

# Utilization of Long-lasting Insecticide Treated Net and Associated Factors Among Pregnant Women in Awabel District,North-West Ethiopia, 2017

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## Research

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# **Abstract**

## **Background**

Utilization of long-lasting insecticide treated net (LLITN) is one of the main vector control activities. It has a killing, repellent and physical barrier effects against mosquito. Even if priority is given for pregnant women, not all nets owned by household have been utilized by pregnant women. The objective of the study was to assess utilization of Long-lasting insecticidal net and associated factors among pregnant women in malarious kebeles, Awabel woreda, North-West Ethiopia.

## **Methods**

A community-based cross-sectional study was conducted from May 1 to June 30, 2017. A systematic random sampling was used to select 422 households. Two days training was given for data collectors and supervisors. Collected data were coded and entered using epi-data version 3.1, then it was exported to Statistical Package for Social Science (SPSS) version 20. After bivariate logistic regression analysis, all variables with a p-value less than or equal to 0.25 was entered into multivariable logistic regression and p value < 0.05 considered as significantly associated with the outcome variable.

## **Results**

Utilization of LLITN was 33.6%. Factors such as attending antenatal care [adjusted odd ratio (AOR) =1.89; 95% CI; 1.04-3.44], traveling <1 hour to reach health facility AOR=4.41; 95% CI; 2.06-9.43], age  $\geq$  35 year [AOR= 3.67; 95% CI; 1.36-9.95], knowledge [AOR=11.68; 95% CI; 5.96-22.89] and having positive attitude [AOR=3.12; 95 CI; 1.66-5.88] were significantly associated with utilization of LLITN.

## **Conclusion**

This study showed that low utilization of LLITN. Attending antenatal care (ANC), traveling <1 hour to reach health facility, age  $\geq$  year, knowledge and attitude had positive association with LLITN utilization. Every concerned body should focus on reducing distance barrier by giving outreach services and increasing ANC, the attitude and knowledge of pregnant women toward malaria and LLITN which might increase utilization of LLITN.

# **Introduction**

World Health Organization (WHO) recommends that all risk persons, particularly pregnant women, sleep under Long lasting insecticide treated nets (LLINs) during the night [1] because it reduces miscarriages/stillbirths by one third compared with newborn babies of mothers with no protection, use of LLINs during first or second pregnancies was estimated to provide a protective efficacy of 18% against neonatal mortality and of 21% against low birth weight [2]. Women who used LLINs were less likely to have acute malaria, anemia and babies with low birth weight than women who did not use LLINs [3].

Long lasting insecticide treated nets (LLINs) are also effective tools to reduce illness and death due to malaria [4].

In Africa, malaria causes 10% of direct and indirect maternal death, 35% of preventable low birth weight and 75,000-200,000 infant deaths in each year [2].

In Sub-Saharan Africa, about 23 million pregnant women were unprotected by an insecticide treated net [8]. In this region, educational level, household income, malaria and ITN knowledge and urban residence were the major factors of LLINs utilization [9].

In Ethiopia, despite of giving special emphasis and priority to LLITNs use among pregnant women [7] not all mosquito nets owned by households are being properly utilized by pregnant women [10]. The gap between ownership and use remains high [2].

Ethiopian federal minister of health and different nongovernmental organization has made considerable effort in distribution of LLITNs to improve ownership [6]. The distribution of LLITNs has been strong and consistent but discrepancy still exists between ownership of household and utilization of LLITNs by pregnant women [7]. A lot of emphasis has been put on ownership but less attention has been given to utilization of LLITNs and associated factors among pregnant women [6]. Considering the ongoing gap between LLITNs ownership and usage commonly observed in Ethiopia and an investigation of factors influencing a women's decision use an LLITNs during pregnancy is warranted [8]. Previous studies mainly focus on Self-reported utilization [10] but this study was including direct observation of LLITNs whether hanging or not over sleeping place.

## Methods

A community based cross-sectional study was conducted among a total of 422 pregnant women from May 1 to June 30, 2017. in malarious kebeles, Awabel district, North- West of Ethiopia. The district was located at an altitude of 1623–2570 meter above sea level with the annual rainfall of 1100–1400 and temperature lies 15–21 Degree Centigrade [11].

The required sample size was calculated using a formula for single population proportion. It was calculated considering the utilization of LLIN was 48.4% among pregnant women in Amhara region [12].  
$$\text{varvec}n = \text{varvec}Z^2 \text{varvec}P(1 - \text{varvec}P) \div \text{varvec}d^2$$
 The total sample size was 422. The total sample size was proportionally allocated to nine malarious kebeles (the smallest administrative units) based on the number pregnant women who were residing in the study sites. Eligible women in each kebele were selected by systematic random sampling during the study period.

Structured questionnaire was prepared in English and was translated into Amharic language for data collection and translated back into English to check its consistency. Interviewer administered technique was used for data collection by trained data collectors. Training was given for data collectors and

supervisors for 2 days on how to collect data. Pre-test was done on 22 pregnant women before actual data collection.

Collected data were coded and entered through epi data version 3.1, and then exported to SPSS version 20 for analysis. Descriptive, bivariate and multivariate analysis was done. Tables, charts and text were used to present the result of the analyzed data. Independent variables with P-value of  $< 0.25$  in bivariate analysis was considered for multivariate logistic regressions. P-value less than 0.05 were used as cut off point for presence of statistical significance.

## Results

Among the total, 417(98.8%) of pregnant women were participated in the study. The mean age of the respondent was  $29.00 \pm 7.089$  SD years. About 408 (97.8%) were married. Two hundred sixty-nine (64.5%) of the respondent were unable to read and write. Three hundred seventy-three (89.4%) of the respondents were farmer. Regarding to the family size, 161 (55.3%) and 102 (24.5%) of the respondents had 5–6 and 1–2 respectively. More than half 235(56.4%) of the respondent had antenatal care follow up for the current pregnancy. Nearly two-third, 287 (68.8%) of pregnant women had low level of awareness about malaria and LLITN. In likert scale measurement, nearly half, 215 (51.6%) of pregnant women had negative attitude towards malaria and LLIN. (Table 1).

**Table 1**  
**characteristics of pregnant women in Awable district, North West Ethiopia, 2017**

<b>Characteristics</b>		<b>Frequency</b>	<b>Percentage</b>
Age(n = 417)	15–24 year	119	28.5
	25–34 year	168	40.3
	≥35 year	130	31.2
Educational level (n = 417)	Not read and write	269	64.5
	Able to read and write but no formal education	90	21.6
	Primary	41	9.8
	Secondary	17	4.1
Marital Status (n = 417)	Married	408	97.8
	Single	3	0.7
	Widowed	2	0.5
	Divorced	4	1.0
occupation(n = 417)	Housewife	39	9.4
	Farmer	373	89.4
	Merchant	5	1.2
Family size(n = 417)	1–3	102	24.5
	4	85	20.4
	5–6	161	38.6
	≥7	69	16.5
Antenatal care follow up (n = 417)	No	182	43.6
	Yes	235	56.4
Time taken to reach health facility (n = 417)	1 hour	121	29.0
	< 1 hour	82	19.7
	> 1 hour	214	51.3
Knowledge (n = 417)	Low	287	68.8
	High	130	31.2

<b>Characteristics</b>		<b>Frequency</b>	<b>Percentage</b>
Attitude (n = 417)	Negative	215	51.6
	Positive	202	48.4

Among the total 140 (33.6%) of pregnant women utilize LLITN preceding night of the survey. Eighty-one (29.2%), 75(27.1%) and 64(23.1%) of the respondents had the reason not utilizing LLITN was inconvenient to heat, no mosquito and cause of skin itching respectively (Fig. 1).

In multivariable analysis, age, ANC follow up of current pregnancy, time taken to reach health facility, knowledge and attitude were statistically significance with LLITN utilization among pregnant women (Table 2).

Characteristics	LLITN Utilization		COR (95% CI)	AOR (95% CI)	P-value
	Yes	No			
Age group in year	15–24	37	82	1	1
	25–34	49	119	0.91 (0.55–1.52)	1.89 (0.83–4.28) 0.107
	35–49	54	76	1.58(0.93–2.65)	3.67 (1.36–9.95) 0.009
Educational level	Unable to read and write	78	191	1	1 0.448
	Able to read and write but have no formal education	27	63	1.05(0.62–1.77)	1.88(0.72–4.90) 0.199
	Primary	23	18	3.13(1.60–6.12)	1.43(0.43–4.80) 0.565
	Secondary	12	5	5.88(2.00–17.24)	2.87(0.34–24.55) 0.336
Family size	1–3	43	59	1.67(0.87–3.18)	1.19(0.57–2.48) 0.122
	4	31	54	1.31 (0.67–2.58)	1.38(0.63–3.01) 0.431
	5–6	45	116	0.89(0.48–1.64)	0.67(0.33–1.35) 0.703
	≥ 7	21	48	1	1 0.102
ANC follow up	No	42	140	1	1 0.037
	Yes	98	137	2.38 (1.55–3.67)	1.89 (1.04–3.44)
Time taken to reach health facility	1 hour	59	62	1.58(1.00–2.51)	3.32(1.70–6.47) 0.000
	< 9 – 1 hour	49	33	1.56(0.89–2.75)	4.41(2.06–9.43) 0.000
	> 1 hour	182	32	0.19(0.11–0.31)	1
Knowledge	Low	42	245	1	1 0.000
	High	98	32	11.68 (5.96–22.89)	11.68(5.96–22.89)

Attitude	Negative	32	183	1	1	0.000
	Positive	108	94	6.57(4.12–10.47)	3.12(1.66–5.88)	

## Discussion

In this study, utilization of LLINs among pregnant women was 33.6% [95% CI; 28.8%-38.8%]. This is consistent with the study conducted in Ethiopia at national level (35.3%) and Tigray region 33.3% [12], Lagos state and Southern Nigeria 37.5%, 33.3% [21, 22] and Uganda 35% [23].

This is lower than the study conducted in Southern Ethiopia (48%) [13], Northern Ethiopia (58.4%), (57.3%) [14], and 2011 MIS in Ethiopia Benshangul Gumez, and Gambella (47.5%), SNNPR (45.1%), Amhara region (48.4%) [12], Kenya (> 82%) [9], Ghana 42.5% [15], Nigeria 68% [16], Ile-Ife, Osun State 44% [17], at a tertiary hospital in Nigeria 43.7% [18] and Uganda 73%, 58.6% [19, 20]. This discrepancy might be due to direct observation. In the previous studies the data were collected through self-report but in this study data were collected through direct observation whether the LLINs were hanging or not on the sleeping space.

In this study, utilization of LLITNs is greater than the study conducted in Afar 24.7%, Somali 24.7%, and Oromia region 26.7% [12] and at tertiary hospital in Nigeria 24.6% [24]. The difference might be due to socio demographic, and seasonal variation. The previous studies were conducted in lower seasons but this study was conducted in higher malaria transmission seasons. This might increase LLINs utilization.

Moreover, this study also identified factors that have association with utilization LLINs among pregnant women and found that being knowledgeable, ANC follow up, travelling less than one hour to reach health facility, being age 35 years or above and having favorable attitude toward LLINs utilization were factors that had significantly associated with LLINs utilization.

Being knowledgeable on malaria and LLITNs in this study, compared to not being knowledgeable was associated with utilization of LLITNs, which increases the odds of using LLINs during pregnancy by twelve times [AOR = 11.68; 95% CI; 5.96–22.89]. This is consistent with the study conducted in Sub-Saharan Africa [9] Northern Uganda [23], Nigeria [25, 26], Adama woreda and selected malaria prone area in Ethiopia [27, 28]. This might be due to knowledgeable pregnant women may know the consequences of malaria in pregnancy if they did not use LLINs. This might impose to use LLINs.

Pregnant women who had ANC follow up for the current pregnancy was almost 2 times more likely to utilize LLITNs than those who had no ANC follow up for current pregnancy [ AOR = 1.89; 95% CI; 1.04–3.44]. This is almost congruent with the study conducted in Uganda [23]. This might lead to increase the opportunity of getting counseling from Health workers on how to use LLINs [2].

In this study, pregnant women who travelled less than one hour to reach health facility were almost 4 times more likely to utilize LLITNs than those who travelled more than one hour [AOR = 4.41; 95% CI;

2.06–9.43]. This is almost consistent with the study conducted in Uganda [23]. This might increase the health facility visits which might increase opportunities of getting information about malaria and LLITNs.

Pregnant woman whose age were 35 and above were almost 4 times more likely to utilize LLITNs than those whose age was between 15 and 24[AOR = 3.67; 95% CI; 1.36–9.95]. This result is almost similar with the study conducted in South –East Nigeria [35]. This might be due to as age increase the probability of getting repeated malaria infection and counseling about LLITNs utilization which might impose to utilization of LLINs.

Furthermore, having favorable attitude toward LLINs utilization was more than fifth-fold increases in the odds of LLITNs utilization [AOR = 3.12; 95 CI; 1.66–5.88] as compared with having unfavorable attitude. This is consistent with the study conducted in Southern Ethiopia [13].

## Conclusion

Utilization of LLITNs among pregnant women was low. Utilization among pregnant women were positively associated with attending antenatal care in current pregnancy, knowledge of pregnant women about malaria and LLITNs, travelling less than one hour to reach health facility, age greater than 35 year and positive attitude towards malaria and LLITNs. Therefore, every concerned body should focus on reducing the barrier of distance by giving outreach services and increasing ANC follow up, the attitude and knowledge of pregnant women about malaria and LLITNs which increase utilization of LLITNs.

## Limitation of the study

Including all pregnant women in a household survey was difficult because some women did not know that they were pregnant. This study did not show how often pregnant women utilize LLITN because data were collected at single point of time.

## Abbreviations

ANC: Antenatal Care, AOR: Adjusted Odd Ratio, CI: Confidence Interval, COR: Crude Odd Ratio, LLIN: Long Lasting Insecticide Treated Net, MIS: Malaria Indicator Survey, SNNPR: South Nation Nationality and People Region, SPSS: Statistical Package for Social Science

## Declarations

### Ethics approval and consent to participate

Ethical clearance was obtained from Debre Markos University Institutional Review Board committee. Permission letter was sought from Awabel district health office. Verbal and written informed consent were obtained from each participant. Written consent was obtained from a parent or guardian on behalf of the participants under the age of 18 years. The study participants had the right to refuse in the study or

withdraw at any time during the interview was respected. The information obtained from the study participant was maintained its confidentiality by not writing name of the study participants on the questionnaire paper.

**Consent for publications:** Not applicable

**Availability of data and material:** The data sets generated during the current study are available from corresponding author on reasonable request.

**Competing interest:** The author declare that they have no competing interests

**Funding:** Not applicable

#### **Author contribution**

MK wrote the proposal, involved in study design, analyzed the data, drafted paper. Author read and approved the final manuscript.

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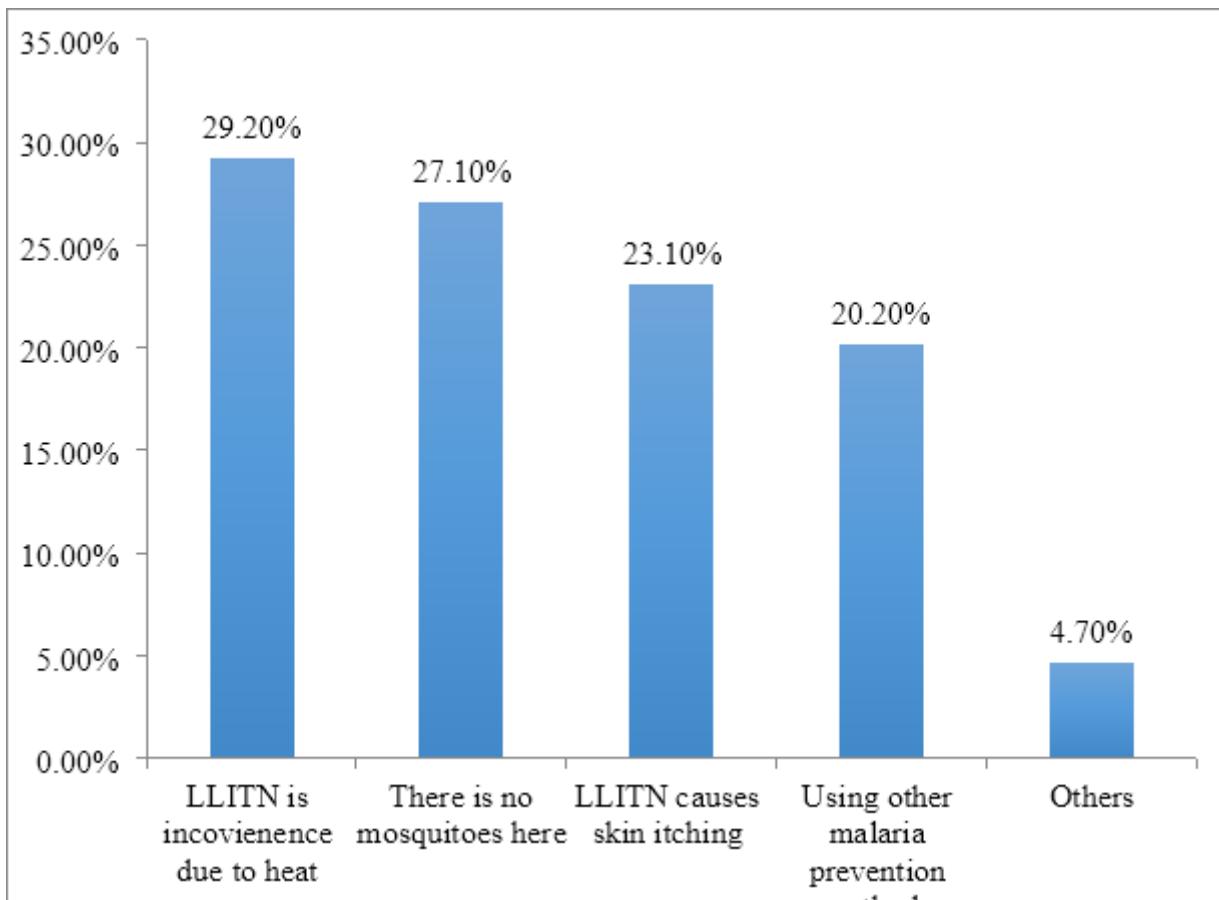
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## Figures



**Figure 1**

Reasons not using LLITN among pregnant women in malarious kebeles, Awable district, North West Ethiopia, 2017