Assessing Consistent Use Of Insecticide Treated Bed Nets (ITN) In The Prevention Of Malaria Among Pregnant Women In The Nkoranza South District Of Brong Ahafo Region Of Ghana

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Abstract- The main objective of this study was to assess the consistent use of Treated Nets (ITNs) among pregnant women in Nkoranza South District.

Consistent use of ITNs was assessed through descriptive cross sectional survey of twenty towns and villages with a sample size of three hundred and eighty four (384) pregnant women from the study communities using structured questionnaire containing open and closed ended questions.

Out of those who have accepted and owned the net, 162 (90%) frequently hang their nets on the bed. Further assessment of the net usage revealed that 105 representing 59% use their nets all year round.

Consistent use of ITN among pregnant women in the district was 59%.There was no association between possession and use of ITN (p= 0.12, chi = 2.47).

The data was analysed using SPSS version 16.0. Descriptive statistics was employed in the analysis of field data. More permanent conical nets should be imported for easy hanging even without beds. Education on ITN should be intensified and more emphasis should be laid on the consistent or frequent use of ITN among the vulnerable.

Index Terms- Insecticide, Treated Net, Malaria, Pregnant Women, Consistent use, Ghana.

I. INTRODUCTION

It is believed that the Anopheles mosquito feeds in the night and mainly between 10.00p.m and 4.00a.m and this is peculiar to Africa. It could be therefore said that if people are made aware of the feeding habit of the Anopheles mosquito and the use of insecticide treated net is promoted; the rate of malaria infection will reduce to an appreciable level [1]

According to Robert Newman, WHO Global Malaria Programme director, “In 2008, there were an estimated 232 million malaria cases and 841 000 malaria deaths, with close to 90% of those occurring in sub-Saharan Africa,” he noted, declaring: “we have an unfinished agenda.” [2]

Malaria is a major public health problem in Ghana. The current strategy of the National Malaria Control Programme is based on effective case management and the use of insecticide treated bed nets among vulnerable groups such as children under-five years of age and pregnant women [3].

The use of individual methods of protection are particularly important, especially in areas lacking any formal mosquito control programmes, like Burkina Faso. Bed nets, window screens, house sprays, ceilings, closed eaves and in some cases, zooprophylaxis can reduce the risk of malaria [4].

Resistance to pyrethroids by *Anopheles gambiae s.l.* and *Anopheles funestus* has been reported in several African countries including neighbouring Burkina Faso [4].

The treated bed net has proven to be very effective in reducing malaria morbidity and mortality in Sub-Saharan Africa. Sleeping under the treated mosquito net is the most effective method for preventing mosquito bite because mosquitoes bite at night when people are asleep.

In the absence of large scale, organized vector control programmes, individual protective measures against mosquitoes are essential for reducing the transmission of diseases like malaria. Knowledge of the types and effectiveness of mosquito control methods used by households can aid in the development and promotion of preventive measures.

The total population of Ghanaians who sleep in insecticide treated bed nets is only 4.1%. Again, only 12.2% of households in Ghana, 9.1% of children under five years of age and 7.8% of pregnant women sleep under insecticide treated bed nets [5].

II. RESEARCH QUESTIONS

1. What percentage of pregnant women do own and use ITN?
2. How frequent do pregnant women use ITN in Nkoranza South District?

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III. LITERATURE REVIEW

ACCEPTANCE AND FREQUENCY OF ITN USE

People's belief, perception and knowledge have a large influence on their acceptance of and compliance to ITNs [6]. Past research in a variety of countries has revealed that children may fail to sleep under bed nets for a number of reasons. For instance, parents attribute malaria to causes other than mosquitoes and may not associate bed net usage with the prevention of malaria. If people don't see mosquitoes as transmitters of malaria then there is no way they will consider the use of bed nets as a tool of preventing the disease. Therefore health educators should sensitise people about the link between mosquito and malaria transmission through persuasive health education programmes.

Additionally, parents may consider using bed nets difficult because to them sleeping under ITN can be hot and uncomfortable or they may believe that bed nets resemble burial shroud or that insecticides used to treat the nets will harm their children. Such beliefs often undermine the consistent use of bed nets and especially during the dry season [6].

Community perception, beliefs and attitudes about malaria causation, prevention and care influence efforts to address the malaria problem but they are often overlooked in control efforts. In the case of Ghana, some individuals maintain the notion that certain types of "fever" (local term for malaria) are caused by the heat of the sun and therefore cannot be prevented by the use of bed net [7].

In the words of Agyapong and Manderson, "people's ability to comply with interventions and to treat sickness is affected by their acceptance of the intervention, their understanding of the nature of the illness and the relationship between vector and infection and other socio-economic and cultural factors" [8].

Apart from belief, perception and knowledge factors, many other factors will influence whether insecticide treated net will achieve widespread acceptance and use or not. Among them are; access to netting and insecticides for re-treatment, affordability and public education. Also, essential will be improved natural, political and policy environment, refinement and adaptation of ITN to specific circumstances and methods of use; an increase in knowledge base required to support the design and implementation of national ITN programmes and the development of public health communication tools and strategies to support national ITN programmes [9]. According to Gimnig in 2003, nightly ITN use can prevent one-fifth of child deaths from all causes [10].

Use of ITN among pregnant women has been associated with lower prevalence of malaria infection, fewer premature births and significant reductions in all causes of maternal anaemia [11, 12].
The total population of Ghanaians who sleep in insecticide treated bed nets is only 4.1%. Again, 9.1% of children under five years of age and 7.8% of pregnant women sleep under insecticide treated bed nets [5].

The emphasis placed on ITN usage by the WHO and its subsidiary organization also calls for an in-depth study to determine the consistent usage of the ITNs on the globe especially in Sub-Saharan Africa.

Muller and colleagues in 2003, say that 92% of women said the main reason for not using the ITN was lack of money [13].

A randomized control trial in Kasena-Nankana district in Ghana showed that out of 80% of women who had nets 70% of women used them frequently [14] and a study by Okra and Colleagues in 2002 showed that, 87% of respondents were interested in the future use of treated nets, mostly because they felt it would provide them with better protection against mosquitoes [15].

Appropriate use of ITN is shown to reduce malaria transmission by 90% [16, 20]. Use of ITN during Pregnancy is shown to reduce miscarriages and stillbirths by 33% [17, 16, 20]. ITN use among Pregnant women in Ghana increased from 33% in 2011 to 43% in 2014 [16, 18, 20].

However, evidence from some parts of Ghana has shown that over 40% of ITNs available in the households go unused [19, 20].

IV. METHODOLOGY

The study was conducted in twenty communities in Nkoranza South municipality within the period of July and October, 2010 after ethical approval from the Committee on Human Research Publication and Ethics (CHRPE), School of Medical Sciences, of the Kwame Nkrumah University of Science and Technology, KNUST and the Municipal Health Directorate of Nkoranza South. All study subjects gave their consent before questionnaires were administered. . A descriptive cross sectional design was used to collect data from a section of the population in the Nkoranza South District. The study was basically observational without any interventions. Data on insecticide treated net ownership, consistent usage, awareness and acceptance etc was obtained from the study subjects one at a time. Background information such as age, marital status, socio-economic status, religion etc was also obtained. Both qualitative and quantitative data were collected for the study. The study engaged households in selected communities within the Nkoranza South district. The focus was on pregnant women in the study households. Subjects were drawn from a number of communities within the Nkoranza South district.

A total of 384 pregnant women were selected for the study. A mix of sampling methods was used in selecting the 384 study subjects. This included cluster sampling, simple random and systematic sampling methods. A simple random sampling technique was used to select twenty (20) communities and each community then formed a cluster. Subjects were selected from each cluster systematically. The sample frame was the total number of households within the study communities. Each household then constituted a sample unit.
The sample size was obtained using statistical population proportion method,

$$n = \frac{z^2 p(1-p)}{d^2}$$

Where, n = estimated sample size

P = sample proportion (the proportion of the sample that is assumed to be using ITNs = 50% or 0.5)
d = the probability that the desired sample size will not be representative of the study population (5%)
Z = level of confidence that the chosen sample will be representative of the population (95%)

The assumption that 50% or 0.5 of the sample using ITNs is based on the fact that there is no baseline data from the district

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hence half of the population is assumed to be using ITN. Below is the sample size calculation;

$$n = \frac{1.96^2 \times 0.5\ (1-0.5)}{0.05^2}$$

$$n = \frac{3.8416 \times 0.5 \times 0.5}{0.0025}$$

$$n = \frac{0.9604}{0.0025}$$

$$n = 384.16$$

$$n = 384$$

Prepared questionnaires containing open ended and closed ended questions were given out to the study subjects to respond with the aid of research assistants. The research assistants administered the questions to the respondents' one at a time. They read out the questions and interpreted them to the respondents in a local language (Twi) after which the response from the respondents were recorded accordingly.

Data collection tools such as the questionnaire and checklist was tested in a pilot study before the actual collection of data. This was to test the validity and reliability of the instruments. The pre-test or pilot study was conducted on pregnant women in a non-study community within the Nkoranza south district. Any faulty tool was redesigned or replaced after the pre-test.

STUDY VARIABLES

Variables for this study are categorized into dependent and independent variables as shown below;

Dependent variable: Insecticide Treated Nets (ITNs) coverage and use in the Nkoranza south district.

Independent variable: Affordability, Ownership and use, Socio-cultural beliefs, Acceptance and frequency of ITN use and Education (awareness) on ITN.

Table 1. Study Variables

VARIABLE (CONCEPTUAL DEFINITION)	OPERATIONAL DEFINITION (INDICATOR)	SCALE OF MEASUREMENT
Affordability of ITN	Cost of ITN	Discrete e.g. cost in Cedis
Awareness of ITNs	Knowledge and understanding of ITN by pregnant women	Ordinal e.g. low, high
Frequency of ITN Education	Number of times pregnant women receive ITN Education in a year	Discrete e.g., 3 times
Availability of ITNs	Accessibility of ITN to pregnant women (public)	Nominal e.g. accessible, not accessible
Compliance with ITN message	Level of pregnant women compliance with ITN message	Ordinal e.g. low, high
Rate of ITN usage	Percentage of pregnant women who own and use ITN	Continuous e.g. 30%
Acceptance of ITN	Pregnantwomen perception about ITN	Nominal e.g.positive, negative
Age of pregnant woman	Age of pregnant woman at last birthday	Discrete e.g. 19 years
Education of pregnant mother	Level of education of pregnant mother	Nominal e.g. JHS, SHS, Tertiary
Occupation of pregnant mother	The type of job pregnant mother does for living	Nominal e.g. farming, trading etc
Marital status of pregnant mother	Whether pregnant mother is married or not	Nominal e.g. single, married, divorced, widow
Number of children of pregnant mother	Number of children ever born including those dead by pregnant mother	Discrete e.g. 3
Religion of pregnant mother	Religious affiliation of pregnant mother	Nominal e.g. Christian, Islam etc
Malaria cases among pregnant mothers	Whether pregnant mother in a household has ever had malaria in the last month	Nominal e.g. Yes, No

Source: Author's own construct.

ETHICAL CONSIDERATION

The study protocol was reviewed and approved by the Ethical Review Committee (CHRPE) KNUST School of Medical Sciences

Copies of an introductory letter obtained from the department of community health, school of medical sciences, KNUST was presented to the Brong Ahafo regional director of health services, Nkoranza south district director of health services, Nkoranza south district Assembly and the medical superintendent of Nkoranza south district hospital to notify them of the research and its purpose. At the beginning of the data collection exercise, the principal researcher met all chiefs and opinion leaders of the study communities and also sought their consent for the study. In consultation with the opinion leaders and chiefs, meetings were convened to formally introduce the research team to the people in the communities and explain to them the purpose of the study.

Data analysis

Data collected was analysed through the use of computer to construct tables and charts. Computer software Statistical Package for Social Science (SPSS) version 16.0 was used for the data entry and analysis was done using Stata software. The data from the questionnaire was coded and fed into the computer for onward analysis based on the study objectives and the main study variables. Descriptive statistics was employed in the analysis of data collected from the field.

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FINDINGS AND DISCUSSIONS

This section shows the results of three hundred and eighty-four (384) pregnant women interviewed in Nkoranza South district on Ownership and Use of ITN. The mean age of respondents was (26.03) with SD of (6.23). Fifty four percent 207 (54%) were married, forty four percent 170 (44%) were single while one percent 4 (1.0%) were widows and one percent 3 (1.0%) were divorced. Twenty one percent (21%) had no formal education.

Forty four percent (44%) have had JHS/Middle School education. Eight percent (8%) of the respondent had secondary education with three percent (3%) having tertiary education while twenty four percent (24%) had only primary education. Farming constituted thirty one percent (31%) of the respondents' occupation while thirty four percent (34%) were unemployed and others constituted thirty five percent (35%) of the respondents'. The women had an average of 1.83, SD = 1.70 children. Fifty one percent (51%) had less than four (4) children while 34% had no child before the survey and 15% had four or more children.

Pregnant Women Acceptance and Frequent use of ITN

This sub-section was guided by the research question; How frequent do pregnant women use ITN in Nkoranza south district?

Table 2. Possession of any Net

POSSESSION OF NETS (TREATED AND UNTREATED, n=384)

Variable	**Percentage (%)**
Frequency	
ITN	32
122	15
Untreated net	53
57	**100**
No net	
205	
Total	
384	

Source: Field survey, 2010

Table 3.

Test of association between ownership and usage of ITN

Variable	**Chisquare**
p-value	
Ownership and	2.47
0.12usage	

Source: Field survey, 2010

Frequency of ITN Use

Out of those who have accepted and owned the net, 162 (90%) frequently hang their nets on the bed whilst 17 (10%) do not hang on bed. Further assessment of the net usage revealed that 105 representing 59% use their nets all year round with 66 representing 37% use net particularly during rainy season and 8 representing 4% consisted of the others.

Out of those who have accepted and owned the net, 162(90%) frequently hang their nets on the bed whilst 17(10%) do not hang on bed. Further assessment of the net usage revealed that 105 representing 59% use their nets all year round with 66 representing 37% using their nets particularly during rainy season and 8 representing 4% consisted of the others. This is in support of a study conducted by Brown and colleagues in 2001 a randomized control trial in Kasena-Nankana district in Ghana that out of 80% of women who had nets 70% of women used them frequently. Another study by Okra and Colleagues in 2002 also showed that, 87% of respondents were interested in the future use of treated nets, mostly because they felt it would provide them with better protection against mosquitoes.

Seventy-three percent (73%) of pregnant women with nets slept under it the night before the survey as against twenty-seven percent (27%) who did not sleep under the net the previous night. Findings from a study in Kasena-Nankana district in northern Ghana by Brown and colleagues in 2001 also recorded high net use of about 70%.

Some of the pregnant women lose protection from the nets when they leave their family houses to sleep with their husbands who do not use nets.

About 59% of those who owned nets used them all year round because they did not want to be disturbed by mosquitoes. This was in contrast with a study in Ghana by Okra and colleagues in 2002 which showed that only minority of households which owned nets used them throughout the year.

Some of the pregnant women were also using the nets for the simple reason that they were hanged permanently on their beds and could not remove and hang again. About 37% said they use the net during the rainy season since it was the era of high presence of mosquitoes. They again gave the following as benefits for sleeping under ITN: protects against mosquito bite, afford good sleep and others.

Association between ownership of mosquito bed nets and its usage did not show any significant association between the two variables (chi square = 2.47, p-value = 0.12).

Parity and usage of ITN also did not show any significant association between the two variables (chi = 4.32, p-value = 0.63).

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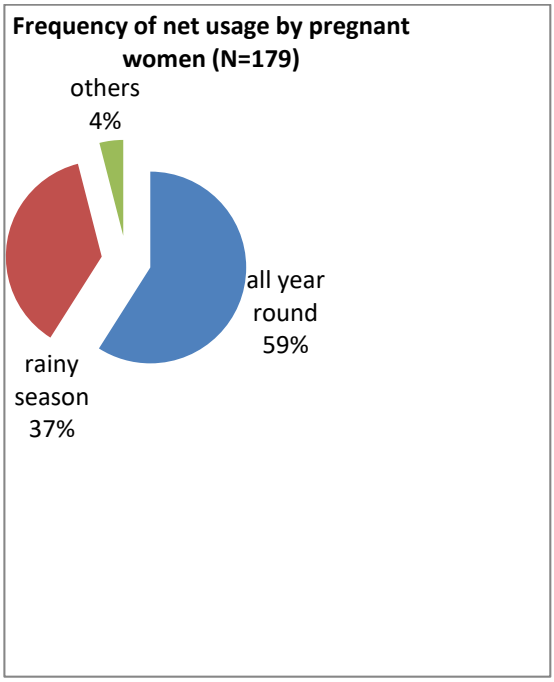

Figure 1: Frequency of net usage by pregnant women (N=179)

Source: Field Survey 2010

V. CONCLUSIONS

This study showed that, more than half of the pregnant women who possessed ITN frequently used them to protect them from mosquito bites. Some of the pregnant women were also using the nets for the simple reason that they were hanged permanently on their beds and could not remove and hang again.

However, some of the pregnant women lose protection from the nets when they leave their family houses to sleep with their husbands who do not use nets.

This study disagrees with Grace Manu and colleagues in 2017 that, there is low Utilization of Insecticide Treated Bed net among pregnant women in the middle belt of Ghana. In fact there was a significant improvement in the frequent use of ITN among pregnant women in this study.

RECOMMENDATION

- The District Health directorate should organize frequent sensitization programmes and encourage the communities to use ITN. This can be realised through advocacy and the exhibition of the political drive required making the necessary impact.
- Husbands should be very much concerned with providing treated nets to their pregnant wives.
- They should also encourage everybody in the family to sleep under a net and this could be achieved by ensuring that all and sundry in the family possess and use the treated net in order to minimise the burden of malaria in their families.
- The emphasis placed on ITN usage by the WHO and its subsidiary organization also calls for an in-depth study to determine the consistent usage of the ITNs on the globe especially in Sub-Saharan Africa.

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CONFLICT OF INTEREST

The author declares that there are no conflicts of interest regarding the publication of this paper.

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