



Knowledge, Attitude and Practices towards Malaria and the Use of Insecticide-Treated Net among Rural Dwellers in Mubi North Local Government Area, Adamawa State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author EIE, MNE and BB conceived and designed the study. Authors EIE, OCG and NPC participated in writing and technical editing of the manuscript. Authors EIE, DTM, OVC collected, contributed and interpreted the data. Authors EIE, MNE, BB and OCG contributed in critically reviewing the study and drawing the conclusion. All authors read and approved the final manuscript.

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ABSTRACT

Malaria continues to be a critical health issue globally with more cases from the WHO African region and has remained endemic in Nigeria despite the possession of insecticide-treated nets. This present study aimed to explore the knowledge, attitude and practice regarding malaria and the

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use of ITNs as a malaria prevention strategy among rural dwellers in Mubi North Local Government Area, Adamawa State, Nigeria. A systematic questionnaire was used to get responses from a total of 304 households from January to March 2020 with only one adult interviewed per household. The respondents were the heads of the household. In their absence, a responsible adult above eighteen years, chosen by the family was interviewed. 99.3% (302) of the respondents agreed that malaria is caused as a result of a mosquito bite. The majority (90.8%) of them also agreed that ITN prevents mosquito bites, while 86.8% of them had ITNs. The study participants identified Fever (82.2%) and Headache (33.9%) as the most common evidence of malaria. Our study participants applied various preventive measures against mosquito bites such as the use of ITNs (86.5%), clearing breeding sites around their homes (28.3%), use of insecticidal sprays (18.8%), and wearing protective clothing's (6.9%). This study has shown that respondents had good knowledge and attitude towards malaria and ITN, and also employed various measures to reduce the prevalence of malaria in the area.

Keywords: Malaria; mosquitoes; knowledge; attitude; practices; insecticide-treated nets; mubi; Nigeria.

1. INTRODUCTION

The climatic condition of Africa has made Africa the continent with the highest malaria mortality rate in the world. This has made malaria a significant public health issue with huge economic loss irrespective of the fact that it is a curable disease [1]. The increased funding by the global community has helped reduce malaria prevalence over the past 2 decades with 229 million cases of malaria in 2019 [2]. The WHO African region carries the highest incidence of malaria with 90% cases and 94% of malaria deaths recorded in the region in 2019 [2]. Of the 87 countries that were malaria endemic in 2019, Nigeria (27%), the Democratic Republic of the Congo (12%), Uganda (5%), Mozambique (4%) and Niger (3%) accounted for about 51% of all cases globally [2]. Furthermore, Nigeria (23%), the Democratic Republic of the Congo (11%), the United Republic of Tanzania (5%), Burkina Faso (4%), Mozambique (4%) and Niger (4%) accounted for about 51% of all malaria deaths globally in 2019 [2]. In Nigeria, malaria is predominantly transmitted through the bite of infected female anopheles mosquitoes. Cases of malaria in children and pregnant women continues to increase in Africa, resulting in high neonatal and infant mortality [3]. To the country's health and economy, malaria negatively affects productivity, adds to costs of care [4] and impacts negatively on the household income [5]. Various measures including the clearing of breeding sites, use of mosquito coils and repellents, and the use of insecticidal treated nets have been implemented towards the reduction of mosquito bites. There has been remarkable progress on the sensitization and utilization of insecticidal treated nets (ITN) and it

is effective for protection against mosquito bites [6]. In 2019, an estimated 60% of pregnant women and children under five living in sub-Saharan Africa slept under an ITN compared to 26% in 2010 [2] with the proportion of the population with access to an ITN rose from 33% in 2010 to 56% in 2017 [7]. Also, households with at least one ITN for every two people doubled to 40% between 2010 and 2017 [8]. In Sub-Saharan Africa, initiatives such as the Roll Back Malaria program helped in the propagation of Insecticide Treated Nets as an integral strategy for malaria prevention and control [9].

Researches have shown that ITN is effective in reducing deaths from malaria [10-12] and malaria-related morbidity [13-15]. Non-continuity in the use of ITN has been a stumbling block [16] since user acceptability of ITN remains a prime challenge [17]. Various cultural, ethnic, behavioural, and demographic factors at a household level have influenced the use of ITN [14,18-20]. It has been noted that the size of a household and the size of a house are critical issues of concern [19,20]. These can be explained by the fact that households with small rooms often complain of high room temperature at night which prevents sleeping under mosquito nets. Also, in a large family, there is a very low likelihood that everybody will sleep under a mosquito net.

Findings from KAP surveys can be formative to guide malaria in vector control, case management, implementation of behavioural interventions, promotion of health-seeking behaviour, and ultimately enhance community participation and engagement [21-26]. In ITN utilization surveys conducted in Southwestern

Nigeria and Tanzania, only a few respondents had ample knowledge about malaria and few of the respondents were using ITNs [27,28]. On the other hand, attitude towards ITN utilization is influenced by socio-cultural expectations and cultural beliefs about symptoms of malaria-like fever, backache, nausea, loss of appetite, and vomiting being regarded as signs of pregnancy, thus precluding married women from using those ITNs [18]. There is also misuse of ITN sometimes even as fishing net as a result of poor knowledge of ITN [29]. Hence, given the endless malaria-related morbidity and mortality rates in Nigeria, this research aimed to explore the knowledge, attitude, and practice towards malaria and the use of ITNs as a malaria prevention strategy among rural dwellers in Mubi North Local Government Area, Adamawa State, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Area

The study was carried out in Mubi North Local Government Area of Adamawa State, Northeastern Nigeria. Mubi is located at latitude 10°16'N and longitude 13°16'E. According to the National population commission (2006), the local government has an estimated land area of 903km² with a total population of about 151,515. The area is marked with typical wet and dry seasons. The dry season spans from late October to mid-May, while the wet season is between June and September. The vegetation is of the Sudan savannah type, which connotes grassland interposed by shrubs. The main tribes in Mubi include; Gude Nzanyi, Fali, Kilba, Marghi, Higgi, Fulani, and Mundang (Godo-godo). Mubi town is currently home to three higher Institutions of learning: The Federal Polytechnic Mubi, Adamawa State College of Health Technology, and the Adamawa State University. The majority of the inhabitants are farmers (as reflected in their two notable vegetation zones, the Sub-Saharan and Northern Guinea Savannah zones) and petty traders, with few civil servants, students, and other professionals. Their cash crops are cotton and groundnuts while food crops include maize, yam, cassava, guinea corn, millet, sorghum, cowpea, rice, groundnut, and sugar cane. The village communities living on the banks of rivers engage in fishing while the Fulanis are cattle rearers.

2.2 Study Design

A community based, descriptive cross-sectional study was carried out from January to March 2020. A total of 304 households were examined. For each household, a household head, spouse, or senior matriarch was selected to be interviewed using the structured questionnaire.

2.3 Data Collection Instruments and Method

A Structured questionnaire was developed from previous researches that involved people's perception of malaria and the use of Insecticide Treated Net (ITN) [5,30-32] was used for data collection. These were developed in English and administered by trained research assistants who were fluent in both local languages (Hausa, Fulani, Marghi, and Higgi) and English. The questionnaire comprised of 38 questions divided into six sections; Section A had questions on socio-demographic variables, Section B had questions on the basic knowledge about ITNs and malaria, Section C had questions on the reasons for ITNs possession, Section D had questions on the reasons for not having ITNs, Section E had questions on the reasons for having ITNs but not using it, and Section F had questions on the attitudes towards the use of ITNs. Only one adult was interviewed per household. The respondents were the heads of the household. In their absence, a responsible adult above eighteen years, chosen by the family was interviewed.

2.4 Pre-test of Questionnaire

The questionnaires were pretested, in Mubi North Local Government Area of Adamawa State for validity and reliability. This involved administering the instrument to forty (40) respondents (Households) that were not involved in the main study. This was to assess the importance of questions to measured variables, reduce uncertainty where it occurred, optimize question sequencing, train field assistants on how best to collect sensitive questions, and estimate the optimal time for questionnaire completion. Questionnaires were checked for completeness and corrected when typographic or comprehension errors were found.

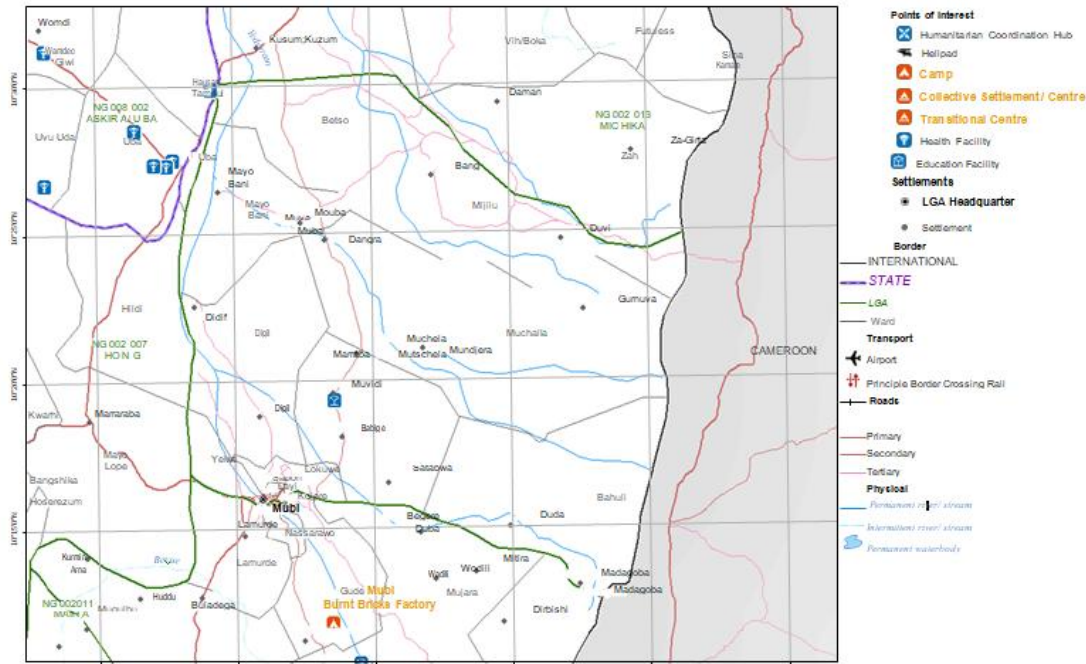


Fig. 1. map of mubi north local government area, Adamawa state

Sources: DTM RXVII, DWC, eHealth Africa, IHP, ITOS, Government of Nigeria (OSGOF), OSM, UNCS, WFP

2.5 Data Analysis

Data were organized using Microsoft Excel. Frequencies and percentages were used to tabulate and describe data. The primary analysis identified measures of self-reported socio-demographic data that included household head, gender, age, level of education, the total number of household occupants, basic malaria awareness and ITN use. The basic malaria knowledge of the participants was focusing on the twelve issues that embodied the cause of malaria, signs and symptoms of malaria infection, means of preventing and managing malaria, possession of an ITN by families, and attitude towards the use of ITNs.

3. RESULTS

3.1 Socio-demographic Characteristics of Respondents

Three hundred and four household heads or a responsible adult chosen by the family were interviewed. 51% (155) of the respondents were from the urban regions of the Mubi North Local Government area while 49% (149) of them resided in the rural area. There were 178 (57.9%) males and 128 (42.1%) females. The majority (34.5%) were farmers followed by

Traders (33.6%), 30.9% were Government/NGO employees, while (1%) of the respondents were pensioners. 145 (47.7%) of the study participants were single, 138 (45.4%) of them are married, 15 (4.9%) were divorced, and 6 (2%) of them were widows. 7.2% of the respondents never had a formal education, 4.9% of them had attended primary school, 15.8% attended secondary school, while 40.8% and 31.3% attended Colleges and Universities respectively. The majority (52.3%) of the respondents were of the age group 18-29 years, 35.9% of them were of the age group 30-49 years, while 18.8% of them were 50 years and above (Table 1).

3.2 Knowledge about the Cause of Malaria, Signs and Symptoms and Malaria Control Measures

99.3% (302) of the respondents agreed that malaria is caused as a result of a mosquito bite. The majority (90.8%) of them also agreed that ITN prevents mosquito bites, while 86.8% of them had ITNs (Table 2). The study participants identified Fever (82.2%) and Headache (33.9%) as the most common signs and symptoms of malaria (Table 3). Other signs and symptoms reported include Chills (16.8%), Fatigue (14.8%), Sweating (8.2%), Joint pain (6.6%), Vomiting

(14.1%), Convulsion (3.3%), Loss of consciousness (1.3%), and loss of appetite (10.5%). Our study participants applied various malaria preventive measures such as the use of ITNs (86.5%), clearing breeding sites around their homes (28.3%), use of insecticidal sprays (18.8%), Herbal infusions (12.8%), and wearing protective clothing's (6.9%). However, a respondent (0.3%) was unable to identify any malaria preventive measure (Table 4).

3.3 Possession and Utilization of ITNs

Reasons for ITN possession were analyzed in Table 5. The majority (92.1%) of the respondents

used ITNs because it prevents mosquito bites, 77.6% of them used ITNs to prevent bites from other preying insects, 41.4% of them use ITN because of the comfort it provides, 21.7% used ITNs as window screens, while 21.4% of the respondents used ITNs to protect their farmstead from animals. On the other hand, study participants reported various reasons for not having ITNs (Table 6). They include; lack of knowledge (26.3%), not received (40.1%), uncomfortable to use (30.3%), ITN was destroyed (23.6%), very expensive (15.8%), no benefit (4.9%), and no mosquitoes in my area (2.6%).

Table 1. Sociodemographic characteristics of respondents (N=304)

Variable	Frequency (N)	Percentage (%)
Gender of respondent		
Male	176	57.9
Female	128	42.1
Participants' age category (Years)		
18-29	159	52.3
30-49	109	35.9
≥50	36	11.8
Marital status of the respondent		
Single	145	47.7
Married	138	45.4
Divorced	15	4.9
Widow	6	2
Location of household		
Urban	155	51
Rural	149	49
Level of education		
Not educated	22	7.2
Primary school	15	4.9
Secondary school	48	15.8
College	124	40.8
University	95	31.3
Religion		
Christianity	172	56.6
Islam	115	37.8
Others	17	5.6
Source of income		
Farmer	105	34.5
Government or NGO employees	94	30.9
Trader	102	33.6
Pensioner	3	1
Number of people in the household		
1-3	94	30.9
4-6	126	41.5
≥7	84	27.6

Table 2. Knowledge about the cause of malaria and insecticide treated mosquito nets

Variable	Frequency (N)	Percentage (%)
Cause of malaria		
Mosquitoes	302	99.3
Flies	1	0.3
I don't know	1	0.3
Bedbugs	0	0
Midges	0	0
Do you have a mosquito net	264	86.8
Does ITN prevent mosquito bite	276	90.8

Table 3. Knowledge about the signs and symptoms of malaria

Variable	Frequency (N)	Percentage (%)
Signs and symptoms of malaria		
Fever	250	82.2
Headache	103	33.9
Chills	51	16.8
Fatigue	45	14.8
Sweating	25	8.2
Vomiting	43	14.1
Joint pain	20	6.6
Convulsion	10	3.3
Loss of consciousness	4	1.3
Loss of appetite	32	10.5

Table 4. Knowledge about malaria preventive measures

Variable	Frequency (N)	Percentage (%)
Malaria preventive measures		
Use of Mosquito nets	263	86.5
Clearing breeding sites	86	28.3
Use of insecticides	57	18.8
Herbal infusions	39	12.8
Wearing protective clothes	21	6.9
I don't know	1	0.3

Table 5. Reasons for ITN possession

Variable	Frequency (N)	Percentage (%)
To prevent mosquito bite	280	92.1
To prevent bites from other insects	263	77.6
To use as window screen	66	21.7
For comfort	126	41.4
To fence farmstead	65	21.4

Table 6. Reasons for not having ITN

Variable	Frequency (N)	Percentage (%)
Unavailability	122	40.1
Uncomfortable to use	92	30.3
My ITN was destroyed	71	23.6
Cost (very expensive)	48	15.8
I have not heard about ITN	80	26.3
There is no benefit	15	4.9
No mosquitoes in my area	8	2.6
I don't like using a mosquito net	110	36.2

Table 7. Reasons for having ITN but not using it

Variable	Frequency (N)	Percentage (%)
My ITN was torn	78	25.7
I got tired of using ITN	102	33.6
No mosquitoes in my area	16	5.3
I forgot	69	22.7
I don't like using ITN	134	44.1
Side effects (n=93)		
Burning sensation	25	26.9
Difficulty in breathing	30	32.2
Rashes on the skin	38	40.9

Table 8. Attitude towards the use of mosquito net

Variable	Frequency (%)
Do you think most people are worried about not having ITN	256 (84.2)
Do you think using ITN is the best way to prevent malaria	277 (91.1)
It is important and beneficial to sleep under ITN every night	269 (88.5)
Do you believe that you can still suffer malaria while using ITN	66 (21.7)
Do you believe that it is difficult to use ITN every night	55 (18.1)
Do you think it is easier to take antimalarial medication than to use ITN	63 (20.7)

3.4 Reasons for ITN Possession, But Non-use among Respondents

Some respondents refused to use ITN regularly despite having them (Table 7). The majority reported various side effects including difficulty in breathing (32.2%) as a result of the heat generated by the ITNs, burning sensation (26.9%) and rashes on the skin (40.9%) resulting from body contact with chemicals contained in the mosquito net while they are asleep. Others gave varied responses on why they have not been using their ITNs. 25.7% of them reported that their ITNs were torn therefore, there is no point using the ITN since mosquitoes will still enter and bite them while sleeping. 22.7% of them forgot to use ITNs, 44.1% don't like using the ITNs, and 33.6% of them got tired of using the ITNs while 5.3% of the respondents reported that there are no mosquitoes in their area.

3.5 Attitudes Towards ITN Use

Attitudes towards the use of ITN were shown in Table 6. The majority (91.1%) of the respondents agreed that consistent use of ITN is the best preventive measure against mosquitoes and malaria, 88.5% of them believe that it is important and beneficial to sleep under ITN every night, while 18.1% of them believe that it is difficult to use ITN every night. However, 84.2% of them who couldn't afford to buy ITNs were worried about not having ITNs. As a result of sitting outside at nighttime, 21.7% of the

respondents believe that they can still suffer malaria while using ITN, while 20.7% of the respondents think it is easier to take antimalarial medications rather than undergo the stress of using ITNs daily.

4. DISCUSSION

Our study findings have revealed that the majority (99.3%) of them were well educated and informed on the cause of malaria, use of ITN as a preventive measure (86.5%), and can identify at least a sign and symptom of malaria. The reported knowledge about malaria is consistent with other studies in Rangamati Hill tracts of Bangladesh [33], North-eastern Ethiopia [34], North-western Tanzania [35] and North-western Nigeria [36]. This high level of awareness about malaria in Mubi North could be as a result of the concerted efforts of the government-owned health facilities, coupled with the generous efforts towards this intervention by Non-Governmental Organizations in the area. Furthermore, since malaria is studied in higher institutions in Nigeria and Mubi is home to a State University, a federal polytechnic, and other numerous government-owned and private Colleges of Health, the reported level of awareness about malaria could have occurred through formal education in these higher institutions of learning.

The ITN self-reported possession rate observed in this study (86.8%) is greatly higher than the World Health Organization reference of at least

80% [37]. This finding was similar to previous reports in Southwestern Uganda [5], North-western Tanzania [35] where ITN possession rate was 84%, and 58.7% respectively. These high ITN possession rates could be ascribed to its popularity as a means for controlling malaria [38]. Furthermore, ITN is thought to be able to minimize morbidity by 60% and mortality by about 25% among children under the age of 5. [39].

Contrary to the findings in Mumbai, India [40] where 90% of the respondents reported the elimination of standing water in or near the house was the most common malaria preventive measure, the use of ITN was the most common method used for prevention of malaria as reported by 86.5% of the respondents. The study in Mumbai, India which comprised of respondents living in slums and construction areas, are favourable breeding sites for mosquitoes. Therefore, draining these stagnant waters would be the ideal first line of response against mosquitoes. Studies have shown that the higher outdoor-biting pattern of malaria vectors implies that techniques that prevent the transmission of malaria primarily indoors (such as ITNs) may not provide adequate protection outdoors [33,41]. Therefore, in addition to the use of ITN, respondents also employed several other preventive measures including the use of insecticides (18.8%), wearing long-sleeved clothes (6.9%), and clearing breeding sites (28.3%). These measures were constant with reports from Rangamati Hill tracts of Bangladesh [33], and North-western Tanzania [35].

Among those who do not have ITN, unavailability (40.1%), cost (15.8%), discomfort (30.3%), and lack of knowledge on the benefits and importance of ITN (26.3%) were the major reasons highlighted by the respondents for not owning ITN. This finding is in line with the works of other scholars [10,42,43] who have reported that cost, unavailability, and inconsistency in the distribution of ITN as the barriers to ownership of bed nets. Therefore, there is a need for intensified efforts in the distribution of ITN if the goal of controlling malaria will be achieved.

However, awareness about the benefits of ITN against malaria was not enough to encourage all respondents who had ITN to regularly use it. Most of the respondents were wary about ITN use due to possible side effects of the chemicals contained in the bed net when it comes in contact with the skin. 40.9% of them reported

rashes on the skin as a likely side effect from ITN use, 26.9% reported that they often feel a burning sensation on their skin whenever they use ITN, and 32.2% of them highlighted a high risk of suffocation/difficulty in breathing when using ITN. 33.6% of the respondents noted that they eventually became tired of the stress of hanging ITN every night, 25.7% of them reported that their bed nets were torn while 22.7% of the respondents said that they often forget to use their bed nets. The reasons outlined in this study for non-use of ITN were similar to the findings of [5] who reported that respondents were skeptical about the use of ITN because of alleged hazards, such as the possible adverse effects of chemicals on ITNs, the risk of ITN suffocation, or the risk of cancer in pregnant women and children.[30,31] have reported similar findings with People who do not use the freely distributed ITNs because of factors related to the insecticide's adverse risks.

The majority (88.5%) of the study participants had a positive attitude towards the benefits of using ITN every night. Respondents were also worried about community members who do not own ITN, highlighting that they are higher chances of being exposed to malaria and other mosquito-borne diseases. However, the lack of ITN uses among residents who can likely to afford it implies that other variables affect net usage of beds [40]. For instance, 18.1% of the respondents in this current study admitted that the stress of setting up the bed nets every night made it extremely difficult for them to use bed nets every night, while 21.7% of them believed that they can still suffer malaria even though the use bed nets every night.

5. CONCLUSIONS

Our study findings have revealed that the majority of the respondents were well educated and informed on the cause of malaria, use of ITN as a preventive measure, and can identify at least a sign and symptom of malaria. However, the respondents were also worried about community members who do not own ITN, highlighting that they are higher chances of being exposed to malaria and other mosquito-borne diseases. Therefore, there is a need for awareness campaigns on the importance of using bed nets every night and applying other preventing measures like wearing protecting clothes when outdoor and clearing mosquito breeding sites.

CONSENT AND ETHICAL APPROVAL TO PARTICIPATE

All respondents consented to fill the form after receiving a detailed description of the study. Qualified participants consented and no rewards were offered for privacy. At all levels of data collection, the respondents' privacy was guaranteed.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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