from the author on reasonable request.

Conflict of interest: The author declares no conflict of interest.

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