

Insecticide treated net utilization and associated factors among households having under-five children and pregnant women in Fogera District, Northwest Ethiopia

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Abstract

Background: Malaria is life threatening disease particularly for under-five children and pregnant women unless there is no proper use of bed nets. Evidences are limited on the use of insecticide treated net among under-five children and pregnant women.

Objective: The aim of this study was to assess insecticide treated net utilization and associated factors among households having under-five children and pregnant women in Fogera district, Northwest Ethiopia.

Method: Community based cross-sectional survey was conducted from October 01 to November 30, 2016. A total of 712 households were selected using two-stage random sampling technique. Data were entered using Epi Info version 7 and exported to SPSS version 20 for further analysis. Both descriptive and analytic statistics were computed. Variables having association with the outcome variable was reported using odds ratio with 95% CI. Model fitness was checked by Hosmer and Lemeshew test.

Result: Insecticide treated bed net utilization among under-five children and pregnant women was 63.3%. Households having <3 sleeping spaces (AOR = 7.45; 95% CI; 3.97-14.1), nets available per house hold (≥ 2 nets) (AOR = 5.2; 95% CI 2.4-11.2), family size of <5 (AOR = 6; 95%CI; 2.8-12.8), being urban resident (AOR = 17.4; 95% CI; 6.3-48.1), having poor knowledge of malaria and bed net use (AOR = 0.09; (95% CI; 0.04,0.2) and having good perception of net use (AOR=4.2; (95% CI; 1.8, 10.3) were found to be significant predictors of bed net utilization.

Conclusions and recommendations: In this study, insecticide treated net utilization was slightly lower than the standards set by federal ministry of health and world health organization recommendation. Bed net utilization among pregnant women and under-five children was significantly associated with number of sleeping spaces per households, number of nets available, family size, residence and perception on net use. Utilization of bed net has to be strengthened with special emphasis on households having large family size, more sleeping spaces, rural residence, poor knowledge on malaria and net use, inadequate perception about net use.

Key words: Malaria, insecticide treated net, utilization

Introduction

Malaria is a life-threatening disease caused by plasmodium parasites that are transmitted to people through the bites of infected female Anopheles mosquitoes. Plasmodium falciparum is the most deadly malaria parasite and the most prevalent in Africa, where malaria cases and deaths are heavily concentrated. It is major health problems in the world. About 3.2 billion people – almost half of the world's population are at risk of malaria.

The African region accounted for 88% of global burden and 90% deaths of malaria In areas with high transmission of malaria, children under-five are particularly susceptible to malaria infection, illness and death and more than two thirds (70%) of all malaria deaths occur in this age group (Laurence 2016; Gobena 2012). In sub-Saharan Africa, the area most burdened by malaria; the disease is thought to cause as many as 10,000 cases of malaria-related

deaths during pregnancy and causes severe complication in children and pregnant women (WHO 2015). In Ethiopia, malaria is a major public health problem where about 75% of its total area is malarious and nearly 68% (52 million) of the total population lives in areas at significant risk of malaria. As evidenced from 2010/2011 report of the Ethiopian ministry of health, malaria was the leading cause of outpatient visits, accounting for 15% of all visits and health admissions. It is one of the top ten causes of in-patient deaths among children less than five years of age and adults (Presidential malaria intuitive 2013). In April 1998, the WHO African regional organization undertook the initiative to bring malaria under control, as the continent bears 80 to 90 percent of the global malaria disease burden.

World Health Organization launched a global initiative called “Roll Back Malaria” by setting goals considering the four strategic tools for prevention and

control of malaria. These tools are insecticide treated nets use particularly of under-five children and pregnant women, intermittent preventive treatment of pregnant women with effective anti-malarial drugs, prompt access to combined anti-malarial treatment of cases within 24 hours of diagnosis and epidemic control. Of the four major malaria control strategies strongly advocated by roll back malaria program, insecticide treated nets use stands at the forefront.

In Ethiopia, in 2008 President's Malaria Initiative began to expand support nationwide. Experiences with effectiveness of insecticide treated nets as public health intervention tools and the local factors influencing their usefulness are very limited in the area (Laurence 2016). Therefore, this study was aimed to assess insecticide treated nets use and associated factors among households having under-five children and pregnant women in Fogera District, South Gondar Zone, and Northwest Ethiopia.

Materials and Methods

Community-based cross-sectional study was conducted from October 01 to November 30, 2016 in Fogera District, South Gondar Zone, and Northwest Ethiopia. Household heads aged ≥ 18 years living in the malaria endemic area of the district were the source populations and those household heads having at least one child aged under-five years and/or pregnant women with similar age group living in the three selected kebeles of the district were the study population. All selected household heads that lived at least for 1 year in the study area were included in the study.

Sample size was calculated using a single proportion population formula using the following assumptions: 95% confidence level, 5% margin of error and 73% bed net utilization which was taken from study conducted on ownership and utilization of insecticide-treated nets for malaria control in Harari Region, Eastern Ethiopia (Teklemariam et al. 2015). The final sample size was 712 after considering 10% of non-response rate and multiplying by two for design effect. The dependent variable of this study was household insecticide nets utilization, whereas independent variables included sleeping spaces per household, knowledge about malaria and net use, nets available per house hold, family size, urban residence and perception about net use.

A total of six trained data collectors who were familiar with the study area and spoke the local language were involved. Two supervisors had supervised the data collection process in the field. A structured questionnaire adopted from the 2015 Malaria Indicator Survey originally prepared in

English and translated to Amharic language was used for the study. The questionnaire contained questions related to socio-demographic status of the households, and knowledge about malaria and its control methods, and mosquito net availability and utilization. In addition to interviews, the data collectors were instructed to make direct observation of the insecticide treated net to verify their condition, where it was placed in the house, whether it was properly hung or not, and if it was tucked properly.

Data were entered into Epi Info 7 and transferred into SPSS 20.0 software. Data Analysis was made by using bi-variable and multi-variable logistic regression. Adjusted odds ratio (AOR) with 95% confidence interval was used to assess the presence and degree of association between dependent and independent variables. Ethical clearance was obtained from the Ethical Review Board of the University of Gondar. Study participants were informed about the purpose of the study, the importance of their participation, and the right to withdraw from the study at any time they want. Verbal consent was obtained prior to data collection.

Results

Socio-demographic characteristics of participants:

A total of 697 households were included in the study with response rate of 97.9%. The median age of respondents was 30 years. Out of the total participants 605(86.8%) of them were females. Six hundred forty nine (93.1%) was married. Nearly 399 (57.2%) of the respondents were not able to read and write and 68.6% of participants were farmers. The average family size was 5 people with a range 2 to 8. The mean number of beds or sleeping spaces per household was 2.05 (Table1).

Utilization of insecticide treated net: The findings revealed that about 685 (98.3%) households owned at least one insecticide treated net. The average number of nets per household was 2.3 ($SD \pm 0.98$) with a range of 1 to 6 nets. All respondents who had insecticide treated net received the net as free provision by the government and malaria prevention and control partners.

Nearly 189 (78.8%) of pregnant women and 485(77.5%) of under-five children were slept under insecticide treated net prior night to the survey day. As of observational survey 157(66%) pregnant women and 389(62.2%) of under-five children were utilized insecticide treated net properly. Properly hanged and tucked bed nets at the time of observation were 527 (76.9%) and 401(72.1%), respectively. Ninety eight (14.3%) of insecticide treated net had holes or tears. The main reasons mentioned by

participant for not using insecticide treated net were inconvenience for hanging (38.1%), infestation of bed or the net with bed bugs (27%) and insufficient number of net per sleeping spaces (8.2%) (Table 2).

Table 1: Socio demographic characteristics of the respondents in Fogera district, northwest Ethiopia, 2017

Characteristics/Variables	Frequency	Percent (%)
Age group (in years)		
18-24	116	16.6
25-44	568	81.5
45-64	13	1.9
Residence		
Urban	192	27.5
Rural	505	72.5
Educational status		
Unable to read and write	399	57.2
Able to read and write	77	11
Primary/1-8/	167	24
Secondary and above	54	7.7
Marital status		
Married	649	93.1
Single	5	0.7
Divorced	36	5.2
Widowed	7	1.0
Occupational status		
Daily Laborer	38	5.5
Farmer	478	68.6
House wife	39	5.6
Merchant	89	12.8
Hand craft	21	3.2
Government	32	4.6
Employers		
Monthly income (mean $\pm$ SD)	700 ($\pm$ 400.84)	
< 700	256	36.7
$\geq$ 700	441	63.3
Family size (mean $\pm$ SD)	5 $\pm$ 1.98	
<5	317	45.5
$\geq$ 5	380	54.5
Sleeping places (mean $\pm$ SD)	2.05 $\pm$ 0.89	
<3	534	76.6

Table 3: Factors affecting utilization of insecticide treated net among households having < 5 children and pregnant women, in Fogera District northwest, Ethiopia 2017.

Variables		Insecticide treated net use		COR(95% CI)	AOR(95%CI)
		Yes	No		
Residence	Urban	188	5	17.1(6.9,42.3)	17.4(6.3,48.1)
	Rural	339	158	1	
Educational status	Informal education	243	54	1.76(1.2,2.54)	0.94(0.55,1.6)
	No education	279	109	1	
Sleeping spaces per HH	<3	442	80	11.8(7.9,17.7)	7.45(3.97,14.1)
	$\geq$ 3	52	111	1	
Number of nets available per HH	<2	76	46	1	
	$\geq$ 2	446	117	2.2(1.45,3.37)	5.2(2.4,11.2)
Family size	<5	338	23	11.2(6.95,18)	6(2.8, 12.8.)
	$\geq$ 5	184	140	1	
Knowledge on malaria & net use	Knowledgeable	467	64	0.08(0.05,0.12)	0.1 (0.04,0.19)
	Not knowledgeable	56	98	1	
Presence of many mosquitoes hard to sleep in their house	Yes	366	95	1.68(1.2,2.4)	0.88(0.88,2.9)
	No	156	68	1	
Heard malaria education message	Yes	362	90	1.84(1.3,2.6)	2.3(1.1,4.6)
	No	160	73	1	
Functional radio possession	Yes	226	38	2.5(1.7, 3.8)	1.13(0.6,2.0)
	No	296	125	1	
Perception about Insecticide treated net use	Favorable	498	108	0.09(0.05,0.15)	4.15(1.68,10.3)
	Unfavorable	25	50	1	

$\geq$ 3	163	23.4
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Table 2: Utilization of ITN in households having pregnant and < 5 children, in Fogera District, Northwest Ethiopia, 2017.

Characteristics/Variables	Frequency	Percent
Number of ITN /HH		
One	127	18.5
Two	362	52.8
$\geq$ 3	196	28.6
Use ITN in the last night (mean $\pm$ SD)	2.3 $\pm$ 0.9	
Any family member	537	78.4
Pregnant women	189	78.8
<5 children	485	77.5
Net ownership		
<12 months	55	8
12-24 months	594	86.7
$\geq$ 24 months	36	5.3
Nets condition (mean $\pm$ SD)	1.08(0.79)	
Nets not hanged	)	6.9
Net had hole/tears	527	14.3
Nets tucked under mattress	98	72.1
	401	

Factors associated with ITN utilization: Respondents who have a family size of <5 were 6 times more likely to utilize insecticide treated net than those who have a family size of 5 and above (AOR = 6; 95% CI 2.8, 12.8), individuals who live in households with two and above bed net were 5.2 times more likely to utilize bed net than those who live in households with <2 bed net (AOR=5.2; 95% CI 2.4- 11.2). Those who live in households with < 3 sleeping spaces were 7.4 times more likely utilize bed net than those who live in households with $\geq$ 3 sleeping spaces (AOR=7.45; 95%CI 3.97-14.1). Moreover, individuals who heard malaria education messages were 2.3 times likely utilize nets (AOR=2.3; 95%CI 1.11-4.6) (Table 3).

Discussion

The study revealed that more than 98% of the surveyed households had at least one insecticide treated net, but only two third of pregnant women and children under five slept under insecticide treated net in the previous night of the survey. Inconvenience for hanging especially for those that sleep out of bed, insufficient number of bed nets for all family members, infestation with bed bugs and using nets for unintended purpose were the reasons that the respondents did not use insecticide treated net. This study revealed about 98.3 % households own at least one net. This is almost similar to report of 97% in Jabi Tehnan district, North west Ethiopia (Animut et al. 2014). This is higher than a previous insecticide treated net ownership reports of 92% in Rwanda (Kateera et al. 2015), 73.7% in Amhara region, MIS/2011(Federal Democratic Republic of Ministry of Health Ethiopia 2012), 57.9% in Harari Regional State, Eastern Ethiopia and 86.1% in Afar, Northeast Ethiopia (Negash et al. 2012). The reason for high ownership of net in this study as compared to other studies may be due to mass Insecticide treated net distribution campaign conducted by Federal Ministry of Health at end of 2015.

History of sleeping under a net (utilization) in the previous night by children under five and pregnant women, was 77.5% and 78.8% respectively. However, by observation utilization was observed as 62.2% and 66 % in children and pregnant women respectively. This is slightly lower than reported from Afar, Ethiopia that was 82% and 79 % respectively and in the direct observation 76.1% and 70% children and pregnant women (Negash et al. 2012). The proportion of under 5 children and pregnant women who slept under the net during early morning survey was 71.64 % and 69% respectively, Raya Alamata, Tigray, 2013 (Girmay 2015) and 80% utilization recommended by WHO (WHO 2013). The reason for lower utilization than the above result because, one fourth (23.1%) of households not tucked the net under the mattress and some (14.3%) of the household's insecticide treated net have tears or holes. From the households that own Insecticide treated net, only 76.9% and 72.1% of household demonstrated proper hanging and tucking of nets respectively in this study. This is higher than 57.9% report from Harari, eastern Ethiopia and different from the report of study conducted in Raya Alamata which showed 68.6% and 35.7 % households demonstrated proper hanging and tucking techniques respectively (Teklemariam et al. 2015 Kateera et al. 2015). This difference may be due to time difference as time increases exposure of peoples to information and awareness of individuals related to Insecticide

treated net use may increase results in proper utilization of Insecticide treated net. Like that of the current study, net number, residence and household family size showed significant association with Insecticide treated net utilization in study conducted in Southwest Ethiopia (Lelisa and Ahmed 2013). Among the potential determinants explored regarding utilization of Insecticide treated net in under five children and pregnant women in study area, the number of sleeping spaces per household (<3 sleeping spaces), bed nets available per household (≥ 2 nets per household), family size (<5), hearing malaria education message, urban residence, being Orthodox Christian, knowledge of participants about malaria and net use were significant predictors of net utilization.

Participants from households having ≥ 2 bed nets were 5.2 times more likely to utilize Insecticide treated net than those from households with <2 nets per HH. Similarly as report of study conducted in Rwanda, a progressive increase in odds of net use proportional to number of used nets the night before the survey was observed and also as report of Southwest Ethiopia, Individuals who had ≥ 2 nets were 2.1 times likely to utilize than that of individuals having one net (Berkessa T 2016). Individuals who live in households having < 3 sleeping spaces were 6.5 times likely to utilize Insecticide treated net than those who live in households having ≥ 3 sleeping spaces. This finding was supported by the result of study conducted in Rwanda; households with ≥ 2 sleeping spaces were associated with lower odds of net use. This is due to households with more sleeping places did not have enough bed nets to cover each sleeping space.

Households with family size of <5 were 6 times likely to utilize Insecticide treated net than those who have family size of ≥ 5 . This finding was consistent with report of study conducted in Southwest Ethiopia. Urban residence also showed significant association with Insecticide treated net utilization in the study area and this had been identified by study conducted in southwest Ethiopia (Berkessa 2016). This may be due to peoples living in urban area had a possibility to get information through media like radio and more utilize nets. Knowledge of participants on malaria and Insecticide treated net use also showed significant association with Insecticide treated net utilization by pregnant women and children under five. This finding was also supported by the finding of study conducted in south west Ethiopia and the finding of study conducted in Harari region, having knowledge about net use has a positive influence on utilization of Insecticide treated net (Araya 2015).

Receiving education about malaria and prevention methods increases awareness of community regarding net use and having positive perception towards net use increases utilization of nets, the possible reasons mentioned by majority of respondents for not utilizing insecticide treated net were lack of awareness of community regarding utilization, negligence, inconvenient for hanging especially for those that sleep out of bed, lack of strict follow up from the government side, insufficient number of bed for all family members and lack of punishment for those who use nets for unintended purpose (Gobena 2012).

Conclusions and recommendations

Generally, in this study ownership of Insecticide treated net was slightly lower than a target set by FMOH and utilization was lower than WHO recommendation. Households with ≥ 2 nets per HH, family size of < 5 , sleeping spaces < 3 , urban residence, getting health information about malaria and prevention methods, knowledge of participants about net use were factors that determine Insecticide treated net utilization by households in the area. Utilization of bed net to pregnant women and children under five has to be strengthened.

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