

MALARIA PROTECTIVE PRACTICES AMONG MOTHERS WITH CHILDREN UNDER THE AGE OF FIVE YEARS IN NASARAWA STATE, NORTH CENTRAL NIGERIA

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ABSTRACT

Malaria remains to be the major cause of morbidity and mortality among pregnant women and children under the age of five years in Nigeria. The aim of this study was to investigate protective practices for malaria among mothers with children under the age of five years in Nasarawa state. A multi-stage systematic random sampling technique was adopted and a pre tested structured questionnaire was administered to 1416 representative respondents from six local government areas. In addition, focus group discussions and in-depth interviews were conducted on similar issues to complement the quantitative data. Chi-square was used to test for statistical differences within categories of the independent variables and p-values less than 0.05 were considered significant, while knowledge of malaria prevention was scored on a 3-scale of Low (0-2 points), Medium (3-4 points) and High (5-6 points). The study findings showed that respondents knowledge score of malaria prevention was skewed towards medium (43.9%). The major form of protection for children from mosquito bites was the use of bed-nets (76.8%); with 58.8% of all respondents' children under five years sleeping under bed-nets. The major reason for protection against mosquitoes was because they cause malaria (56.6%). Majority (82.4%) of the respondents reported ownership of at least a bed-net in the house with 88.1% in the urban and 76.7% rural reporting at least a bed-net in their household. Children (98.6%) more than adults (1.4%) often use bed-nets in their homes. Only 41.2% of all respondents' children sleep under bed-nets. Less than half (45.1%) had mosquito proofs on their doors and windows with more urban (60%) than rural (24%) respondents had mosquito proofs on doors and windows. Based on the findings of this study, it is concluded that the envisaged reduction in malaria morbidity and mortality in children less than five years will depend on the successful implementation of malaria prevention strategies by involving women. It is therefore recommended that women must be given priority in the effective implementation of bed-nets because women are role models for their family members particularly for their children. Raising their awareness and involving them in malaria prevention and control could enhance the proper use of preventive strategies by their children as well as other family members.

Key words: Malaria, Nasarawa State, North Central Nigeria, Protective practices.

INTRODUCTION

Despite the considerable increase in funds over the recent years to control malaria in Nigeria, the disease has been the most frequently reported cause of morbidity and mortality. All age groups

are at risk of developing severe malaria illness, but children and pregnant women are biologically the most vulnerable (WHO, 2003). Although a variety of preventive measures against malaria can be recommended, but none of them can guarantee full protection (Sussanne, 2000). Preventive measures are either directed against the mosquito vector (avoiding infection) or against the development of the parasite within the human host. Popular practices used to minimize mosquito bite in most endemic countries of Africa include; protective clothing, use of skin repellants, mosquito coils and residual insecticides (applied on house walls and anopheline resting places), nightly spraying with insecticides of windows and walls inside the house, screening of doors and windows with net, and sleeping in air-conditioned rooms (Iwelunmor *et al.*, 2010). For curative purposes, a variety of anti-malarial drugs, attacking the parasite at different stages of the life-cycle in the human host, are available under different brand names obtainable from drug shops.

Preventive measures such as the use of Insecticide-Treated Nets (ITNs) and indoor residual spraying are current malaria interventions in the country. However, the use of bed-nets has found some success in controlling the spread of the disease and upon which future efforts may depend. At present, the primary recourse in preventing malaria, at least until a suitable vaccine is found, is to break the chain of transmission between mosquito vector and human host. Since the groundbreaking research of Bradley and Greenwood in Gambia (Bradley, 1996), which showed a significant inverse correlation between bed net usage and mortality, much hope has been pinned on the use of bed nets in malaria control. Literature is unanimous that treated bed nets do indeed offer some degree of protection (Audrey *et al.*, 2008; Humprey *et al.*, 2010; James *et al.*, 2011). Thus, studies aimed at uncovering local attitudes towards bed net usage as well as other means used to prevent mosquito bites are critical for they reveal a multiplicity of local variations and point to the need for behavioural and anthropological approaches in the design and implementation of malaria control programmes.

Due to the high burden of malaria among pregnant women and children under the age of five years, targeting women in the reproductive age group to deal with the disease has recently been widely recognized. It has been acknowledged that the success of malaria control in this group of the population depends on the understanding of their practices of malaria prevention measures (WHO, 2011). However, to the best of our knowledge, there is paucity of information on mother's protective measures against mosquito contact in children less than five years of age in Nasarawa state. Thus, the objective of study was to ascertain the anti-mosquito protection measures adopted among mothers in the state. It is hoped that the findings of this study will enhance the performance of the Global Roll Back Malaria project in the country and the state in particular.

STUDY AREA

The study was conducted between September and November 2011 in Nasarawa state, Nigeria. The state covers an area of about 27,116.8 km² and shares boundary with Kaduna state in the North, Plateau state in the East, Taraba and Benue states in the South, while Kogi state and the Federal Capital Territory flank it in the West. According to 2006 provisional census figure, the population of the state was 1,863,275. The people are predominantly subsistence farmers belonging to different ethnic groups. The settlement pattern of the ethnic groups overlap owing

to common neighborhood, farmlands, intermarriages and other forms of cultural and inter group relations. The state is administratively organized into thirteen local government areas (the third tier of government in the country). The vegetation is Guinea savanna and experience average rainfall of 328 mm/year from April to November. The state is well endowed with enormous water resources. The climatic and ecological conditions of the state also favour high malaria transmission with mosquitoes all year round particularly around the rivers. Malaria transmission is common in the state; peaking from June to October and the disease is the major cause of morbidity in the state. There are two groups of healthcare providers in the study area; the modern western health and the traditional healthcare practitioners. There are also those who combine traditional medicine with modern medicine.

MATERIALS AND METHODS

Study Design and Sampling Procedure

Quantitative and qualitative methods were employed to generate data for the study in Akwanga, Lafia, Karu, Nasarawa, Nasarawa Eggon and Keana Local Government Areas (LGAs) of the state. Qualitative methods included Focus Group Discussions (FGDs), in-depth interviews, and ongoing observations. Eighteen FGDs with an average of ten participants in each group and 12 in-depth interviews were held with mothers of children under the age of five years to further explore their preventive measures about the disease. The qualitative data were used to supplement, cross check and further explore the quantitative findings.

An open-ended questionnaire was also used to source data from 1416 mothers with at least a child under the age of five years; contacted through a multistage systematic sampling procedure. In the first stage was the stratification of the state into Senatorial Districts; two LGAs were systematically selected in each of the senatorial districts. This systematic sampling exercise resulted in the selection of Nasarawa and Karu LGAs in Nasarawa West Senatorial District; Nasarawa Eggon and Akwanga LGAs in Nasarawa North Senatorial District and Keana and Lafia LGAs in Nasarawa North Senatorial District. In the second stage; each LGA was further stratified into urban and rural areas. Each local government headquarters was categorized as urban and was stratified into three residential zones. These are the high, medium and low class areas; based on the socio-economic attributes/status of their residents.

The third stage was the selection of settlements and respondents in the LGAs using the updated version of the 2006 National Population Enumeration Areas (EAs). A total of six EAs in each LGA were purposely and systematically selected (3 urban and 3 rural) giving an overall total of 36 EAs sampled for the study. Sampling at the EA level proceeded with the listing of all the buildings in the EA and study. Sampling at the EA level proceeded with the listing of all the buildings in the EA and thereafter the selection in each EA at specified intervals of either every third or fifth building from a starting number (determined randomly) depending on the length of the street or on the total number of houses on each street or area.

Data Management and Analysis

Verbatim transcriptions were made for all tape-recorded FGDs and interviews. Thereafter, the transcripts were coded and prepared by themes. The textual data was used to support the quantitative findings and where appropriate, quotes that best explained mother's malaria preventive measures in children under the age of five years were identified and used in parallel with the quantitative findings to elaborate more on the insights of practices of the mothers. The data generated from the questionnaire were subjected to descriptive statistics while Chi-square statistic was used to test for statistical differences within categories of the independent variables and p-values less than 0.05 were considered significant. Knowledge of malaria prevention was scored by creating dummy variables in which those who responded in the preferred direction were coded as 1 and 0 otherwise. It was scored on a 3-scale of Low (0-2 points), Medium (3-4 points) and High (5-6 points). The six knowledge of malaria prevention variables measured was to affirm that: Malaria is preventable; cleaning the environment reduces mosquitoes; clearing grasses reduces mosquitoes; putting nets on doors and windows reduces mosquitoes; filling up pot holes and pools of water that do not flow reduce mosquitoes and use of bed-nets prevents mosquitoes.

- High knowledge score of malaria prevention: to correctly mention five to six malaria preventive strategies
- Medium knowledge score of malaria prevention: to correctly mention three to four malaria preventive strategies.
- Low knowledge score of malaria prevention: to correctly mention at least two malaria preventive strategies.

Ethical Considerations

The study made efforts to collect ethical clearance in the state, but it was non-existent. However, to facilitate the successful conduct of the study, official letters containing the purpose of the study, its procedure and duration was taken to the state ministry of local government and chieftaincy affairs and the health department of the study LGAs two weeks before the commencement of the study. This enabled the health department to introduce the researcher to the community leaders and health officers. In each community, before starting the study, rapports were established with the community leaders and heads of the household- this facilitated their cooperation, mobilization and support. The aim and objectives of the study were explained to them for their cooperation and participation in the study. Thereafter, oral consent from the respondents was sought directly while in some cases because of cultural considerations, the husbands consent was sought and obtained before the mothers participated.

RESULTS AND DISCUSSION

Background Characteristics of the Respondents

Table 1 summarizes the background characteristics of the study mothers. Almost equal numbers of respondents were sampled in the LGAs; 50.3% were urban while 49.6% were rural residents. Majority (93.4%) of the respondents were married, with about 33.4% aged 30-34 years and had post primary education (40.3%). Slightly more than half (50.3%) were Christians, 44.9% were Muslims, 4.4% were traditional worshippers and 0.4% had other forms of religion.

Table 1: Socio-economic and Demographic Characteristics of Respondents

Characteristics	Variable	Frequency	Percentage
LGA	Lafia	233	16.5
	Karu	237	16.7
	Keana	239	16.9
	Nasarawa	242	17.1
	Nasarawa Eggon	234	16.5
	Akwanga	231	16.3
Locality status	Urban	713	50.3
	Rural	703	49.7
Age group	15-19	53	3.7
	20-24	189	13.3
	25-29	366	25.8
	30-34	473	33.4
	35-39	214	15.1
	40-44	90	6.4
	45-49	31	2.2
Educational status	No formal education	347	24.5
	Primary	323	22.8
	Post primary	571	40.3
	Tertiary	165	11.7
	Others	10	0.7
Religion	Christianity	712	50.3
	Islam	636	44.9
	Traditional	63	4.4
	Others	5	0.4
Ethnic group	Eggon	310	21.9
	Mada	220	15.5
	Alago	275	19.4
	Hausa	158	11.2
	Ebira	97	6.9
	Gbagi	96	6.8
	Afo	110	7.8
	Fulani	56	3.9
	Others	94	6.3
Occupation	Farming	267	18.9
	Business/Trading	479	33.8
	Civil Servants	328	23.2
	Housewife	328	23.2
	Others	14	1.0
Income per month(in Naira)	Below 5,000.00	464	35.3
	5,000.00-10,000.00	449	34.2
	10,100.00-15,000.00	197	15.0
	15,100.00-20,000.00	77	5.9
	20,100.00-25,000.00	47	3.6
	25,100.00-30,000.00	26	2.0
	30,100.00-35,000.00	28	2.1
	35,000.00-40,000.00	10	0.8
Above 40,000.00	15	1.2	
Marital status	Married	1323	93.4
	Single parent	25	1.8
	Others	68	4.8

The ethnic groups of the respondent's show that 21.9% were Eggon, 15.5% were Mada, 19.4% were Alago, 11.2% were Hausa, 6.9% were Ebira, 6.8% were Gbagi, 7.8% were Aho, 3.9% were Fulani while 6.3% were other tribes. One third(33.8%) of the respondents were into business/trading, 18.9% were farmers, 23.2% each were civil servants and housewives while only 1.0% had other forms of occupation. Most (84.5%) of the respondents earn N15, 000.00 and below monthly. This is generally low given the present economic situation in the country.

Knowledge of Prevention of Malaria

Figure 1 presents information on respondent's knowledge of malaria prevention. The table reveals that mothers had several opinions about the preventability and ways to prevent malaria. About three-fourth(72.7%) of them believed that malaria could be prevented, while 27.3% did not know whether the disease could be prevented or not, indicating that some mothers in the community still had myths about malaria prevention in children. A variety of methods were used by mothers to protect their children and other family members from malaria. A substantial proportion of the study subjects (82.5%) reported knowing the use of bed-nets as a strategy for preventing mosquitoes. This was higher than the results reported in different studies (Sultana *et al.*, 2001; Legesse *et al.*, 2007; Khumbulani *et al.*, 2009; Paulander *et al.*, 2009; Safari *et al.*, 2010). This high knowledge may be due to increased health promotion by health workers and the government. Knowledge about cleaning environment to prevent mosquitoes was less than half (48.8%) while 62.7% and 68.3% knew that putting nets on doors and windows and clearing grasses respectively will prevent mosquitoes. Only 34.3% reported knowing filling up pools of water that do not flow which serve as breeding sites for mosquitoes as a strategy for preventing mosquito. It was observed in the study community that many of the respondents who reported knowing some of the practices were not adopting them. The figure also indicates the level of ignorance of how mosquitoes can be prevented. This is further supported by the following statements and some comments by discussants during FGD who did not affirm some of the preventive strategies:

Mosquitoes are natural and there is nothing you can do to prevent them. Even if you say bed-nets prevent mosquitoes, will a person be carrying the net to the farm or when you are staying outside the house, are you saying that a person should use it cover himself outside the room (FGD, rural mother).

Is it possible to cut down all the grasses because you want to prevent mosquitoes?.Even if it is possible, mosquitoes will always come around (FGD, rural mother).

There is no way you can say that malaria is preventable. This is because no matter what you do during rainy season, they will always come (FGD, urban mother).

No matter how you fortify your house with mosquito nets and doors, mosquitoes will always enter the room (FGD, rural mother).

Most of the respondents in the FGDs believed that malaria could be prevented. Although use of bed-nets, draining of mosquito breeding sites, cleaning the environment around the compound, smoking, blockage of mosquito entry holes and insecticide sprays were reported as common

practices of households to prevent malaria, the practice was not observed and might be influenced by social desirability bias in which the respondents replied to conform to the expectations of the health workers.

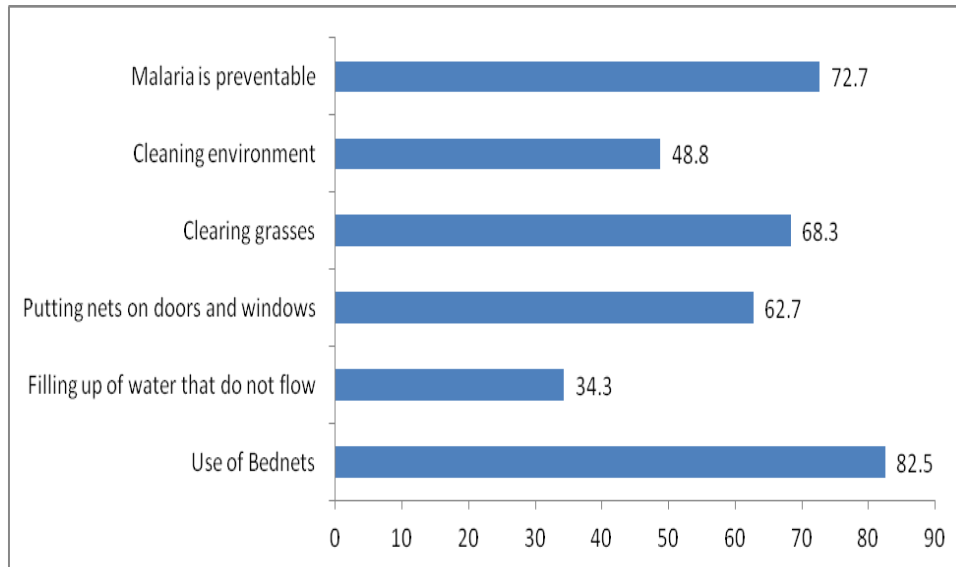


Fig. 1: Respondents knowledge of malaria prevention

The percentage distribution of scores on the 6-question test on the prevention of malaria by low, medium and high knowledge is shown in table 2. The table shows that those with medium knowledge of malaria prevention had the highest percentage frequency (43.9%) among the respondents. This is an indication that the preventive knowledge of the respondents in this survey about malaria was average. This average knowledge could also be attributed to ignorance of malaria prevention methods among some community members and lack of sensitization on the part of health workers to communities on the appropriate malaria preventive measures. Only 35.2% had high knowledge score while 20.9% had low knowledge score. The knowledge score of malaria prevention differed significantly between urban and rural areas ($\chi^2 = 12.95$, $df = 2$, $p = 0.000$). Low knowledge score was 31.1.8% for rural and 10.8% for urban respondents. High score was 49.3% for urban and 20.9% for rural respondents while medium knowledge score was 47.9% for urban and 39.9% for rural respondents.

Table 2: Knowledge Score of Prevention of Malaria

Locality status	Low		Medium		High	
	Frequency	%	Frequency	%	Frequency	%
Urban	84	10.8	277	39.9	337	49.3
Rural	211	31.1	345	47.9	162	20.9
Total	295	20.9	622	43.9	499	35.2

Protective Measures

Peoples' perception of the cause of malaria determines their protective behaviour and the type of protective measures used. Table 3 contains information on the major method used by mothers to protect children from mosquito bite. The table shows that the commonest form of protection against mosquitoes for children in the study area was a mosquito net (76.8%), which is interestingly high. This is commendable because generally, all mosquito nets are helpful for preventing malaria and it works by acting as a physical barrier to prevent access of vector mosquitoes to users, thereby providing personal protection against malaria to the people using them. This is however, because the population is able to link the cause of malaria to mosquito bite which has made them appreciate the use of nets as an effective preventive method of malaria. A similar finding was reported by Humprey *et al.*, (2010) in their study of Knowledge, Attitudes, and Practices about Malaria and its Control in Rural Northwest Tanzania. Majority of the respondents associated bed-nets with a control programme of the government. Since identification of malaria as a serious and potentially deadly disease is already high in the study area, only little effort is needed in educating the respondents on this. The study findings confirm higher mosquito net use in urban (80.8%) than rural areas (73.7%) as reported by Philip *et al.* (2005) and Habtamu (2011). Others use insecticides/spray (7.0%), 2.9% use smokes (mosquito coil), 1.4% use cloth as a barrier to drive away mosquitoes, 9.5% cover their body when sleeping while only 0.2% use fire to drive mosquitoes away. Also, 2.0% use different plants as mosquito repellants in rooms. The major method used by mothers to protect children from mosquito bite differed significantly between urban and rural areas ($\chi^2 = 17.36$, $df = 1$, $p = 0.000$).

The FGD participants particularly in the remote areas of the state elaborated and believed that some plant leaves were effective in preventing mosquito bites. They reported that certain plants were selected and hung around the body in the field to keep mosquitoes away while some are placed at the different parts of the houses. Mosquito coils and insecticide sprays were sold under various brand names in the communities visited. Although the finding reveals that the major form of protection for children from mosquito bites was the use of bed-nets; it was observed during the FGDs that some of the measures against mosquitoes were targeted at the perceived mosquito nuisance rather than for malaria prevention. The FGD participants reported that the preference for a particular protective devise varied from cost of the method such as mosquito nets and availability. A rural respondent during FGD reported that children sleep where animals are kept especially among the cattle and use them as a form of protection against mosquitoes:

Children sleep among the cattle and the mosquitoes do not see them to bite. The cattle are big enough and the mosquitoes prefer to bite them instead of the children. When will mosquitoes finish biting the big cattle and turn to the children? The only problem the children normally have is that the cattle sometimes kick them if they do not take care. But they protect them against mosquitoes.

Table 3: Major Preventive Measures for Children against Mosquitoes

Major Protective measures	Urban		Rural		Total	
	Frequency	%	Frequency	%	Frequency	%
Use bednet	574	80.5	514	73.1	1088	76.8
Spray	52	7.3	47	6.9	99	7.0
Coil	18	2.5	23	3.3	41	2.9
Drive them away with cloth	7	1.0	13	1.8	20	1.4
Plants(Repellants)	12	1.7	16	2.3	28	2.0
Cover them when sleeping	49	6.9	85	12.1	134	9.5
Use of fire	1	0.1	5	0.7	6	0.4
Total	713	100	703	100	1416	100

Major Reason for protecting Children against Mosquitoes.

The major reason for mothers protecting their children against mosquitoes (Table 4) was because they cause malaria (56.6%). The same reason was supported by 69.4% of urban and 43.7% of rural respondents. There were significant differences in the major reasons for protection children against mosquitoes between urban and rural mothers ($\chi^2 = 12.65$, $df = 4$, $p = 0.000$). Since majority used bed-nets, it can be inferred that the study respondents consider mosquito nets as an effective strategy in reducing malaria in this group of children as reported by WHO (2003) and Obinna *et al.* (2004). Other mothers protect their children against mosquitoes because they bite (12.8%), they cause itching (11.7%) and 9.0% do so because they cause rashes. However, 5.7% protect children from mosquitoes because they disturb one's sleep (nuisance) and they suck blood (3.8%).

Table 4: Major Reason for Protecting Children against Mosquitoes

Reason	Urban		Rural		Total	
	Frequency	%	Frequency	%	Frequency	%
They bite	33	4.6	148	21.1	181	12.8
They suck blood	7	1.0	47	6.7	54	3.8
Cause itching	65	9.1	103	14.7	168	11.7
Cause malaria	495	69.4	307	43.7	802	56.6
Cause rashes	66	9.3	62	8.8	128	9.0
Disturb one's sleep	47	6.6	36	5.1	83	5.7
Total	713	100	703	100	1416	100

Ownership and Use of Bed-nets

Bed-nets are owned and used for children to reduce transmission of malaria and hence morbidity and mortality. It is interesting to note that all the study respondents were aware of mosquito nets and most (82.4%) of them reported ownership of at least a bed-net in their houses. This was an encouraging observation and can be used by malaria control programme to increase the number of ITNs issued to this community; but this will not imply use of it. The high rate of ownership may be due to increased health promotion by the government. It can also be attributed to the state government massive distribution of ITNs in all communities in the state in December 2010 and the government policy of at least an ITN for any woman that put to bed in any public health facility. It could also possibly imply that the campaign of the Ministry of health to reach 100% coverage by 2010 was being successfully implemented which has also increased mosquito net availability and use in communities where they were previously unknown. This is also an indication that the Nasarawa State Government has directed attention to assessing the potential benefits of ITNs and has also responded to the need for low-cost preventive measures. The high rate of ownership of bed-nets is a further indication that the respondents associate mosquitoes with malaria.

Ownership by locality status shows that, 88.1% of the urban and 76.7% of rural respondents reported at least a bed-net in their household (Table 5). The findings showed higher bed-net ownership in urban compared with rural areas. However, the rate of ownership in both communities was above 70%. Bed-nets were generally appreciated in the study community as some communities were found to have reported health officials for not supplying them with mosquito nets. Two other communities were reported to have refused immunization for their children because they were not given mosquito nets and the health officials had to supply them before carrying out the immunization exercise. The mosquito net ownership findings in this study is higher than the results reported by Sultana *et al.*(2001) in Rawalpindi, Legesse *et al.* (2007) and Paulander *et al.* (2009) in Ethiopia, Humprey *et al.* (2010) and Safari *et al.* (2010) in Tanzania, and Khumbulana *et al.* (2009) in Swaziland.

Table 5 also shows the category of people that use mosquito nets most often. Children (98.6%) more than adults (1.4%) significantly ($\chi^2 = 22.36$, $df = 1$, $p = 0.000$) often use bed-nets in their homes in both urban (98.1%) and rural (97.2%) areas. This demonstrates that the existing mosquito nets were used by people who are at greatest risk for severe malaria-the children. This support James *et.al.*(2011) findings in northern Uganda where younger children were more frequently protected with mosquito nets than older children and adults. The use of mosquito net for children is commendable and reflects a genuine desire by mothers to ward off mosquitoes bite. This finding is confirmatory to the findings in the FGDs where discussants who mentioned the use of bed-nets in their homes also indicated that children mostly use them. A discussant during FGD echoing the assertion that children use bed-nets more reported that:

We have mosquito nets but it is not everybody that sleeps under the mosquito nets. In my house there are both men, women and children, but there are those who use mosquito nets and those who do not. It is the children especially the young one's that use and sleep under the mosquito nets.

Discussants reported that the bed-nets were generally not sufficient for their households and most children sleep together and share bed-net, normally two of the same sex under one net. The mother normally slept with the youngest child under a net and in most cases without the husband. It was also observed in homes without beds that the children sleep on mats on the floor under a net which was mounted by tying the strings on the sides of the net to nails in the wall. It was noted in some communities that instead of mounting the bed-nets they were rather used as curtains on bathrooms, doors and windows.

Table 5 further shows that more than half (58.8%) of the respondents reported that not all their children under five years sleep under bed-nets while 41.2% reported that all their children sleep under bed-nets. Reporting all children less than five years sleeping under bed-nets was more in urban (54.1%) than rural (28.2%) areas. This urban-rural difference is expected because of income variation and fluctuation. This could probably also be because the urban population is more literate and with more civil servants who can afford to pay for bed-nets because of their higher monthly income compared to farmers whose source of income are not only lower, but seasonal and may fluctuate, increasing considerably during harvesting and dwindling sometime after. It could also be because all the urban communities in this study were LGA headquarters and may have more access to the nets.

Respondents were also asked whether they had mosquito proofs on their doors and windows as a strategy for preventing children from mosquito bites (table 5). The table show that the practice of putting mosquito proofs on doors and windows as a form of protection against malaria was not too common in the study community. About 54.9% of the respondents do not have mosquito proofs on their doors and windows while 45.1% had. More urban (60%) than rural (24%) respondents had mosquito proofs on their doors and windows. The urban-rural difference which is significant ($\chi^2 = 70.47$, $df = 2$, $p = 0.000$) could be because urban residents are expected to be more exposed to the mosquito preventive benefits associated with having mosquito proofs on doors and windows. They are also expected to have more advocacies about the disease. Interestingly, the study respondents believed the introduction of bed-nets and mosquito nets on doors and windows had helped to reduce malaria. This is in agreement with a similar study done by Ajadi *et al* (2012).

Table 5: Ownership and Use of Bed-nets

Characteristics	Variable	Urban		Rural		Total	
		Frequency	%	Frequency	%	Frequency	%
Ownership of bed-net	Yes	628	88.1	539	76.7	1167	82.4
	No	85	11.9	164	23.3	249	17.6
	Total	713	100	703	100	1416	100
Use of bed-nets	Adults	12	1.9	15	2.8	17	1.4
	Children	616	98.1	524	97.2	1150	98.6
	Total	626	100	539	100	1167	100
All children under 5 years sleep under bed-nets	Yes	386	54.1	198	28.2	584	41.2
	No	327	45.9	505	71.8	832	58.8
	Total	713	100	703	100	1416	100
Mosquito proofs on doors and windows	Yes	470	60.0	169	24.0	639	45.1
	No	243	40.0	534	76.0	777	54.9
	Total	713	100	703	100	1416	100

CONCLUSION

Knowledge of malaria prevention of respondents in this study was average. Since 2010, important steps have been undertaken particularly to scale-up the implementation of ITNs in the state. The envisaged reduction in malaria morbidity and mortality will depend on the successful implementation of malaria prevention and control strategies by involving women. Since sleeping under bed net was the most common malaria prevention method in the study area, even though not all households and children use bed nets; a more concerted effort is needed to sustain and scale-up the distribution of ITNs and its proper utilization. This will consolidate the gains made in malaria control in the state. Women are role models for their family members particularly for their children thus; their pivotal role in the community should be given priority in the effective implementation of ITNs. Raising their awareness and understanding, and involving them in malaria prevention and control could enhance their use of proper protective measures for themselves, their children as well as other family members. Women should be mobilized and empowered with knowledge of malaria prevention through ongoing information, education and communication activities in the communities.

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