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FACTORS INFLUENCING UTILISATION OF INSECTICIDE TREATED NETS AMONG CHILDREN UNDER-FIVE YEARS OF AGE IN KPONE-ON-SEA IN THE KPONE KATAMANSO DISTRICT IN GHANA.

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Original Article

ABSTRACT

Children under-five years of age are among the vulnerable group mostly affected by morbidity and mortality due to malaria. Insecticide treated nets (ITNs) have proved to be effective in reducing malaria transmission and increasing child survival. Significant investment into scaling up of ITNs has been done but achieving actual utilisation among beneficiaries is still a challenge in malaria endemic regions including Ghana. The study aimed to assess factors influencing utilisation of ITNs among children under-five years in Kpone-On-Sea in Ghana. We used a cross-sectional community survey design to determine the proportion of children under-five years of age sleeping under ITNs and factors influencing utilisation of ITNs among care-givers in Kpone-On-Sea. We randomly sampled 325 care-givers of children under-five years between March and June 2017. Microsoft Excel version 2016 and SPSS were used for data entry and analysis, and further analysis was conducted using STATA version 14 software. Chi-square test was used to test for associations and multiple logistic regression to determine strength of associations. We found that the proportion of children under-five years sleeping under ITNs was 91%. Factors associated with ITN utilisation among children under-five years included caregivers' level of education ($p<0.01$), their awareness that children under-five years are most at risk of malaria ($P<0.05$), knowledge that ITN protect against mosquito bite ($P<0.02$), knowledge on the importance of ITNs in preventing malaria ($P<0.01$), ITN ownership ($P<0.03$), type of ITN owned ($p<0.02$) and the period within which caregivers utilise ITN ($P<0.00$). We also found high ownership of ITNs among caregivers, and no difference between caregivers' knowledge on malaria and its prevention. These data improved the current knowledge of ITNs utilisation among caregivers of children under-five years and offer opportunities to conduct further studies in other regions of Ghana.

Keywords: ITN, Utilisation of ITN, Children under-five years of age, caregivers

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INTRODUCTION

Malaria is a disease caused by infection of the genus Plasmodium and it is transmitted to man through the bite of an infected female Anopheles mosquito (WHO 2015). It is an endemic disease predisposing over 200 million people globally affecting mostly pregnant women and children under-five years of age. Malaria is regarded as the fourth highest cause of death of children in Sub-Saharan Africa (WHO 2015).

Frequent episodes of severe malaria among children may cause negative impact on their learning abilities and educational attainment (Holding and Snow 2001, Boivin et al 2007).

Malaria among children also contribute indirectly to illness and death from respiratory infection, diarrheal diseases and malnutrition (Rodríguez L et al 2011). Malaria in school children is also attributed to absenteeism in endemic countries (Holding and Snow 2001, Boivin et al 2007).

In 2015, malaria accounted for about 73.6% outpatient department (OPD) consultations in Ghana, out of which 26.7% were in children under-five years of age (GHS 2015a). Also, 409,446 patients were admitted to hospitals due to malaria and a total of 2,133 lives were lost to malaria. Almost half of the hospital admissions and death due to malaria were in children under-five years (GHS, 2015a).

Among the malaria control interventions, insecticide treated net (ITN) has proved effective in reducing malaria infection and increasing child survival (Eisele et al 2009; Lim et al 2011; Ameyaw et al 2015; Oyekale 2015).

Despite significant effort into scaling up ITN ownership, achieving its actual utilisation among beneficiaries is a problem in malaria endemic regions including Ghana (GSS 2014)

Ghana Demographic Health Survey Report in 2014 revealed that, among all households in Ghana, 68 percent possess at least one ITN but utilisation of ITNs among children under-five years overall was 47% and differs according to residence, region and locality (GSS 2014, GHS 2015a). In urban residence, utilisation of ITNs among children under-five years was 35.8%, and in rural residence, it was 56.1% (GSS 2014, GHS 2015a). Okafor & Odeyemi (2012) in their study on use of insecticide treated mosquito net for children under-five years in Lagos Nigeria, reported a high rate ITN usage among under-fives (61.8%).

A number of studies have found that utilisation of ITNs is influenced by factors such as socio demographic characteristics, level of awareness, knowledge and cost of ITNs (Wiseman et al 2007; Vijayakumar et al 2009; Dye et al 2010; Hill et al 2013). Household factors such as decision making, sleeping space, fewer nets in the households, impact of media messages, community knowledge and large household size or family size affect the use of ITN as well as poor sleeping arrangements (Baume et al 2009; Adjah & Panayiotou, 2014; Oe et al 2015; Ruyange et al 2016). Also, Multichannel Behaviour Change Communication campaigns as well as other media have shown to contribute to an increase in ITN culture (Noor et al 2006, Bennett et al 2012).

Assessment of actual utilisation of ITNs among children under-five years is very important as it can provide understanding of how to plan more targeted interventions to protect these vulnerable group from malaria and it associated complications.

The need for more current data is highlighted by the fact that in Ghana including the research area were malaria is said to be perennial, there are limited information regarding ITN utilisation and its barriers specifically among children under-five years as earlier studies conducted were not specifically on this phenomenon. The aim of this study was to use quantification sampling to

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determine the proportion of children under-five years of age sleeping under ITNs, and factors influencing caregivers' utilisation of ITNs among children under-five years of age in Kpone-On-Sea in Kpone-Katamanso district in Ghana.

MATERIALS AND METHODS

We used a cross-sectional community-based survey design to determine the proportion of children under-five years of age sleeping under ITNs, and factors influencing caregivers' utilisation of ITNs among children under-five years of age in Kpone-On-Sea between March 2017 and June 2017. Kpone-On-Sea, a GIS mapped study site developed by the University of Ghana School of Public Health (Tchouassi et al., 2012), is a fishing community situated in the Kpone-Katamanso district (newly created district) in the Greater Accra Region of Ghana. The community is surrounded immediately by shrub land except for the southern aspect that is bounded by the Atlantic Ocean. Malaria is perennial in the region though its transmission varies throughout the year with intensity in the raining season and declines in the dry season (Tchouassi et al., 2012).

Sample Size Determination

The sample size calculation formula by Pourhoseingholi, Vahedi, & Rahimzadeh, (2013) was used to calculate the sample size. A desired precision (d) of ±5% with 95% confidence level (z) and a frequency of Insecticide treated net use of 25.9% (P) (which is the prevalence of children sleeping under nets in the Accra Region is used as a proxy) (GSS, 2014), imputed into the formula below gives a sample size(n) of 295

Formula:

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

$$n = \frac{1.96^2 * 0.259 (1-0.259)}{0.05^2} = 295$$

Description:

n = required sample size

z = confidence level at 95% (standard value of 1.96)

p = estimated prevalence of ITN use in in greater Accra region (25.9%)

d = desired precision at 5% (standard value of 0.05) Taking into account contingencies such as non-response, recording errors, the number will be adjusted by 10% to have a final sample size of 325 for the study.

Sampling Method

A multistage sampling method was used to select participants for this study. In the first instance, two sections out of the four sections of Kpone-On-Sea community were randomly selected. This was conducted using four sheets of papers, two of the papers had the word 'yes' and the other two had the word 'No'. These sheets were folded into balls put in a plastic bag and mixed thoroughly. Four members of Kpone-On-Sea, one from each section was asked to pick one ball of sheet from the plastic bag. Those that picked the paper ball bearing 'yes', the sections they represented were included in the study and those that picked the paper balls that had the word 'No' on it, their sections were exempted from the study. The section that was studied first was also randomly selected by asking the representatives to pick a ball of paper from a plastic bag. The one who picked the paper bearing first was the section that was first studied. In each section, alternate houses were used, if a household consisted of more than one caregiver that meets the study criteria, one was randomly selected. This continued until the total sample size was exhausted.

Data Collection Tools and Techniques

Tools for collection of data were structured questionnaires which consisted of three sections:

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Section A: Socio-demographic information of caregivers, Section B: Knowledge on malaria and its prevention, and knowledge on ITNs, Section C: ownership and use of ITNs for children under-five years of age. Participants were required to choose options as applies to the questions. Data was collected through home visits during the study period. After getting approval from the participants through informed consent, the research assistants administered the questions to the respondents, one at a time in their preferred language. Responses from the respondents were then recorded accordingly.

Data Processing and Analysis

Data collected in the form of answered questionnaires, field notes and tapes were checked in the field to ensure completeness and were kept securely in a locked bag pending analysis.

The data was double checked for completeness and internal consistency and then coded. Microsoft office Excel 2016 was used for data entering and cleaning. The results were then presented in frequency tables based on the objectives. Further analysis was done using STATA version 14 software. Chi-square test was used to test for associations and multiple logistic regression to determine strength of associations.

Ethical approval

Ethical approval was sought from the Ghana Health Service Ethical Review Committee (GHS-ERC) with reference number GHS-ERC:58/02/17. Permission was also obtained from appropriate leaders at the study site. Informed consents were obtained from the respondents and they were assured of confidentiality before their engagement in the study. The study participants were adult and there were no risks associated with the study.

RESULTS

Background Characteristics of Respondents

Table 1: Background Characteristics of Respondents

ATTRIBUTE	Frequency (N=325)	Percent (%)
Age of participant (in years)		
15-25	52	16.0
26-36	139	42.8
37-47	79	24.3
48-60	41	12.6
60 and above	14	4.3
Length of stay in community (in years)		
1-10	72	22.1
11-20	33	10.2
21-30	85	26.2
31-40	65	20.0
40 and above	70	21.5
Gender of participant		
Male	24	7.4
Female	301	92.6
Marital status		
Married	206	63.4
Not married	119	36.6
Level of education		
Primary	65	20.0
Secondary	201	61.8
Tertiary	36	11.1
No education	23	7.1
Occupation of participant		
Public worker	48	14.8
Fishmonger	15	4.6
Petty trader	142	43.7
Business man/woman	27	8.3
Other occupation	93	28.6
Religion		
Christianity	311	95.7
Islam	14	4.3

A total of 325 respondents were sampled for this study. Most (43%) of the respondents were within ages 26 to 36, and on average, 26% of the respondents had stayed in the community for about 21 to 30 years. Ninety-three percent (93%) respondents were female, more than half (63%) were married and six in every ten (62%) had completed secondary education. Less than half (44%) of the respondents were petty traders and a near universal (96%) of them were Christians.

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Mothers'/Caregivers' Knowledge on Malaria and Insecticide Treated Net (ITN) Usage

Ninety-six percent (96%) of mothers/caregivers were aware that the main cause of malaria was through mosquito bite. On assessing the sources of respondents' education on malaria, respondents selected multiple options as sources. In all, 76% said they heard malaria information through the radio, 94% had information from health workers and 32% from family and friends. Only 16% had information on malaria through a religious medium and newspapers (8%). Similarly, a little over half (53%) of the respondents had knowledge that mosquitoes transmit malaria, and had fair knowledge on the signs and symptoms of malaria. About 83% were aware that using a sleeping under an ITN could prevent malaria. Eight in every ten were aware that children under five years (87%) and pregnant women (49%) were most at risk. More than half of the respondents had heard of ITN through the hospitals and clinics. Almost all (99%) caregivers were aware that ITNs are used to protect against mosquito bite and 81% emphasised the importance of ITNs in preventing malaria. Other details in Table 1.

Household Factors Influencing Insecticide Treated Net (ITN) Usage

The results indicate that majority of the respondents were owners of at least an ITN (88%). However, 8% did not own an ITN with the reason that they were not supplied, while 5% said they had no ITNs because the nets were not available. Among those who owned an ITN, more than half (61%) owned an insecticide treated net and majority (44%) owned only a net. Most (39%) of the respondents had their nets from mass campaign, Respondents whose child usually uses a bed net were (81%). However, the rate of ITN usage among children under five years at Kpone was 91%.

Among respondents who had children at the time of the study, more than half (65%) of the respondents had only one child under five years. A little over half (56%) of the respondents used bed nets throughout the year, 95% agreed that ITNs keep mosquitos away, and protects them from malaria (97%). In addition, 56% of respondents said ITNs generates too much heat. Respondents (69%) suggested the free distribution of ITNs as a method to improve the usage of ITNs. However, 25% suggested intensive education, while 6% thought that modification of the shape and size of ITNs will be a best method to improve usage. Other details in Table 2.

Associations Between Background Characteristics and ITN Usage

Table 1: Associations between Background /Individual Characteristics and ITN Usage

Attribute	ITN Usage		P value
	Yes (%)	No (%)	
Age of participant (in years)			
15-25	46(88.5)	6(11.5)	.322
26-36	131(94.2)	8(5.8)	
37-47	68(86.1)	11(13.9)	
48-60	37(90.2)	4(9.8)	
60 and above	12(85.7)	2(14.3)	
Length of stay in community (in years)			
1-10	64(88.9)	8(11.1)	.639
11-20	31(93.9)	2(6.1)	
21-30	74(87.1)	11(12.9)	
31-40	60(92.3)	5(7.7)	
40 and above	65(92.9)	5(7.1)	
Gender of participant			
Male	21(87.5)	3(12.5)	.608
Female	273(90.7)	28(9.3)	

Marital status			
Married	187(90.8)	19(9.2)	.799
Not married	107(89.9)	12(10.1)	
Level of education			
Primary	61(93.8)	4(6.2)	.010
Secondary	177(88.1)	24(11.9)	
Tertiary	34(94.4)	2(5.6)	
No education	22(95.7)	1(4.3)	
Occupation of participant			
Public worker	42(87.5)	6(12.5)	.315
Fishmonger	13(86.7)	2(13.3)	
Petty trader	127(89.4)	15(10.6)	
Business man/woman	23(85.2)	4(14.8)	
Other specify	89(95.7)	4(4.3)	
Religion background			
Christianity	281(90.4)	30(9.6)	.755
Islam	13(92.9)	1(7.1)	

In building a chi-square model to test the associations between background characteristics of respondents and their ITN usage, several demographic factors were considered, but there were no statistically significant association with their use of an ITNs. However, there was a statistically significant association between their levels of education and their use of an ITN (p=0.01). Other details in Table 3.

Associations Between Mothers'/Caregivers' Knowledge on Malaria, ITN and ITN Usage

Table 3: Associations between Mothers'/Caregivers' Knowledge on Malaria and ITN Usage

ATTRIBUTE	ITN Usage		P value *
	Yes (%)	No (%)	
Main cause of malaria			
drinking dirty water	6(100.0)	0(0.0)	.490
mosquito bite	281(90.1)	31(9.9)	
others specify	7(100.0)	0(0.0)	
Source of education on malaria (Multiple Responses)			
Radio	232(92.1)	20(7.9)	.068
Newspaper	23(92.0)	2(8.0)	.785
Posters	17(85.0)	3(15.0)	.391
family/friend	96(93.2)	7(6.8)	.252
health worker	277(90.5)	29(9.5)	.880
government official	8(80.0)	2(20.0)	.253
religious house	45(84.9)	8(15.1)	.132
Mosquito transmit malaria			
Yes	152(88.4)	20(11.6)	.024
No	124(94.7)	7(5.3)	
don't know	18(81.8)	4(18.2)	
Signs and symptoms of malaria (multiple responses)			
fever	252(91.6)	23(8.4)	.041
headache	180(90.5)	19(9.5)	.994
Vomiting	203(90.2)	22(9.8)	.826
Diarrhea	46(92.0)	4(8.0)	.687
loss of appetite	165(92.7)	13(7.3)	.131
body weakness	155(91.2)	15(8.8)	.646
Best preventive method			
taking preventive medicine	6(100.0)	0(0.0)	.646
using mosquito coil	243(90.0)	27(10.0)	
using insecticide spray	12(85.7)	2(14.3)	
keeping the house clean	33(94.3)	2(5.7)	
Seriousness of malaria			
very serious	103(91.2)	10(8.8)	.933
Serious	151(89.9)	17(10.1)	
not serious	40(90.9)	4(9.1)	
Persons most at risk (multiple responses)			
elderly persons	62(86.1)	10(13.9)	.154
adult men/women	7(87.5)	1(12.5)	.773
pregnant women	146(91.2)	14(8.8)	.634
children under-five years	253(89.4)	30(10.6)	.051
children above 5years	57(90.5)	6(9.5)	.996
all family members	133(93.0)	10(7.0)	.166
Where respondents heard of ITN			
Radio	42(91.3)	4(8.7)	.847
Television	68(91.9)	6(8.1)	
hospital/clinic	184(89.8)	21(10.2)	
Knowledge on uses of ITN			
protecting against mosquito bite	291(90.9)	29(9.1)	.019
to keep insects away	3(60.0)	2(40.0)	
Knowledge on the importance of ITN			
very important	245(93.5)	17(6.5)	.001
Important	49(77.8)	14(22.2)	

The study also assessed the relation between mothers'/caregivers' knowledge on malaria and ITNs and their usage of ITNs. Most variables assessed including Knowledge on the main cause of malaria (p<0.49), their source of information being radio (p<0.06), newspaper (p<0.79), poster (p<0.39) or health workers (p<0.88), were not significant to their use of ITN. However, respondents' awareness that fever is a sign and symptom of malaria (p<0.04), and that children under five years (p<0.05) were most at risk, were significant to their ITN usage. Their knowledge that

mosquitoes transmit malaria (p<0.02), knowledge on the uses of ITNs (P<0.02), and knowledge on the importance of ITNs in preventing malaria (p<0.01), were all significant to a respondent usage of ITNs. Other details in Table 4.

Associations Between Household Factors Influencing ITN Usage

On assessing the influence of household factors on the usage of ITNs, the stated reasons for not possessing an ITN (p<0.08), the source of respondents' ITN (p<0.09), the family member that uses the possessed ITN (p<0.09), and whether a respondent's child usually uses an ITN (p<0.38), were all not significant to ITN usage.

Table 4: Associations between household factors influencing ITN usage

ATTRIBUTE	ITN Usage		P value
	Yes (%)	No (%)	
Respondents who owned a bed net			
Yes	254(89.1)	31(10.9)	.028
No	40(100.0)	0(0.0)	
Reasons for not owning a bed net			
nets are not available	15(100.0)	0(0.0)	.084
I was not supplied a net	26(100.0)	0(0.0)	
not applicable	253(89.1)	31(10.9)	
Type of net owned			
non-treated net	7(100.0)	0(0.0)	0.22
insecticide treated net	170(86.3)	27(13.7)	
long lasting insecticide net	76(95.0)	4(5.0)	
None	41(100.0)	0(0.0)	
Number of nets owned			
None	41(100.0)	0(0.0)	.052
1	125(87.4)	18(12.6)	
2	88(94.6)	5(5.4)	
3	28(82.4)	6(17.6)	
4	7(87.5)	1(12.5)	
5	5(83.3)	1(16.7)	
Source of respondents' bed net			
given to me by relative/friend	13(86.)	2(13.3)	.098
it was bought	20(95.2)	1(4.8)	
got it from the clinic	106(86.2)	17(13.8)	
from mass campaign	114(91.2)	11(8.8)	
not applicable	41(100.0)	0(0.0)	
Family member using net			
children under five years	27(87.1)	4(12.9)	.090
Everybody	118(90.8)	12(9.2)	
mother and child	96(86.5)	15(13.5)	
Nobody	12(100.0)	0(0.0)	
not applicable	41(100.0)	0(0.0)	
Respondents' child usually uses nets			
Yes	237(89.8)	27(10.2)	.379
No	57(93.4)	4(6.6)	

Among the influence of household factors on the usage of ITNs, only ITN ownership (P<0.03), the type of ITN a respondent owned (P<0.02), and the number of ITNs owned by a respondent (P<0.05), were significant in determining ITN use among respondents. Similarly, the number of children under five years in a household (P<0.01), and the period within which respondents uses ITN (P<0.001), were also significant. Other details in Table 4.

Determinants of ITN Usage Among Children Under Five Years

Using a significance level of p<0.05, all significant variables at the chi-square test were used to build a multiple logistic model. This model establishes the strength and direction of the significance and controlled for confounders of the study. The study results indicate that caregivers who had completed secondary level education as compared to those who had a primary education, were two times more likely to use an ITN for children under five years (OR 2.07, 95% Cl: 0.69-6.19). Again, respondents who were aware that children under five years were the most at-risk group were almost five times more likely to use an ITN (OR 4.86, 95%Cl: 0.64-36.63) than those that said that the elderly are the most at risk.

On the use of ITNs, mothers/caregivers who were aware that ITNs are used as protection against mosquitoes, were almost seven times more likely to use an ITN for their children (OR 6.69, 95%Cl: 1.07-41.68). Respondents who said ITNs were important were also four times more likely to use an ITN for under five (OR 4.11, 95%Cl: 1.91-8.90). Other determinants of ITN use for children under five years included ownership of an ITN (OR 2.02, 95%Cl: 3.25-5.68) and ownership of a long-lasting insecticide net (LLIN) (OR 3.33, 95%Cl: 4.50-8.79). As compared to respondents who owned no ITN, caregivers who owned four ITNs were more likely

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to use them to prevent malaria in children under five years (OR 1.07, 95%Cl: 0.11-10.91). Also using respondents who used ITNs throughout the year as a reference, those who used ITNs only during rainy seasons were ten times more likely to use them to prevent malaria in children under five years. Other details in Table 6.

DISCUSSION

The study sought to explore the factors that influence the use of Insecticide Treated Nets (ITNs) at Kpone-On-Sea community. The prevalence of children under five years using ITN at the Kpone-On-Sea community was reported by this study to be 91%. Evidently, Okafor & Odeyemi (2012) also reported a considerably higher prevalence rate (62%) among a similar population in Nigeria. However, Adjah & Panayiotou (2014) study reported ITN utilisation rate lower than that reported by this current study. In a similar study, Noor et al 2006 reported as low as 12% and 15% ITN utilisation rate respectively among children under five years.

Background Characteristics of Respondents

The parameters including age and gender did not establish any significant influence on mothers' use of ITN in preventing malaria among children under five years. In a related study conducted in Cameroon, similar findings were also reported (Oyekale 2015). In a similar population, however, Hill et al (2013) indicate that respondent's age was a significant determinant of ITN usage. Considering that these two studies were conducted at different locations, one will not be wrong to say that variations in population aging could account for the differences being noticed. Marital status was also found not to influence ITN usage for malaria prevention among children under years. In previous studies in Rwanda and elsewhere, mothers' use of ITNs in children under five years to prevent malaria was associated with marital status (Oe et al 2015; Ruyange et al 2016). The current study results further indicate that among all background characteristics, only educational background was a predictor of ITN use. Similarly, Ruyange et al (2016) study reported that a mother's educational attainment significantly determined their use of ITNs in the prevention of malaria among children under five years. Contrary to this study, Adjei (2012) found that mother/caregiver's educational attainment had no influence on their use of ITNs.

Mothers'/Caregivers' Knowledge on Malaria and ITNs

Evidence from this study showed that knowledge on causes of malaria and malaria prevention among mothers/caregivers was a factor that contributed to increase use of ITNs among mothers. In other reviews, similar results were reported that suggested the significance of knowledge on ITN usage and malaria prevention among under five years (Hill et al 2013). This finding is similar to results from Ruyange et al (2016), they reported that the association of poor level knowledge to lower ITN use among similar respondents. In considering the sources of information on malaria, information sources including radio, newspaper, poster and health workers had no influence on the use of ITN by mothers in the prevention of malaria. In previous studies, however, only poster and health workers as sources of information, determined the use of ITNs (Adjah & Panayiotou 2014). While these findings share similar characteristics, they also indicate variations in findings. Considering that both studies were done in Ghana, different study periods with different periods of preventions campaigns could account for these variations.

Aside this, respondents' knowledge that mosquitoes transmit malaria also greatly determined their use of ITNs. This finding concur with studies in Ethiopia that assessed factors associated with use and non-use of ITNs (Baume et

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al 2009), but disagrees with other studies that evaluated similar populations in Sierra Leone (Bennett et al 2012). Current findings could be as a result of intensified health education and changes in recent programming. In addition, malaria is an endemic disease condition in Ghana and most mothers/caregivers would have shared knowledge on the role of mosquitoes in causing malaria. With regards to knowledge on the signs and symptoms of malaria, majority of the respondents had adequate knowledge on the signs and symptoms of malaria. This knowledge translated significantly into the use of ITNs among mothers and caregivers. Similarly, Ameyaw et al (2015) had reported findings in other parts of Ghana that agrees with this study. Another factor that determined the use of ITN among mothers in the prevention of malaria was their knowledge on the seriousness and severity of the condition. Other studies have also reported this finding as a significant factor that motivated mothers to seek more health attention with their children and increased their use of ITNs in children under five years malaria prevention (Vijayakumar et al 2009). Conversely, respondents who were interviewed in Ethiopia had indicated that since malaria can be effectively treated, it is not perceived as a threatening condition (Baume et al 2009), resulting in their low usage of ITNs. As mentioned by respondents in similar studies, universal knowledge about at risk group is mostly placed on children under five years and pregnant women (Bo, An, Ji, & Gn, 2010). Findings like those of this study could reflect personal experience of mothers/caregivers at their period of pregnancy and care for their children under five years, as well as peer education. One previous study have proven that less appreciation was placed on the importance of ITN and limited knowledge on their importance in preventing malaria was noticed among respondents (Hill et al., 2013)

Household Factors Influencing ITN Usage

This study revealed that respondents who owned ITNs were more likely to use them in preventing malaria among children under five years. Similarly, Bennett et al (2012) study indicated that ITN ownership within households was a primary factor that influence the use of ITNs. In other reports, however, ITN ownership in Kenya was reported to have less influence on their use among children under five years (Dye et al 2010). Another study found negative association between net ownership and use (Adjei, 2012).

Again, the number of nets owned in a household could positively influence the use of ITNs. In the Kpone community, mothers/caregivers' ownership of between one to five ITNs greatly determined their use in preventing malaria among children under five. Here, ownership and the advantage to have alternatives could have accounted for these significant results. The number of ITNs owned by mothers seems to be a universal determinant of the use of ITNs. For instance, previous studies in other parts of the world earlier reported the positive association between number of ITNs and usage (Eisele et al 2009; Oyekale 2015). Contrary findings were, however, reported in a study conducted in an African country (Lim et al 2011). Another determinant of ITN usage at the Kpone community was the number of children within the household. Mothers who had two or three children were more likely to use an ITN as compared to mothers with fewer children. It can be noted that mothers with more children have more economic burdens and are likely to rely on the use of ITNs to prevent the burden of malaria and hospitalisation costs among children. A Gambian study report had also indicated the positive association between number of children and ITN usage among caregivers (Wiseman et al., 2007).

CONCLUSION

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The proportion of children under five years sleeping under ITNs in Kpone-On-Sea was significantly high and mothers/caregivers at the Kpone community were highly knowledgeable on the causes and prevention of malaria, as well as populations at risk to be children under five years and pregnant mothers. Major determinants of ITN utilisation in the Kpone community were level of education, number of children in a household, knowledge on the signs and symptoms of malaria, and knowledge on persons at risk. Other factors include knowledge on the importance of ITNs, ownership of ITN and number of nets owned. Moving forward, future research should look at extending the study beyond the Kpone community to target other communities of rural nature as well as consider using direct observation at sleeping time rather than reported use to determine actual utilisation of ITNs. This gives a broader picture on the situation of ITN utilisation among children under five years and enhances better policy formulation.

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