

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

Mengistie Kassahun Tariku (✉ [mengesh2009@gmail.com](mailto:mengesh2009@gmail.com))

Aneded Woreda Health Office

Zewdu Dagneu

Debre Markos University

Sewnet Wongiel Misikir

Felge Hiwot Specialized Referral Hospital

Abebe Habtamu Belete

Jimma University College of Public Health and Medical Sciences

---

## Research

**Keywords:** LLITN utilization, pregnant women, malarious kebeles, Awable, Ethiopia

**Posted Date:** May 7th, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-26383/v1>

**License:** © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# 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 [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 , 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 increase utilization of LLITN. Key words : LLITN utilization, pregnant women, malarious kebeles, Awable, Ethiopia

## Introduction

World Health Organization (WHO) recommends that all risk persons, particularly pregnant women and infants, 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].

Ethiopian national policy aims to provide one LLINs for every sleeping space in malaria-endemic areas <2,000m [6]. According to this policy, more than 64 million nets were distributed between 2005 and 2014 by Federal Ministry of health [7]. In early 2015, approximately 4.3 million LLITNs were also distributed to malaria risk area district in Oromia, Amhara and Tigray region [7].

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].

Pregnant women are four times as likely to get sick from malaria and twice as likely to die from the disease if they are not using LLINs [1].

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 ITN 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]. The previous studies mainly focused on household and under five utilizations of LLITN but this study specifically focusing on utilization of LLITNs and associated factors among pregnant women.

## 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 Amhararegion [12].  $n = \frac{Z^2 P(1-P)}{d^2}$  The total sample size was 422. The total sample size was proportionally allocated for the nine kebeles 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 by 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 participants were participated in the study. The median 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. The median income of the respondent was  $1294.00 \pm 769.49$  SD Ethiopian birr. Regarding to the family size, 161 (55.3%) and 102 (24.5%) of the respondents had 5–6 and 1–2 respectively (Table 1).

Table 1

Socio-demographic characteristics of pregnant women in malarious kebeles, Awable district, North West Ethiopia, 2017

Characteristics		Frequency	Percentage
<b>Age(n=417)</b>	15-24 year	119	28.5
	25-34 year	168	40.3
	35 year	130	31.2
<b>Educational level</b>	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
<b>Marital Status (n=417)</b>	Married	408	97.8
	Single	3	0.7
	Widowed	2	0.5
	Divorced	4	1.0
<b>Religion(n=417)</b>	Orthodox	415	99.5
	Muslim	2	0.5
<b>Ethnicity(n=417)</b>	Amhara	408	97.8
	Oromo	9	2.2
<b>occupation(n=417)</b>	Housewife	39	9.4
	Farmer	373	89.4
	Merchant	5	1.2
<b>Family size(n=417)</b>	1-3	102	24.5
	4	85	20.4
	5 – 6	161	38.6
	7	69	16.5

Two hundred eighty-three (67.9%) of respondents' current pregnancy has been three and above. About 257(61.6%) of the respondents' current pregnancy was between 4 and 6 months, 235(56.4%) of the respondent had antenatal care follow up for the current pregnancy, 117 (49.8%) of them had two times, 39 (16.6%) of them had three times antenatal care follow up.

Among the total 287 (68.8%) of the respondents had low level of awareness about malaria and LLITN.

Attitude of the respondents was measured by Likert scale. Among the total, 215 (51.6%) of the respondents had negative attitude towards malaria and LLIN.

One hundred seventy-nine (42.9%) and 133 (31.1%) of the respondents have lived in house having two and three living rooms respectively. Three hundred sixteen (75.8%) of the respondents have lived in the household not having functional radio. Majority 341 (81.8%) of pregnant women have lived in the household having LLITN, 159(46.6%) of them have lived in the household having two LLITNs. More than half 191 (56.0%) of pregnant women have lived in household not hanging any sleeping place. 81 (42.4%) of respondent had had the reason not hanging was being torn of LLITN. Almost half 214 (51.3%) were travelled more than one hour.

Among the total 140 (33.6%) of the respondent utilize LLITN preceding night of the survey. 81(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 (Figure 1).

In multivariate analysis age, ANC follow up of current pregnancy, time taken to reach health facility, knowledge, attitude and age 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	
	Yes	98	137	2.38 (1.55-3.67)	1.89 (1.04-3.44)	0.037
Time taken to reach health facility	1 hour	59	62	1.58(1.00-2.51)	3.32(1.70-6.47)	0.000
	<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	
	High	98	32	11.68 (5.96-22.89)	11.68(5.96-22.89)	0.000

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

## 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]. 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.

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 information 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 may 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 information about malaria and LLITNs may increase 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.

## Acronyms And 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 authors declare that they have no competing interests
- Funding: Not applicable
- Authors' contribution

MK wrote the proposal, involved in study design, analyzed the data, drafted paper. ZD approved the design and the proposal.

SW involved in data entry, revised subsequent drafts of the paper and reviewing of the manuscript.

AH revised and approved the draft of the paper

All authors read and approved the final manuscript

- Acknowledgement

We would like to acknowledge Debre Markos University, College of Health Sciences and Department of Public health.

Our sincere and deepest gratitude would go to Awabel Woreda health office for writing letters of permission for malarial Kebeles. We would also like to extend our thanks to data collectors, supervisors and study participants.

## Reference

1. World health organization. World malaria report; 2014, Geneva
2. Roll Back Malaria Partnership. The contribution of malaria control to maternal and new borne health (progress and impact series), 2014, Geneva.
3. Ugwu E. O., Ezechukwu P. C., Obi S. N., Ukwu A. O. and Okeke T. C. Utilization of insecticide treated nets among pregnant women in Enugu, south-eastern Nigeria. Nigerian journal of clinical practice; 2013,16(3):292–296
4. National malaria guideline 3rd edition, 2012, Ethiopia
5. National strategic plan for going to scale with coverage and utilization of ITN in Ethiopia, 2004–2007, Addis Ababa, Ethiopia.
6. Ethiopia national malaria survey 2011 final report by Ethiopian health and nutrition, research institute and partners, 2012, Addis Ababa, Ethiopia.
7. President's malaria initiative, malaria operational plan, 2015, Ethiopia.
8. Eijk A.M, Hill J., Alegana V. A., Kirui V., Gething P. W., Kuile F.O and Snow R. W. Coverage of malaria protection in pregnant women in sub-Saharan Africa a synthesis and analysis of national survey data, the lancet infectious disease, 2011,11(3):190–207

9. Singh M., Brown G and Rogerson S. J Ownership and use of insecticide-treated nets during pregnancy in sub-Saharan Africa: a review *Malaria Journal* 2013 12:268.
10. Dagne G. and Denessa W. knowledge and utilization of ITMN among freely supplied households in Wonago woreda, southern Ethiopia. *Ethiopian journal health development*; 2008, 22(1): 35–40
11. Ethiopian fiscal year 2009 Awabel health office annual plan, July 2008, Lumamie
12. Ethiopia national malaria survey 2011 final report by Ethiopian health and nutrition, research institute and partners, 2012, Addis Ababa, Ethiopia.
13. Fuge T. G., Ayanto S. Y. and Gumamo F. Assessment of knowledge, attitude and practice about malaria and ITNs utilization among pregnant women shashogo district, southern Ethiopia. *Fuge et al. malaria journal*; 2015,14:235
14. Belay M. and Deressa W. Use of insecticide treated nets by pregnant women and associated factors in a pre-dominantly rural population in northern Ethiopia. *Tropical Medicine and International Health* 2008, 13(10): 1303–1313
15. Wisdom K.A, Margaret K, Sedoafia A, Gideon K.D, Eric A and etal. Ownership and Utilization of Long Lasting Insecticide Treated Nets (LLIN) and Factors Associated to Non utilization Among Pregnant Women in Ho Municipality of Ghana. *Central African Journal of Public Health*; 2016, 2(1):35–42. doi: 10.11648/j.cajph.20160201.16
16. Afolabi B. M., Fatunmbi B. S., Otsemobor O. and Sofola T. O Women in child-bearing age who are not currently pregnant are missed opportunities for malaria control in pregnancy: Evidence from 16 Local Government Areas of Nigeria, *Journal of Public Health and Epidemiology*, 2014, 6(1): 60–69
17. Omolade A. O. Oluwatoyin O. A. and Ayobami A. O. The Assessment of the Efficacy of the Usage of LLIN among Pregnant Women in Ile-Ife, Onus State *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 2016, 15(1): 61–68
18. Okoronkwo I. and Okoye H. Factors influencing utilization of intermittent preventive treatment and long lasting treated bed nets by pregnant women in Anabra state, Nigeria. *International journal of advanced scientific research and management*; 2016, 1(7):229–235
19. Sangare´ LR, Weiss NS, Brentlinger PE, Richardson BA, Staedke SG. Determinants of Use of Insecticide Treated Nets for the Prevention of Malaria in Pregnancy: Jinja, Uganda. *PLoS ONE*; 2012, 7(6): e39712. doi:10.1371/journal.pone.0039712
20. Elizabeth M., Noel N., Bonny E. B., Jessica N. and Elizabeth E. K. factors associated with use of malaria control interventions by pregnant women in Buwnuga Sub County, Bugiri district, Uganda. *Muhumuza etal malar J*; 2016,15:342
21. Aina B. A. and Ayeni F. A. Knowledge and use of insecticide treated nets as a malaria preventive tool among pregnant women in a local government area of Lagos state, Nigeria. *Journal of Applied Pharmaceutical Science*; 2011, 01 (07): 162–166
22. Johnson OE, Inyang AC, Etuknwa UI, Ekanem UD, Udo UO, Ubom I, Tommy DP, Ichah ME, Okeke OJ. And Ntukidem UB Awareness, Ownership and Utilization of Insecticide Treated Nets among

- Households in a Rural Community in Southern Nigeria. *Scholars Journal of Applied Medical Sciences*, 2015; 3(2A):608–613
23. Obol J. H., Ononge S. and Orach C. G. utilization of insecticide treated nets among pregnant women in Gulu: a post conflict district in northern Uganda. *African health science*; 2013,13(4):962–969
24. Akaba G. O., Otubu J., Agida E. T. and Onafowokan O. Knowledge and utilization of malaria preventive measures among pregnant women at a tertiary hospital in Nigeria's Federal capital territory. *Niger J Clin Pract*; 2013,16(2):201–206
25. Omokanye L. O., Saidu R., Olatinwo A. W. O., Jimoh A. G. A., Salaudeen A. G., Balogun O. R., Ijaiya M. A. and Penti A. A. the determinants of utilization of insecticide treated nets among pregnant women attending antenatal clinic at university of Ilorin teaching hospital, Ilorine, Nigeria. *International Journal Biological and medical research*; 2012, 3(4):2538–2541
26. Onoriode E., Samson B. D., Omokhudu I., Elijah A. B. and Ernest N. Determinants of use of insecticide-treated nets among pregnant women in Nigeria. *International Journal of women's health*; 2015,7:655–661
27. Animut A., Gebre-Michael T., Medhin G., Balkew M., Bashaye S., Seyoum A. Assessment of Distribution, Knowledge and Utilization of Insecticide Treated Nets in Selected Malaria Prone Areas of Ethiopia. *Ethiopian Journal of Health Development*; 2008, 22(3):268–274
28. Felema B. Assessment of insecticide treated nets among children under five years of age and pregnant women of Adama woreda, Oromia regional state, Ethiopia, Addis Ababa University, 2007 <http://etd.aadu.et/dspace/handle/123456789>
29. Ukibe S. N., Ikeako L. C., Mbanugo J. I., Obiokano A. C. and Ukibe N. R. knowledge, attitude and practices of pregnant women concerning the use of insecticide treated nets in Anabra state, South-East Nigeria. *Journal of applied medical science*; 2014, 3(1):15–22