

*Original Research Article*

# Diffusion of Innovations and Utilisation of Malaria Prevention Information among rural population in Nigeria.

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The acceptance that communication has a significant role to play in every initiative against the elimination of malaria led to the adoption of the Global Strategic Plan on Roll Back Malaria, (2005-2015) also domesticated as the Nigeria National Malaria Strategic Plan (2014-2020). Thus, RBM and other Partners, using Roger's Diffusion of Innovations templates, deployed communication messages to various populations, among them rural dwellers, in Oyo and Osun states with the aim of creating awareness about malaria prevention and encouraging the adoption of preventive behaviours. This study, anchored on Roger's Diffusion of Innovations, investigated the outcome, employing Survey, Focus Group Discussion (FGD) and Key Informant Interview (KII). It surveyed 2,200 household members drawn from 10 local government areas of Oyo and Osun states using multi-stage sampling. The FGD was made of 96 participants in 16 focus groups involving men, women and expectant mothers selected purposively. There were eight KII. Findings indicate that RBM and Partners in Oyo and Osun states used mass media and interpersonal channels, including Change Agents, to communicate the messages about malaria prevention among their target audience. However, there was a significant difference in the frequency of receiving information on malaria prevention from the information sources identified by respondents (Chi-square=2801.1, df=13, p=0.000) and in the utilisation of malaria prevention information by respondents (Chi-square=1284.310, DF=5, p=0.000). Access to preventive information was hampered by several extraneous factors. A Pearson correlation test established significant relationship between access to malaria prevention information and adoption of malaria preventive measures (p.value =74.009, DF=16, Asymp Sig (2-sided) =.000) and confirms key assumptions of the Diffusion of Innovations including how extraneous factors limit the possibilities of adopting an innovation and the need to reinforce information about an innovation among adopters to avoid their losing the trend. This should guide future interventions.

**Key words:** Access; diffusion; information; malaria; Nigeria; rural; utilisation.

## INTRODUCTION

### Malaria and access to malaria prevention information

The term 'malaria' originated from the Romans; although that was not the name they called it in ancient Rome. It used to be called 'ague', 'intermittent fever', 'swamp fever',

'Roman fever', and 'death fever' (Heggenhougen, Hackethal and Vivek, 2003) and according to the authors, "Malaria or "bad" or evil (mal) air (aire) was a name derived from the

miasma theory of causation. Most African communities similarly have different terms to describe the disease. Among the people of South-west and south-east Nigeria, malaria is called locally *ibà*. However, they also distinguish between “ordinary” and “yellow”, “cold”, “colored”, “wet”, “dry” and “shaking” malaria (Brieger, Nwankwo, Ezike, Sexton, Breman, Parker, Ekanem and Robinson, 1996, Okeke and Okafor, 2008). In the south-west, there is what is called *ibà apónju*; yellow fever, the type that colours the eyeballs yellow, *akọ ibà*; severe malaria, *ibà apóntò*; the one that colours the urine deep yellow, *ibà réfunréfun*; typhoid fever and *iba ré kùrékú*; relapsing fever. There is also the ordinary *ibà* associated with headache, shivering, cold etc.

Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected mosquitoes (World Health Organisation, 2010). The infected Anopheles mosquitoes, called “malaria vectors”, bite mainly between dusk and dawn. There are four types of malaria parasites infecting humans: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae*, and *Plasmodium ovale*. While *Plasmodium falciparum* and *Plasmodium vivax* are the most common, *Plasmodium falciparum* is the most deadly. However, some cases of human malaria have also been identified with *Plasmodium knowlesi* – a monkey malaria that occurs in certain forested areas of South-East Asia (WHO, 2010). The official body responsible for coordinating Nigeria’s response to the malaria challenge is the Nigerian national secretariat of Roll Back Malaria (RBM) Partnership which is 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.

The first meeting of stakeholders to design an acceptable framework for communication related to malaria prevention took place in 2011-2012, following the understanding that sustained communication interventions were necessary to motivate households to prevent and treat malaria (Roll back Malaria, 2012). The situation painted by the ‘insufficiencies’ and ‘lacks’ in the area of malaria prevention communication highlighted by the stakeholders is succinctly described by Roll Back Malaria (2012), as follows:

“within countries there is currently high demand for technical assistance to carry out planning processes, write proposals for communication research, conduct training, develop appropriate communication materials, and design M&E systems. Communication activities in support of malaria prevention and treatment generally fall to Ministry of Health (MOH), Communication or Health Promotion units that are understaffed and overburdened with responsibilities for a wide range of public health priorities.”

It is therefore now accepted that communication has a big role to play in every initiative against malaria. Some of these roles include the facilitation of the adoption of new policies, building awareness and changing perceptions and beliefs about malaria, increasing knowledge as well as the demand for malaria prevention services, and also improving acceptance and trust within the family and the community. Others include improving prescription practices and effectiveness of counselling, improving motivation of families, communities, and providers, reducing barriers, increasing the appropriate utilisation of services as well as the management of unforeseen events (Roll Back Malaria, 2012). Thus, the stakeholders in the development of the strategic malaria communication framework agreed to some specific objectives at the end of the various meetings that held between 2011 and 2012. The objectives are that between 2012 and 2017, international and national partners will advocate for and provide the resources, training, and expertise to ensure NMCPs in 80% of high-burden countries have developed and implemented evidence-based, national communication strategies, 80% of high-burden countries are routinely allocating resources in their malaria prevention budgets to communication interventions, RBM communication partners will regularly generate and disseminate evidence of communication impact, including the impact of the priorities outlined in the communication research agenda. The conclusion of the stakeholders is that the “achievement of these goals will contribute to a reduction in the intolerable burden of malaria morbidity and mortality in these countries” (Roll Back Malaria, 2012). This study is therefore an investigation of how these objectives has been achieved in Nigeria, particularly in Oyo and Osun states.

### Problem Statement

A major achievement of the RBM Partnership was the adoption of the Global Strategic Plan on Roll Back Malaria, (2005-2015) which has also been domesticated in the Nigeria National Malaria Strategic Plan (2014-2020). This strategic plan includes the creation of awareness, demand and appropriate use of malaria prevention products and the development of country-level advocacy and communication. The communication component of the Strategic Plan is expected to ensure that ‘information about malaria prevention interventions reaches the appropriate groups, and that families are empowered to make informed decisions concerning appropriate care practices related to preventing and managing malaria’ (Roll Back Malaria Partnership 2005). The Diffusion of Innovations (Rogers 1987), is a popular theory that drives many communication aimed at behaviour change such as the adoption of malaria preventive behaviour. In utilising the theory, communication planners would consider changes in terms of knowledge and attitude to be intermediate steps in a decision process (Windahl, Signitzer and Olson 2009).

The five goals identified in the Strategic Framework for Malaria Prevention (Roll Back Malaria Partnership, 2012)

can be summed up as promoting an innovation: 'a culture of malaria prevention and treatment-seeking behaviour' which would include improved acceptance and use of LLINs, particularly for children under five and pregnant women, early treatment seeking and compliance with drug therapy (Artemisinin-based Combination Therapy — ACTs), as well as the acceptance of indoor residual spraying (IRS) as a tool in vector control among the populace, among other measures. The adoption of this 'culture of malaria prevention' was the focus of the communication campaigns by the RBM and Partners in Oyo and Osun states and this study investigated the degree to which the communication had succeeded among the target audience by examining the access to the prevention information from selected sources of information that ranged from the mass media, interpersonal contacts, change agents and opinion leaders as proposed by Rogers (1987). Limited work has been done in examining the level of access to information that is meant to influence the change of behaviour on malaria prevention, particularly among rural dwellers. Apart from NPC and ICF Macro (2009; 2014) which investigated access to mass media information across Nigeria, other existing studies have focused on impact of mass media on adoption of preventive measures (Ankomah, Adebayo, Arogundade, Anyanti, Nwokolo, Inyang, Ipadeola and Meremiku, 2014; Bowen 2013, Yaya, Uthman, Amouzou and Bishwajit 2018), without examining the access of end users.

### Research Questions

1. What is the level of access to malaria prevention information among rural dwellers in Oyo and Osun states?
2. What factors influence access to malaria prevention information among rural dwellers in Oyo and Osun states?
3. How do rural dwellers in Oyo and Osun states utilise malaria prevention information provided by Roll Back Malaria and other Partners?

### Hypothesis

H<sub>0</sub>1: There is no significant relationship between access to malaria prevention information and adoption of malaria preventive measures among rural dwellers in Oyo and Osun states.

### Theoretical Framework

This study is guided by the Diffusion of Innovations (Rogers, 1987). The four basic assumptions of the theory are that;

- (a) There are conditions which increase or decrease the likelihood that a new idea, product or practice will be adopted by members of a given culture.
- (b) The media as well as interpersonal contacts provide information and influence opinion and judgment.
- (c) Opinion leaders exert influence on audience behaviour through their personal contacts, but that additional intermediaries, also called Change

Agents, are equally included in the process of diffusion.

- (d) Information flows through networks; the nature of networks and the roles opinion leaders play in them determine the likelihood that an innovation will be adopted.

Rogers identified five stages in the process of adopting an innovation: the knowledge stage, the persuasion stage, the decision stage, the implementation stage and the confirmation stage. At the knowledge stage, Rogers (1987, cited in Windahl et al, 2009) identified three types of knowledge as follows:

- (1) Software information or awareness knowledge, which relates to information that would create awareness among those being exposed to an innovation. Thus, many of the communication by the RBM and Partners among rural dwellers in Oyo and Osun states were targeted at providing awareness about the availability and usefulness of LLINs, availability of malaria rapid test etc
- (2) How-to-Knowledge which is meant to assist the adopter access and utilise the innovation appropriately. The communication materials deployed among the rural areas for this study contained information that guided the receivers for instance on where to access free LLIN, how to hand it, how to wash it and how to sleep inside the net.
- (3) Principles Knowledge which has to do to with the general ideas behind the innovation such as the scientific laws that relates to the functioning of the innovation.

At the Persuasion Stage individuals are able to form their opinions about the innovation, hence, as suggested by Windahl et al (2009), interpersonal channels are more crucial as information source at such a stage since they are able to formulate a message better than mass communication sources.

The Decision Stage follows persuasion and will manifest as either adoption or rejection of the innovation. At this stage however, utilisation of the adopted innovation may still prove difficult due to other extraneous factors such as availability of resources. An example of this is in the study by Ojebode (2005) where residents of Oyo state indicated they understood communication messages on environmental cleanliness but that they could not practice what the message recommended since government had not provided enough waste collection materials for them to use. A resource poor rural dweller may also not be able to visit a clinic at the onset of malaria or having known the right medication to use may still not be able to purchase such. But there could also be positive external factors to aide adoption such as, in the case of malaria prevention, and as happened in the states in this study, massive distribution of LLIN to the public. This too, however, has its own limitations as would be discussed in other parts of this study.

However, in the absence of negative extraneous factors, individuals are ready for the Implementation Stage of the theory where they start to use the innovation they have adopted. In the case of malaria prevention, to sustain the utilisation of preventive measures individuals must have access to information for instance on where to get their LLIN, how to mend it if it spoils, how to wash it and dry it etc.

The last stage in the diffusion of innovations theory is the Confirmation Stage where the adopter will seek information that will reinforce his/her positive decision on the innovation. A negative information at this stage may still lead to a discontinuation of the innovation.

### **The Diffusion Process for Malaria Prevention Information among Rural Dwellers in Oyo and Osun states.**

The communication materials used in this study included five radio jingles produced by Malaria Plan in States (MAPS) to mobilise residents for collection and use of LLIN in Oyo state and one radio jingle on malaria prevention in Osun state produced by the state's Malaria programme. MAPS was a Principal Recipient of the Global Fund New Funding Model Round 8.

The jingles had been played on the various radio stations in the states prior to this study. Other materials included a copy of *Interpersonal Communication Flip Chart for Malaria Control in the Community* and a copy of *RBM Malaria IPC Guide*. Both documents were produced by NMEP and were in use in the two states by Association of Civil Society Organisations (CSOs) working on Malaria prevention and Nutrition (ACCOMIN)/AFRICARE prior to this study.

There were also three generic posters on malaria prevention produced by NMEP, Osun state government and Oyo state government and other RBM partner Organisations. The generic posters share common features and were commonly distributed in the two states with the only difference being the inscription of the host state's name on the poster circulating in their respective state. These materials were also in circulation in the two states prior to this study. The suitability of these materials have been discussed in another study (Laninhun and Oyeleye, 2021). MAPS made use of religious leaders for its advocacy activities on malaria prevention during the period.

MAPS trained 33 Local Government Health Educators in Oyo state because they were responsible for communication and social mobilisation at the ward and local government level. MAPS had 236 Community Volunteers who were expected to visit a minimum of 30 households per day within 132 out of the 351 wards supported by the organisation in Oyo state. Each Volunteer was expected to visit targeted households and speak to them about malaria and mosquitoes in Yoruba language.

MAPS also made use of religious leaders for its advocacy activities on malaria prevention during the project. The religious leaders were used as "Malaria Champions/ Ambassadors" and their role was such that during Jumat services on Friday and during services in the church on

Sunday, 'they kind of diffuse malaria prevention and treatment services during sermons by mainstreaming malaria messages into their programmes.', according to KIIvii.

AFRICARE a Sub Recipient of the RBM Grant for the implementation of social mobilisation project in 15 local government areas of Osun state, worked with a pair of Interpersonal Communicators (IPCCs) who carried out interpersonal Communication (IPC) sessions throughout the local government areas. The IPCCs were men and women who had been involved in Social mobilisation activities on different programmes and as such were well grounded in communication.

### **Literature Review**

Although they are few, there have been scholarly interest in the investigation of access to malaria prevention information among various population groups in Nigeria. NPC and ICF Macro (2009), NPC and ICF Macro (2014) both investigated three major sources of access to mass media information viz, newspaper, television and radio among respondents. The investigation was justified on the basis that "exposure to information on television and radio and in the print media can increase people's knowledge and awareness of new ideas, social changes, and opportunities as well as affect their perceptions and behaviours, including those related to health". Similarly, NPC, NMCP and ICF International (2012; 2016) also included access to malaria prevention messages in its Malaria Indicator Survey 2010 and Malaria Indicator Survey 2015. The 2010 MIS investigated exposure to eleven malaria prevention messages with respondents from the South -West indicating their exposure levels to them as follows: Mosquito backing baby (8.2%), Man playing draft with mosquito (3.6%), Mosquito appears in family picture (2.9%) Woman wearing mosquito net to market (billboard) ( 0.5%), Friends playing drafts; small friend slaps big friend (14.2%), Mosquito takes child while family is sleeping (4.9%), Woman wearing mosquito net to market (TV) (1.1%), Woman tells husband (3.6%), King gets slapped (25.5%), Lonarts Vs Malaria (36.5%). Others (8.7%) and Don't Know (12.1%).

A comparison of the 2010 and 2015 MIS indicate that while radio decreased in importance between 2010 and 2015 as a source of malaria prevention messages from 74.1% to 67.0% among rural dwellers across Nigeria, it increased from 42.1% to 80.9% among respondents in the South-west. Television also decreased among rural dwellers within the same period from 20.7% to 15.9% but again increased in the South-west from 52.1% to 60.2%. This could probably be traced to the apparent implosion of private broadcasting operations in the South-west following the liberalisation of licensing by the federal government of Nigeria. Community Health Extension Workers increased only marginally among rural dwellers between 2010 and 2015 from 4.0% to 5.3% but increased significantly in the South -West from 3.4% to 21.2%. Mosques / Churches as source of malaria prevention

messages increased from 0.3% to 3.5 % among rural dwellers across Nigeria between the two studies and also increased from 0.4% to 5.5% in the South-west zone and while the use of Town Announcer decreased from 7.0% to 5.3% among rural dwellers, it increased in importance among residents of the South West from 2.5% to 5.4%.

The use of Leaflets, Fact Sheets and Brochures as sources of information on malaria prevention increased among rural dwellers from 3.7% in 2010 to 4.7% in 2015 and also increased from a mere 2.0% in 2010 to 14.8% in 2015 among South-west people. However, although the use of Relatives and Neighbours decreased significantly among rural dwellers nationally from 17.4% in 2010 to 6.8% in 2015, it gained little increase in the South-west, from 9.4% in 2010 to 10.6% in 2015. The 2010 MIS did not consider 'Attendance at Ante Natal Care', 'Government Hospitals' and 'Social Media' as sources of information on malaria prevention but the 2015 investigation did. From the 2015 MIS, 3.5% of residents in the South-west sourced information on malaria prevention from 'Attendance at Ante Natal Care' and 4.2% from 'Government Hospitals'. However, the 4.2% from the South-west is lower than the 8.7% of respondents from the South-South who sought information on malaria prevention from 'Government Hospitals' although the 3.5% who sourced information from 'Attendance at Ante Natal Care' in the South-west is higher than the 0.9% from the South-South. These differentials may speak of the attitude and trainings of health workers in the South-west on malaria prevention while relating with their patients.

In their own study of mothers in Ebonyi State, South East Nigeria, Agu and Nwojiji (2005) however identified relatives/community members (51.7%) as the highest source of information on malaria among the respondents followed by health facilities (27.1%) and health education campaigns (5.1%). AudienceScapes (2010) in their study of access to malaria information among Zambian adults note that rural residents are somewhat less exposed to information compared to their urban counterparts with a difference of more than 7%. The study also indicates differences in monthly access to malaria information by respondents' financial status, level of English comprehension as well as level of education. It established a link between the general health status of respondents and their access to malaria information. Thus those who claimed higher access have relatively better health than the other respondents. The study did not however indicate whether the respondents with better health were in such condition because of their access to malaria prevention information or whether their being in good health was what predisposed them to seeking malaria prevention information. Nevertheless, such people can become influential sources of marketing malaria prevention information; they can be used as Change Agents because they have a state of health that can be desired by others.

The study by AudienceScapes (2010) identified the top three most-used sources for obtaining malaria-related information by men and women as radio, friends/family

and medical doctors. For men however, the most used source of information is radio while for women the most used source is friends/family. A similar study in South West Uganda showed a high level of usage of radio and health workers as sources of information on malaria (Ndyomugenyi, Magnussen and Clark, 2007). But a two-year study conducted by Malaria Research Lead Programme (MRLP) (2008) among residents of KwaZulu-Nata, Limpopo and Mpumalanga areas of South Africa indicated that health facility was the highest source of information on malaria although it decreased in importance by about 2% between the study period, 2004 and 2006. On the other hand, family and friends increased in importance by almost 4% at 15.2% in 2004 and 18.7% in 2006. Radio had one of the highest rates of increase in importance, from 12.9% in 2004 to 21.1% in 2006 while pamphlets and posters decreased from 4.9% in 2004 to 2.7% in 2006. The highest rate of importance was in the use of community health workers, rising from a 0% level in 2004 to 36% in 2006. The high rate in the use of community health workers was due to the fact that up till 2004, they were not being used for malaria education (Malaria Research Lead Programme, 2008).

A study of the impact of health facilities on malaria control intervention by Aregbeshola and Khan (2017) indicated that health facilities really have impact, particularly for children under five years of age and pregnant women in Nigeria. However, their impact on the uptake of malaria control interventions such as IPTp, ACT and RDTs among the same set of population was low indicating the need to improve on health care facilities as a critical centre for the uptake of malaria prevention interventions in Nigeria. Napier, Baird, Walwyn-Jones, Garcia, Categena, Mngadi, Vanisaveth, Sengsavath, Vilay, Thongpiou and Cohen (2021) evaluated the role of Community Health Workers (CHWs) in vertical malaria control among populations in Honduras and Lao Peoples Democratic Republic and noted the positive contributions of CHWs who are able to detect nearly 30% of all malaria cases in remaining hotspots in Lao PDR and more than 50% of all reported malaria cases in select regions of Honduras. The study recommended that 'as malaria test positivity declines, expanding CHWs' responsibilities may encourage individuals to seek care and enable CHWs to more promptly detect and treat remaining cases'

Ogedengbe and Oyeleye (2021) investigated patterns of media usage among residents of Lagos state to unravel 'why media of communication seems to have failed to produce desirable outcome in Lagos State on the Mask-Up Lagos Campaign despite exposure of residents of Lagos to its communication which has not led to change in their behaviour towards COVID-19 curtailment.'

It is evident from these various studies that access to malaria prevention information varies among countries and even geo political zones in Nigeria. Therefore it is more germane to examine the level of utilisation of insecticide treated nets and other malaria prevention initiatives due to access to malaria prevention information in a Nigerian

context. Understanding the degree of correlation between access to malaria prevention messages and the utilisation of such information in the form of acquiring ITNs and taking other preventive measures will assist in a better understanding of the adoption process and therefore the development of more effective strategies to reach rural dwellers with malaria prevention initiatives.

### Materials and Methods

This is a cross sectional study and made use of both quantitative and qualitative data. Specifically, the study employed the Survey, Focus Group Discussion and Key Informant Interview.

### Study Site

The study was conducted among rural dwellers in Oyo and Osun states, Nigeria, malaria communication managers in the secretariat of Roll Back Malaria (RBM) in Nigeria as well as coordinators of Partner organisations on Malaria prevention working with the RBM in Oyo and Osun states. The two states are in the South-west zone of Nigeria. The capital of Oyo state is Ibadan while Osogbo is capital of Osun state. In terms of land mass, Osun is made up of 3,525.78sqm and Oyo 10,351.56sqm, (NBS, 2009). They share boundaries and are culturally homogenous. While Osun state has 30 local government areas Oyo has 33.

### Sample Size

The survey was made up of 2,200 household members drawn from 10 local government areas of Oyo and Osun states. The Focus Group Discussion (FGD) was made of 96 participants in 16 focus groups involving men, women and expectant mothers. Each discussion group comprised of six participants. There were eight participants in the Key Informants Interviews.

### Sampling 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. In the second stage, the ten local government areas: Obokun, Ejigbo, Irepodun, Boluwaduro and Orolu (Osun State) and Afijio, Egbeda, Surulere, Orire and Atiba (Oyo state) were selected through balloting for the study. In the third stage, two communities hosting Primary Health Centres (PHC) were purposively selected from each local government. 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, eight 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. From each local government, two PHCs were also selected.

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.

For the Key Informants Interview (KII), eight (8) interviewees were purposively selected based on their positions and official involvement in ACSM activities: KII1 worked with the National Malaria Elimination Programme (NMEP) office, KII2 (ACCOMIN), KII3 (AFRICARE), KII4 (Ministry of Health, State of Osun), KII5 (Malaria Programme, Oyo State), KII6 (Association for Reproductive and Family Health, Ibadan), KII7 (Ministry of Health, Oyo state) and KII8 (Malaria Programme in States).

### Ethical approval

Ethical approvals for the research were obtained from the Ministries of Health in Oyo and Osun states respectively.

### Methods of data collection

The questionnaire was in English and Yoruba Languages to take care of respondents who might not be able to read or write in English. 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. Others were allowed to keep the questionnaire for some days to enable them provide proper answers while the trained Research Assistants would go back to collect such. The questionnaires were administered at the homes or shops of respondents. A total of 2,200 copies of the questionnaire were distributed to respondents but only 2,120 were retrieved, indicating a 96.3% return rate. The researcher followed up with the trained Research Assistants in six of the local government areas to ensure proper return of the questionnaire. 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.

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. The interviews with Key Informants were conducted in English

language in the offices of the respective interviewees. The sessions of the Key Informant Interviews were also

### Data Analysis

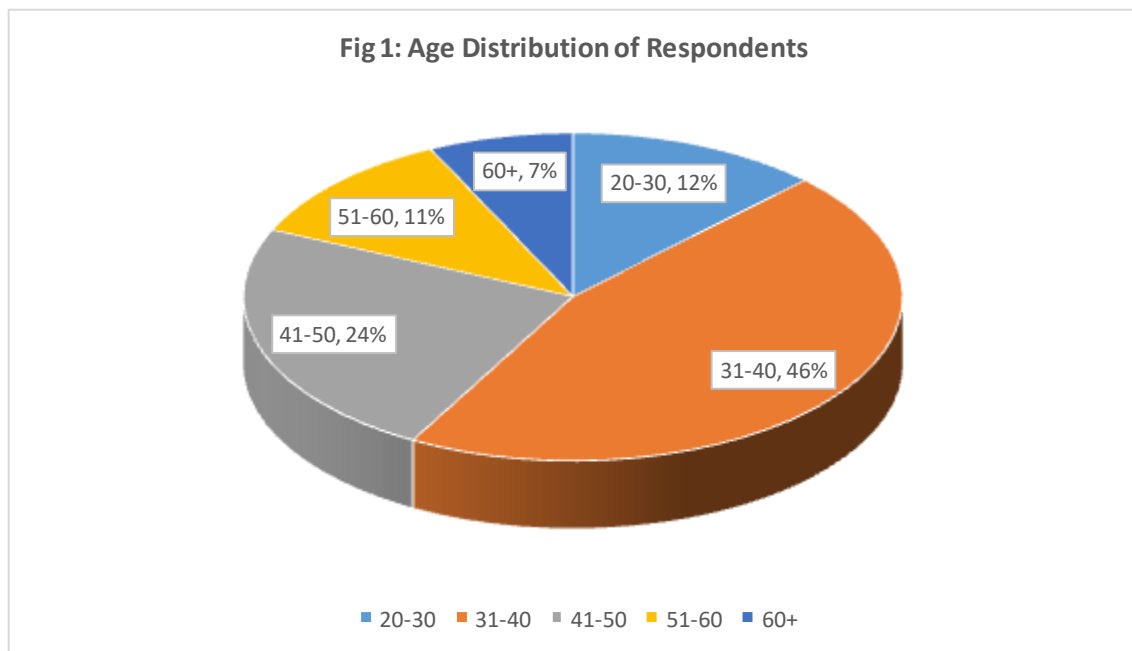
For the survey, the general distribution of trends in the data was analysed using descriptive statistics; simple percentages and the Friedman non-parametric test. The Friedman non-parametric test was used to rank the observations of respondents on a number of variables in the study. The t-test was used to compare mean scores of demographic variables of the sample while Pearson correlation was used to investigate the significance of associations and relationships between the study variables. The voice notes from Key Informants were transcribed and a panel consisting the Researcher and the seven trained Research Assistants reviewed the notes to establish themes from the responses. Voice notes from FGD participants

conducted by the researcher with the aid of a digital tape recorder.

were first translated into English language before the panellist reviewed the comments along thematic lines. Both KII and FGD data were analysed objectively 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 allocated a number (from 1-6), along with the name of their respective communities, for ease of reference during analysis.

### Results

The distribution of respondents by their age is presented in Figure 1. About 38.4% were aged 20-30 years, 32.1% (31-40 years), 16.6% (41-50 years), and 7.9% (51-60 years) while 5.0% were from 60 years and above.



The gender distribution of respondents is presented in Figure 2. About 39% were males while 61.1% were females.

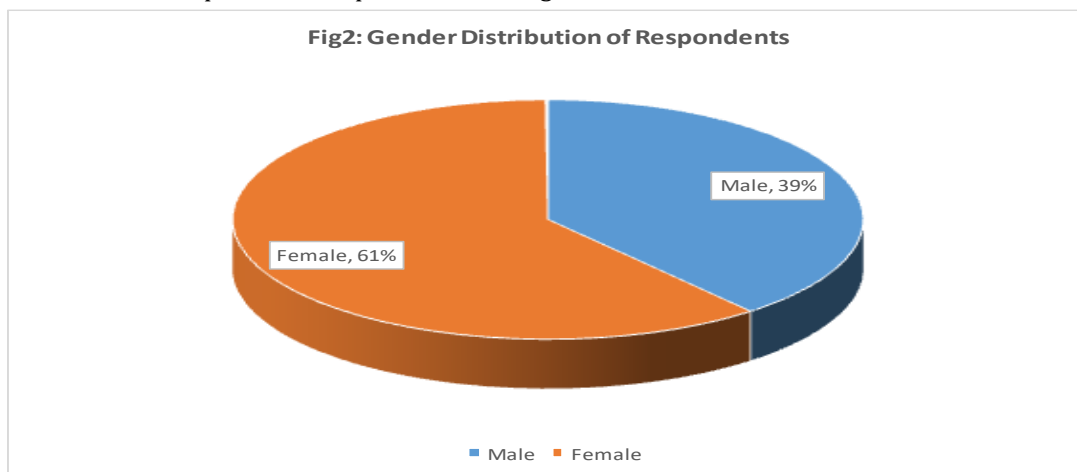


Figure 3 presents the educational background of respondents, indicating that about 7.8% had no formal education, 11.0% had primary education, 22.6% (secondary), 33.0% (NCE/OND), 21.2% (HND/BSC) while 4.4% had other forms of educational attainment.

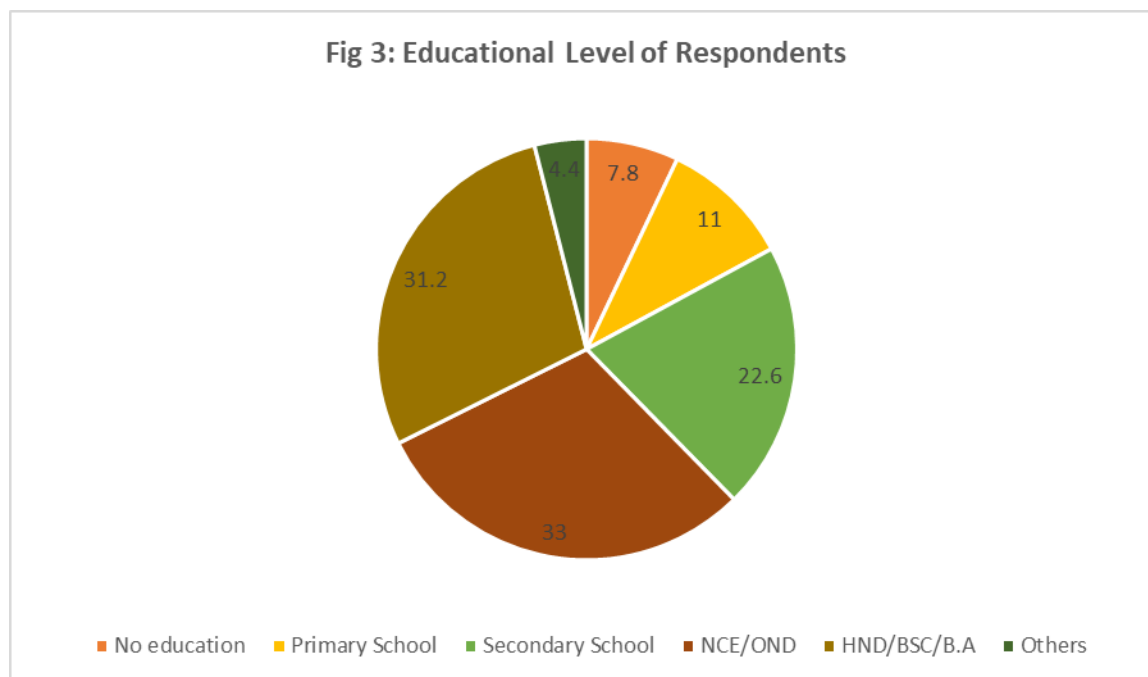
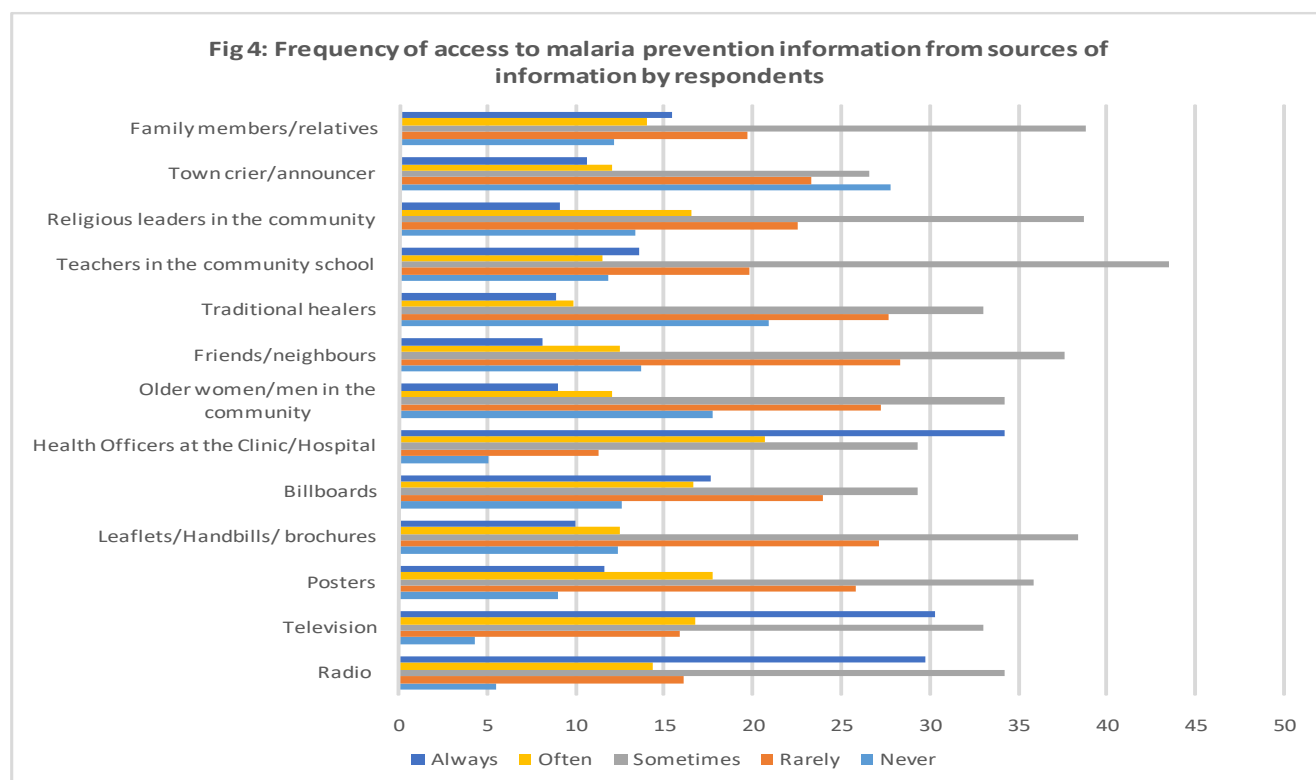


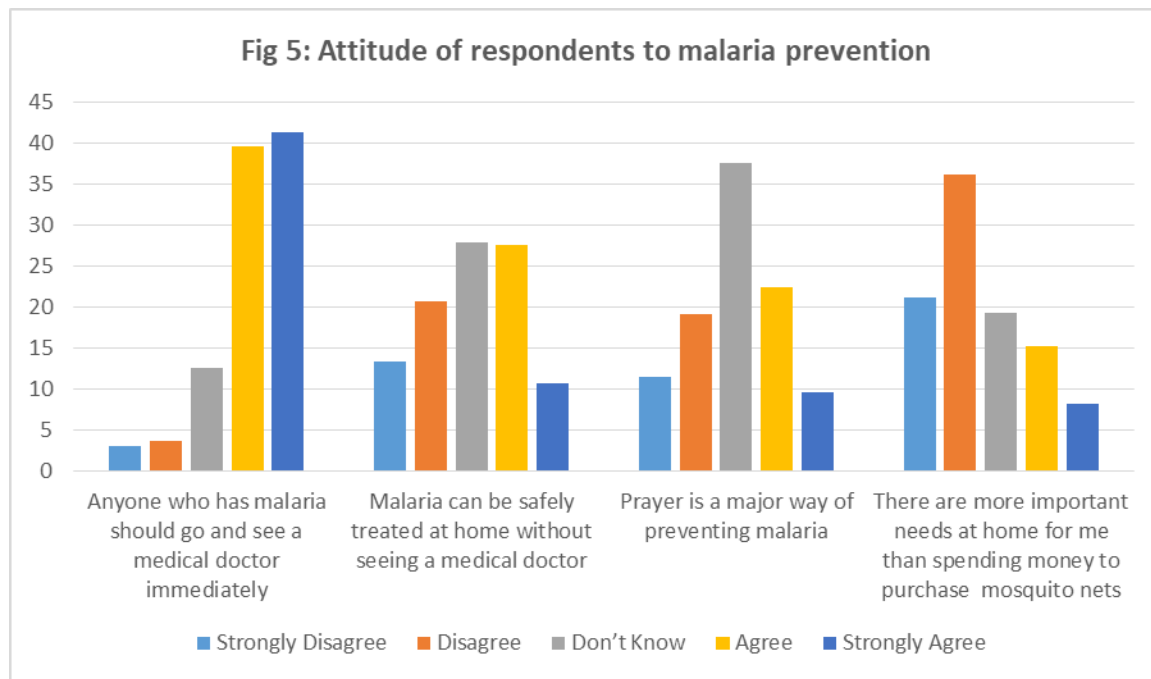
Figure 4 presents the frequency of access to malaria prevention information from sources of information by respondents. From the result, respondents claimed to have the highest frequency of receiving information on malaria prevention from Health Officers at the Clinic/Hospital

(54.8%), followed by television (46.9%), Community Volunteers/Malaria Role Models (45.2%) and radio (44.0%). The information source with the least frequency of exposure by respondents was traditional healers (18.6%).



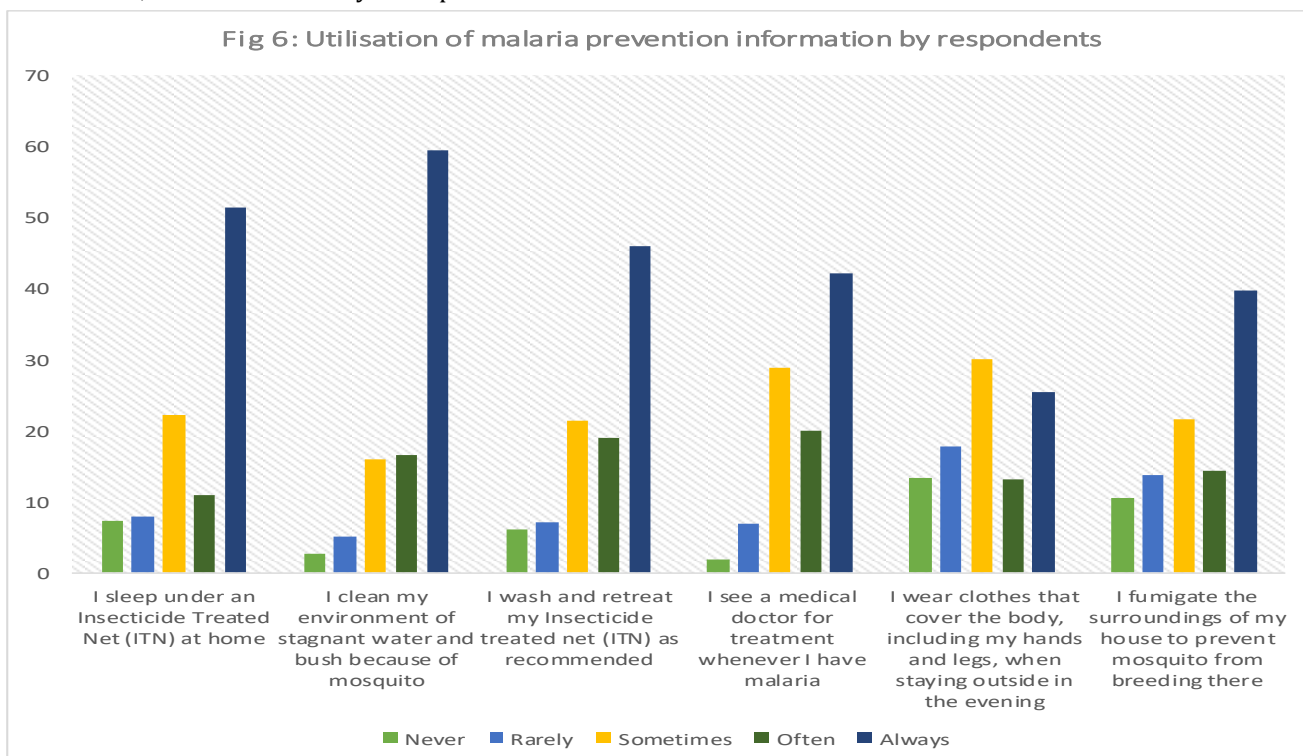
The attitude of respondents to malaria prevention is presented in Figure 5. About 80.5% would see a medical doctor immediately they had malaria while 6.6% would not. About 38.2% considered malaria as a disease that could be easily treated at home, but 34.0% disagreed and while

32.0% would resort to prayer as a major way of preventing malaria, only 30.5% said they would not assume such disposition. Only 23.4% of respondents considered that they had more important needs at home than spending money to purchase mosquito nets while 57.3% disagreed.



The utilisation of malaria prevention information by respondents is presented in Figure 6. About 76.2% reported to always clear their environment of dirt to prevent malaria, 65.1% regularly wash and retreat their insecticidal nets, and 62.4% always sleep under an ITN

while 62.3% reported seeing a medical doctor immediately they had malaria. The least positive utilisation was that of wearing clothing that cover the body, including the hands and legs, when staying outside in the evening (38.7%).



A one-way analysis of variance to determine the difference between the scores in the utilisation of malaria prevention information by respondents is presented in Table 1. It indicated a significant difference (Chi-square=1284.310, DF=5, p=0.000). Cleaning the environment of stagnant

water and bush because of mosquito ranked 4.17, sleeping under an ITN (3.68), seeing a medical doctor at any attack of malaria (3.65) and washing and retreating the ITN as recommended (3.63) while fumigating the environment ranked 3.24.

**Table 1: Differences in Utilisation of Malaria Prevention Information by respondents**

	Statement	N	Mean	Std. Deviation	Mean Rank
1	I clean my environment of stagnant water and bush because of mosquito	2073	4.29	1.019	4.17
2	I sleep under an Insecticide Treated Net (ITN) at home	2073	3.94	1.283	3.68
3	I see a medical doctor for treatment whenever I have malaria	2073	3.95	1.065	3.65
4	I wash and retreat my Insecticide treated net (ITN) as recommended	2073	3.92	1.249	3.63
4	I fumigate the surroundings of my house to prevent mosquito from breeding there	2073	3.60	1.394	3.24
5	I wear clothes that cover the body, including my hands and legs, when staying outside in the evening	2073	3.21	1.352	2.62
Chi-square=1284.310, df=5, p=0.000					

**Table2: Test of H<sub>0</sub>1: There is no significant relationship between access to malaria prevention information and adoption of malaria preventive measures among rural dwellers in Oyo and Osun states, Nigeria.**

I sleep under ITN at home								
Radio jingles as info source			Never	Rarely	Sometimes	Often	Always	Total
	Never	Count	13	15	28	17	40	113
		%within radio_1	11.5%	13.3%	24.8%	15.0%	35.4%	100.0%
	Rarely	Count	17	38	88	44	148	335
		%within radio_1	5.1%	11.3%	26.3%	13.1%	44.2%	100.0%
	Sometimes	Count	51	52	187	70	349	709
		%within radio_1	7.2%	7.3%	26.4%	9.9%	49.2%	100.0%
	Often	Count	16	27	55	48	152	298
		%within radio_1	5.4%	9.1%	18.5%	16.1%	51.0%	100.0%
	Always	Count	36	36	111	52	388	623
		%within radio_1	5.8%	5.8%	17.8%	8.3%	62.3%	100.0%
	Total	Count	133	168	469	231	1077	2078
		%within radio_1	6.4%	8.1%	22.6%	11.1%	51.8%	100.0%

Pearson Chi-Square (p.value =74.009, DF=16, Asymp Sig (2-sided) =.000

**Decision Rule:** Reject  $H_{01}$  if p-value is less than  $\alpha$ -value (.05), otherwise do not reject  $H_{01}$ .

**Conclusion:** Since p-value of .000 in the result is less than  $\alpha$ -level of (.05), we therefore reject null hypothesis and conclude that there is significant relationship between access to malaria prevention information and adoption of malaria preventive measures among rural dwellers in Oyo and Osun states, Nigeria.

### Discussion of Findings

#### What is the level of access to malaria prevention information among rural dwellers in Oyo and Osun states?

In answering this research question, survey respondents were asked to indicate the frequency of their receiving information from 14 selected sources of information on malaria prevention in their communities as presented in **Fig 4**. It is assumed that exposure to such sources of information will infer availability of the source(s) of information. A Friedman nonparametric test indicated significant differences in the frequency of receiving information on malaria prevention from the information sources identified by respondents (Chi-square=2801.1, df=13, p=0.000). Result of the Friedman test however indicated that in terms of ranking, Health Officers at the Clinic/Hospital, had the highest rank (9.90), followed by television (9.08), radio (8.99) and Community Volunteers/Malaria Role Models (8.97). The source of information with the least rank was Town Crier/Announcer (5.88).

From the results of both the frequency counts and the Friedman non-parametric test, Health Officers at the Clinic/Hospital had the highest score (54.8%) and rank (9.90), followed by television with frequency count of 46.9% and mean rank of 9.08. However, although the frequency count indicated a higher frequency of exposure to Community Volunteers/Malaria Role Models (45.2%) than radio (44.0%), the Friedman test ranked radio (8.99) slightly higher than Community Volunteers/Malaria Role Models (8.97). This result confirms the emergence of Health Officers and Community Volunteers/Malaria Role Models as important elements in the diffusion process.

The possibilities inherent in enhancing malaria prevention behaviour using health officers had been highlighted in the study by Malaria Research Lead Programme (MRLP, 2008) which established a 36% increase in the importance of community health workers as sources of information on malaria within two years following specific training programmes for them. This relevance was also highlighted in various interviews conducted with Key Informants. For instance, KII8 explained that MAPS trained 33 Local Government Health Educators in Oyo state because they were responsible for communication and social mobilisation at the ward and local government level. MAPS had 236 Community Volunteers who were expected to visit a minimum of 30 households per day within 132 out of the 351 wards

supported by the organisation in Oyo state. Each Volunteer, according to KII8 was expected to visit targeted households and speak to them about malaria and mosquitoes in Yoruba language. Another Key Informant, (KII6) explained that her organisation, which was a Sub Recipient of the RBM Grant for the implementation of social mobilisation project in 15 local government areas of Osun state, worked with a pair of Interpersonal Communicators (IPCCs) who carried out interpersonal Communication (IPC) sessions throughout the local government areas. She said:

“Most of the IPC Conductors have been involved in Social mobilisation activities on different programmes so they are well grounded in communication. Acceptance of LLINs and use is now on the increase as a result of the information that is being disseminated during social mobilisation activities.”

This was the same approach identified by KII1 who worked with the NMEP especially during the distribution of mosquito nets. According to her, apart from training and using health workers, the NMEP used women who had been trained on malaria prevention messages and how best to communicate such to householders. Such volunteers were going from one household to the other while there were also role model care givers who were mainly retired health workers who had also been appropriately trained and were respected in their respective communities.

The responses of FGD participants in this study also corroborated the importance of the interpersonal channels of health workers and community volunteers in the dissemination of malaria prevention information. While the preponderance of FGD participants identified radio and television as key channels of information on malaria prevention in their localities, some of them equally established the usefulness of the interpersonal sources such as Health Workers, Malaria Role Models (MRMs), and Community Volunteers (CVs). The Community Volunteers act like the Malaria Role Models except that they are not necessarily retired health care workers like most of the MRMs. A seamstress (Olorunsogo4) in Egbedore local government area of Osun state said, “some people were appointed to be going round the town and it was from them that we first heard”, while her colleagues on the panel nodded in affirmation. The same scenario repeated itself in most of the FGD sessions. For instance at Araromi PHC, Oyo East local government area when an old farmer (Araromi6) acknowledged that until the coming of the Community Volunteers, many residents used to follow the pattern of treating malaria established by their forefathers, most of the participants also nodded in apparent agreement with the statement. At Aba-Iya Oje PHC, a participant (AbaiyaOje4) said:

“You know that before, we used to take herbal concoction but through the education we received they taught us to stop doing that because it has no measurement that we should go to hospital. The health workers taught us that, and they are really working; the community volunteers also taught us too anytime they come to our house.”

Another participant, a nursing mother at Olorunsogo PHC, Ofatedo in Egbedore local government area of Osun state recalled that:

“they (health workers) have been giving people Information at the health centre. They tell you that once you have this type of experience, head straight to the hospital, so it is the health workers that have been teaching us about malaria here.”

The significant role of television and radio in the result is also in line with findings by Elegbe (2009) whose study on ‘Effect of Sources of Information about HIV and AIDS on the Knowledge, Attitude and Sexual Practices of Public Senior Secondary School Students in Oyo State, Nigeria’, reported that public secondary school students ranked radio and television as most significant sources of information available to them on HIV and AIDS.

Thus, Roll Back Malaria and Other Partners in Oyo and Osun states used interpersonal sources such as Health Workers, Malaria Role Models (MRM) and Community Volunteers (CVs) as well as mass media sources of television and radio jingles for the dissemination of information on malaria prevention among rural dwellers in the two states.

This finding confirms the postulation of the Diffusion of Innovations Theory: the media as well as interpersonal contacts provide information and influence opinion and judgment, opinion leaders exert influence on audience behaviour through their personal contacts, additional intermediaries, also called Change Agents, are equally included in the process of diffusion, and that while information flows through networks, the nature of networks and the roles opinion leaders play in them determine the likelihood that an innovation will be adopted.

### **What factors influence access to malaria prevention information among rural dwellers in Oyo and Osun states?**

Through observations and inferences from survey results and comments of Key Informants and FGD participants, this study identified a number of factors that influenced access to malaria prevention information and therefore the innovation adoption process among rural dwellers in Oyo and Osun states. These factors are discussed in the subsequent paragraphs.

Firstly, from the outcome of interviews conducted with Key Informants, it was evident that funding was a major hindrance to the continuous dissemination of malaria prevention information in the two states. KII1 explained that it was funding constraints that limited the number of billboards approved to be erected in each state to a mere two, a number she agreed was grossly inadequate to create the kind of awareness desired among the states. KII8 on his part explained that funding limited the number of copies of *MAPS Inter-Personal Communication Flip Chart for Malaria Control in the Community* that were produced and more importantly, did not allow for their translation into Yoruba

language which incidentally is commonly spoken in the South-west zone. He said:

“I think the inability to translate the *MAPS Inter-Personal Communication Flip Chart for Malaria Control in the Community* into Yoruba is due to funding because you know it is really colourful and if you look at the materials it cost a lot and we gave to all the 264 Volunteers that go to households with bags, pens and recording tools.”

Yet, if the contents of *MAPS Inter-Personal Communication Flip Chart for Malaria Control in the Community* had been translated into Yoruba, some of the drawbacks noticeable in the document, particularly about its unsuitable illustrations within a Yoruba setting, (Laninhun and Oyeleye, 2021) would have been avoided. Furthermore, the challenge of funding was also evident in the fact that the radio jingles that were used for this study were no longer running due to the absence of funding. This impacted negatively on the ability of respondents to recall the malaria prevention information disseminated through the jingles. Funding also affected the use of some Community Volunteers who were meant to visit households and discuss with them in Yoruba, according to KII8 who said that: “in recent past we have had CBOs, about four of them we engaged for between three and eight months, we have now disengaged them for lack of funds. They will go to households, having been trained to talk to them in their own language, Yoruba, about mosquitoes.”

The inadequacy of funding created gaps which affected continuity of programmes, according to KII5 who noted that: “information has to be very constant and continuous. But if there is a gap, if the communication stops if you go there again they will hardly remember. So there is need to sustain the information over time.” This is the manifestation of how an extraneous factor outside communication impact on the adoption and utilisation of an innovation.

Lack of transparency, on the part of state officials, could also be inferred as another factor that affected the access of rural dwellers in the two states to malaria prevention information provided by RBM and Other Partners in the zone. This was evident on the issue of allocation of billboards to states. While the NMEP claimed to have erected two billboards in each state of the federation, the Key Informants for this study claimed that the billboards were nowhere to be found.

Another major factor that could be inferred as having negatively influenced the access of rural dwellers in this study to malaria prevention information was lack of coordination between the state and RBM and Partners as it affects activities of the ACSM particularly the development of malaria prevention information. This has affected the reinforcement of malaria prevention information to the public and hence, their access to such information and adoption of its recommendations. This was well established by KII7, a staff of the Ministry of Health, Oyo state. According to her, most of the processes of developing malaria prevention communication would have been

completed by the RBM and Partners before such were brought to the state for implementation. She said:

"I think they should involve the state more right from the implementation stage to monitoring etc...it is only when they are at the final stage that we get to know what is going on and at that time maybe there will be little or nothing that we can change...They have their own guidelines because that is one of the things I took up ... when I became the chairman that being the funding agency should not make them to be at the driver's seat; the state should always be at the driver's seat. That is why I recommended that they should let us be involved right from the planning stage, not just bringing us in when the matter had been settled."

The scenario painted by KII7 might also have been responsible for the failure of state governments to substantively support regular airing of radio jingles, for instance in Oyo state, where KII8 complained that there was greater need for the reinforcement of malaria prevention information by government. According to him:

"another thing I can tell you is that if we get sufficient support from the state, like the state owns the BCOS, if they can give us three jingles every day, it will help a lot. The government is supporting us but we need more of that to ensure that first we have radical behaviour change as well as sustain it. We can only sustain by reinforcing our messages. As of now the reinforcement is not sufficient on the part of government."

Finally, observations in the course of this study indicated that while the ACSM was strong at the national level, it was not well positioned in the states used for this study. For instance, KII4 confirmed during interview that Osun state was yet to have a functional ACSM sub-committee as at the time of this study. And in Oyo state where there was a functional ACSM Core Group, they were not implementing the recommended activities that could enhance access to malaria prevention information in the state. For instance, there were no 'Malaria Media Networks' in the state. Yet this was one of the activities recommended for each state ACSM in the Advocacy, Communication, and Social Mobilisation Strategic Framework and Implementation Plan (ACSMFIP) (Federal Ministry of Health, National Malaria prevention Programme (2010) and 'Scope of Work for ACSM Core Group (Oyo state)'. The ACSMFIP was produced by the Federal Ministry of Health and NMEP and details some specific activities to support the result-oriented communication of the malaria message nationwide and its adoption by Oyo state led to the creation of the ACSM Core Group in the state. The Core Group was supposed to be responsible for the overall success of malaria prevention communication in the state.

Based on the recommendations of the Advocacy, Communication, and Social Mobilisation Strategic Framework and Implementation Plan (Federal Ministry of Health, National Malaria prevention Programme, 2010), each ACSM was expected to;

- (a) conduct periodic press trips to selected facilities and communities ...to highlight best practices in

malaria prevention, success stories and problematic interventions,

- (b) set up malaria media network,
- (c) support health reporters' creative initiatives in reporting malaria issues in the region, including establishment of weekly malaria columns and news magazines,
- (d) conduct media advocacy as and when necessary to ensure that bottlenecks that develop in the malaria prevention process are discussed,
- (e) co-opt media executives and renowned health beat reporters/correspondents as permanent members of the ACSM.

Other duties expected of the ACSM Core group included having Malaria Listeners' Clubs in the rural areas of Oyo state and ensure that ACSM/SBCC activities in the rural areas are culturally appropriate.

This study has thus highlighted four major factors that affected access to malaria prevention information provided by RBM and Other Partners among rural dwellers in Oyo and Osun states. These factors were identified as poor funding which has affected continuity of disseminating malaria prevention information, lack of transparency on the part of state officials in providing billboards where they were designated to be and the use of unsuitable illustrations in the design of posters as well as wrong choice of language in the production of radio jingles. Other factors identified include lack of coordination between the state and RBM and Partners as it affects activities of the ACSM Core Groups particularly in the development of malaria prevention information, failure of state governments to substantively support regular airing of radio jingles and the fact that while the ACSM was strong at the national level, it was not well positioned in the states used for this study.

### **How do rural dwellers in Oyo and Osun states utilise malaria prevention information provided by Roll Back Malaria and other Partners?**

Respondents were first asked to indicate the level of their agreement or otherwise with four statements designed to measure their attitude to malaria prevention because it is assumed that attitude would influence adoption and utilisation. This is in line with the thinking of scholars such as Allport (1935) as quoted by Maio and Haddock (2010) that, our attitude 'determines for each individual will what he will see and hear, what he will think and what he will do...they are our methods for finding our ways about in an ambiguous universe'. The idea about attitude influencing 'the information we see and hear' is one of the oldest assumptions in the study of attitudes, according to Maio and Haddock (2010). In addition, the adoption of malaria prevention information such as the use of LLIN by FGD participants as well as their other personal malaria prevention measures as evidence of adoption of available information provided by RBM and Other Partners, were also evaluated and discussed. **Fig 5** contains the statements to measure attitude of respondents, that 'anyone who has malaria should go and see a medical doctor immediately',

"malaria can be safely treated at home without seeing a medical doctor", 'prayer is a major way of preventing malaria' and 'there are more important needs at home for me than spending money to purchase mosquito nets.'

As noted earlier, 73.0% of the respondents claimed to have access to the communication campaigns mounted by RBM and Other Partners. FGD participants were also asked to mention the malaria prevention information they had heard and the frequently mentioned ones were 'Using mosquito nets' 'Living in clean environment' 'Using insecticides', 'Using nets regularly', 'Not allowing stagnant water around', 'Clearing surrounding bushes at weekends', 'Spraying surrounding with insecticide' and 'how to hang our nets'. Most of them traced the source of their information to Health workers, Community Volunteers, television jingles and radio jingles. Therefore it could be established that survey respondents and FGD participants knew some malaria prevention measures, particularly the use of ITN/LLIN, clearing of the environment and spraying with insecticide.

But how did they use this information? From the result of **Fig 6** a majority of the respondents made use of the various malaria prevention information they had accessed in their localities. For instance, 76.2% reported to always clear their environment of dirt to prevent malaria, 65.1% claimed to regularly wash and retreat their insecticidal nets, 62.4% claimed to always sleep under an ITN while 62.3% reported seeing a medical doctor immediately they had malaria. The least positive utilisation was that of wearing clothing that covers the body, including the hands and legs, when staying outside in the evening (38.7%). Similarly, some of the personal malaria prevention measures which FGD participants claimed they undertake were 'Close house windows before dusk', 'Window net being maintained', 'Mosquito nets being maintained too', 'Children wear clothes at night', 'Using nets to sleep at night' 'Cleaning environment regularly' and '...We make sure we cover our water containers'.

This result confirms the outcome of the 2008 and 2013 National Demographic and Health Surveys (NDHS) on ownership of ITN. In the 2008 NDHS rural dwellers had a higher rate of net ownership (18.5%) than urban dwellers (14.1%), a trend that was also repeated in the 2013 NDHS where the figure of net ownership among rural dwellers across Nigeria had increased to 60.7% among rural dwellers while their urban counterparts too also rose to 48.2%. In the South-west, the pattern of increase was also visible as ownership of 'any net' rose from 10.8% in 2008 to 47.2% in 2013. Thus, as noted in the literature section of this study, the people of South-west Nigeria, among them residents of Oyo and Osun states, utilise one of the basic messages of malaria prevention; ownership of mosquito nets, although at a rate lower than those of other zones in the country. Comparatively therefore, they can be said to be laggards in the diffusion process. It must however be noted that ownership of ITN may not be a product of exposure to information and personal decision to utilise such information but rather because ITN had been distributed as political patronage or during awareness creation activities.

A one-way analysis of variance to determine the difference between the scores in the utilisation of malaria prevention information by respondents indicated a significant difference (Chi-square=1284.310, DF=5,  $p=0.000$ ). From the result in **Table 1**, cleaning the environment of stagnant water and bush because of mosquito had the highest mean rank (4.17), as against sleeping under an ITN (3.68), seeing a medical doctor at any attack of malaria (3.65) and washing and retreating the ITN as recommended (3.63) or fumigating the environment (3.24).

This result indicated that respondents were more likely to adopt malaria prevention measures that were less expensive such as cleaning the environment of stagnant water and bush, as against measures such as seeing a medical doctor, using an ITN or fumigating the environment which would involve elements of cost.

### Conclusion

This study examined the diffusion of innovation for the adoption of preventive malaria behaviour among rural residents of Oyo and Osun states, Nigeria. Findings indicate that RBM and Partners in Oyo and Osun states used mass media and interpersonal channels, including Change Agents, to communicate the messages about malaria prevention among their target audience. However, access to such information was hampered by several extraneous factors. Yet it was established that there is significant relationship between access to malaria prevention information and adoption of malaria preventive measures among rural dwellers in the selected states. The findings confirm key assumptions of the Diffusion of Innovations by Rogers (1987) including the reality that extraneous factors can limit the possibilities of adopting an innovation and also that information about an innovation must be reinforced among adopters to avoid their losing the trend.

### Recommendations

- (1) Stakeholders in the fight against malaria should devote more resources to communication activities on the disease. The use of television and radio jingles on malaria prevention which have proved acceptable and have high level of perceived credibility among the rural dwellers should not be tied to availability of funds. State governments should direct their broadcast stations to air malaria prevention jingles regularly as a part of social service. Corporate organisations should also be encouraged to sponsor such jingles as part of their corporate social responsibility to their communities of operation.
- (2) Advocacy, Communication and Social Mobilisation (ACSM) groups should be made more effective at the state level. There should be close linkage between RBM and other Partners and the ACSM teams of state governments where they operate. Both should be actively involved in the planning

and implementation of communication and social mobilisation activities on malaria.

- (3) ACSM groups should implement the recommendations on media relations contained in the Advocacy, Communication, and Social Mobilisation Strategic Framework and Implementation Plan (Federal Ministry of Health, National Malaria prevention Programme, and 2010: 31).

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