

Original Research Article

Evaluation of utilization of insecticide treated nets among pregnant women in Bayelsa State of Nigeria: a case study of Sagbama community

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ABSTRACT

Background: There has been a roll back mosquito (RBM) program in Nigeria. This study was carried out to determine the effectiveness and utilization of insecticide treated nets (ITNs) among pregnant women in Bayelsa State, Nigeria.

Methods: A descriptive survey design was used to assess usage and patient experience. A total of 250 completed survey were returned out of 260 questionnaires distributed. Statistical analysis was in frequency counts and percentages.

Results: Over 55% of respondents are aware that the best way to prevent malaria in pregnancy is to always sleep in ITNs. 20% of the respondents lack ITNs due to non-availability in the clinic or unaffordability in the market. Among those that own ITNs, only 31% utilize it every day. Suffocation and skin irritation were reasons for non-utilization. On effectiveness, among those who use their ITNs, 24.3% never suffered malaria or mosquito bite.

Conclusions: ITNs utilization seems to have reached the RBM target. However, the study shows patient experience that use of ITNs seems to have limited effectiveness in prevention of malaria during pregnancy, while affordances and quality are barriers to utility. Ministry of Health and especially antenatal and community healthcare workers need to intensify health education campaign to improve attitude and practice of ITNs utility among pregnant mothers. Manufacturers of ITNs also need to improve on the quality of ITNs to reduce skin irritation or suffocation in order to encourage usage among pregnant mothers.

Keywords: Effectiveness, Insecticide-treated nets, Malaria, Patients' perspective, Public health

INTRODUCTION

Malaria increases the risk of adverse pregnancy outcomes for mother, the fetuses and newborns.¹ The prevalence of malaria is on the increase globally with sub-Saharan African being the worst hit. There are about 300-500 million clinical cases per year with 80% occurring in Africa.²⁻⁴ The Roll Back Malaria (RBM) identified pregnant women as one of the highest risk groups for malaria, and one of the strategies set to fight malaria in this group is to increase utilization of mosquito nets.⁴⁻⁶

It has been articulated in a recent narrative that beside affordances as a barrier factor, "The proper use of insecticide treated nets (ITNs) can reduce mortality mostly among children. However, there is evidence that relatively few people in high-risk regions access and use them the extent to which the general population residing in high-risk areas own and utilize this medical commodity remains unknown".⁷ Several studies have also been done in Nigeria and overseas with most emphasis being around ownership and determinants of utilization of ITNs.⁸⁻¹³

This study aims at assessing effectiveness of ITNs with a focus on the perspective of patient experience and hope to suggest ways to tackle reasons for non-utilization. This study will assess the knowledge, attitude and practice (KAP) on utilization of ITNS among pregnant women in Bayelsa State in Southern Nigeria; with a view to determine the experience and level of usage among owners of ITNs. Thus, the research has the following 3-questions and 3-objectives-among pregnant women:

- What is the extent of KAP on malaria and ITNs influence the use of the latter?
- How effective is malaria prevention by using ITNs?
- What are the factors that influence the utilization of ITNs?.

METHODS

Research design and setting

The research work adopted a cross-sectional descriptive survey method. Pregnant women and breast-feeding mothers in the community were surveyed. Non-pregnant mothers, visiting and/or non-home owners (i.e. teenage pregnancy) women were excluded. The study was conducted at Sagbama, Yenagoa and Ogbia Communities in Bayelsa State. Each of these three communities are representative of the three senatorial zones in Bayelsa State.

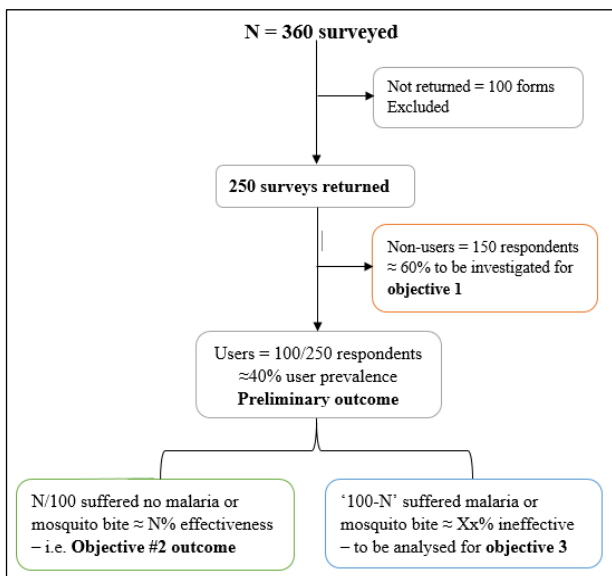


Figure 1: Data analysis plan assuming 100 users of ITNs.

Sampling and sampling techniques

Based on estimated population size of 3,400 pregnant and breast-feeding mothers that reside in the three Communities in Bayelsa State (NPI/NPHCDA2016), the stratified and convenience sample technique was used to obtain the sample size of 347 pregnant and breast feeding

mothers, using Taro Yamen’s formula. A random sampling technique of 120 pregnant mothers were chosen to be surveyed among the target population from each of the three communities. The instrument for data collection was a structured questionnaire following the methods of similar studies.^{14,15}

Data analysis and expected outcomes

A systematic analytical approach was adopted in analysing the % prevalence of users/non-users, and effectiveness/ineffectiveness as illustrated (Figure 1).

RESULTS

A total of two hundred and sixty (260) questionnaires were administered and two hundred and fifty (250) questionnaires were filled and returned. Ten (10) questionnaires were not returned. Table 1 presents the description and distribution of the respondents. For instance, all the respondents are less than 44 years old, and a vast majority (88%) has at least secondary school education. Also, majority of the respondents (95.2%) are traders, civil servant, private business women, or trades/skill women and only 4.8% are farmers. Further, 19.2% is within 1st trimester 98% of the women already has one child or more children <5 years in the household (Table 1).

On the evaluation of knowledge, up to 93% of the respondents are aware that malaria in pregnancy could be cause by a bite from infected mosquito; while 75% knows about the effect including that malaria in pregnancy may lead to maternal anemia, still-birth or miscarriage. A lower but simple majority (55%) of the respondents correctly identified that the best way to prevent malaria in pregnancy is to always sleep in ITNs (Figure 2).

On evaluation of ownership and utilization, it responses indicate that 80% (200/250) of the participants have mosquito nets, including 76% (189/250) of being ITNs and 4% other types. Thus, among the 200 respondents who own mosquito nets, 94.5% (189) of them are ITNs (Figure 3). The evaluation of usage among the 200 respondents who own mosquito nets show that:

- Only 31% sleep in it every day (Figure 3),
- 17% sleep with their nets only when there is no heat,
- 12% use it only when it is comfortable,
- 40% use only when there is disturbance of mosquito,
- Further, 27% cannot remember when last they slept with it (Figure 3).

Evaluation of the reasons for not owning among the 50/250 non-owners of any net was done alongside review of response to ‘where do you obtain your net’ provided

by 200/250 owners. Two main results show that out of the entire 250 respondents (Figure 4):

- 12 non-owners (5%) claim it is due to non-availability of the net in the clinic, whereas 81 owners (32%) indicated to have obtained their nets at the clinic
- 8 non-owners (3%) indicate it is costly to afford in the market, while 12 (5%) owners got theirs from market.

Table 1: Description and distribution of respondents.

Characteristics	Frequency	%	
Age	15-19	32	12.8
	20-24	43	17.2
	25-29	66	26.4
	30-34	62	24.8
	35-39	40	16.0
	40-44	7	2.8
	45 and above	0	0.0
Marital status	Single	67	26.8
	Married	164	65.6
	Widow	6	2.4
	Divorce	4	1.6
	Separated	9	3.6
Education	No formal Education	13	5.2
	Primary school education	17	6.8
	Secondary school education	145	58.0
	Tertiary education	75	30.0
Occupation	Civil Servant	28	11.2
	Private Business	53	21.2
	Trader	89	35.6
	Tradeswomen	68	27.2
	Farmer	12	4.8
Age of Pregnancy (trimester)	1-3 Months	48	19.2
	4-7 Months	134	53.6
	8-10 Months	68	27.2
No. of <5years children in household	1	92	36.8
	2	120	48.0
	3	17	6.8
	4 and Above	16	6.4
No child	5	2.0	

Other observations indicate that non-users include 38% of non-owners who do not like to use nets because it suffocates, and another 22% that cites the reason that it causes skin irritation. On the other hand, 63.5% of owners got informed about ITNs from various health worker and another 25.5% specifically from antenatal clinics, while 54% acquired their ITNs during public health campaign.

On “how do you make use of the net at night?” most of the respondents 62.0% indicate that they hang and tuck

the net when about to sleep. On the quality of the nets, 38% answered that their net is in good quality without tear, while 7% admitted that their net is dirty (Table 2).

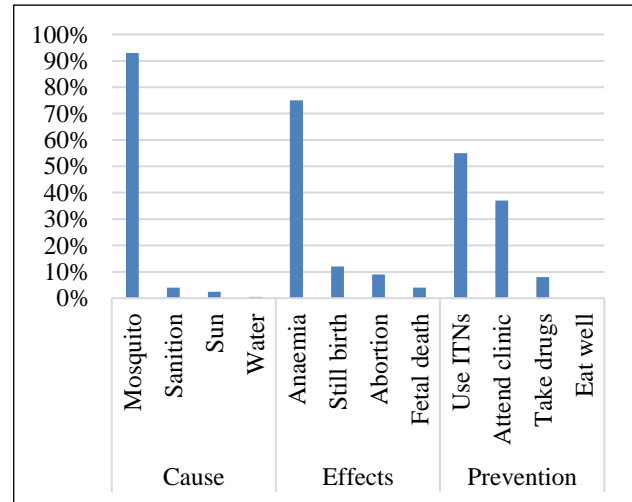


Figure 2: Causes, Effect and prevention of malaria in pregnancy.

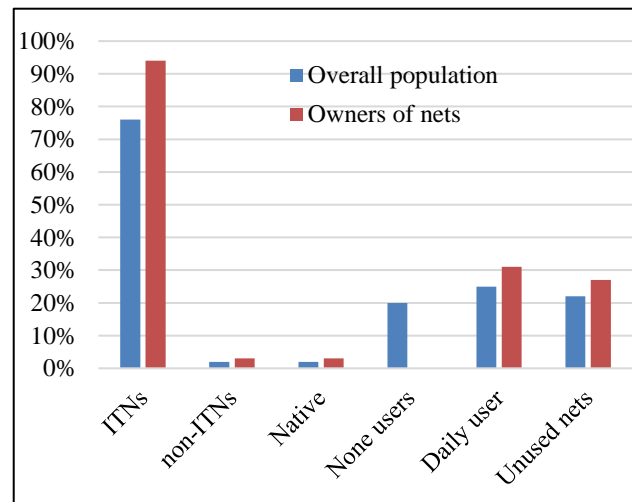


Figure 3: Ownership, type and usage of mosquito nets.

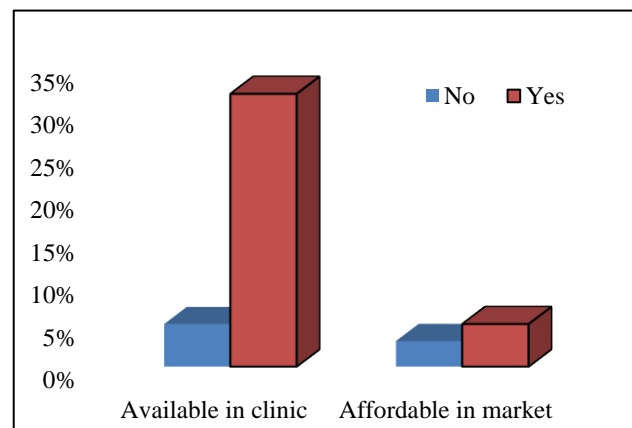


Figure 4: Reason for not owning a net compared with owners' responses.

Table 2: Method of usage and quality of nets.

	Variable	Response	Percentage (%)
How do you make use of the net at night?	Hang and tuck net when about to sleep	124	62
	Hang net and drop it on bed or mat	34	17
	Sleep under the already hanged net	32	16
	Sleep half way and later make use of net	10	5
What is the quality of the insecticide treated net you have?	No hole in the net	75	38
	There is hole in the net	78	39
	The net is sealed completely	33	17
	The net is dirty	14	7

On effectiveness of the insecticide treated nets; out of 189 respondents that use ITNs, 46 (24.3%) agreed not to have suffered mosquito bite/malaria, while the rest appear to indicate ineffectiveness of ITNs. All respondents indicated that household members to have had the same effect-i.e. 75.7% of the respondents have their household member affected as themselves (Figure 5).

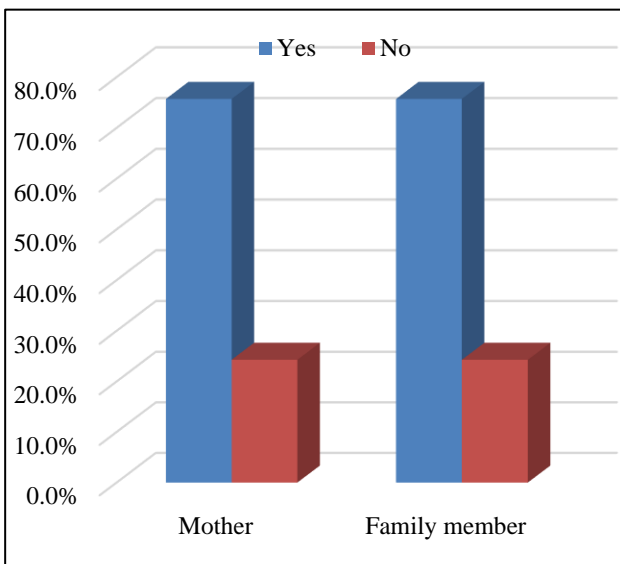


Figure 5: Effectiveness of the insecticide treated nets.

DISCUSSION

The aim of this study is to assess the utilization and effectiveness of insecticide treated nets (ITNs) among pregnant women in Bayelsa State, Southern Nigeria. The respondents were pregnant women, who are subjects for ‘prevention of malaria in pregnancy’ at the time of the study. The age range of the respondents were within 15-44 years and majority 65.6% are married 58.0% had exposure to secondary education and 30.0% had tertiary education, 6.80% had primary education and 5.2% had no formal education (Table 1). A closely related study from another state in Nigeria has reported that age, educational status and family size influence ITNs utilization.¹⁶ There

is also indication that birth spacing and socioeconomic status are factors.¹²

From the study, majority (74.8%) of the respondents are aware of the effects of malaria in pregnancy could lead to maternal anemia others agreed that malaria in pregnancy may result to fatal death, still birth and abortion (Table 1). It is presumable that education level of the participants seems to influence the knowledge level in malaria in pregnancy. The level of education among the respondents who had secondary (58%) and tertiary (30%) education of the respondents to be aware that a bite from infected mosquito causes malaria in pregnancy. This is in close relation to a similar study where 83% of the respondents were aware that mosquito bite is the mode of malaria transmission.¹⁷

Behavioural change wheel on use of ITNs among pregnant women

Behavioural change wheel is founded on the basis KAP and translates into capacity, opportunity and motivation.^{18,19} It is known that knowledge precedes attitude and both predict practice²⁰ In this study, we observe about 93% of participants being knowledgeable that mosquito bite causes malaria, but only 80% of them own mosquito nets, with 94.5% of the owners being ITNs. Yet, less than half of the owner use it daily (Figure 3); with 69% of them using theirs only on certain occasions (Table 2). This is a poor attitude and practice that could contribute to potential ineffectiveness of the ITNs, which will translate to limited or negative patient experience. The implication is that educational program will need to be increased with a view to improve attitude and practice vis-à-vis utilization of ITNs among owners and improvement in patient experience.

On source of information about use of ITNs, majority of the respondents 127 (64.0%) stated that it is from community health extension workers and other health workers, 51 (26.0%) answered ANC clinic, 18 (9.0%) answered community members 4 (2.0%) answered radio respectively (Table 4.7). This factor is considered to serve an influence on behavioural change wheel on use of

insecticide treated nets among pregnant mothers. Ironically, within the period of study, health workers in the study area in Bayelsa State were on three months' industrial strike. This non-availability of antenatal clinic extensively affects continuum of health information to pregnant mothers, especially those who need the information for the first on how appropriate and effective to use ITNs. For instance, 20% (50/250) of participants do not own any type of mosquito net and whereas 81 owners (32% of total participants, but 41% of owners) indicated to have obtained their nets at the clinic; 12 non-owners (5% of total participants, but 24% of non-owners) are unaware of availability of the nets in the clinic. These 12 non-owners have been informed of the availability, but the industrial strike action delayed the clients' visits to their antenatal clinics for verification. Perhaps, it should be acknowledged that attending antenatal clinic has been reported as one of the factors that influences utilization of ITNs.¹²

Effectiveness on use of ITNs against malaria among pregnant women

Results shows ineffective level of 75.7% among users of ITNs as indicated by fraction of those who have suffered malaria or mosquito bite whilst using their nets (Fig 5). Attitude and practice on use of ITNs is undoubtedly a big factor in patients' experience of effectiveness, especially as patient adherence determines outcome.²¹ It is known that non-conformance is a type of non-adherence that can limit the effectiveness of a prescription.²² Beside the noted 69% of owners not utilizing their nets regularly i.e. synonymous to attitude of skipping doses of ITNs intervention, evaluation of the quality of ITNs owned by respondents indicate that 39% of owners admitted that their nets were torn (Table 2). This is another factor that could limit the effectiveness of the ITNs since mosquitoes have easy access to penetrate into the torn nets and bites the users. Whether the participants know how to repair the torn nets has not evaluated in this study. It is thinkable that appropriate education on repair of torn ITNs by health workers will help to improve the quality of the nets and the effectiveness for users.

Factors that influence utilization of ITNs-focus on patient experience

The reasons for non-utilization by owners as well as why the non-owners do not own any type cannot be jettisoned. It is observed that 60% of non-owner indicate reason of either suffocation or risk of irritation. These reasons are either based on previous experience or stories of owners. It is also observed that among the 69% owners who may be deemed to have poor attitude and practice on the use of ITNs, 17% cite 'heat', while another 12% indicate 'discomfort' as reasons for not utilizing their nets regularly. These are also based on clients' experience that should be given a consideration, especially as this is line with previous reports of reasons of non-utilization of ITNs even among owners.¹¹

It is pertinent to note that considering the RBM target of 60% at-risk population to be "protected or treated with appropriate methods"; the expected key performance index is up to 60% pregnant women who experiencing no malaria or mosquito bite.³ In this study, 80% of this research participants owning mosquito nets implies high coverage, but the 31% level of utilization and 24.3% of users suffering no malaria or mosquito bite is much below the goal. This observation is in agreement with report of similar study from Nigeria that ownership of ITNs does not translate to utilization.⁸ Therefore, it behooves that all stakeholders in this service delivery to do more to achieve the goal. Considering the reasons adduced by participants, the following suggestions are hereby propounded:

The manufacturers of ITNs consider modification of their products in line with conditions of usage. For instance, the cause of irritation. ITNs are coated with insecticides and insecticide-resistance as well as impact of temperature have been reported. Hence, new formulations has been called for.^{23,24} Deltamethrin-treated nets has been reported to cause skin irritation.^{25,26} This calls for review of the insecticides used in the ITNs.

The healthcare workers and public health educators can consider three different interventions. First is self-management of skin irritation and associated discomfort. For instance, moisturizers are indicated to counteract skin irritation.^{27,28} Secondly, vulnerable pregnant women can be visited to proffer advice on optional bedding arrangements and/or net usage with a view to improve comfortability and ventilation. Third is to develop a micro-climate awareness as it relates to effectiveness of ITNs i.e. knowledge that variations in indoor temperatures across the year affects the effectiveness on ITNs.²³ including that users may need thermometers to monitor their rooms.

On the part of government including Ministries of Health, there is need that living or building structure is improved for good ventilation i.e. to alleviate heat and discomfort with a view to enhance use of ITNs. Regular supply of electricity to rural areas by the state and federal government will also help to eliminate factors such as heat at home that discourage mothers not to use ITNs during dry seasons. In long-term, these require the Ministry of Health to develop liaison with other governmental ministries. In short-terms, the government need to adequately advice vulnerable rural dwellers who have no electric power supply that they need to provide electricity for themselves. The essence of this suggestion is that it is insufficient to provide ITNs when the conditions for effective utilization are lacking.

The main constraint of this study was that health care providers in the Local Government Areas of Bayelsa State were on strike for three months prior to the administration of questionnaires to expected respondents in the rural areas. The strike was call-off in less than a

month to deadline for seminar presentation of results. Thus, while it was a given that the pregnant mothers are antenatal clinic patients by default, data collection being limited to community setting is a limitation. In particular, the claim by non-users of the ITNs that their non-usage is due to absence of the nets at various healthcare centres could not be officially verified.

CONCLUSION

There is evidence that ITNs coverage or ownership seems to have achieved the RBM target. However, utilization is quite low and a far cry as most of the owners are not utilizing their nets. The study shows that patient experience of discomfort and heat as well as risk of irritation and suffocation limits utilization, while affordances and quality are further barriers to utilization. Effectiveness among users is low, but it can be said that poor attitude on use of ITNs among respondents that owns ITNs is influencing effective utilization of ITNs. It behooves on ITNs manufactures to improve the quality of nets, while healthcare workers and government agencies vigorously increase the campaign of creating more awareness on how best to use the ITNs among pregnant mothers.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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