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Assessment of Insecticide Treated Bed Net Use and Factors Affecting Its Use For Prevention of Malaria Among Pawe Woreda Community, Benishangul Gumuz, North-West, Ethiopia

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Abstract:

Background: Three-fourths of the total land area of Ethiopia is malarious with more than two-thirds of the total population (68%) being at risk of its infection. The use of ITNs is, however, limited and there are a number of possible explanations. This study aims to provide information about ITN and promote ITN use, and factors influencing its possession and use in Pawe woreda. *Method*: A community based cross sectional study was conducted among 770 households in Pawe Woreda, Benishangul Gumuz, North-West Ethiopia. Multistage sampling method was employed for the quantitative data and purposive sampling for the qualitative data. Data were entered into computer, edited, cleaned and analyzed using SPSS (version 16). Logistic regression was done to determine predictor variables. *Results:* Out of 727(94.4%) of the households currently possessing an ITN, 700 (90.9%) of them reported ever use of ITN and 619 (80.4%) used last night. Being house servant (AOR=0.287 95%CI: 0.11-0.748), being grandparent, (AOR = 3.693, 95%CI: 1.406-9.698), monthly family income of 2501 to 3500 (AOR=3.757, 95%CI: 1.015, 13.903), getting sick with malaria in last month (AOR=0.489 95%CI: 0.265- 0.901), getting message/information about ITN (AOR=0.152, 95%CI: 0.06-0.383), average number of ITN (AOR=0.423 95%CI: 0.212-0.843) and believing ITN should be re-treated (AOR=2.927 95%CI: 1.472, 5.82), were found to be predictor variables of ITN utilization. *Conclusions and Recommendations:* The overall knowledge, attitudes and practices of ITN usage was high among the study subjects. However, there is gap between possession and use. There is a need to develop a health promotion package to further maximize ITNs use and increase access to ITN. Awareness creation, continuous monitoring and evaluation regarding proper use of ITNs are necessary. The government should work integrating with private sector and NGOs to achieve maximum ITNs coverage and utilization. On the other hand, ITN distribution programme should consider family size.

Keywords: Insecticide Treated Bed Net Utilization, Factors, Pawe woreda, Benishangul Gumuz

Introduction

Ethiopia is one of the sub-Saharan African countries that are seriously affected by malaria. Three-fourths of the total land area of Ethiopia is malarious with more than two-thirds of the total population (68%) being at risk of malaria infection (1).

The annual report (2005/06) of the Federal Ministry of Health (FMOH) in Ethiopia states that malaria accounts for 17.8% of outpatient consultations, 14.1% of admissions and 21.8% of inpatient deaths. The disease mainly affects those living in rural areas due to the existence of abundant mosquito breeding sites, poor housing conditions and inability to afford preventive measures, coupled with low awareness of the preventive methods. Insecticide treated bed nets (ITNs) have emerged in the last several years as an effective malaria control intervention (2).

Ethiopia has adopted the use of ITNs as one of its vector control strategies primarily in selected

malarious areas with the view to a gradual scaling-up of the intervention. Early detection and prompt treatment of malaria cases, selective vector control (indoor residual spray, use of insecticide treated mosquito nets and source reduction) and epidemic prevention and control are the major strategies adopted in the country. Currently, insecticide treated mosquito nets (ITNs) have received serious attention and have raised renewed interest to serve as tools in malaria control (3). ITNs have a mean protective efficacy against malaria episodes of approximately 50% in endemic areas of Africa and recent review has similarly shown that ITNs are highly effective in reducing morbidity and mortality from malaria (1, 2, and 3).

Questions remain, however, on how best to promote correct and sustained use of ITNs, particularly in areas without a tradition of bed net use. A large number of studies have attempted to identify household and individual level factors associated with malaria. Factors examined includehousing type, proximity to vector breeding site and vector abundance, socioeconomic status, age, occupation, sex, residential mobility and travel, knowledge of malaria, household size, sleeping room density, presence of domestic animals near home, use of preventive methods (e.g., coils, house spraying), bed net use, and local area population density (4). The use of mosquito nets is, however, limited and there are a number of possible explanations for this low coverage. These may be due to lack of cultural exposure to the use of mosquito nets, lack of awareness, absence of a sustainable mechanism for the distribution of ITNs, low acceptance by the community, and concerns regarding its high cost (1,3,4).

The aim of Ethiopian Government was to reduce morbidity and mortality of malaria by half by the year 2010, and again by another 50% by 2015. In the latest plan, the Ministry of Health and Roll Back Malaria partners in Ethiopia are determined to achieve 80 per cent coverage and utilization rates by children and pregnant women of insecticide-treated mosquito nets in all regions by 2010. Linked with this is the goal of, by 2010, having 80% of malaria cases in Ethiopia treated successfully within 24 hours with effective anti-malaria drugs(5).

Methods and Materials

The study was conducted in Pawe woreda, Benishangul Gumuz Regional State, North-west Ethiopia, located at 400 kms from regional town Assosa and 573 kms away from Addis Ababa. Administratively, the woreda is divided in to 20 kebeles and has 12267 households with 50220 populations (25153 males and 25067 females) (24). A community-based cross-sectional study was conducted among Pawe woreda residents. Both quantitative and qualitative data were collected. The qualitative data were used to support the findings from quantitative data. The source population for this study was all household residents in Pawe woreda during the study period. The study population was all household heads residing in Pawe woreda during study period.

Household heads who were residents of Pawe woreda and aged >=18 years were included in the study. For quantitative study, sample size was calculated using single population proportion formula below.

$$n = \frac{(Z(1-\frac{\alpha}{2})^2 P(1-P)}{d^2}$$

Where n=the minimum sample size required Z (1-$^{\alpha}/_{2}$) =the standard normal variable at 95% confidence level.

P= proportion of households using ITN

d= margin of error

Values taken in this study were-

p=65% (0.65) proportion of households used ITNs (7)

d=5 %(0.05)

Z (1-$^{\alpha}/_{2}$) =1.96 (Z score at 95% confidence level)

$$n = \frac{(1.96)^2(0.65)(0.35)}{(0.05)^2} = 350 + 10\% = 385$$

Considering a design effect of two, the final sample size taken was: (385 X 2) **=770**

For the qualitative study, one disease control officer and four health extension workers were selected purposively for in-depth interview. For quantitative study, the sampling technique employed was multistage sampling method. Accordingly, of the total 20 kebeles in the woreda 20% (4 kebeles) were taken randomly. Then systematic random sampling method was used to select households from the selected kebeles. Number of households, which were selected from the selected kebeles, was allocated proportionally. For the in-depth interview, five individuals (one health extension worker from the four selected kebeles and one disease control officer from Pawe woreda health office) were taken purposively.

The proportional allocation of sample size for selected kebele was calculated by formula $n_i = Ni\ (n_f)/N$

Where, n_i = total sample size for kebele i

N_i= total no, of households in kebele i

n_f= final sample size determined.

N= total no, of households in four kebeles

The first household was picked randomly and the next household was every k^{th} until the required sample was obtained using formula ($k=N/n_f= 3370/770 \approx 4$)

Where: K= the interval between two households

N = total no. of households in four kebeles
n_f = final sample size

For qualitative data, an in-depth interview guide prepared in English version was used. Individuals, who were heads of households or elder member in the household, were asked for their consent to participate in the study. Five B.Sc holder instructors were recruited for data collection from Pawe health Science College. The quantitative data were coded, edited, entered into SPSS version 16.0-window for analysis. Descriptive statistics (frequencies, percentages, means and standard deviations) was computed to show the picture of the data. Logistic regression was used for determining the predictor variables. The qualitative data were analyzed manually using thematic method. Written letter of ethical clearance was obtained from Jimma University College of Public Health and Medical Sciences Ethical Committee and permission was sought from Pawe woreda administrative office. Individuals were incorporated into the study after they had consented to participate in the study.

Results

Socio-demographic characteristics

Seven hundred seventy household heads were interviewed in Pawe woreda and the response rate was 100%. The mean age of respondents was 36.19 with SD ±11.91 and 390(50.6%) were females. Concerning marital status 580(75.3%) were married, 97(12.6%), 47 (6.1%), 46 (6%) were single, divorced and widowed respectively. Majority 373(48.4%) of household heads were farmers, 119(15.5%) house servants and 83 (10.8%) government employed. About 349(45.3%) of the household heads were illiterate, 106 (13.8%) were read and write, and the rest were educated from primary education to college/university level. Regarding family size, 404 (52.5%) had 3 to 4 family size, and 227 (29.5%) had 5 and more. Majority 648(94.7%) of household heads earn more than 3500 birr monthly and 26 (3.8%) earn 2501 to 3500 birr monthly. Three hundred ninety (50.6%) of respondents were fathers, 40.1 %(309) were mothers and the rest were son/daughters and other relatives (Table 1).

Table 1: Socio- demographic characteristics of household heads Pawe woreda, Benishangul Gumuz Region, North, West Ethiopia, May 2012.

Variables	Frequency	Percent
Age group of respondents		
<=29	224	29.1
30 -39	263	34.2
40-49	183	23.8
50+	100	13
Sex of respondents		
Male	380	49.4
Female	390	50.6
Marital status		
Married	580	75.3
Single	97	12.6
Divorced	47	6.1
Widowed	46	6.0
Educational status of respondents		
Illiterate	349	45.3
Read and write	106	13.8
Grade 1-8	188	24.4
Grade 9-12	73	9.5
College/university	54	7.0
Religion of house hold respondents		
Orthodox	451	58.6
Muslim	179	23.2
Protestant	110	14.3
Catholic	26	3.4
Others	4	0.5
Family Size		
1 to 2	139	18.0
3 to 4	404	52.5
>=5	227	29.5
Family Income		
<= 1500	7	1.0
1501 to 2500	3	0.4
>=2501	674	98.5

Knowledge about malaria symptoms and Perception About Malaria

Five hundred thirty four (69.4%) of respondents, mentioned being bitten by mosquito causes malaria, followed by 342 (44.4%) living near collected water, 318 (41.3%) being in rain, 173 (22.5%) working in the sun, 116 (15.1%) getting cold, 65(8.4%) drinking dirty water, and 16 (2.1%) contact to person with malaria. Regarding method of malaria prevention by the respondents, ITN use, keeping house/surrounding clean, and clearing/draining stagnant water, were the responses given by 629 (81.7%), 40 (5.2%), and 32(4.2%) subjects respectively.From the in-depth interview, all of the participants said that the preferred malaria prevention and control strategies applied in the woreda were; ITN distribution to households and educating how to use ITN, environmental management, and residual spraying. Concerning the appropriateness of ITN in the woreda context, the participants added that ITN was the most applicable, feasible and sustainable strategy to prevent and control malaria. Therefore, as the participants mentioned, LLITN distribution, environmental management, and residual (DDT/Dentamethrin) spraying were currently ongoing activities to prevent malaria but the IEC activities and training of health workers were not sufficient and remained low. Four hundred two (52.2%) of respondents have accessed information about malaria.

The most frequent source of information about malaria was health workers, accounting for 292 (37.9%), followed by radio 137 (17.8%), TV 98 (12.7%), and the least was from parents 1 (0.1%).

ITN Utilization and Related Factors

The experience of the household respondents towards ITN and malaria was assessed by asking last night use of ITN and last month's experience of malaria disease. Seven hundred (91%) of them ever used ITN of which 619 (80.4%) used last night. About 296 (38.4%) of the respondents reported one of their family members had experienced malaria disease in the last six months. Concerning household's access of information, 362 (47%) and 116 (15.1%) own functional Radio and TV respectively.

Possession, Knowledge and Household factors related to ITN

Regarding the house arrangement, 84% of the houses have two or less rooms and more than 16% have three or more rooms. Ninety three percent of the households have two or less beds and 4.7% have three or more beds and nearly 43% of the households have two or less sleeping mats but 10 (1.3%) have more than two sleeping mats. Of the total household respondents, 475(61.7%) replied they have access to information about ITN, and health workers, radio, and TV were the sources of information for 364(76.6%), 145 (30.5%), and 109 (22.9%) respectively. Seven hundred twenty seven (94.4%) of the households currently possessed an ITN of which 672 (87.3%) were possessed free and 62 (8.1%) purchased/bought but three (0.4%) do not remember. Concerning the number of ITNs owned, 440 (57.1%) of households possessed one ITN, 287(37.3%) two to three ITNs, and five (0.6%) possessed four or more ITNs. Four hundred ninety four (64.1%) of households possessed ITNs in last 2 to 5 years. One hundred ninety six (25.5%) households possessed within the last one year, 26 (4.3%) possessed for 6 to 9 years, and the rest possessed for the last 10 and above years. ITN unavailability 21 (53.8%), lack of interest to put on every bed 10 (25.6%), bed net too expensive three (7.7%) and bed net do not protect against malaria two (5.1%) were the reasons given for not owning ITN. Even though they own ITN, 29 (4%) respondents do not utilize ITN, and the main reason for not using is that it is not season of malaria transmission 13 (44.8%), and ITN is not suitable for use 2 (6.9%). From the in-depth interview participants mentioned, every household was targeted at least to have one ITN and almost all of the ITNs distributed to households in the woreda were free by NGOs. The participants recommended that there should be sustained ITN distribution considering family size, residual spraying, and environmental management activities in their future. Additionally participants suggested that the gov't have to allocate budget to purchase and distribute ITN as well as to train technical personnel and model households.

Perception and Related factors

Among the total 770 household heads interviewed, 320 (41.6%) believe that malaria can attack while using an ITN, while 431(56%) do believe that malaria cannot attack while using ITN, but19 (2.5%) of them do not know. More over among those who believe that malaria can attack while using ITNs, 288 (90%) said malaria episode is the same in both ITN users and non-users, and 6 (1.8%) replied malaria episode is less among ITN users and 26 (8.2%) replied that they do not know. Frequency of ITN washing has been reported every six months, every week, every year and every day by 427 (59.3%) 192 (26.7%), 88 (12.2%) and 13 (1.8%) household heads respectively. Majority

761 (98.8%) of the respondents think/agreed that ITNs have benefit and not to be bitten by mosquito729 (95.8%), not to get malaria390 (51.2%), not to bother about other insects 228 (29.9%) and to get warmer 28 (3.7%) were reported to be the benefits of ITN. Out of all, 717 (93%) of the household heads reported using ITN has no associated problem, but few 8 (1%) reported there is associated problem with ITN use. Moreover, 677 (88%) household heads agree that ITN should be re-treated (Table 8). The purposes of ITN re-treatment as reported by the heads of households were to kill mosquitoes, to repel mosquitoes and to make the net stronger by 627 (92.6%), 209 (30.9%), and 38 (5.6%) respectively.Among the 869 ITNs inspected by observation, majority 794 (91.4%) were hanged 34(3.9%) packed, and 41 (4.7%) used for other purposes. Among ITNs hanged, 718(90.4%) were on bed, 56 (7.1%) on floor, and 20 (2.5%) on sleeping mats. Out of the 794 hanged ITNs, 260 (32.7%) had holes, of which about 135(51.9%) ITNs have <= 2 average number of holes and 125 (48.1%) ITNs have >=3 average number of holes. Concerning size of the hole, 10 (3.8%) of ITNs have <=2 cm, 102 (39.2%) of ITNs have 2< to <=5 cm, and 148 (56.9%) have >5 cm. Out of 23 (2.9%) ITNs which have tear; two ITNs have tear size of <=5 inches, and 21 (91.3%) have >5

Table 2: Logistic regression of socio-demographic factors and ITN utilization Pawe woreda, Benishangul Gumuz North-West Ethiopia May 2012

Variables		Used ITN last night		COR (95% CI)	AOR (95% CI)
		Yes (%)	No (%)		
Sex	Female	302(39.2)	88(11.4)	1.00	1.00
	Male	317(41.2)	63(8.2)	0.682 (0.476, 0.977)	1.542 (0.609, 3.907)
Family size	1 to 2	90(11.7)	49(6.4)	0.352 (0.227, 0.546)*	2.599(0.973, 6.936)
	3 to 4	339(44.0)	65(8.4)	0.358 (0.218 -0.587)*	0.917(0.472, 1.781)
	>= 5	190(24.7)	37(4.8)	1.00	1.00
Occupation	Government employed	68(8.8)	15(1.9)	0.876(0.474, 1.619)	0.526(0.150, 1.838)
	Farmer	298(38.7)	75(9.7)	1.00	1.00
	Merchant	57(7.4)	12(1.6)	0.836 (0.427,1.638)	0.612(0.187, 2.005)
	Student	31(4.0)	22(2.9)	2.82(1.544, 5.149)*	1.785(0.438,7.275)
	Self employed	11(1.4)	4(0.5)	1.445 (0.448, 4.665)*	0.384(0.036, 4.06)
	House servant	104(13.5)	15(1.9)	0.573 (0.315, 1.042)	0.287(0.11, 0.748)*
	Daily labor	46(6.0)	6(0.8)	0.518 (0.213, 1.259)	0.256(0.053,1.226)
	Jobless	3(0.4)	1(0.1)	1.324 (0.136, 12.914)	1.501(0.092,24.455)
	Others	1(0.1)	1(0.1)	3.973 (0.246, 64.261)*	
Educational status	Illiterate	276(35.8)	73(9.5)	1.00	1.00
	Read and Write	94(12.2)	12(1.6)	0.483(0.251, 0.928)*	0.444(0.167,1.187)
	Grade 1-4	79(10.3)	7(0.9)	0.335 (0.148, 0.757)*	0.428(0.140,1.306)
	Grade 5-8	82(10.6)	20(2.6)	0.922 (0.531, 1.603)	0.714(0.241, 2.113)
	Grade 9-12	52(6.8)	21(2.7)	1.527 (0.865, 2.696)	1.184(0.363,3.86)
	College/university	36(4.7)	18(2.3)	1.890 (1.015-3.521)*	1.457(0.314, 6.759)
Marital status	Single	70(9.1)	27(3.5)	1.829 (1.117, 2.995)*	1.086(0.328, 3.592)
	Married	479(62.2)	101(13.1)	1.00	1.00
	Widowed	31(4.0)	15(1.9)	2.295(1.195, 4.408)*	1.665(0.570,4.892)
	Divorced	39(5.1)	8(1.0)	0.973(0.441, 2.144)	0.532(0.128,2.21)
Religion	Orthodox	361(46.9)	90(11.7)	1.00	1.00
	Protestant	101(13.1)	9(1.2)	0.357(0.174, 0.734)*	0.401(0.149,1.076)
	Catholic	25(3.2)	1(0.1)	0.16(0.021, 1.2)	0.305(0.037, 2.531)
	Muslim	128(16.6)	51(6.6)	1.598(1.073, 2.38)*	1.711(0.896,3.268)
	Others	4(0.5)	0(0.0)	0.00	
Monthly family income	<= 2500	9(1.1)	1(0.1)	2.367(0.213,26.331)	3.75(1.015, 13.903)*
	2501 - 3500	14(2.0)	12(1.8)	4.058(1.828,9.007)*	1.00
	>=3501	535(78.2)	113(16.5)	1.00	

inches of tear size (Table 9). From the in-depth interview, participants generally rated the status of previously distributed ITNs to be in bad conditions and the practical lifespan 1 to 2 years.

Factors Associated With ITN Utilization

From bivariate analysis of last night ITN utilization in relation to each explanatory socio-demographic variable, age, sex, family size, occupation, educational status, status of respondent in the household, marital status, religion, and monthly family income were found to be significantly associated (at 0.05 level of significance). Further, multivariate logistic regression was done to control the effects of confounding variables. In the multivariate analysis being house servant, (AOR=0.287 95%CI: 0.11-0.748) being grandparent, (AOR = 3.693 95%CI: 1.406-9.698), earning 2501-3500 birr monthly (AOR=3.757, 95%CI: 1.015-13.903) were statistically significantly associated with last night ITN use. Age, sex, family size, educational status, marital status, and religion were not significantly associated (Table 2).

Household heads perception and related factors affecting ITN utilization

In the bivariate analysis of ITN use in relation with other ITN related factors, sick with malaria last month, having functional radio, got information about malaria in the last one year, got information/message about ITN, average number of ITNs possessed, washing of ITNs, and believed that ITN should be re-treated, were statistically associated at 0.05 significance level. However, having functional TV, average number of rooms, average number of beds, way of possessing ITN, believing that malaria can attack while using ITN and having re-treated ITN were not statistically significantly associated with last night ITN use at 0.05 significance level.

Multivariate logistic regression was done by considering all covariates simultaneously. Sick with malaria in last month (AOR=0.489 95%CI: 0.265-0.901), got message/information about ITN (AOR=0.152, 95%CI: 0.06-0.383), average number of ITN (AOR=0.423 95%CI: 0.212-0.843) and believe ITN should be re-treated (AOR=2.927, 95%CI: 1.472, 5.82), were statistically significantly associated with ITN use(Table 3).

Table 3: Logistic Regression of perception of household heads and related factors and ITN utilization Pawe woreda, Benishangul Gumuz North-West Ethiopia May 2012

Variables	Response	Used ITN last night		COR (95% CI)	AOR (95% CI)
		Yes	No		
Sick of malaria last month	Yes No	255(33.1) 364(47.3)	41(5.3) 110(14.3)	1.88(1.269, 2.784)* 1.00	0.489, 0.265, 0.901)* 1.00
Have functional radio	Yes No	316(41.0) 303(39.4)	46(6.0) 105(13.6)	0.420(0.287, 0.615)* 1.00	0.992 (0.534, 1.843) 1.00
Have functional TV	Yes No	96(12.5) 523(67.9)	20(2.6) 131(17.0)	0.832(0.495, 1.397) 1.00	1.195 (0.436, 3.276) 1.00
Got information about malaria in past one year	Yes No	344(44.7) 275(35.7)	58(7.5) 93(12.1)	2.006(1.393, 2.887)* 1.00	2.181 (0.884, 5.381) 1.00
Average no. of rooms	<=2 >=3	520(67.5) 99(12.9)	126(16.4) 25(3.2)	1.00 1.042(0.645, 1.684)	1.00 1.07(0.465, 2.459)
Average no. of beds	<=2 >=3	576(76.6) 31(4.1)	140(18.6) 5(0.7)	1.00 0.664 (0.253, 1.737)	1.00 1.509 (0.423, 5.384)
Believe that malaria can attack while using ITN	Yes No	613(79.6) 6(0.8)	148(19.2) 3(0.4)	1.00 2.071(0.512, 8.377)	1.00 6.937 (0.051,1.609)
Believe ITN should be Re-treated	Yes No	365(47.4) 254(33.0)	112(14.5) 39(5.1)	1.998(1.342, 2.976)* 1.00	2.927(1.472, 5.82) 1.00

Discussion

Ethiopia is malarious with three-fourth its total land area and 68% of the total population being at risk of malaria infection (1). Insecticide treated bed nets (ITNs) have emerged in the last several years as an effective malaria control intervention (2). Ethiopia had adopted the use of ITNs as one of its vector control strategies (3). Recent studies had shown that ITNs are highly effective to reduce malaria morbidity and mortality (1, 2, and 3).

In this study, the level of ITN utilization by households remained high. The overall result has shown that 94.4% households currently possessed an ITN and the level of ever utilization and last night utilization were 90.9% and 80.4% respectively. This is consistent with some studies in malaria prone areas of Ethiopia (Dire Dawa & Afar), Amhara & Oromia Region, Abuja Malaria Summit 2010 target, US President's Malaria Initiative (PMI), and Guinea-Bissau (in 2006), (6,7,11,19). This might show that the government targeted to distribute ITNs since the woreda was malaria prone area. On the other hand this study has shown that ITN utilization level was higher compared with study from South Ethiopia (Arbaminch Zuria) (8) North Ethiopia (9), and reports from elsewhere (14, 19). Even though there was high ITN coverage and level of utilization in the area, sustainable ITN distribution considering family size and IEC activities should be further strengthened to achieve the universal coverage, which means one net distributed for each two people in the population, to two nets per household (11).

Many studies have attempted to identify household and individual level factors associated with malaria (4). The overall understanding of malaria transmission and effective means to prevent transmission were good among the present study population. Seven hundred sixty one (98.8%) of respondents think ITNs have benefit, either not to be bitten by mosquito 729 (95.8%), or not to get malaria 390 (51.2%). The most common methods of malaria prevention methods were ITN use (81.7%), keeping house & surrounding clean (5.2%), clearing/draining stagnant water (4.2%), take tablets (3%) and use spray (2.5%). This is consistent with reports in the study of malaria prone areas of Ethiopia (6), where most (91.1%) of the respondents cited that ITN is useful to control malaria through either prevention of mosquito bites (60%) or prevention of the disease (39%). This clearly shows to what extent the community is aware about ITN use and it can be attributed to the IEC activity on malaria undergoing in the woreda by health workers.

ITN was supplied to the study population mainly freely (87.3%) by the government or NGOs. Majority (57.1%) of households owned one ITN and 37.3% owned two to three. The common reasons for not owning ITN were, bed net is not available 21 (53.8%) and lack of interest to put nets on every bed 10 (25.6%) whereas the main reason for not using was that it was not season of malaria transmission 13 (44.8%). Most of the interviewees 704 (91.4%) involved in this study identified children below five years age to be the priority groups to sleep under ITNs in their household. Besides, 240(31.2%) respondents claimed pregnant women as a priority group to sleep under ITNs. These results revealed that the communities in the present study have higher level of knowledge compared to communities in Tigray-Ethiopia where children and pregnant women were identified as priority groups by 76% and 1.63% of the study population respectively (12). This suggested there is adequate knowledge among the present study communities concerning the high-risk groups to be given priority to sleep under ITNs. During physical inspection of ITNs, 34(3.9%) were packed, and 41 (4.7%) were used for other purpose than as a bed net, and some hanged ITNs have holes 260 (32.7%) and tears 21 (91.3%) that can let mosquito pass through. This study is consistent with the study in Oromia & Amhara (7, 13). In general, ITN distribution, utilization, knowledge of users and its acceptability were good and the community had high awareness about malaria disease and its prevention. However, there were some ITNs left unused and misused by the households. This revealed that there was knowledge gap on ITN utilization. Thus to increase the uptake and use of malaria intervention by the community, the designed interventions should be build on the existing practices, culture and the community must be fully engaged.

Some studies have identified a number of possible explanations for low ITN coverage. These may be due to lack of cultural exposure to the use of mosquito nets, lack of awareness, absence of a sustainable mechanism for the distribution of ITNs, low acceptance by the community, and concerns regarding its high cost (1,3,4).

Since ITN distribution strategy, as one of the vector control options in the country, is an initiative, understanding the perceptions and willingness of the community towards using ITNs as well as the factors influencing its usage is a prerequisite for designing strategies aimed at scaling-up mosquito net implementation programmes in Ethiopia(1,3,4).

The socio-demographic factors determining utilization of ITN in this study were being household servant, grandparent, and having monthly income of 2501 to 3500 Birr. Compared to household servants, farmers were 1.72 times more likely to utilize ITN and grandparent headed households used ITN 3.7 times higher than father headed did. Households with monthly income 2501 to 3500 birr utilized ITNs 3.76 times more than those with monthly income of >=3501birr which might be because those with better income had demand for drug treatment rather than ITN use. This finding is consistent with reports from Arba Minch and Tigray (8, 21), that reported income of households head was a predictor of ITN utilization. The same study also reported that sex of the respondents and presence of radio in the households were predictors of ITN use (8, 21), which is not the case in this study. There is no statistically significant difference between utilization of free ITNs and purchased/paid ITNs, which is contradicting with the study in Oromia and Amhara regions during malaria season in October 2007 (13) which reported that nets paid for were more likely to be used than free nets. Current information on ITN is believed to increase and positively influence its use. However, in the present study individuals who reported to have information about ITN used ITN last night 0.15 times lower compared with those who do not have information. It might explain that the information the individuals accessed might be from non-credible sources or the health education activities were weak. As the number of ITNs owned by household increases, the level of use was assumed to increase, or it positively affect its use. However, the present study revealed that possession of more number of ITNs in a household decreased usage. Households, which had two or more ITNs have used it 0.42 times lower compared to those that had one ITN per household, which is in contrast to a study in Wonago that reported possession of two or more ITNs positively predicted its use (15). The possible explanation might be because of that, the households saved the nets for their future utilization fearing that there might be shortage or might use the net for other purpose than using as bed net. The ITNs that were retreated with chemicals were efficient to protect from mosquito bite so that it prevents malaria; and were used more than those not retreated. The present study showed that household heads who believed ITN should be re-treated have used it last night 2.93 times more than those who did not believe. This might indicate that the communities might have feared that retreated ITNs have side effects and it might call for the government to further promote long lasting Insecticide Treated bed Nets in the community.

However, age, sex, family size, educational status, marital status, having functional radio/TV, getting information about malaria, average number of sleeping room and beds, way of possessing ITN, believe that malaria attack while using ITN, washing ITN, and having re-treating ITNs had no statistically significant association with last night ITN use. This is in contrast with a study in Arbaminch (8) where sex, presences of radio in the households predicted utilization of nets, and study in Wonago (15) that showed availability of separate bedroom significantly increased ITN use by households. Finding in Kafta-Humera District, Tigray Ethiopia, suggested that radio possession, malaria education message in rural and occupation (being merchants and government employees) in the settings had a positive effect on net use (21) which is also in contrast to the present study.

Conclusion

In conclusion, ITN ownership and use were high and promising among the study population. The overall knowledge, attitudes and practices of insecticide treated mosquito net (ITN) usage was high as well. However; some ITNs were left not used which implies there is gap between possession and use.

There was high perception about the seriousness of malaria and its effect, and there was high-perceived benefit of ITNs in protecting the study subjects against malaria. On the other hand, physical inspection of nets sampled from net owning households revealed misuses and ITN damages. The common identified factors affecting ITN use in the study area were; occupation, household status, household monthly income, sick with malaria in last month, got message/information about ITN, average number of ITN and believe ITN should be re-treated. Further Research should be done in the future to identify additional factors on ITN use.

List of Abbreviations

AOR: Adjusted Odds Ratio
CI: Confidence Interval
CIDA: Cooperation for International Development Agency
COR: Crude Odds Ratio
FMOH: Federal Ministry of Health
HHs: House Holds
IRS: Indoor Residual Spray
ITN: Insecticide Treated Net
LLIN: Long Lasting Insecticide Net
MIS: Malaria Initiative Survey

PMI: President's Malaria Initiative
RBM: Roll Back Malaria
UC: Universal Coverage

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