IJSRM
INTERNATIONAL JOURNAL OF SCIENCE AND RESEARCH METHODOLOGY
An Official Publication of Human Journals

Human Journals
Research Article
April 2017 Vol.:6, Issue:2

Awareness and the Use of Insecticide Treated Nets for Malaria Control in Amainyi, Ihitte-Uboma Lga, Imo State, Nigeria

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Submission: 2 April 2017
Accepted: 7 April 2017
Published: 25 April 2017

Keywords: Awareness, Use, Insecticide-Treated Nets, Malaria Control, Amainyi, Ihitte-Uboma.

ABSTRACT

Aims: The thesis sought to find out the awareness and use of insecticide-treated nets for malaria control in Amainyi, Ihitte-Uboma LGA, Imo state, Nigeria. **Study Design:** A descriptive survey design was used.**Place and Duration of Study:** A community-based study was conducted in Amainyi, Ihitte-Uboma LGA, Imo State, Nigeria between July and December 2015.**Methodology:** A validated and reliable (r = 0.77) questionnaire and focus group discussions were the instruments used for data collection. A sample size of 280 households was drawn from the five villages studied with a population of 1400 households using proportionate and systematic sampling methods. One person was sampled in each household. The data were analyzed using descriptive statistics.**Results:** The result showed that 244 correctly filed copies of the questionnaire were analyzed and 211(86.5%) respondents were aware of the use of Insecticide-Treated Nets (ITNs) in the control of malaria while 33(13.5%) were not aware. Majority of the respondents 215 (88.1%) perceived the importance of ITNs, 10 (4.1%) said it is somewhat important, 6(2.5%) was undecided while 13(5.3%) said ITNs were not important. In terms of methods of malaria prevention 46 (18.9%) preferred sanitary measures, 43(17.6%) preferred other measures like burning of herbs, leaves and use of wide brooms, 16 (6.6%) used repellents, 12(4.9%) preferred closing doors and windows, 105(43%) did not use any measure while only 5(2%) preferred the use of ITNs. In patterns of malaria treatment, 114(46.7%) used health facilities, 63(25.8%) used home medication, 40(16.4%) used traditional practices and 19 (7.8%) used herbal plants. Among the respondents, only 11(4.5%) had ITNs and used it while 233(95%) had none. Major reason for not having ITNs by 106(43.4%) is that it makes heat, 32(13.1%) said it is expensive while the major problem encountered while sleeping under the ITNs is that it is hazardous (48%), difficulty coming out of bed at night(24.2%) while 13(5.3%) said it is stifling.**Conclusion:** The findings showed poor usage of ITNs in Amainyi. Concerted effort is needed to scale-up the distribution of insecticide-treated nets and emphasis led to the usage by health workers. The study highlights the need for further research on the human concerns that contribute to sustained use of nets or, conversely, present significant barriers to their use.

INTRODUCTION

Malaria is a disease caused by infection with single-celled parasites of the genus *Plasmodium* *Anopheles* mosquitoes which transmit these parasites from one person to another in their bites. Malaria is characterized by periodic bouts of severe chills and high fever [World Health Organization (WHO), 2010]. It is the number one public health issue in Nigeria, accounting for 25% of under-5 mortality, 30% of total childhood mortality and 11% maternal mortality. According to recent reports, 20% of the global malaria cases occur in Nigeria, with approximately 110 million people affected annually and majority of the outpatient visits being malaria-related (WHO, 2007). Most Nigerians are likely to suffer at least one episode of malaria in their lifetime but the vast majorities experience multiple bouts. The economic impact of the mosquito-borne disease is not insignificant. It is estimated that the cost of treatment and loss of productivity and earnings as a result of sick days may be as high as 1.3% of annual economic growth (WHO, 2007).

Community perceptions relating to causation, transmission, prevention and treatment are the main socio-cultural factors that can influence malaria control [Roll Back Malaria (RBM), 2002]. The success of malaria control programs at present relies on community perceptions of the disease; incorrect beliefs or inappropriate behavior that can interfere with the effectiveness of a control measure such as vector control or chemotherapy (Legesse and Deressa, 2009). These issues are particularly important in tropical areas where malaria control options are limited because of the parasite and vector resistance to anti-malarial drugs and insecticides, respectively. For the participation of the community to be meaningful the views of the community should be sought and incorporated into any control program.

Malaria remains a public health problem, causing significant maternal and child morbidity and mortality annually in sub-Saharan Africa. WHO (2000) has recommended the use of ITNs as a vital tool in combating malaria but the public awareness of this approach vary from place to place (Widmar *et al*, 2009). International efforts to combat malaria have led to a scaling-up of the key existing malaria control measures over recent years.

Mosquito nets have been in use since very early times to protect people against bloodsucking insects at night; they also help to protect against other creatures, such as spiders, cockroaches, beetles, lizards, snakes and rats. When made of thicker opaque sheeting they also protect against cold and dust and provide privacy (Ali *et al*, 2004).

A ITNs is a mosquito net that repels, disables and/or kills mosquitoes coming into contact with insecticide on the netting material. There are two categories of ITNs which are conventionally treated nets and long-lasting insecticidal nets (LLITNs). A conventionally treated net is a mosquito net that has been treated by dipping in a WHO-recommended insecticide. To ensure its continued insecticidal effect, the net should be re-treated after three washes, or at least once a year (WHO, 2000). A LLITNs is a factory-treated mosquito net made with netting material that has insecticide incorporated within or bound around the fibers. The net must retain its effective biological activity without re-treatment for at least 20 WHO standard washes under laboratory conditions and three years of recommended use under field conditions.

The above-mentioned problems of standard mosquito nets can be solved by impregnating them with a quick-acting pyrethroid insecticide which irritates or kills mosquitoes on contact, preventing them from finding openings (RBM, 2002). An impregnated net with holes that are not too large is as effective as an undamaged net. Insecticide treatment thus extends the useful life of a net. Mosquitoes that land on an impregnated net and attempt to feed through it on part of the body in contact with the net are likely to be killed. The behavior of a mosquito that survives contact with the insecticide is so disturbed that it is unlikely to attack again. People without a net and sleeping near someone with a treated net may receive some protection from bites. A person leaving such a net during the night or in the morning runs a reduced risk of being bitten. (RBM, 2002)

Fig 1: a typical net in the study area.

ITNs serve as human-baited traps when somebody is sleeping inside by attracting and killing mosquitoes and other biting insects. These factors make the widespread use of treated mosquito nets particularly important in the control of malaria. When employed by all members of a community, the practice kills many *Anopheles* and reduces the chance that any will live long enough to transmit malaria parasites (Ansari *et al*, 2010). People outside their nets early in the night or before dawn, or people not using nets, thus receive some protection against the risk of infection. According to National Malaria Control Programme (NMCP, Nigeria), (2006–2010), treated nets can also be used to protect the most vulnerable groups in a community, such as pregnant women, children and old and sick people, from infection with malaria or other insect-borne diseases. Young children, going to sleep early, receive most protection. The use of impregnated bed nets may lead to the disappearance or reduction of other pests that are sensitive to the insecticide used, such as bedbugs, head lice, chicken ticks and houseflies.

The WHO distributed bed nets to families with children under age 5 in several African countries and found that the death rate from malaria dropped by 50 to 60 percent among children in these countries (WHO, 2000). ITNs have raised a renewed interest to serve as tools for malaria control in Africa. The use of this control method has been proved to be a cost-effective means for the control of malaria (Hanson and Jones, 2000)

Current WHO initiatives in malaria control such as RBM emphasized the use of ITNs as one of the key strategies for malaria prevention and control in sub-Saharan Africa. It has been suggested, however, that ordinary nets provide only partial protection because the nets allow mosquitoes to enter and feed, especially, if the net is even slightly torn or not tucked in properly (Hanson and Jones, 2000). On the other hand, treating a net with insecticides makes it very effective at repelling and killing anopheles mosquitoes (Anosike *et al*, 2004). Even when there are holes in the treated nets, insecticide can affect the mosquitoes as they work their way through. One problem with treated bed nets has been that they lose their effectiveness over time. Newer nets, however, retain their effectiveness for several years. Although the nets are inexpensive, even their modest cost is beyond the means of many families in developing countries.

ITNs are very effective as they are estimated to be twice as effective as untreated nets and offer greater than 70% protection compared with no net. These nets are dip treated using a

synthetic pyrethroid insecticide such as deltamethrin or permethrin which will double the protection over a non-treated net by killing and repelling mosquitoes. (RBM, 2002)

The distribution of mosquito nets impregnated with insecticides such as permethrin or deltamethrin has been shown to be an extremely effective method of malaria prevention, and it is also one of the most cost-effective methods of prevention. A current challenge that is facing many sub-Saharan African countries like Nigeria is how to achieve widespread distribution and use of ITNs for the control of malaria.

Malaria is the number one public health problem in Nigeria (RBM, 2002). By preventing malaria, ITNs reduce the need for treatment and the pressure on health services. Baume and Marin (2008) identified four 'most common options' for ITNs and insecticide distribution and these were: government systems; non-governmental organization systems; unassisted private sector; and assisted private sector (social marketing models).

It has been observed that no matter the level of proven effectiveness of ITNs if the acceptance and rate of use among the general population is low, the program cannot achieve the desired goal (Erhun *et al,* 2005). It is for this reason that the researcher decided to assess in the study area the awareness of the use of insecticide treated nets in the control of malaria, identify the method of malaria treatment and prevention, the reasons for non usage of ITNs in the community and the level of usage of ITNs in the community of Amainyi, Ihitte Uboma LGA, Imo State, Nigeria.

METHODOLOGY

A descriptive survey design was used for the study. The study population involved five villages in Amainyi namely Umulo, Umunahihie, Amaorji, Amaokwe and Umutuada having a population of 1400 households (National Population Commission, 2009). The sample size was two hundred and eighty (280) drawn from a population of 1400 households from the five villages in Amainyi. Umulo has a population of 250 households, Umunahihie has 256 households, Amaorji has 274 households, Amaokwe has 319 households and Umutuada has 301 households. The sample size of 280 was considered high enough considering Nwana's(1981) formula for sample size determination. Nwana (1981:72) in his work on educational research observed that ''if the population is a few hundred, forty percent or more sample size will do., if many hundreds a twenty percent sample size will do., if a few thousand a ten percent sample size or more will do and if several thousands a five percent

sample size or less will do. Considering the fact that the population of 1400 is in many hundreds, a 20 percent sample size of 280 households was drawn.

A multistage sampling technique was used. Stage 1: A proportionate sampling technique was used to select from each village. Stage 2: A systematic sampling method was used to select the number proportionately allocated to each village. Random start of 3 was used, and sample taken after every 3 households till the number allocated to each community was completed. The validated and reliable (r = 0.77) instruments for data collection were the questionnaire and focus group discussion. The data were analyzed using descriptive statistics. Qualitative data from focus group discussions were recorded, transcribed and analyzed manually by content analysis.

RESULTS

Table 1: Socio- Demographic characteristics of respondents in the five districts or villages.

District	Umulo (n=47)	Umunahihie (n=50)	Amaorji (n=48)	Amaokwe (n=49)	Umutuada (n=50)	Total (n=244)
Age						
15-19	3(6.4)	5(10.0)	1(2.1)	3(6.1)	5(10.0)	17(7.0)
20-34	18(38.3)	29(58.0)	32(66.7	27(55.1)	36(72.0)	142(58.2)
35-44	22(46.8)	13(26.0)	12(25.0)	12(24.5)	8(16.0)	67(27.5)
45>	4(8.5)	3(6.0)	3(6.3)	7(14.3)	1(2.0)	18(7.4)
Sex						
Male	20(42.6)	38(76.0)	25(52.1)	26(53.1)	25(50.0)	134(54.9)
Female	27(57.4)	12(24.0)	23(47.9)	23(46.9)	25(50.0)	110(45.1)
Marital status						
Married	45(95.7)	39(78.0)	48(100)	47(95.9)	50(100)	229(93.9)
Not married	2(4.3)	11(22)	0(0)	2(4.1)	0(0)	15(6.1)
Level of Education						
No formal Education	15(31.9)	20 (40.0)	18(37.5)	20(40.8)	25(50.0)	98 (41.2)
Primary	15(31.9)	14(28.0)	15(31.3)	12(24.5)	10(20.0)	66 (27.0)
Secondary	7 (14.9)	10 (20.0)	8(16.7)	10 (20.8)	8 (16.0)	43 (17.6)
Tertiary	10(21.2)	6(12.0)	7(14.6)	7(14.3)	7(14.0)	37 (15.2)
Occupation						
Farmer	23(48.9)	28(56)	25(52.1)	25(51)	26(52)	127(52)
Trader	12(25.5)	13(26)	11(22.9)	15(30.6)	10(20)	61(25)
Civil -servant	8(17)	5(10)	7 (14.6)	4(8.2)	6(12)	30(12.2)
Professional	4(8.5)	3(6)	3(6.3)	5(10.2)	6(12)	21(8.6)
Others	0(0)	1(2)	2(4.2)	0(0)	2(4)	5(2)

The result in table 1 showed that out of the 280 sample size, 244 correctly filled copies of the questionnaire were used for analysis. Age range 15-19 were 17(7.0%), 20-34 years old were 142 (58.2%), 35-44 years were 67 (27.5%) and above 45 years were 18 (7.4%).

In the sex distribution of respondents, 134(54.9 %) were males and 110(45.1 %) were female respondents. The marital status of the respondents showed that 229(93.9%) of the respondents were married, while 15(6.1%) were unmarried. In terms of level of education, 98 (41.2%) had no formal education, 66(27.0%) had primary education, 43(17.6%) had secondary education while 37 (15.2%) had tertiary education. In occupation, farming was found to be the predominant occupation 127 (52%) followed by trading 61 (25%), Public service 30 (12.2%), professionals 21 (8.6%) and others 5 (2%).

Table 2: Awareness of the use of ITNs By respondents in the five districts or villages (%)

District	**Umulo (n=47)**	**Umunahihie (n=50)**	**Amaorji (n=48)**	**Amaokwe (n=49)**	**Umutuada (n=50)**	**Total (n=244)**
Aware of ITNs?						
Yes	41(87.2)	45(90)	44(91.7)	37(75.5)	44(88)	211(86.5)
No	6(12.8)	5(10)	4(8.3)	12(24.5)	6(12)	33(13.5)
Perceived importance of ITNs						
Very important	38(80.9)	44(88)	44(71.7)	44(89.8)	45(90)	215(88.1)
Somewhat important	3(6.4)	3(6)	0(0)	2(4.1)	2(4)	10(4.1)
Undicided	1(2.1)	0(0)	2(4.2)	0(0)	3(6)	6(2.5)
Not important	5(10.6)	3(6)	2(4.2)	3(6.1)	0(0)	13(5.3)

Out of the 244 respondents studied, only 211(86.5%) respondents had seen or heard of nets treated with insecticides while 33(13.1%) had not had of ITNs. Majority of the respondents 215 (88.1%) said that the use of ITNs is very important. 10(4.1%) said it is somewhat important, 6(2.5%) were undecided and 13 (5.3%) said it is not important.

Table 3: Methods of malaria prevention and pattern of treatment by the respondents in the districts, (%)

District	Umulo (n=47)	Umunahihie (n=50)	Amaorji (n=48)	Amaokwe (n=49)	Umutuada (n=50)	Total (n=244)
Prevention methods						
Sanitary measures	10(21.3)	9(18)	9(18.8)	8(16.3)	10(20)	46(18.9)
Mosquito nets	2(4.3)	1(2)	1(2.1)	0(0)	1(2)	5(2)
Insecticide spray	3(6.4)	1(2)	4(8.3)	2(4.1)	7(14)	17(7)
Repellants use	6(12.8)	3(6)	2(4.2)	3(6.1)	2(4)	16(6.6)
Closing doors and windows	5(10.6)	3(6)	0(0)	2(4.1)	2(4)	12(4.9)
Others	6(12.8)	8(16)	14(29.2)	10(20.4)	5(10)	43(17.6)
Nil	15(31.9)	25(50)	18(37.5)	24(49)	23(46)	105(43)
Patterns of malaria Treatment.						
Use of Healthcare facility	24(51.1)	22(44)	23(47.9)	19(38.8)	26(52)	114(46.7)
Home medication	14(29)	12(24)	14(29.2)	12(24.5)	11(22)	63(25.8)
Traditional practices	5(10.6)	10(20)	7(14.6)	9(18.4)	9(18)	40(16.4)
Herbal plants	3(6.4)	4(8)	3(6.3)	5(10.2)	4(8)	19(7.8)
Others	1(2.1)	2(4)	1(2.1)	4(8.2)	0(0)	8(3.3)

The results in Table 3 presented the preventive measures adopted which were, sanitary measures 46(18.9%) respondents, use of mosquito nets 5 (2%) respondents, use of repellents 16 (6.6%) respondents, insecticide spray 17 (7%) respondents, closing doors and windows 12 (4.9%) respondents. Other responses include burning of herbs and leaves, use of wide brooms, chanting some incantations 43 (17.6%) respondents and 105(43%) respondents practice no preventive measure. Also presented in table 3 is the pattern of malaria treatment by the respondents. About 114(46.7%) of the respondents visited healthcare facility for

treatment, while 63 (25.8%) respondents preferred home medication, 19 (7.8%) of the respondents took herbs prepared for them by herbalists, 8(3.3 %) of the respondents visited either their pastors for prayers, native doctors or took hot baths etc.

Table 4: Reasons for non-use of bed net by respondents in the districts (%)

District	Umulo (n=47)	Umunahihie (n=50)	Amaorji (n=48)	Amaokwe (n=49)	Umutuada (n=50)	Total (n=244)
Do you have Nets						
Yes	3(6.4)	2(4)	1(2.1)	2(4.1)	3(6)	11(4.5)
No	44(93.6)	48(96)	47(97.9)	47(95.9)	47(94)	233(95.5)
Reason for not having one						
Too expensive	7(14.9)	5(10)	8(16.7)	9(18.4)	3(6)	32(13.1)
Makes heat	16(34)	24(48)	12(25)	22(44.9)	32(64)	106(43.4)
Only for kids	3(6.4)	0(0)	2(4.2)	3(6.1)	5(10)	13(5.3)
Not effective	3(6.4)	6(12)	10(20.4)	3(6.1)	2(4)	24(9.8)
Occupies space	12(25.5)	10(20)	13(27.1)	10(20.4)	5(10)	19(7.8)
Not available	6(12.8)	5(10)	2(4.1)	2(4.1)	3(6)	19(7.8)
Would you accept bed net if provided free of charge?						
Yes	35(74.5)	32(64)	35(72.9)	34(69.4)	31(62)	167(68.4)
No	12(25.5)	18(36)	13(27.1)	15(30.6)	19(38)	77(31.6)
Problems with sleeping under nets						
Hazardous	20(42.6)	29(58)	19(39.6)	23(46.9)	26(52)	117(48)
Mosquitoes can still bite through nets	7(14.9)	4(8)	5(10.4)	3(6.1)	4(8)	23(9.4)
Difficult to get out at night	13(27.7)	8(16)	16(33.3)	11(22.4)	11(22)	59(24.2)
Takes time to tuck in	5(10.6)	8(16)	5(10.4)	8(16.3)	6(12)	32(13.1)
Net is stifling	2(4.3)	1(2)	3(6.3)	4(8.2)	3(6)	13(5.3)

The result in table 4 showed that 11 (4.5%) respondents had ITNs while 233(95.5%) had not in their households. The reason for not having insecticide-treated nets were that nets were

expensive 32 (13.1%), makes heat 106 (43.4%), perception that nets are for children alone 13 (5.3%), not effective 24 (9.8%), occupies space 19 (7.8%) and non-availability of the nets 19 (7.8%). In regards to acceptance of bed net, if provided free of charge, 167(68.4%) said yes while 77(31.6%) said no. The respondents problems sleeping under the net were the impression that the nets were hazardous 117(48%), mosquitoes can still bite through nets 23(9.4%), difficult to get out at night 59(24.2%), takes time to tuck in 32(13.1%) and net stifling 13(5.3%).

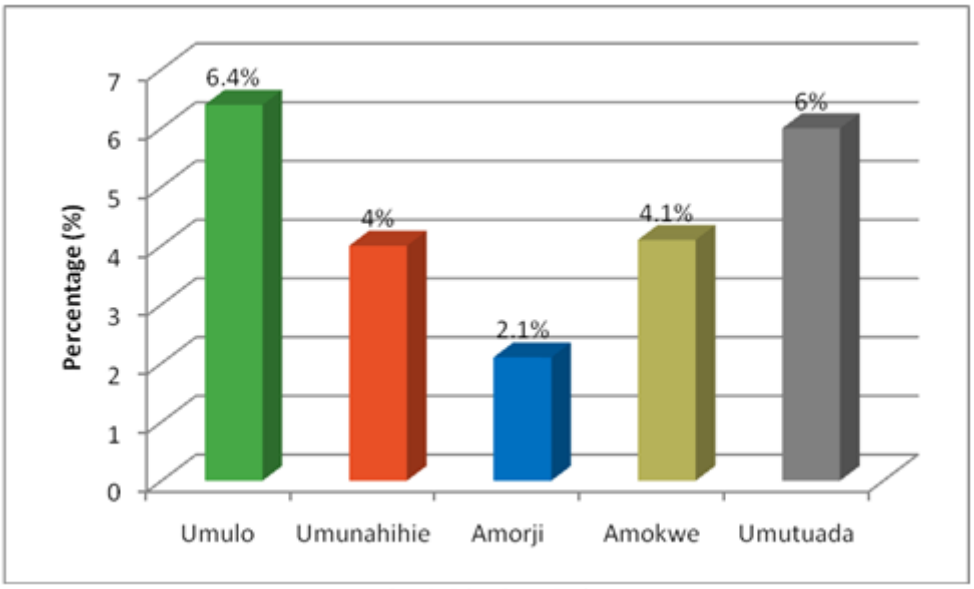
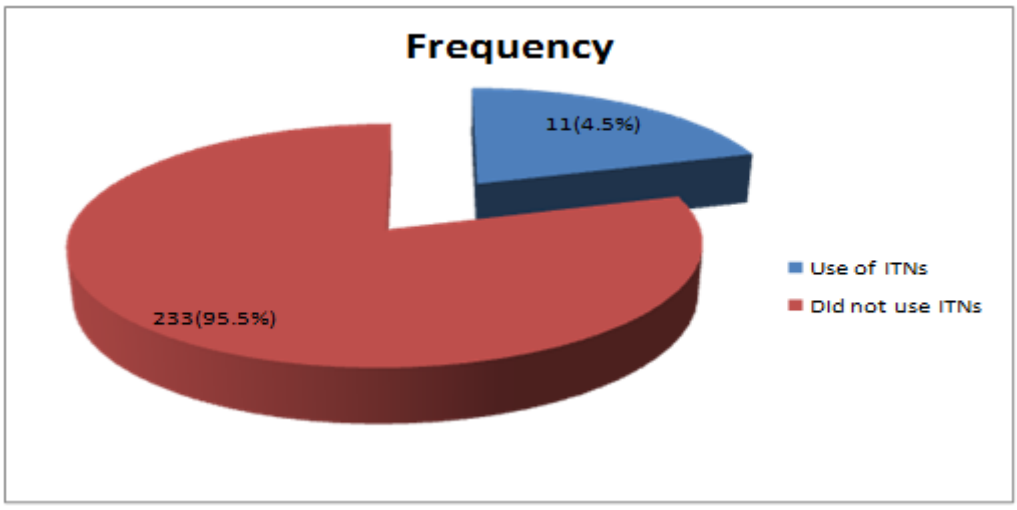


Figure 2: Use of bed net in Amainyi communities

In Umulo Amainyi only 3(6.4%) used ITNs out of 47respondents, 2(4%) in Umunahihie out of 50, 1(2.1%) in Amaorji out of 48, 2(4.1%) in Amaokwe out of 49 and 3(6%) in Umutuada out of 50.



Out of the 244 respondents in Amainyi communities, 11(4.5%) were using ITNs while 233(95.5%) were not using the ITNs.

DISCUSSION

The majority 211(86.5%) were aware of the ITNs while 33(13.5%) were not aware. Majority 215(88.1%) respondents were of the view that it is very important to use ITNs but still do not use them. This is in line with the study of Iyaniwura *et al*. (2008) in Zambia, where knowledge of malaria was found to be positively associated with level of education but no significant relationship was found between education and the use of mosquito nets indicating that education is sometimes, but not always, an important determinant of net ownership. The results are also similar to findings in Mozambique, where only 3% of the people heard about ITNs and 9% used treated or ordinary nets. In 2000, in Achi, a rural community in Enugu state of Nigeria, only 11.4% had ever heard of ITNs (Malaria & Vector Control Unit, 2000). A study conducted in 2005 in the 6 geopolitical zones of Nigeria showed household ownership of ITNs to be 10.1%, but only 1.7% of children under the age of 5 slept under it (ACT, 2005).

The preventive methods for malaria used by the study community were sanitary measures 18.9% followed by other responses like burning of herbs and leaves, use of wide brooms and incarnations 17.6% while use of mosquito nets was just 2% and non-use of preventive measures 43%. This is supported by the study of Afolabi *et al*. (2006) and Aribodor *et al.* (2003) where priority was given to traditional means of prevention. In regards to treatment, majority used health care 46.7%, 25.8% used home medication while others used traditional practices. The study by Govere *et al.* (2000) also noted that prominent use of herbal treatment for malaria has been reported in some West African countries. Lack of adequate access to health centers and hospitals in most rural communities due to distance, cost and/or lack of transportation and long waiting time might be a contributory factor why respondents resort to patronizing local drug stores and herbalists (Afolabi *et al.,* 2006). Orthodox medicine is complemented by traditional medicine in Nigeria. Traditional healers provide low-cost care and are usually the first point of contact for many residents of rural areas. Historically, there are certain conditions for which the skills of traditional healers have been customarily sought and for which their expertise is widely recognized. Snakebites, severe malaria, bone fracture and dislocation are common examples (Aribodor *et al*, 2003).

Various reasons were given for not having or using the ITNs, 43% said it makes heat followed by being expensive 13.1%. Problems with not sleeping under the net were that it is hazardous 48%, inconveniences one during getting out of bed in the night 24.2% as well as tucking it in 13.1%. Also reported is that net is stifling 5.3%. Use of ITNs in Amainyi community was very poor. Out of the 244(100%) respondents in the present study, only 11(4.5%) used ITNs. Although insecticide-treated bed nets are effective tools, use often does not follow ownership. The use of nets-especially ITNs is very low, although some studies in Nigeria indicate that the numbers of people using ordinary nets and ITNs are steadily increasing (FMOH, 2001). However, 215(88.1%) of the respondents agreed after enlightenment that use of ITNs is very important. This indicates that community members felt that there were gains to be realized by using nets, and more gains if such nets were treated for prolonged protection from mosquito bites and malaria fever.

Focus group discussion

Focus group discussions, revealed that why some preferred the use of herbal plants in the treatment of malaria is because of the easy access to the herbs and the cost which is cheap. In terms of preventive measures repellents, insecticide spray and closing of the doors were preferred while use of ITNs are good and protective from mosquito bite and malaria but the weather is usually hot and one can not afford to sleep under the ITNs. During focus group discussion, reasons like heat, non-availability of ITNs, fear of inhaling the chemical used in treating the net and lack of finance for transportation and buying of the nets were hindering factors to using ITNs. Someone also noted that use of ITNs is for children and not adults that even if the ITNs are given free of charge that many will not use it as there is no regular electricity to use the fan when under the net for those who have fan. To majority availability of the ITNs is not the issue but the usage.

CONCLUSIONS

The findings suggest that there were important barriers to the preventative measures for the successful control of malaria. Nonetheless, the findings were of general interest and were congruent with existing published empirical work. There is moderate awareness of malaria preventive measure using ITNs but the practice by people is very poor. This study has shown that negative perceptions on ITNs are held by most people who have not even used them and do not have first-hand experience. It would be interesting to try an intervention where users of ITNs narrate their experiences to non-users and test how this may influence the use of

ITNs in the community. This will enable policy makers to design a better package for ITNs distribution. Hence, there is stronger need more than ever before to reinforce the importance of adoption of ITNs as a malaria prevention and control strategy among rural endemic communities by health educators.

ETHICAL CONSIDERATIONS AND INFORMED CONSENT.

An approval was given by research ethical committee of Federal University of Technology Owerri and informed consent given by the participants.

ACKNOWLEDGEMENTS

The authors will like to express their heartfelt gratitude to the heads of the households and village heads for their cooperation.

COMPETING INTERESTS.

Authors hereby declare that there is no competing interest.

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