



## Research Article

# PATTERNS OF BEHAVIOUR: DECISION- MAKING PROCESSES WITHIN HOUSEHOLDS ON THE USE OF THE INSECTICIDE TREATED BED NETS

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### ABSTRACT

**Introduction:** Insecticide treated bed nets are the most reliable and cost effective tool to use in the prevention of malaria. This study explored the usage patterns and decision making processes; on the consistent use of the insecticide treated bed net.

**Methodology:** A mixed method study that used the multi stage sampling technique in the selection of study districts and households. The target population was residents of the upper east region of Ghana. The study used data from three key informant interviews conducted with District Malaria Control Officers and a structured survey for households in three administrative Districts in the Upper East Region.

**Results:** The study identified; nature of the weather, season of the year, relative temperature, relative humidity, education, access to the ITN, number of persons living in the household and the belief and understanding of the household head to influence patterns of behaviour and decision making processes in the use of the insecticide treated bed net.

**Conclusions:** Behaviour change communication methods should be adopted in educating the public on the measures to ensure sustained usage of the ITN in the region and to prioritize the vulnerable populations in the use of the ITN. Specific malaria bed net campaign messages should target male or household heads that made the decision on who sleeps under the insecticide treated bed net.

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## INTRODUCTION

The Ghana Government has stepped up its efforts to tackle malaria, with a renewed interest in the past decade. An integrated approach has been adopted by Ghana in the fight against malaria. This integrated approach include the free distribution of insecticide treated bed nets to pregnant women and children under five years and an intensive indoor residual spraying (IRS) exercise. Also an intensive campaign on prompt adequate treatment of malaria and prophylaxis treatment is a routine exercise for the vulnerable populations (pregnant women and children under five). Malaria is hyper endemic in Ghana and is the leading cause of morbidity and mortality, in both infants and children under five years, accounting for 22% of under-five deaths and 9% of maternal deaths in 2007 (President's Malaria Initiative, 2009). The Ministry of Health (MOH) estimates that 3 to 3.5 million cases of suspected malaria cases are reported each year in public health facilities, representing 30 - 40% of all outpatient attendance. Of this figure over 900,000 are children under the age of five (Ghana Health Service, 2011).

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Malaria is also responsible for an estimated average annual reduction of 1.3% Gross Domestic Production (GDP) in economic growth (President's Malaria Initiative, 2009). Reducing the malaria disease burden is therefore a priority for the government of Ghana, the Ministry of Health, the Ghana Health Service, and the National Malaria Control Programme (NMCP) but most importantly, the general population whose life is severely affected by this disease. With the passage of the 2008 Lantos-Hyde Act, funding for President Malaria Initiative (PMI) was extended and, as part of the Ghana Health Initiative (GHI), the goal of PMI was adjusted to reduce malaria-related mortality by 70% in the original 15 countries by the end of 2015. This will be achieved by continuing to scale up coverage of the most vulnerable groups — children under five years of age and pregnant women — with proven preventive and therapeutic interventions, including artemisinin-based combination therapies (ACTs), insecticide-treated nets (ITNs), intermittent preventive treatment of pregnant women (IPTp), and indoor residual spraying (IRS) (President's Malaria Initiative, 2014).The ITN have proven to be one of the most reliable and cost effective tools for the control of endemic malaria in Africa and free distribution of the net is on-going in many countries of the sub region.

However, the fact that people do have the nets does not readily guarantee that they will eventually benefit from its specific use. A study in Burkina Faso; disclosed that although ITNs were given free to the population and education on their proper use was addressed, especially to women during the net distribution, not everyone slept under an ITN every night (Toe *et al.*, 2009). What therefore are the political, economic and socio-cultural factors in the community and within the household that influence the perception of the vulnerable in the use of the insecticide treated bed nets?

### Problem Statement

The ITN is the most reliable tool to use in the prevention of malaria<sup>5</sup>. Knowledge has shown that the vector that transmit malaria, the female *anopheles mosquito*, is generally nocturnal and mostly indoors<sup>5</sup>. The transmission of the disease is habitually during bedtime - the optimum time to use the ITN. The urgency to control malaria made the roll back malaria campaigners to adopt free distribution of the insecticide treated bed net (to the vulnerable populations). In Ghana and the Upper East Region in particular, various interventions are used to get the local communities to own and use the insecticide treated bed net. These interventions include subsidizing the price of the ITN in open markets through the community bed net vendors, free distribution in ante natal and post natal clinics and during vigorous malaria crusade sessions. As efforts are made towards the distribution of the insecticide treated bed net to pregnant women and children less than five years, very little significance is still seen in the control of the disease in the region. Families and household heads have the lassitude to decide who sleep under the insecticide treated bed net each night. The study elicited the specific factors that influence decision making in the use of the insecticide treated bed net in the household. Malaria is still noted as the number one cause of all OPD attendances in Ghana and the Upper East Region ([http://www.ghanahealthservice.org/malaria\\_control.php](http://www.ghanahealthservice.org/malaria_control.php) (retrieved July 11, 2011)).

### Justification of Study

This study specifically assessed those factors within the household that influence the decisions of using the insecticide treated bed nets especially by the vulnerable populations. The findings of this study served as an impetus for the formulation of policy towards ensuring the sustained use of the insecticide treated bed net in the region.

### OBJECTIVE OF STUDY

To investigate the patterns of behaviour: decision- making processes within households in the use of the insecticide treated bed nets.

### SPECIFIC STUDY OBJECTIVES

- To determine how the insecticide treated bed nets were acquired by the household
- To determine the decision making process in the use of the insecticide treated bed net
- To determine the prioritized cadre of people in the use of the ITN in the household

## METHODOLOGY

### Study design

This was a cross sectional descriptive study. It employed mixed methods (quantitative and qualitative methods). The mixed study design allowed for the eliciting of exhaustive understanding and expression of the views of the study participants as well as the use of figures and numbers to support expressed research findings.

### Study population

The Upper East Region is estimated to have a population of 1,046,545 people distributed in to thirteen (13) Administrative Districts with a 1.2 inter-censal population growth rate (Ghana Statistica Statical, 2010). The study population included all this inhabitants of the region. The targets population are mainly households that have pregnant women/woman and / or children /child under five years (vulnerable populations). Included in the study as target population were also officers who have in-depth knowledge in malaria control programmes.

### Sampling technique

The districts were first selected based on three clusters: The Upper East Region (the target population) was sliced / zoned in to three zones making up the eastern, central and the western zones. The eastern zone included the Bawku Municipality, Garu-Tempani District, Binduri District, Pusiga District and Bawku west (Zebilla) District. The central section included Bolgatanga municipality, Bongo District, Talansi district and Nabdram District while the Western segment included the Kasena-NankanaEast and West Districts, Builsa (Sandema) and Builsa South (Fumbisi) districts. In each zone, a district was blindly handpicked from a collection of Districts listed in to a basket. In the eastern segment the Bawku Municipality was selected, central zone Bolgatanga municipality while in the western zone the Kasena-Nankana East District.

There were two separate assortments of samples that took part in the study. Three (3) district malaria control coordinators / officers were involved in the key informant interviews (KII) (one person from each chosen district). One hundred and fifty two persons representing their individual households responded to the structured questionnaire. This was made up of fifty respondents in Kasena-Nankana East District and fifty one people in each of the municipalities (Bolgatanga and Bawku municipalities). The aggregation (quantitative and qualitative facets) of these participants completed a sample size of one hundred and fifty five (155) people.

### Selection technique

Households included in the study were those that have a child of under five years or that have a pregnant woman. The inclusion criteria for selection of a household to be part of the structured survey included; for each pregnant woman and each child under five; owning at least one bed net for their household. The head of such household or caregiver or the pregnant woman was made to respond to a questionnaire. The multistage sampling technique was used for the selection of

household for the study. In each study district, quotas were created from randomly selected communities. Within each community, with assistance from community members sample frames were created. Study participants were selected by using the systematic sampling technique. The sampling fraction differed from one community to the other.

### Data collection and analysis

The three research assistants were graduates from the University for Development Studies who were doing national services in the respective study districts. Research assistants were given a two day orientation on conducting in-depth interviews and assisting research participants on reporting research findings on a questionnaire on each day respectively. The data was collected from 2<sup>nd</sup> March to 30<sup>th</sup> April 2015. Digital (audio) recordings of the interviews were transcribed verbatim. The transcripts and notes from the interviews were analyzed manually into themes and patterns. Completed questionnaires were scrutinized for appropriateness and completeness. Scrutinized questionnaire were first entered in Microsoft excel 2010 and transferred in to statistical package for social sciences. The structured questionnaires were analyzed using Statistical Package for Social Sciences (SPSS) version 20 in to descriptive statistics.

### Pretesting

Pretesting was done in the Talansi District of the Upper East Region because it has a blend of both rural and urban characteristics.

## RESULTS

Individuals' representing their household's responded to a structured questionnaire while district malaria control officers were engaged in an in-depth interview. Household representative were adult individual of the household who had an appraisal of bed net use within the household. The said individual stayed with the household for more than a month at the time of conducting the study. District malaria control officers are responsible for coordinating malaria control activities within the district. They are public health nurses, district disease control officers or health information officer but have the additional responsibility of coordinating malaria control activities in the district. All households engaged had an insecticide treated bed net. Respondents were largely of the reproductive age group of twenty one to fifty years. Female constituted the bulk of household representatives that responded to the structured field survey questionnaire. All the three religions (Islam -32.0%, Christianity- 47.0% and Traditional African religion- 21.0%) were proportionally represented while majority of the respondents were married. Bulk (55.3%) of households had four to six persons within those households while some (23.7%) households were seven to nine people. The Upper East Region generally has larger household sizes based on multiple marriages or giving birth to many children by one couple. Only one household with member's more than nine people were included in the study. The average household size is more than five persons but fewer members of the households (87.5% had one to three persons within the individual household's) actually slept under the insecticide treated bed net each night.

Expressing the place of acquisition of the ITN, respondents mentioned; health care professionals (34.9%), bought from open markets(34.2%), bought from designated community ITN vendor (27.6%) and given by a friend or another family member (3.3%). Concerning person who influenced the decision to acquire the ITN, response were health care professional (34.9%), bednet vendor (27.6%) and friends and family members (37.5%). Bulk (40.8%) of the respondents did not prioritise the use of the ITN. People who prioritised mentioned women(4.8%), pregnant women(46.8%), under five children (37.1%) and men(3.2%) as the persons given priority. Indicating the source of information to prioritise the use of the ITN: health care professionals (51.6%), bednet vendors (30.6%) friends and family(14.5%) and from the mass media (2.3%). Demonstrating the person who made the decision in using the ITN, responses were; health care professional (16%), man (household head) of the house (47%), mother of the house (19%), and decision was cooperative (6%) and other external family members (12%). External family members included uncles, grandparents and siblings.

When asked whether the respondents were given information about the ITN during acquisition, only 22.4% stated that they were given education and information on the use of the ITN and its retreatment modalities during the acquisition of the net. The remaining 77.6% were not given any information or education during the acquisition of the net. They relied solely on individual perceptions and information acquired from friends and individual family members. District Malaria Control Officers intimated that the patterns of behaviour within the household on the use of the ITN is varied and differed from one district, community or household to the other as some people do not have the net at all. The patterns of behaviour were identified to range from ignorance on the importance of ITN usage to over complacency in the use of the ITN.

They identified three categorization on the use of the ITN to include: Some people did not use the net because they do not have adequate knowledge on its use, lack of the net or access, have myths and inexperience on the use of the net; some do have, understand the need to use the net and prioritized the vulnerable and used the net correctly and according to instruction while the last category were expected to have an understanding to the use of the net but were only over complacent on the net usage and hence did not use the insecticide treated bed net at all time or did not use it at all. In these patterns of behaviour identified, was the fact that people do not have a sustained use of the insecticide treated bed net in the community.

A respondent indicated:

*"Some people will not just use the ITN because they believe that they will not get infected with malaria"*

Free distributions of the net are usually done during mass campaigns and malaria prevention outreach programmes but subsidized distributions are largely a routine in child welfare clinics or within some Community Health Planning and Services (CHPS) compounds. They also contend they were yet to get to the target of 100% coverage of all the vulnerable populations.

**Table 1. Distribution of variables on acquisition and ownership of itn**

VARIABLES	RESPONSES	FREQ.	PER
Place of acquisition of ITN	Health care professional	53	34.9
	Bought in open market	52	34.2
	Designated community ITN vendor	42	27.6
	Given by friend or family member	5	3.3
	TOTAL	152	100
Person who influenced the decision to acquire ITN	Health care professional	53	34.9
	Bednet vender	42	27.6
	Freiends	57	37.5
	TOTAL	152	100

**Table 2. Distribution Of Variables On Prioritization of Itn Usage**

VARIABLES	RESPONSES	FREQ.	PERC.
household usually prioritise the vulnerable in the use of he ITN	Yes	62	40.6
	No	87	58.4
	TOTAL	149	100
Persons prioritised in usage	Women	3	4.8
	Pregnant women	29	46.8
	Underfive children	23	37.1
	Elderly children	5	8.1
	Men	2	3.2
	TOTAL	62	100
Source of information to prioritise ITN usage	Health care professional	32	51.6
	Bed net vendor	19	30.6
	Friends and family	9	14.5
	Mass media	2	3.2
	TOTAL	62	100

*“... Even though we are doing all this towards malaria control and bed net distribution, we cannot say we have had hundred percent coverage for the distribution of the ITN to the vulnerable populations”.*

Male dominance has an influence on the use of the ITN within the various households. The region is highly patrilineal and male are highly valued and domineering in all affairs of life including the manner that the ITN is being used in the household. A respondent summarized this view by saying

*“The men decide what their wives and children will do and so if the man decides that the woman will sleep under the ITN, the woman will surely do, but if he decides otherwise, then it also means the woman will not sleep under the ITN”.*

When is mandated for the woman to stay indoors during the peuperium, then nursing mothers are likely to sleep under the ITN with the baby in other to provide warmth. In this instance the culture is likely to promote the use of the ITN to protect the post natal woman and her baby. On other factors that influence the pattern of behaviour within the households and within the communities on the use of the ITN, the District Malaria Officers mentioned; The season of the year, whether characteristics, atmospheric temperature, presence or absence of rain, relative humidity, room size, number of persons sleeping in one room, and level of ventilation.. A respondent indicated that:

*“in the rainy season when the weather is generally humid and cold, people are more likely to sleep under the ITN compared to the dry periods of February to April when the weather is generally very warm and dry, many persons in the region sleep outside their rooms and are not likely to use the ITN then”.*

**DECISIONS:** Despite the male dominance in the region, health workers also have greater influence on the manner in which decisions are made even though the final prerogative still lies with the head of the family – the man of the house. The health worker’s counsel to the family is usually much adhered to and treated as a “gospel truth”. Most men are likely to take decisions based on that made by the health service provider to the family

*“The people are concerned of their health and see the health worker as the knower of all, they will believe, obey and practice all that is thought them by the modern health practitioners as long as it benefits their health ... Most health information given by health professionals is not queried.”*

The National Malaria Control Programme and the UNICEF sponsored malaria net distribution programmes prioritized the vulnerable populations. They could not however indicate if the vulnerable actually use this net consistently during bed time. A district malaria control officer indicated;

*“For the NMCP we give the nets or subsidize it for the vulnerable populations but we cannot be sure if they are those who actually use it in the night.”*

The ITNs are subsidized at the ANC and with only accredited bed net distributors in the Districts but not all pregnant women attend ANC services or have access to the accredited bed net distributors and for that matter are not able to get the ITN during the distribution

*“.... Not everyone get health care services from modern facilities and for that matter they may be vulnerable but will not be catered for because of the lack of access to health facilities where the nets are distributed.”*

## DISCUSSION

The cadres of respondent for the questionnaire understand the dynamics of the household basically and are capable of giving information on the intricacies involved in the use of the ITN within the household. The qualitative study interviewed District Malaria Control Officers who are involved in the day to day distribution, education, and monitoring of the use of the ITN. In all the households, not all members actually slept under the insecticide treated bed net. The World Health Organization (WHO) recommends that every one to two persons within the household should own and sleep under an insecticide treated bed net and every vulnerable population should sleep under the insecticide treated bed net (World Health Organization, 2012). The place of acquisition of the ITN supports the president malaria initiative in 2014 that reported that beginning in late 2012, the long-lasting insecticide-treated net (LLIN) strategy shifted from mass campaigns to support for routine LLINs distribution, focusing on antenatal care (ANC) clinics and Expanded Program on Immunization (EPI) clinics as well as school-based distributions.

The centres where the subsidized nets are actually sold or distributed are the places where vulnerable populations actually receive health care services and serves as the most convenient avenues to reach them. Gyapong *et al* (1996) in the upper east region reported that "If the use of insecticide treated nets is to be beneficial to non-immune children, the nets have to be provided for the entire family because children tend to sleep with the mother, grandmother or an older sibling. This could have cost implications which would be beyond the means of a subsistence farming community. Alternatively, nets could be provided for women and children only initially, but in a male dominated society, one could not guarantee that they would remain with them (Gyapong *et al.*, 1996)". The inability for vulnerable populations to use the ITN consistently still exposed them (vulnerable populations) to the effects of being infected with malaria making malaria a burden to household members, the community, to the health delivery system and the region at large. In Ghana, the objective of the National Malaria Control Programme, is to scale up the distribution of bed nets such that 100 percent of all households will own at least one treated mosquito net by 2015 (GHS, 2011).

However, as coverage is not reached for all vulnerable populations, prioritization still remains the surest way to stop the malaria menace in Ghana. This study showed that majority of respondents did not prioritize the vulnerable populations in the use of the ITN. This study finding is actually in discrepancy to that which was reported by Toe *et al* (2009) in the Burkina Faso that when the method of prevention was available, the vulnerable was prioritized (Toe *et al.*, 2009). However Toe *et al* (2009) research findings followed a rigorous campaign for the usage of the ITN when community members were encouraged to prioritize the vulnerable while this study in the Upper East Region was conducted with a population that used the ITN as a routine malaria preventive measure. This is a further revelation that routine activities are not strictly adhered to by community members compared to heighten campaign periods. In Uganda, Mugisha and Arinaitwe (2003) noted that most children use mosquito nets mainly because they happen to share a bed with their parents (Mugisha and Arinaitwe, 2003).

Prioritization of children under five and pregnant women were in conformity to the World Health Organization status on bed net prioritization but this was not universal as people did not prioritize other members of the family. Community members did not understand the concept of prioritization of the ITN usage and used individual discretion and understanding as the yardstick. This is different from the report of Andrew *et al* (2011) that people generally accepted the concept of the use of the insecticide treated bed net (Andrew *et al.*, 2011). District Malaria Control Officers indicated that people were more likely to accept and practice any information advanced to them by the health care professionals than that which they heard on the radio or from any other ordinary member of the public. It is important that when health information is advanced to communities' members the reliable conduit should be health care professionals who are generally trusted by the community. This will allow for universality in information delivery and better understanding of the various practices adopted by individual households. The man of the family was the one who made the decision for the acquisition of the ITN, the quantitative respondents identified largely health care professionals and friends while a minority were community bed net vendor. In the region, men actually make decisions for their households and women only echoed this and implemented those decisions to the later.

To have total coverage and efficient distribution of the ITN in the Upper East Region, then male involvement in use and distribution is very inescapable. If one man is educated on the use of the ITN, the rippling effects will be seen in the entire family. Even though the households owned an ITN, the individual daily use of it is still subjected to approval by the man of the house or the specific household head. A much smaller number of respondents suggested that decisions were co-operative (6%), or that the man or father of the house made the decisions in consultation with other members of the family. While the male made the decision as to who is to sleep under the ITN, he slept separately from the vulnerable and could not determine if the person he nominated slept under the net throughout the night (granted that the man's decision even prioritized the very vulnerable person within that household). The very strict gender roles and the patrilineal nature of the inhabitants of the Upper East Region and the private nature of marriages / relationships, combined with the high esteem held for 'the man of the family' allowed for the domineering effects that men exerted on their individual families. This finding is strongly in support of what was found by Andrew *et al*, (2011) that male influence has an impact on the daily use of the ITN in the family (Andrew *et al.*, 2011).

Majority of mosquito bed net beneficiaries were not given any information or education on usage during the acquisition of the net. Health education, quantity and quality of information influence ones knowledge. Based on the health belief model of behaviour change, when information is made available to a group of people, with cues to action, such persons are likely to adopt and practice healthy behavioural outcomes. It is therefore imperative that net distribution is accompanied with health education on malaria and the essence of bed net use to the vulnerable populations. While the amount of information given to bed net beneficiaries are regarded as not been very important by malaria prevention campaigners, its very essence are the basics to a successful programme implementation. The season

of the year (rainy or dry), weather characteristics, atmospheric temperature, presence or absence of rain, room size, level of ventilation influenced the pattern of behaviour on the use of the ITN. A variation in any of these variables that may not necessary be under the influence of a particular individual, influence greatly how the ITN is used within the family. Okrah *et al.* (2002) in an exploratory study in rural Burkina Faso observed that bednets were mainly used during the rainy season and that most of the existing nets were not used by children but by adults, particularly the household heads (Okrah *et al.*, 2002). This is in consonance to Adjei and Gyimah (2012) that after controlling for the effects of potential confounders, the adjusted odds ratios indicate that variables such as the ecological area of residence, place of residence, age of the household head, educational attainment of the household head, the ratio of people to sleeping rooms in the household are statistically significant factors in predicting a household's ownership and use of a bednet (Adjei and Gyimah, 2012).

### Conclusion and Recommendation

Behaviour change communication methods should be adopted by Malaria Control Campaigners in educating the public on the measures to ensure sustained usage of the ITN in the region and to prioritize the vulnerable populations in the use of the ITN. Specific malaria bed net campaign messages should target male or household heads that made the decision as to who is to sleep under the insecticide treated bed net. While this may not be enough, specific messages should also target key beneficiaries like pregnant women and mothers of children under five years. The study identified health care professionals to be the people who are generally trusted and information by such professionals is usually adhered to. It is therefore imperative that health information messages on the use of the ITN should be delivered in hospitals and during curative care services. Education on net impregnation should be given during net acquisition and using the mass media to remind beneficiaries of this education.

### ABBREVIATIONS

IRS: Indoor Residual Spraying  
 ITN: Insecticide Treated Bed Net  
 ANC: Ante Natal Clinic  
 SPSS: Statistical Package for Social Sciences  
 GDP: Gross Domestic Products  
 NMCP: National Malaria Control Programme  
 MOH: Ministry Of Health  
 WHO: World Health Organization  
 PMI: President Malaria Initiative

### Competing Interest

The authors here in declare they do not have any form of competing interest in the conception, drafting, collection of data and writing of this manuscript.

### AUTHOR'S CONTRIBUTIONS

**ALL AUTHORS:** Contributed to conception, design, acquisition of data, analysis and interpretation of data, and involved in drafting the manuscript or Revising. Also all authors read and approved this manuscript for publication.

**KKD:** drafting of proposal, collection of data, presentation of findings and drafting and review of manuscript

**MAB:** conception, design, analysis and interpretation of data and reviewing of manuscript.

**JMK:** conception, design, analysis and interpretation of data and reviewing of manuscript.

**GMW:** conception, design, analysis and interpretation of data and reviewing of manuscript.

### AVAILABILITY OF DATA

All data sets from which the discussion and conclusions of the findings of this study are based are included in the manuscript and no data sets can be found elsewhere apart from that included in this script.

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### Ethics approval and consent to participate

Not applicable

### Consent to publication

Not applicable

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