

**Knowledge Of Malaria Transmission Modes, Preventive
Methods And Practices Among Rural Community Dwellers
In South-western Nigeria**

By

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Abstract

Malaria is a mosquito-borne infectious disease of humans which is commonly transmitted through a bite from an infected female Anopheles mosquito. The disease is thus a major health problem in most of the tropical and subtropical countries in the world. However, little efforts have been placed on examining the knowledge of malaria transmission modes and the preventive methods being utilized and practiced among people living in rural communities particularly in Nigeria. The general objective was to examine the knowledge of malaria transmission modes, preventive methods and practices among rural community dwellers in southwestern Nigeria. Copies of questionnaire were administered to 160 rural community dwellers to elicit information on malaria issue in the study area. It was a cross-sectional descriptive study. More than half (55.0%) and (56.9%) of the respondents were within the age bracket 20-39 years and were married respectively. Furthermore, 36.8% of the respondents had secondary education, 25.6% had tertiary education, while 18.8% had primary education and no education respectively. Majority (77.5%) and (88.1%) of the respondents claimed to have knowledge of malaria transmission modes and knowledge of preventive methods respectively while 52.5% have knowledge of Insecticide-treated net. However, 48.7% of the respondents mentioned mosquito bite as the main mode of malaria transmission while more than half (63.1%) of the respondents believed medical treatment such as prescribed drugs and injection as the best way to treat malaria. In spite of the high levels of malaria knowledge claimed, the respondents did not appear to be applying that knowledge to their healthcare-seeking behaviour.

Keywords: Malaria Attack, Malaria Control, Preventive Techniques, Insecticide Treated Net use, Rural People

1. Introduction

Malaria burden still remains a public health issue in the world. However, Africa remains the most affected continent that has the greatest burden of malaria cases and deaths in the world (World Malaria Report, 2005); where about 90% of all malaria deaths occur there (World Health Organisation, 2012). The data from the regional profile for malaria in West Africa showed that 355 million people at risk for malaria in 2015; 297 million at high risk and no country have been able to eliminate malaria since 2010. In the region, Nigeria had 55% share of malaria cases in 2015 (World Health Organisation, 2016). Meanwhile, children under five are particularly susceptible to malaria where the disease claims the life of a child every two minutes (World Health Organisation, 2018). Moreover, malaria continues to put a heavy burden on the poorest and most vulnerable communities and primarily affects low- and lower-middle income countries (World Health Organisation, 2014) including Nigeria. Malaria remains an important cause of morbidity and mortality in Africa in spite of all efforts at prevention and control (Sangowawa, Amodu, Olaniyan, Amodu, Olumese and Omotade, 2014).

Moreover, one may ask, what is responsible for malaria epidemic? This is a commonly and frequently asked question. They are five identified species of the parasite belonging to the genus *Plasmodium* that causes malaria. These are: *P. falciparum*, *P. vivax*, *P. malariae* and *P. ovale* – are human malaria species, which are spread from one person to another by female mosquitoes of the genus *Anopheles*. Recently, human cases of malaria have also been recorded due to *P. knowlesi* – a species that causes malaria among monkeys, and occurs in certain forested areas of South-East Asia. *P. falciparum* and *P. vivax* malaria pose the greatest public health challenge. *P. falciparum* is most prevalent on the African continent, and is responsible for most deaths from malaria (World Health Organisation, 2014).

However, despite the enormous research studies on malaria burden in the world, cases of poor knowledge of malaria prevention, control and management

have been widely reported among people. Thus, little efforts have been placed on examining the knowledge of malaria transmission modes and the preventive methods being utilised and practised among people living in rural communities particularly in Nigeria. This situation needs to be re-examined to determine the current situation of malaria knowledge and preventive methods being utilised or practised among people living in rural areas. Therefore, the general aim was to examine the knowledge of malaria transmission modes, preventive methods and practices among selected rural community dwellers in southwestern Nigeria. The implications would be the creation of more public awareness and sensitization about malaria scourge through alerting the like-minded stakeholders such as the government at all levels, non-governmental organizations, corporate bodies and individual people etc.; in-depth understanding of the level of malaria knowledge and its preventive strategies among the rural dwellers.

Furthermore, many studies have examined the knowledge of people in relation to the cause of malaria attack, its symptoms, transmission mode and preventive methods across different geographical locations. A study showed that unsafe water supply, sanitation and hygiene are responsible for typhoid and malaria fever in Nigeria and in most cases affecting the health of the poor people (Abdulkarim, 2012). According to Oreagba, Onajole, Olayemi and Mabadeje (2004)'s study, many respondents (65%) attributed the cause of malaria to mosquito bite. Similarly, in another study among 425 respondents, most of the respondents (85.2%) attributed the cause of malaria to mosquito bite. However, some of the respondents (>20%) mentioned lack of personal hygiene, exposure to cold weather, hunger, chewing maize stalk, body contact with malaria patient and flies as the causes of malaria (Abate, Degarege and Erko, 2013). In another finding mosquito bite is the most feared (54.4%) among the study population (Padonou, Gbédjissi, Bankolé, Noukpo, Yadouléton and Akogbéto, 2011). Majority (96%) of the respondents in another study, know that mosquito transmits malaria parasite (Oluyemi and Oluyemi, 2017) and the

major factors influencing the transmission of malaria parasite here include poverty, ignorance, socio-cultural background (Wokem, Christian and Onuegbu, 2017). Also, in another study, majority (60.7%) reported malaria to be a common illness and heat from the sun as the most popularly reported cause of malaria 49.3% (Okeke and Okafor, 2008).

Moreover, in another study the majority (94%) of the respondents believed persistent headache as the symptom of malaria and about 74% have experienced mosquito bites while 26% have not experienced it (Oluyemi and Oluyemi, 2017). The contribution of the environment is also crucial to the breeding of mosquitoes (Febir, Asante, Dzorgbo, Senah, Letsa and Owusu-Agyei, 2013). Malaria is preventable and treatable, and history shows that it can be eliminated (Agbo, Envuladu, Enokela and Zoakah, 2014). However, recognition of malaria symptoms is deemed most important in determining the use of antimalarial drugs rather than the result of a malaria test (Ezeoke, Ezumah, Chandler, Mangham-Jefferies, Onwujekwe, Wiseman and Uzochukwu, 2012).

Another study has reported the knowledge of malaria treatment particularly the knowledge of pediatric doses to be generally poor and the caregivers of children in the communities studied have poor knowledge of malaria. Also, many caregivers of children under 5 years in some rural and urban areas do not have adequate knowledge on the control and treatment of malaria (Oreagba, Onajole, Olayemi and Mabadeje, 2004). Similarly in another study, people had poor knowledge of malaria and mosquito bites which resulted in wrong perception and misuse of the nets (Onyeneho, 2013). However, in another study, a high level of knowledge about the cause, transmission and preventive methods of malaria was reported among the study population. The overall awareness about the cause, symptoms and preventive measures of malaria was found to be high leading to low prevalence of malaria in the area (Abate, Degarege and Erko, 2013). Another study revealed a reasonable knowledge of preventive measure against mosquitoes (Padonou, Gbédjissi, Bankolé, Noukpo, Yadouléton and Akogbéto, 2011). However, in another study

only 32.7% of respondents knew about home management of malaria - HMM (Adeneye, Jegede, Mafe, and Nwokocha, 2013). Thus, it is believed that correct knowledge of mosquitoes causing malaria varied significantly with educational level (Okeke and Okafor, 2008). Thus, poor awareness and low use of LLINs and ACTs are responsible for poor malaria treatment practice (Adeneye *et al.*, 2013).

In addition, the use of insecticide spray was the most common malaria control measure adopted by the participants in another study and was effective despite the fact that it is not a National Malaria Control Policy (Efunshile, Amoo, Akintunde, Ojelekan, König and König, 2011). Majority of the women (97.4%) in another study sleeping under a mosquito net and over 80% sleeping under insecticide treated net and a very low proportion of the study population mentioned using insecticide sprays, creams and lotions (6.1%); taking preventative medications (6.4%); insecticide coils (4.5%); drinking plant juice/root (5.9%); coil smoke (4.9%) and covering the body (8.7%) were the best preventive measures. On the malaria prevention practices, out of 4,656 women, 20.4% reported not using any net at all and 77.9% reported using only insecticide treated nets for children during the night before the survey. Factors such as educational level, place of residence, access to the media, ANC and religion were associated with the level of knowledge of malaria (Yaya, Bishwajit, Ekholuenetale, Shah, Kadio and Udenigwe, 2017). However in another study, knowledge, attitude and practice of the community towards malaria prevention and control options are still at low level. Thus, health and religious institutions are believed to be the main sources of information about malaria control and prevention activities in the study community (Aderaw and Gedefaw, 2013).

Also in another, majority 101/125 (80.8%) of the respondents reported that visiting hospital was their immediate care-seeking behaviour when experiencing malaria symptoms, while 14/125 (11.2%) involved in self-medication. Regarding malaria prevention and control, majority 115/125 (92.0%) of the respondents mentioned using bed-nets as their main malaria prevention

strategy, while 6/125 (4.8%) preferred the use of medicine, mostly artemether lumefantrine, as prophylaxis (Sumari, Dillip, Ndume, Mugasa and Gwakisa, 2016). The use of mosquito repellent such as insecticide and bed-net as mosquito prevention practices seemed to be common. This is because people are necessarily acting to prevent malaria regardless of their malaria knowledge. In essence, people do not want to be bitten, irrespective of their knowledge of the malaria transmission (Oluwafemi, Babatimehin, Oluwadare and Mahmud, 2013).

In another study among 398 pregnant women, the overall knowledge and attitude towards malaria and ITNs was reported to be fairly good and majority (74.3 %) of the mothers had good knowledge. Nevertheless, only 15.6 % of the mothers associated mosquitoes with malaria and majority of them (65.6 %) responded that it is transmitted due to poor personal hygiene and environmental sanitation. However, the ITNs utilisation was poor in the study area. It is further reported that the main causes for the low utilisation of ITNs were low ownership due to inaccessibility and lack of regular use because of its exhaustion as well as lack of awareness about its importance in some of the cases (Fuge, Ayanto and Gurmamo, 2015). Self-treatment with inappropriate doses of chloroquine was used by the majority (83.7%) of the respondents in another study while drug sellers were their most (52.3%) popular source of care. Also, poor utilization of formal health facilities was noted to be due to cost and absence of health personnel. However, herbal remedies remained the most popular treatment for severe malaria (Okeke and Okafor, 2008).

On the issue of bed-net utilization in another study, many people do not have access to information on ITN while many people are unable to purchase it and more so, the cost of insecticide is very high and the rate of refusal to insecticide spraying rate is getting higher (Okafor and Amzat, 2007). The high patronage of chemist, patient medicine vendor and shop may lead to over-medication and wrong prescription of drug thus raising serious health concern among people (Fayehun and Salami, 2014). Therefore, community based malaria intervention

programmes being directed at awareness creation on the modes of malaria transmission, provision of ITNs, prompt identification and treatment of all cases are needed to contain malaria epidemic in the societies (Oladeinde, Omoregie, Olley, Anunibe, Onifade and Oladeinde, 2012). In another study, about 26.4% of the participants used ITN as malaria prevention and control method (Aderaw and Gedefaw, 2013). However, the use of insecticide treated nets (ITN) is still low and continuous awareness creation on the use of ITN and continued efforts aimed at elimination of breeding sites of mosquitoes should be adopted to achieve long term control of malaria (Bamidele, Ntaji, Oladele and Bamimore, 2012). Therefore, health education on awareness of insecticide-treated net is crucial for successful elimination of malaria. However, lack of continuous medical checkup or even the inability to go for medical checkup also pose a great threat to people' health (Oluyemi and Oluyemi, 2017). However, the awareness level of the use of insecticide- treated bed nets and insecticide spray among people remain very poor in another study. Thus, a health education campaign is advocated (Wokem, Christian and Onuegbu, 2017).

2. Brief Background of the Study Area

The study area is located in the Akoko North-West (LGA) of Ondo state. It is under the southwestern region of Nigeria. The southwestern zone is one of the six zones politically created during the military regime in Nigeria. The rural community dwellers (the study population) are predominantly farmers like other rural communities in the southwestern Nigeria. Trading, teaching, driving and riding (taxi and motorcycle- okada) including professionals (health workers, bankers etc.) are other occupations in the community. The community has abundant rainfall annually with the same rainforest/tropical forest that is available in other rural communities in the southwestern zone of Nigeria.

3. Materials and Methods

Survey instrument (questionnaire) was used to get information from the respondents. One hundred and sixty (160) copies of questionnaire (with open-ended and closed-ended questions) were administered to rural community

dwellers including male and female, literate and non-educated to elicit information on malaria issue in the study area. It was a cross-sectional study. Regarding ethical consideration, informed consent was sought and confidentiality of data/information duly observed.

4. Results

1. Socio-demographic characteristics of the respondents

Key variables: Age, Sex, Marital status, Occupation, Religion and Education

From the analysis of the socio-demographic profile in *table: 1below*, it is evident that half (55%) of the respondents fell within age bracket 20-39 and 18.1% of the respondents were within age of 40-59. The largest percentage of the respondents both male and female that constituted the age group bracket 20-39 did not indicate that malaria incidence was more prevalent in this age group. However, 56.9% of the respondents had gotten married and 43.1% of the respondents were single. The percentage of the respondents, both single and married is not much.

Moreover, students and traders had the highest percentage with 33.7% and 30%, followed by farmers with 19.4%. The high percentage of the students as occupation did not indicate that the whole community is majorly composed of students. This was not unconnected with the availability of the respondents that were ready for interviews in the study area. This could be also explained as a result of the easy accessibility of students for interviews. Some of the farmers were not around perhaps busy working in their farms and thereby not being interviewed. However, more than half (65%) of the respondents were Christians, 30% as Muslims and Traditional worshippers as 5%. Western education and civilization might explain the high number of Christians and the drastic reduction in the percentage of traditional worshipping.

Furthermore, 36.8% of the respondents had secondary education, 25.6% had tertiary education level, while 18.8% each of the respondents had no education and primary education respectively. What it means is that majority of the respondents are semi-literate. However, the reason for that could also be

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explained in terms of the nature of their occupations such as farming, trading and students especially those who are seeking for further education or who could not go beyond secondary school.

Table 1: Socio-demographic characteristics of respondents

Variable	Frequency (%) N= 160	
Age (in years)		
Below 20	19	(11.9)
20-39	88	(55.0)
40-59	29	(18.1)
60 and above	24	(15.0)
Sex		
Male	80	(50.0)
Female	80	(50.0)
Marital status		
Single	69	(43.1)
Married	91	(56.9)
Occupation		
Students	54	(33.7)
Traders	48	(30.0)
Farmers	31	(19.4)
Teachers	11	(6.90)
Drivers/motor cyclists (<i>Okada riders</i>)	9	(5.60)
Professionals (doctors, nurses, lawyers and bankers etc.)	7	(4.40)
Religion		
Christian	104	(65.0)
Islam	48	(30.0)
African Traditional Practice (ATP)	8	(5.00)
Education		
No education	30	(18.8)
Primary	30	(18.8)
Secondary	59	(36.8)
Tertiary (college, polytechnic and university)	41	(25.6)

Source: Author's Computation (Field Survey), 2007

The results in *table: 2 below* showed that, majority (93.1%) of the respondents understood the causes of malaria and 89.4% knew any symptom of malaria in their areas. However, mosquito and dirty environment were ranked highest with 40% and 38.8% respectively as the causes of malaria. Symptoms known to the

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respondents are cold, high temperature, headache, body weakness, loss of appetite and fever/cough/catarrh 20%, 20%, 19.4%, 16.8%, 6.9% and 4.4% respectively and 12.5% of the respondents did not mention any malaria symptom probably because they did not notice any symptom when they were sick.

Table 2: knowledge of respondents on the causes and symptoms of malaria

Variable	Category	Frequency (%) N= 160	
Knowledge of the cause of malaria	Knowing	149	(93.1)
	Not knowing	11	(6.90)
Knowledge of any symptom of malaria	Knowing	143	(89.4)
	Not knowing	17	(10.6)
Causes of malaria known	Mosquito	62	(40.0)
	Dirty environment	64	(38.8)
	Sun/hard work	11	(6.80)
	Poor food/water	14	(8.80)
	No response/answer	9	(5.60)
Symptoms known	Headache	31	(19.4)
	Cold	32	(20.0)
	High temperature	32	(20.0)
	Loss of Appetite	7	(4.40)
	Body weakness	27	(16.8)
	Fever/cough/catarrh	11	(6.90)
	No answer	20	(12.5)

Source: Author's Computation (Field Survey) 2007

On knowledge of malaria transmission modes, majority (77.5%) of the respondents in *table: 3 below* knew the modes of malaria transmission. It might also be as a result of the health institutions established in the study area whereby people often visit doctors/nurses for health advice and the ways in which malaria could be transmitted. However, 48.7% of the respondents mentioned mosquito bite through blood as the main mode of malaria transmission; while through body contact, dirty water/food and dirty

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environment are 13.7%, 6.3% and 3.8% respectively. Some (27.5%) of the respondents could not remember any mode of malaria transmission. Many of the respondents believed that mosquito bite through blood is the major mode of malaria transmission. This is not unconnected with the environment they live in that allows for incessant breeding of mosquitoes that may make them fall sick. Eventually, this might make many of the respondents understand that mosquitoes majorly transmit malaria through blood sucking. Majority (96.9%) of the respondents believed malaria attack can be prevented especially if detected early.

However, on ways of malaria prevention, more than half (63.1%) of the respondents see medical treatment such as prescribed drugs and injection as the surest way to treat malaria, while 13.8% mentioned herbal medicines such as (“Agbo” in Yoruba parlance) as the way through which malaria can be treated; 10.6% mentioned through eating good food and drinking good water as a result of maintaining proper diet; 0.6% of the respondent claimed that it is through prayer and 11.9% of the respondents did not mention any way through which malaria can be treated. Perhaps, they were not aware that they do treat themselves from malaria either consciously or unconsciously.

Table 3: Knowledge of malaria transmission modes and prevention among respondents

Variable	Frequency (%) N= 160	
Malaria transmission modes		
Known	124	(77.5)
Not known	36	(22.5)
Transmission modes known		
Through mosquito	78	(48.7)
Dirty environment	6	(3.80)
Dirty water/food	10	(6.30)
Through body contact	22	(13.7)
Can't remember	44	(27.5)
Malaria complications		
Preventable	155	(96.9)
Not preventable	5	(3.10)
Ways of prevention		
Herbal medicine	22	(13.8)
Medical treatment	101	(63.1)
Prayer	1	(0.60)
Eating good food/drinking good water	17	(10.6)
No answer	19	(11.9)

The findings of the study in *table: 4 below* showed that majority (88.1%) of the respondents claimed that they have knowledge of malaria preventive methods. However, only 11.9% of the respondents did not have any knowledge of malaria preventive method probably because of their level of education especially the uneducated ones. Moreover, some of the respondents mentioned insecticide, mosquito net, clean environment, good food (balanced diet) and taking herbal medicine such as “Agbo” in Yoruba language, herbal leaf, 9/9 and coil as the preventive methods known to them; while 1.3% mentioned prayer. Few of the respondents could not remember any malaria preventive method known to them.

Furthermore, more than half (52.5%) of the respondents have knowledge of ITN. However, 47.5% of the respondents do not have knowledge of ITN use. The reason may be due to the unavailability of the ITN in the study area despite the establishment of health institutions in the community. Therefore, not all of the respondents have knowledge of ITN use. This is because there is a slight difference between the percentage of the respondents that have knowledge and those that have no knowledge of it. Furthermore, on source of ITN knowledge, more than half (57.5%) of the respondents could not remember the source of their knowledge of ITN use; probably because of their wrong perception towards the use of ITN. Some of the respondents mentioned media (such as radio, TV and Newspapers), hospital, through friends, neighbours and family members as the source of their knowledge of ITN use.

Table 4: knowledge of malaria preventive methods and practices among the respondents

Variable	Frequency (%) N= 160	
Preventive method knowledge		
Known	141	(88.1)
Not known	19	(11.9)
Preventive methods known		
Mosquito net	29	(18.1)
Insecticide/spray/flit	36	(22.5)
Herbal leaf, 9/9, coil	16	(10.0)
Clean environment	26	(17.5)
Good food (balance diet)/herbal medicine (Agbo)	27	(16.9)
Prayer	2	(1.30)
Can't remember	22	(13.7)
ITN Knowledge		
Known	84	(52.5)
Not known	76	(47.5)
Sources of ITN knowledge		
Hospital	17	(10.6)
Media (radio, TV, Newspapers, etc.)	37	(23.1)
School	3	(1.90)
Friends, Family members, Neighbours	11	(6.90)
Can't remember	92	(57.5)

Source: Author's Computation (Field Survey), 2007

In addition to the above results, some open-ended questions were asked on the advantages and disadvantages of using insecticide treated net (ITN). Some of the respondents claimed, *ITN kills mosquitoes and prevents one from mosquito bite*. "Majority said, *it is hundred percent secured when using it for preventing malaria*". Some said, *it can work for bed bugs, cockroach and other insects*". Majority of the respondents believed, *the use of ITN is very effective in preventing people from malaria attack as a result of mosquito bite*". On the contrary, some claimed that, *ITN can kill persons through the process of applying chemical to it*". Some even believed, *ITN is poisonous and increases death rate respectively*". Majority of the respondents believed that *"frequent use of ITNs can harm people through the poisonous chemical in it"*.

The respondents' opinions on what they thought that could be done to eradicate malaria incidence in their areas. Majority of the respondents believed that *“malaria could be eradicated in their areas by ensuring that government should make anti-malarial drugs and ITNs available for people and also through environmental sanitation throughout the whole community”*.

Responses about the national campaign on malaria control in Nigeria, Majority of the respondents believed that *“it is good and interesting”*. Some opined that, *“government should continue this campaign to create more awareness and further encourage government to make available the use of ITNs”*. One respondent was quoted to have said, *“it is very worse because the less privileged were not well aware and these people are mostly affected”*.

5. Discussion

I. Socio-demographic characteristics of respondents

From the analysis of the socio-demographic profile, it is evident that more than half (55%) of the respondents fall within age bracket 20-39 years. This is similar to (Bamidele *et al.*, 2012)'s work where majority of the respondents (65.0%) were found within the age groups of 20-39 years; to them, this age group falls within the agile population. This age group may be targeted in the long run for active and effective community participation in malaria control; while, 18.1% of the respondents are within age of 40-59 years. The largest percentage of the respondents both male and female that constituted the age group bracket 20-39 years did not indicate that malaria incidence was more prevalent in this age group. The percentage of the respondents between single and married is not much. The high percentage of the students as occupation did not indicate that the whole community is majorly composed of students. This is as a result of the availability of the respondents that were ready for interviews at the time of conducting the study. Some of the farmers were not around perhaps busy

working in their farms and thereby not being interviewed. Western education and civilization might explain the high number of Christians and the drastic reduction in the percentage of traditional worshipping. Furthermore, majority of the respondents are semi-literate.

However, the reason for that could also be explained in terms of the nature of their occupations such as farming, trading and students especially those who are seeking for further education or who could not go beyond secondary school. This is in line with (Bamidele *et al.*, 2012)'s work where majority of the respondents had at least attended primary school. Moreover, being literate has a positive effect on community participation in malaria control as it helped them to have better understanding about the cause of malaria, mode of transmission, symptoms, prevention and control (Bamidele *et al.*, 2012).

II. Knowledge of respondents on the causes and symptoms of malaria

On the knowledge of the cause of malaria, majority (93.1%) of the respondents understood the causes of malaria. About the knowledge of any malaria symptom, 89.4% knew at least a symptom of malaria. On the causes of malaria known, Mosquito 40.0%; Dirty environment 38.8%; Sun/hard work 6.80%; Poor food/water 8.80% and No response/answer 5.60%. Mosquito and dirty environment were believed to be the major causes of malaria. Others included sun/hard work and poor food/water. This study corroborates (Bamidele *et al.*, 2012)'s work where majority of the respondents had knowledge of malaria with most respondents believing that mosquito bite is the cause of malaria. Similarly, attribution of the cause of malaria to mosquito bite has been reported by many previous studies (Oreagba, Onajole, Olayemi and Mabadeje, 2004; Padonou, Gbédjissi, Bankolé, Noukpo, Yadouléton and Akogbéto, 2011; Abate, Degarege and Erko, 2013; Oluyemi and Oluyemi, 2017). Also, heat from the sun as the most popularly reported cause of malaria (Okeke and Okafor, 2008). The contribution of the environment is also crucial to the breeding of mosquitoes (Febir, Asante, Dzorgbo, Senah, Letsa and Owusu-Agyei,

2013). The issue of unsafe water supply, sanitation and hygiene are parts of environmental concerns that are responsible malaria fever in Nigeria affecting the health of the poor people (Abdulkarim, 2012). The major factors influencing the transmission of malaria parasite here include poverty, ignorance, socio-cultural background (Wokem, Christian and Onuegbu, 2017).

On the symptoms known, Headache 19.4%; Cold 20.0%; High temperature 20.0%; Loss of Appetite 4.40%; Body weakness 16.8%; Fever/cough/catarrh 6.90% and No answer 12.5%. Cold and high temperature, headache, body weakness, fever/cough/catarrh and loss of appetite were the main symptoms of malaria known to the respondents. Perhaps, this high knowledge of malaria issue is due to the presence of health facilities in the community where health workers often engaging in sensitization and awareness creation about malaria attack. However, some of the respondents did not mention any malaria symptom probably because they did not notice any symptom when they were sick. In line with other studies, exposure to cold weather has been reported as one of the causes of malaria (Abate, Degarege and Erko, 2013).

However, recognition of malaria symptoms is deemed most important in determining the use of antimalaria drugs rather than the result of a malaria test (Ezeoke, Ezumah, Chandler, Mangham-Jefferies, Onwujekwe, Wiseman and Uzochukwu, 2012). Persistence headache has also been mentioned as one of malaria symptoms (Oluyemi and Oluyemi, 2017). On the contrary, the knowledge of malaria treatment has been reported to be generally poor (Oreagba, Onajole, Olayemi and Mabadeje (2004; Onyeneho, 2013). This poor knowledge of malaria and mosquito bites resulted in wrong perception and misuse of the nets (Onyeneho, 2013); including home management of malaria - HMM (Adeneye, Jegede, Mafe, and Nwokocha, 2013). Thus, it is believed that correct knowledge of mosquitoes causing malaria varied significantly with educational level (Okeke and Okafor, 2008).

III. Knowledge of malaria transmission modes and prevention among respondents

On knowledge of malaria transmission modes, majority (77.5%) of the respondents knew the modes of malaria transmission. It might also be as a result of the health institutions established in the study area whereby people often visit doctors/nurses for health advice and the ways in which malaria could be transmitted. However, some 48.7% of the respondents believed that mosquito bite through blood as the main mode of malaria transmission known; while through body contact, dirty water/food and dirty environment are 13.7%, 6.30% and 3.80% respectively. Some (27.5%) of the respondents could not remember any mode of malaria transmission. Many of the respondents believed that mosquito bite through blood is the major mode of malaria transmission. This is not unconnected with the environment they live in that allows for incessant breeding of mosquitoes that may make them fall sick. Eventually, this might make many of the respondents understand that mosquitoes majorly transmit malaria through blood sucking. In addition, poverty, ignorance and socio-cultural background have been reported to have been influencing the transmission of malaria parasite (Wokem, Christian and Onuegbu, 2017). In another study, very few 15.6% of the respondents (mothers) associated mosquitoes with malaria however majority of them (65.6 %) believed that it is transmitted due to poor personal hygiene and environmental sanitation (Fuge, Ayanto and Gurmamo, 2015).

On malaria complication, it is interesting to know that majority (96.9%) of the respondents believed malaria attack can be prevented especially if detected early. Similarly, on ways of malaria prevention, more than half (63.1%) of the respondents see medical treatment such as prescribed drugs and injection as the surest way to treat malaria. This finding corroborates another study where visiting hospital has been reported as the immediate care-seeking behaviour when experiencing malaria symptoms (Sumari, Dillip, Ndume, Mugasa and Gwakisa, 2016). While 13.8% mentioned herbal medicines such as (“Agbo” in Yoruba parlance) as the way through which malaria can be treated; 10.6% mentioned through eating good food and drinking good water as a result

of maintaining proper diet; 0.6% of the respondent claimed that it is through prayer and 11.9% of the respondents did not mention any way through which malaria can be treated. Perhaps, they were not aware that they directly or indirectly, consciously or unconsciously engage in malaria treatment.

The high level of knowledge about the cause, transmission and preventive methods of malaria reported among the study population is corroborated in another study where the overall awareness about the cause, symptoms and preventive measures of malaria was found to be high thus leading to low prevalence of malaria in the area (Abate, Degarege and Erko, 2013). Also, a reasonable knowledge of preventive measure against mosquitoes has been reported (Padonou, Gbédjissi, Bankolé, Noukpo, Yadouléton and Akogbéto, 2011). However in another study, regarding malaria prevention and control, majority mentioned the use of bed-nets as their main malaria prevention strategy (Sumari, Dillip, Ndume, Mugasa and Gwakisa, 2016) but not mentioned in this study.

IV. Knowledge of malaria preventive methods and practices among the respondents

On the preventive method knowledge, majority (88.1%) of the respondents claimed to have knowledge of preventive method for malaria. However, this contradicts what (Agbo *et al.*, 2014) carried out, that the general knowledge on malaria was found to be poor among people especially on their understanding of malaria and on methods of preventing it. Moreover, Mosquito net 18.%; Insecticide/spray/flit 22.5%; Herbal leaf, 9/9, coil 10.0%; Clean environment 17.5%; Good food (balance diet)/herbal medicine (Agbo) 16.9%; Prayer 1.30% and can't remember 13.7% have been reported as the preventive methods known. This is line with (Febir, *et al.*, 2013)'s work that contribution of the environment is key when chronicling factors that contribute to the breeding of mosquitoes. Maintaining clean environment would be crucial for malaria control. Similarly, the use of insecticide spray is corroborated in another study as the most common malaria control measure adopted by the participants and

was effective despite the fact that it is not a National Malaria Control Policy (Efunshile, Amoo, Akintunde, Ojelekan, König and König, 2011).

Majority of the people (women) in another study sleeping under a mosquito net and sleeping under insecticide treated net but a very low proportion mentioned using insecticide sprays; taking preventative medications; insecticide coils; drinking plant juice/root; coil smoke and covering the body (8.7%) were the best preventive measures (Yaya, Bishwajit, Ekholuenetale, Shah, Kadio and Udenigwe, 2017). In the same way, the awareness level of the use of insecticide-treated bed nets and insecticide spray among people remain very poor (Wokem, Christian and Onuegbu, 2017); meanwhile, the use of mosquito repellent such as insecticide and bed-net as mosquito prevention practices seemed to be common (Oluwafemi, Babatimehin, Oluwadare and Mahmud, 2013). In another study, majority relied on self-treatment with inappropriate doses of malaria drugs (chloroquine) while drug sellers their most popular source of care and herbal remedies remained the most popular treatment for severe malaria (Okeke and Okafor, 2008). The high patronage of chemist, patient medicine vendor and shop may lead to over-medication and wrong prescription of drug thus raising serious health concern among people (Fayehun and Salami, 2014).

While on ITN knowledge, (52.5%) have knowledge of ITN and 47.5% with no knowledge but more than half (57.5%) of the respondents could not remember the source of their knowledge of ITN use; probably because of their wrong perception towards the use of ITN. This finding revealed a slight difference between ITN Knowledge -“Known” and “Not Known”. This may be an indication that there is need for more ITN knowledge and utilization. This is line with (Bamidele *et al.*, 2012)’s work where ITN usage is low among the study population but there was significant association between awareness of insecticide treated nets (ITN) and its usage. Thus, poor awareness and low use of LLINs and ACTs are responsible for poor malaria treatment practice (Adeneye *et al.*, 2013). Likewise, knowledge, attitude and practice of the

community towards malaria prevention and control are still at poor level (Aderaw and Gedefaw, 2013).

However, health and religious institutions are believed to be the main sources of information about malaria control and prevention activities in the study community (Aderaw and Gedefaw, 2013). In another study, the ITNs utilization was poor (Fuge, Ayanto and Gurmamo, 2015). In relation to this study, the poor utilisation of ITNs might also be as a result of the knowledge level about malaria and ITN usage. In this study, some claimed that, *ITN can kill persons through the process of applying chemical to it*". Some even believed, *ITN is poisonous and increases death rate respectively*". Majority of the respondents believed that *"frequent use of ITNs can harm people through the poisonous chemical in it"*. This kind of responses could promote poor utilisation of ITNs. Similarly in another study where the use of insecticide treated nets (ITN) is still low (Bamidele, Ntaji, Oladele and Bamimore, 2012).

On the sources of ITN knowledge, Hospital 10.6%; Media (radio, TV, Newspapers, etc.) 23.1%; School 1.90%; Friends/ Family members/Neighbours 6.90% and can't remember 57.5% have been mentioned by the respondents as the source of their knowledge of ITN utilization. Many of the respondents claimed that they do not have knowledge of ITN use. The reason may be due to the unavailability of the ITN in the study area despite the establishment of health institutions in the community. Thus, not all of the respondents have knowledge of ITN use. However, the use of ITNs is currently considered the most cost-effective method of malaria prevention in highly endemic areas and this is the main method of malaria prevention employed in Nigeria (Agbo, *et al.*, 2014) and bed nets appear to be the most frequently used protective measure. In Okafor and Amzat (2007)'s submission on the bed-net utilization that many people do not have access to information on ITN while many people are unable to purchase it. Moreover, the cost of insecticide is very high and the rate of refusal to insecticide spraying rate is getting higher. From the findings,

many of the respondents claimed that they do not have knowledge of ITN use. Perhaps many people do not have access to information on ITN as Okafor and Amzat (2007) reported.

The acclaimed knowledge of malaria attack, transmission modes and preventive methods among the respondents should translate into reduction in malaria incidence and prevalence. This is because; malaria is preventable and treatable, and history shows that it can be eliminated (Agbo *et al.*, 2014). Factors such as educational level, place of residence, access to the media, ANC and religion play important roles in the level of malaria knowledge (Yaya, Bishwajit, Ekholuenetale, Shah, Kadio and Udenigwe, 2017).

Therefore, community based malaria intervention programmes being directed at awareness creation on the modes of malaria transmission, provision of ITNs, prompt identification and treatment of all cases are needed to contain malaria epidemic in the societies (Oladeinde, Omoregie, Olley, Anunibe, Onifade and Oladeinde, 2012). It is believed that some people are knowledgeable and other not knowledgeable about the vector-borne parasite transmission but necessarily they are acting to prevent malaria. This is because; people do not want to be bitten, irrespective of their knowledge of the malaria transmission (Oluwafemi, Babatimehin, Oluwadare and Mahmud, 2013).

Furthermore, the study has been able to examine the knowledge of the modes of malaria transmission and identified the practices of malaria preventive methods among the rural community dwellers in southwestern Nigeria. It has further given insights into knowledge of malaria and its perceived preventive methods among the selected rural people. However, there are some limitations to this study as with all research. The study was cross-sectional in nature (the data were collected at a single point in time) and relied on survey (questionnaire with open-ended and closed-ended questions) making it impossible to make any causal conclusions. Future research should use a longitudinal approach to data collection which could expand and further examine the exact prevalence of malaria in the study area.

6 Conclusion

It is evident that malaria is a global public health issue that has been claiming many lives particularly in the developing countries such as Nigeria. Knowledge of the modes of malaria transmission and the practices of malaria preventive methods among selected rural community dwellers in southwestern Nigeria has been examined and identified. It is obvious from the study that many people claimed to have knowledge of malaria attack, its modes of transmission and preventive methods, but in reality it does not really translate into reduction in the incidence and prevalence of malaria in the area. People have knowledge but they do not put it into use for the benefits of their health. It seemed that the knowledge of malaria claimed by the participants is mere speculation. In actual fact, in-depth knowledge of malaria is still poor in the study community. Similarly, some current studies on malaria reviewed in this study have also confirmed this fact that people's knowledge of malaria is still very poor.

Therefore, there is need for continuously more public awareness creation to help people particularly in the rural communities regardless of their level of malaria knowledge to always take health actions promptly by seeking for medical help or attention on time whenever they are experiencing unusual feelings in their body systems. In addition, modern preventive methods for malaria attack that are suitable, affordable and accessible should be always made available to people residing in the rural areas. Thus, it would go a long way in addressing the high prevalent rate of malaria attack among them and the world at large. Invariably, experiencing good health among the rural people may as well promote the economic development of the areas.

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