Journal of Women Health Care and Gynecology
2025 Volume 5, Issue 3
DOI: 10.59657/2993-0871.brs.25.085

BioRes Scientia
Value your Research

Research Article

Open Access

Insectside Treated Nets Utilization and Associated Factors Among Households in Harbu Town, South Wollo Zone, Northeast Ethiopia, 2024

Abdulaziz Assefa[1]*, Yasin Yimer[2], Mulugeta Animaw [1], Getu Misganaw[3]

[1]*Department of Midwifery, College of Medicine and Health Sciences, Wolkite University, Wolkite, Ethiopia.*
[2]*Department of Public Health, Kombolcha 03 Health Center, Kombolcha, Ethiopia.*
[3]*Department of Midwifery, Haik Primary Hospital, Dessie, Ethiopia.*
**Corresponding author: Abdulaziz Assefa.*

Abstract

Background: Utilizing insecticide-treated nets (ITNs) is a tried-and-true method of reducing the spread of malaria, a disease that threatens the lives of millions of people worldwide. However, in the Harbu Town, there is a unique challenge of ITN utilization in order to achieve sustained impact in lowering the incidence of malaria and enhancing health outcomes. There for the aim of this study is to asses' utilization of ITN and its predictors.

Objective: To assess the utilization of ITN and associated factors among households in Harbu Town, South Wollo, Northeast Ethiopia, 2024.

Methods: A community-based cross-sectional study was conducted to determine ITN utilization and associated factors among households in Harbu Town, South Wollo, Northeast Ethiopia, from July 20 to August 30, 2024. The Data was collected using a structured, pre tested questionnaire through face-to-face interview, and cleaned, edited and entered in Epi data version 4.6 and analyzed by SPSS version 26. Odds ratio and statistical analysis used to summarize relationship of ITN utilization and variables.

Result: A total of 610 households were interviewed with a response rate of 97.4% and the prevalence of of ITN utilization was 59%, (95% CI: 54.0, 62.3)19%. This study showed that; Sex [AOR= 2.48(95% CI: 1.22,5.05)], household educational level [AOR= 1.47(95% CI: 1.13, 17.11)], number of beds [AOR= 2.81(95% CI: 1.50, 5.25)], households family sizes [AOR=1.89(95% CI: 1.02, 3.50)], and income level [AOR= 1.47(95% CI: 1.13, 17.11)], were significantly associated with ITN utilization.

Conclusion and recommendations: This study revealed that ITN utilization among households in Harbu town was low. Sex, educational level, number of beds, family sizes and income level were significantly associated with ITNs utilization. This suggests that health care professionals are recommended in the district need to provide information, education and communication (IEC), and behavioural change communication (BCC) to community on importance ITN utilization.

Keywords: utilizing insecticide-treated nets; malaria infection; prevention; Ethiopia

Introduction: Background

Malaria is a major public health problem in Ethiopia. It is a life threatening a parasitic disease spread to humans by female anopheles' mosquitoes and mostly found in tropical countries. It is preventable and curable. Globally in the year 2015, an estimated 214 million cases of malaria and 438,000 malaria deaths were enumerated" [1]. The distribution and use of ITNs is one of the main interventions for malaria infection prevention in developing countries [2]. The use of insecticide-treated nets (ITNs), indoor residual spraying, and case management are cost-effective interventions of malaria [1]. The use of insecticide-treated bed nets (ITNs) is one of the key strategies for preventing malaria transmission. Hence, policies of promoting universal access to ITNs are developed in most malaria endemic states [1-2]. ITNs are new to many people and there are many people who are vulnerable to malaria who are too poor to afford one. The government also cannot afford to give free nets to all. Hence, a subsidized ITN market needs to be established well, since subsidized sales of ITNs can effectively introduce the component of sustainability and self-reliance in prevention of malaria. Despite the availability of ITNs, their utilization remains low in many parts of the country, including Harbu Woreda. Factors that could be associated with ITNs underutilization may include lack of knowledge or understanding of the importance of ITNs, socio-cultural beliefs, limited access to ITNs, cost, and challenges in distribution and monitoring programs. It is important to understand these factors to develop effective strategies to promote the uptake and correct

usage of ITNs as an essential intervention for malaria prevention and control.

Statement of the problem

Malaria remains one of the world's most significant health and development problems. According to the reports of WHO, "nearly 3.3 billion people in 97 countries are potentially at risk of malaria [3]. Globally, there were an estimated 247 million malaria cases in 2021 in 84 malaria endemic countries (including the territory of French Guiana), an increase from 245 million in 2020, with most of this increase coming from countries in the WHO African Region [4]. In 2015, the baseline year of the Global technical strategy for malaria 2016–2030 (GTS), there were an estimated 230 million malaria cases [1]. The African Region shoulders the heaviest malaria burden with an estimated 234 million cases and 593 000 deaths in 2021, the WHO African Region continues to be hardest hit by the disease (95% of cases and 96% of deaths globally) [5]. An estimated number of 300-500 million malaria cases and more than one million deaths that are directly attributable to malaria worldwide occur every year. More than 90% of the clinical cases and deaths occur in Africa south of the Sahara Desert. Of those Africans who die from malaria each year of those Africans who die from malaria each year, most are children under five years of age. Pregnant women are also more susceptible than non-pregnant women due to altered level of immunity. The disease is estimated to be responsible for an estimated average annual reduction of 1.3% in economic growth for those countries with the highest burden [4].

In Ethiopia, malaria is a leading public health problem where approximately 68% of the population lives in malarious areas and three fourth of the total land mass is regarded as malarious [2]. In 2021, global distribution of ITNs remained strong overall. However, eight countries – Benin, Eritrea, Indonesia, Nigeria, Solomon Islands, Thailand, Uganda and Vanuatu – distributed less than 60% of their ITNs; while seven countries – Botswana, Central African Republic, Chad, Haiti, India, Pakistan and Sierra Leone – did not distribute any of the planned ITNs. India, Nigeria and Uganda, supported by the High Burden High Impact (HBHI) approach, distributed 0%, 53% and 26%, respectively, of the ITNs planned for distribution in 2021 [5]. By 2021, 68% of households in sub-Saharan Africa had at least one ITN, an increase from about 5% in 2000. The percentage of households owning at least one ITN for every two people increased from 1% in 2000 to 38% in 2021. In the same period, the percentage of the population with access to an ITN within their household increased from 3% to 54%. The percentage of the population sleeping under an ITN also increased considerably between 2000 and 2021, for the whole population (from 2% to 47%), for children aged under 5 years (from 3% to 53%) and for pregnant women (from 3% to 53%). Overall, access to and use of ITNs remains below the levels observed in 2017 [6].

The proportion of the population slept under ITNs in 2015 in Sub-Saharan Africa was estimated to be 55%. Recently, Ethiopia is working for the effectiveness of ITNs for prevention of malaria transmission, scaling up distribution and utilization of ITNs [4, 7]. ITN utilization vary from place to place in Ethiopia, which was 21.5% in Eastern Ethiopia, 66.6% to 68.8% in southern Ethiopia, 73% Arbaminch, Southern Ethiopia [2, 3, 8]. Factors that could be associated with ITNs underutilization may include lack of knowledge or understanding of the importance of ITNs, socio-cultural beliefs, limited access to ITNs, cost, and challenges in distribution and monitoring programs. It is important to understand these factors to develop effective strategies to promote the uptake and correct usage of ITNs as an essential intervention for malaria prevention and control [9]. Ethiopia's national policy of malaria prevention aims to provide one ITNs for every sleeping space (approximately one net per 1.8 persons in malaria-endemic areas of <2,000 m altitude). Recent researches indicated that the proper utilization of ITNs among high-risk groups were found to be very low, and it also revealed that increase in ITNs access does not necessarily indicate equal increase in ITN utilization. The Ethiopia National Malaria Strategic Plan recognizes that the use of ITNs is a key strategy to roll back malaria and free distribution of ITNs in every 3 years to all peoples living in endemic, high, and moderate malaria risk areas of Ethiopia [10].

Measuring the willingness and ability of the consumers to pay for a certain medical service or item has become important because of the interest among governments and NGOs in increasing their reliance on user fees to finance health service delivery. Much of the interest is based on a practical need for more revenue as traditional (budgetary) sources of finance are failing to keep pace with rising costs and utilization. On the other side, several African governments are adopting user fees and promoting

self-financing health care to help restore efficiency and equity to national health systems. User fees in public health facilities help to promote equity because the demand for health care rises disproportionately with income. People who are well off are more able and willing to pay for costly services, so charging wealthier people for service they demand and can afford and pooling those revenues subsidize those least able to afford care is a way to improve health care delivery to the poor.

The problem addressed in the proposal of ITNs (Insecticide-Treated Nets) utilization and associated factors is the high prevalence of malaria and its deadly consequences, particularly in sub-Saharan Africa where it remains a major public health challenge. Despite the widespread distribution of ITNs, there is still a low utilization rate and a lack of understanding of factors influencing its uptake. As far as the works of literature search are concerned, there is no study's particularly in the study area regard of ITNs (Insecticide-Treated Nets) utilization and associated factors. Therefore, this study aims to assess the ITN utilization and associated factors influencing its uptake, factor in Harbu Town, South Wollo, Northeast Ethiopia, 2024.

General objective

To assess the magnitude of ITN utilization and associated factors among households in Harbu Town, South Wollo, Northeast Ethiopia, 2024.

Specific objectives

1. To determine the magnitude of ITN utilization among households in Harbu Town, South Wollo, Northeast Ethiopia, 2024.
2. To identify factors associated with ITN utilization among households in Harbu Town, South Wollo, Northeast Ethiopia, 2024.

Methods and Materials

Study area and period

This study was conducted in Harbu Town, Kallu Woreda, Amhara Regional State, and North East Ethiopia. It is one of the districts in south Wollo zone, which is geographically located at a distance of 603 k/m from Regional Town (Bahr Dar) and 360 k/m from Addis Ababa, the capital city of Ethiopia. It has latitude and longitude 10.9253^0 N 39.7850^0 E and an elevation of 1487.11meter above sea level.

Harbu Town has three kebeles, lowest administrative level in Ethiopia. Based on Harbu Town population statics report of 2016 EC. the Town has a total population of 65293, out of this, 32838 were males and 32455 were females.

Pertaining to health facility, Harbu Town has private and governmental health facilities. According to information given from Harbu town health department, there are 1health center owned by government, and 12 private clinics those are 4 primary clinic and 8 medium clinic and 10 private pharmacies. This study was conducted from July 20 to August 30, 2024.

Study design

A community based cross-sectional study was implemented.

Population

Source Population

All residences of kebeles in Harbu Town was the source population.

Study Population

All person who was simple random selected from study households in Harbu Town.

Study unit

Study unit was randomly selected households with in selected kebeles.

Inclusion criteria

All households with in a selected kebeles in in Harbu Town.

Exclusion criteria

All residence in in Harbu Town with in selected kebeles and within household survey, the houses are not open.

Sample size determination

The sample size for this study will be calculated using one population proportion formula of by considering the following.

P (ITN utilization from previous study is assumptions made were=44.3% [19]

@ (level of significance) =5%

The degree of precision or Z=1.96

Margin of error (W)=5%

Power of study =80%

Hence, $n=\frac{z^2pq}{w^2}$

n= (±1.96)2*0.443*0.557 / (0.05)2, = 379.16~ 379

Therefore, by adding 10% of non-response rate, the total sample size is 379+38=417, then we multiply it by 1.5 (design effect) because our sampling method is

multi-stage sampling method.417 * 1.5= 626 households.

Sampling procedure

From in Harbu Town, there are three kebeles was involved in this study. List of households with in respective Kebeles was taken from each Kebele administration bureau. The sample size proportional to number of households (ni) was calculated by stratified random sampling formula. In addition, was inserted to computer program Microsoft excel to select final participant households by computer driven random number technique from in Harbu Town.

Probability proportional to size /PPS (proportional allocation technique)

This is obtained by: ni = Ni ×n/N

Where: ni -is the sample size of the ith stratum (required sample size of households with ITN utilization from ith stratum); Ni -is the house hold size of the ith stratum (number of households with ITN utilization in ith stratum or kebele); n- Is the total sample size (over all sample size of the study?); N- Is the total population size (total number of households in in Harbu Town); ni -is the sample size of the ith stratum (required sample size of households with under-five children from ith stratum); Ni -is the house hold size of the ith stratum (number of households with under-five children in ith stratum or kebele); n- Is the total sample size (over all sample size of the study); N- Is the total population size (total number of households in the town).

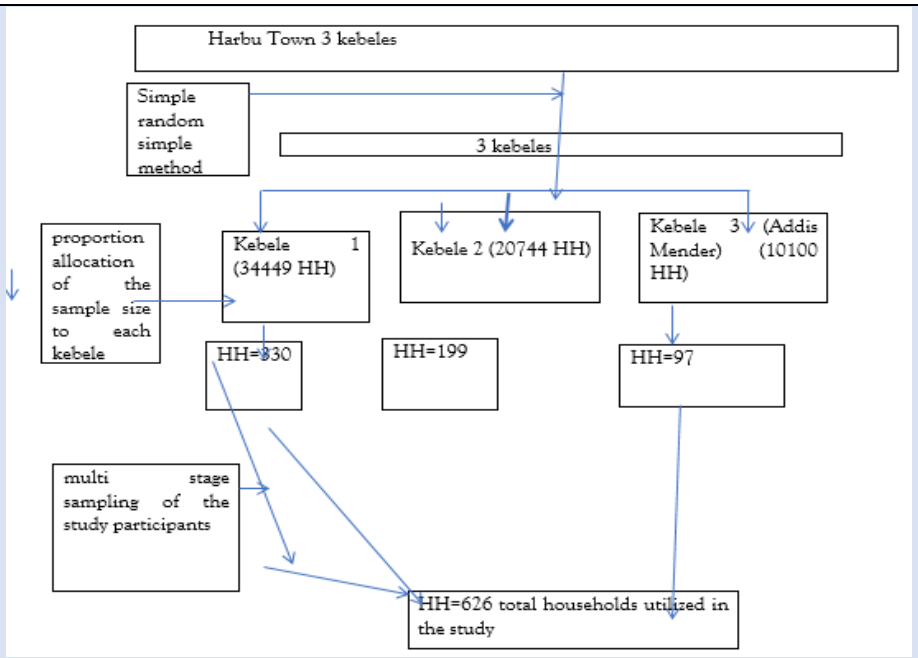

Figure 1: Sampling procedure of ITNs utilization and associated factors among households in Harbu Town, Northeast Ethiopia, 2024.

Data Collection procedures and Instrument

The data was collected using structured pre tested interviewer administered questionnaire through face-to-face data observation collection technique in the selected kebeles. To collect data on ITN utilization in Harbu Town, the following procedure and instruments were used. A structured questionnaire was developed to collect information on ITN ownership, utilization, and barriers to use. Data collectors were visit selected households and administer the questionnaire to the head of the household or another adult member. The data collectors were also visually inspecting the ITNs to check for wear and tear and to confirm their use. The collected data was entered into a database and analyzed using statistical software. Descriptive statistics such as frequencies and percentages were used to summarize the data, while inferential statistics can be used to test for associations between variables. By using this procedure and instruments, it is possible to collect reliable data on ITN utilization in Harbu Town, which can inform the development of interventions and to improve and coverage use of ITNS in the area.

Data quality control

Data cleaning was performed for completeness; consistence and extreme values. The questionnaire was initially prepared by English language. The English version was translated to Amharic local language and retranslated back to English by a language professional in order to ensure internal consistence. The questionnaire was pre-tested 5% (32

HHs) in Kombolcha city 15 day before the actual data collection period before use to ensure its validity and reliability.

Operational definition

ITNs utilization: The extent to which individuals use insecticide-treated bed nets to protect themselves from mosquito bites and prevent malaria infection. And it can be measured based on respondent's self-report. Accordingly, ITN utilization was recorded to be utilized if 1 or more members of household slept under ITN the night preceding the study. On the other hand, ITN utilization was labled to be not utilized if 1 or more members of household did not sleep under ITN the night preceding the study [3,11,12].

Frequently utilization of ITNs: if a household uses ITNs in every night [11].

Frequently checking ITNs for holes: if a household checks ITNs for whole at least once a week utilization of ITNs was measured based on six ITNs utilization related questions [3,11,12].

Study variables

Dependent variable: ITNs utilization.

Independent variables

Socio-demographic characteristics (age, role of respondent, gender, education level, occupation, income, marital status). Household factors (Residence, number of household members, number of beds, number of bed nets, presence of children under 5 years' old and pregnant women). Utilization of ITNs (availability, affordability, and distance to distribution points). Information of malaria (causes, transmission, symptoms, prevention methods of malaria).

Data processing and managements

The data collected on the dependent and independent variables was processed and managed using statistical software such as SPSS. The first step in data processing was clean and code the data, ensuring that all variables were correctly entered and coded. Missing data was also be imputed using appropriate methods. Descriptive statistics was used to summarize the data, including measures of central tendency and variability for continuous variables, and frequencies and percentages for categorical variables. Bivariate logical analyses were used to examine the relationships between the independent variables and ITN utilization. Accordingly, the analysis was controlled for the variables including age, residence, educational status, and number of sleeping rooms in the house, number of peoples lived in the house, the roof of the house, and others predictors. Both COR and AOR with the corresponding 95% CI were computed. Finally, the level of significance was declared based on AOR with its 95% CI and p-value ≤ 0.05 [13]. Multivariate analyses such as logistic regression was used to identify the factors that are independently associated with ITN utilization while controlling for potential confounders. The results of these analyses can be presented in tables and graphs to facilitate interpretation and communication of findings. Finally, data management involves ensuring data security, confidentiality, and integrity throughout the research process. This includes protecting participant privacy, maintaining accurate records, and ensuring that data are stored securely and backed up regularly.

Result

Socio-demographic and household of the respondents

In this study, A total of 610 study participants responded to the questionnaire yielding a response rate of 97.4%.

Around 53% of respondents were between the age of 25 and 44 years with a mean age of the participants was 35.13±6.24 years. Half of the participants, 309 (50.7%) were Muslim by religion. Of the participants, 435 (65.6%) had completed higher education and above. The majority of participants, 444 (72.8%) were employed. The average family income of the respondents was 4,260 ±2,748 Ethiopian Birr, ranging from 1,000 to 24,000. More than half of the respondents, 341(55.9%) had family size greater than five. The majority of the households, 536(87.9%) had 2 or less rooms (Table 1). Table 1 Socio demographic and household characteristics of the respondents in Harbu Town, North-east Ethiopia, 2024.

Table 1: Socio demographic and household characteristics of the respondents in Harbu Town, North-east Ethiopia, 2024.

Variables	Frequency (n=610)	Percent (%)
Age group		
≤25	12	2

25-34	323	53
35-44	228	37.3
≥ 45	47	7.7
Religion		
Orthodox	285	46.7
Protestant	13	2.1
Muslim	309	50.7
Catholic	3	0.5
Sex of respondent		
Male	238	39
Female	372	61
Marital status		
Married	597	97.9
Single	5	0.8
Divorced	5	0.8
Windowed	3	0.5
Educational status		
Not read and write	49	8
Read and write	86	14.1
Primary education	130	21.3
Secondary and above	435	65 .6
Employment status		
Employed	444	72.8
Unemployed	166	27.2
Household income		
≤1,500	46	7.5
1,501-3,000	266	43.6
3,001-5000	161	26.4
≥ 5,001	137	22.5
Role of respondent		
Father	167	27.4
Mother	443	72.6
Numbers of beds		
>3	80	13.1
<2	530	86.9
Numbers of rooms		
>2	74	12.1
<2	536	87.6
Family size in household		
<5	341	55.9
>5	269	44.1
Availability of pregnant women in household		
Yes	248	41
No	362	59
Number of under 5 children		
0	177	29
1	234	38.4
2	108	17.7
>3	91	14.9

Insecticide-treated bed net / ITN Utilization

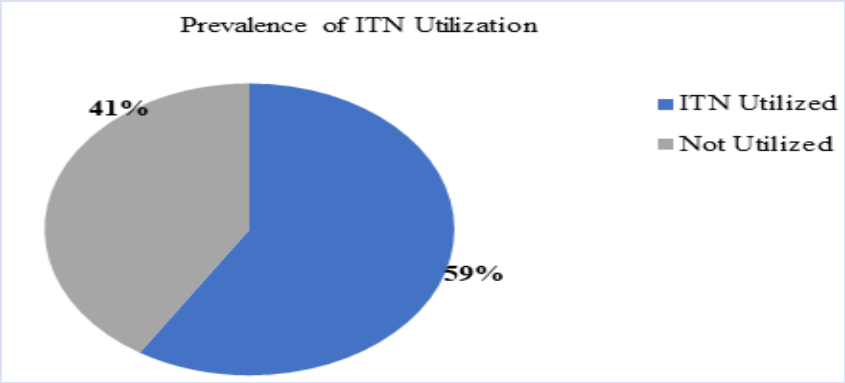

Figure 2: prevalence of ITNs utilization and associated factors among households in Harbu Town, Northeast Ethiopia, 2024. (n=610).

About 360 (59%) (95% CI: 54.0, 62.3) of the households utilized ITN the night before the day the data were collected (figure 2). Ownership and Utilization Insecticide-treated bed net / ITN. The majority of the households', 514 (84.3%) reported that the availability of ITNs in their house, 545 (89.3%) households owned 2-3 ITN and 487(79.8%) of household get their ITN from the source of Government.

Table 2: Ownership and Utilization Insecticide-treated bed net characteristics of the respondents in Harbu Town, North-east Ethiopia, 2024

Variables	Frequency (n=610)	Percent (%)
Know malaria disease		
yes	568	93.1
No	42	6.9
Know that malaria is preventable		
Yes	547	89.7
No	63	10.3
Methods of malaria prevention mentioned by households		
ITN utilization	445	73
Indoor residual spray	41	6.7
Clearing/draining stagnant water	24	3.9
Take anti malaria medication	30	4.9
Environmental management	70	11.5
Had family member caught by malaria in the last one years		
Yes	341	55.9
No	269	44.1
Heared about ITN		
Yes	608	99.7
No	2	0.3
Availability of ITN		
Yes	514	84.3
No	96	15.7
Think that sleeping under ITN have benefit		
Yes	582	95.4
No	28	4.6
Think that sleeping under ITN protects malaria		
Yes	517	84.8
No	93	15.2
Numbers of ITN owned		
1	41	6.7
2-3	545	89.3%
4 and above	24	3.9

Sources of ITN		
Government	487	79.8%
Private/market	70	11.5
NGO	53	8.7
Priority given for malaria prevention at household level for family member		
Under 5 children	161	26.4
Mother and father	46	7.5
Pregnant women	266	43.6
All family	137	22.5
Frequency of ITN utilization		
Always	517	84.8
Sometimes	93	15.2

Reasons for not utilizing ITN

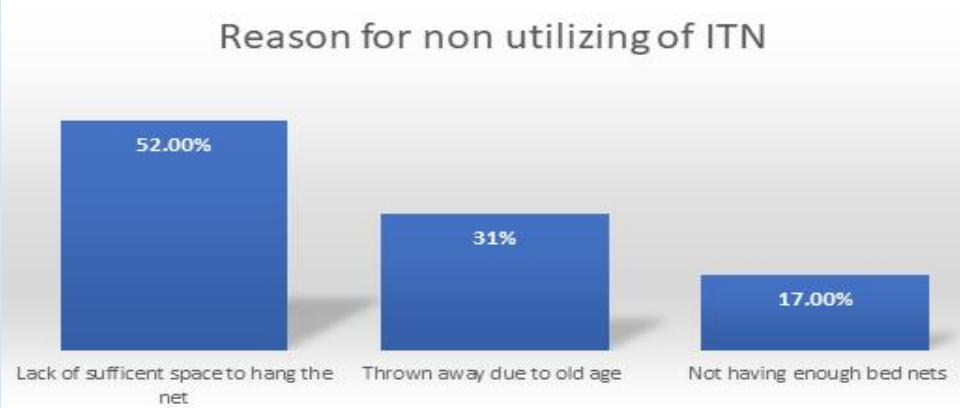

Figure 3: Reasons of not utilized ITNs among households in Harbu Town, Northeast Ethiopia, 2024(n=610). More than half of households, 52% non utilized of ITNs due to the reason of lack of sufficient spaces to hang the nets.

Factors associated with ITNs Utilization

In addition to prevalence, this study aimed to identify the factors associated with ITNs utilization. Explanatory variables were entered to the multivariable binary logistic regression model and analysed by using the entered method. Only five variables (Sex, household educational level, number of beds, and households' family sizes and household income level) were significant variables with ITNs utilization. After adjusting confounding variables, the finding of this study showed that those women in the households were 2.48 times more likely to the odd of utilize ITN than households with men [AOR= 2.48 (95% CI: 1.22, 5.05)]. Moreover, households with higher educational level (secondary and above) were 1.47 times more likely to the odd of utilize ITN than households with lower educational level [AOR= 1.47(95% CI: 1.13,17.11)]. In addition, households' family size was also affecting the outcome variable (ITN utilization). Those households had family size >5 nearly two times more likely to the odd of utilized ITN than those household with family size <5 [AOR= 1.89(95% CI: 1.02, 3.50)]. Furthermore, number of beds of households was also an exposure variable that affected utilization of ITNs. Those households whose number of beds >3 were 2.81 times more likely to the odd of utilized ITN than those those households whose number of beds <2 [AOR= 2.81(95 % CI: 1.50, 5.25)]. Moreover, households with higher family income (≥ 5,001) were 1.47 times more likely to odd of utilize ITN than households with lower family income [AOR= 1.47(95% CI: 1.13,17.11)] (Table 3).

Table 3: Bivariable and multivariable binary logistic regression analysis of ITN utilization and associated factors among households in Harbu town, Northeast Ethiopia, 2024, (N= 610).

	ITN utilization			
Variables	**Yes n (%)**	**No n (%)**	**COR (95% CI)**	**AOR (95% CI)**
Role of respondent				

Father	151(90.4)		1	1
Mother	343(77.4)	100(22.6)	2.75(1.57,4.82)	2.32(0.16,4.66)
Sex of respondent				
Women	200(84)	38(16)	8.89(5.34,14.80)	2.48(1.22,5.05)*
Men	202(74)	70(26)	1	1
Educational status				
Not read and write	20(40.8)	29(59.2)	1	1
Read and write	33(38)	53(62)	2.95(0.49, 17.88)	1.46(0.08, 27.50)
Primary education	55(42.3)	75(57.7)	6.64(1.09, 40.22)	2.47(0.10, 2.00)
Secondary and above	318(73)	117(27)	2.21(1.20, 24.63)	1.47(1.13, 17.11)*
Number of rooms				
>2	27(36.5)	47(63.5)	2.89(1.71, 4.88)	1.12(0.48, 2.63)
<2	89(16.6)	447(83.4)	1	1
Availability of px women				
Yes	124(50)	124(50)	1	1
No	190(52.4)	172(47.6)	5.07(2.10, 12.25)	1.92(0.54, 6.82)
Family size				
>5	255(75)	86(25)	2.69(1.71,4.22)	1.89(1.02, 3.50)*
<5	239(89)	30(11)	1	1
Marital status				
Married	487(81.6)	110(18.4)	1	1
Single	2(40)	3(60)	2.95(0.49, 17.88)	1.46(0.08, 27.50)
Divorced	3(60)	2(40)	6.64(1.09, 40.22)	2.47(0.10, 2.00)
Windowed	1(33.3)	2(66.7)	2.21(0.20, 24.63)	0.47(0.13, 17.11)
Know malaria				
Yes	274(48)	294(52)	1	1
No	21(50)	21(50)	2.24(1.47, 3.41)	1.45(0.84, 2.50)
Number of beds				
<2	245(46)	285(54)	1	1
>3	78(97.5)	2(2.5)	8.15(5.18,12.82)	2.81(1.50, 5.25)*
Availability of ITN				
Yes	83(16)	431(84)	1	1
No	33(34)	63(66)	2.72(1.68, 4.41)	1.52(0.77, 3.01)
Know that malaria is preventable				
Yes	273(49.9)	294(50.1)	15.38(6.36, 37.20)	2.58(0.80, 8.31)
No	23(36.5)	40(63.5)	1	1
Household income				
≤1,500	16(34.7)	20(65.3)	1	1
1,501-3,000	113(42)	153(58)	2.95(0.49, 17.88)	1.46(0.08, 27.50)
3,001-5000	70(43.5)	91(56.5)	6.64(1.09, 40.22)	2.47(0.10, 2.00)
≥ 5,001	99(72)	38(28)	2.21(1.20, 24.63)	1.47(1.13, 17.11)*

*Key 1= reference; Note: * statistically significant at 95% CI, P< 0.05 with ITN utilization, CI= confidence interval; AOR=Adjusted odds ratio, COR= crude odds ratio*

Discussion

The findings of the current study showed the prevalence of ITN utilization and associated factors among households in Harbu town, North-east Ethiopia, 2024. The factors that were significantly associated with ITN utilization were sex, household income level, number of beds, and households' family sizes. In this study, about 360 (59%) (95% CI: 54.0, 62.3) of the households utilized ITN the night before the day the data were collected. This finding of prevalence of ITN utilization is in line with the studies conducted in in Uganda, 56% [20], and Myanmar 52% [21] and Kallu district, SSNP Ethiopia, 2013, 54.3% [7]. The reason for this consistency might be due to similarity in place where more malaria endemic that might enforce the households to utilize ITNs due to fear of malaria infection. On the other hand, this prevalence of ITN utilization was lower than the

studies conducted in Nigeria, in 2018, rural and urban residents utilized ITN (86.1%) and 74.1% respectively [9], in Illu Galan district, Oromia region, 2022 72.2% [12] and in Amhara region, Ethiopia, where the prevalence of ITN utilization was 76.6% [15]. The possible explanation for this discrepancy in prevalence of ITN utilization may be due to the socio demographic characteristics, sample size and study setting differences and lack of adequate ITN per the number of household member. However, the prevalence of ITN utilization in this study was higher than others studies conducted in the Arbaminch, Ethiopia,2022, the proportion of pregnant women and children under five years who slept under ITNs the night preceding the study was 35% and 40.3% [1], world malaria report in sub-Saharan Africa, 2022, 47% [6], Kallu district, SSNP, Ethiopia,2007, 5.8% [7], survey in sub-Saharan Africa, 2023, 2.3% in 2008 and 12.8% in 2018 [10] and in Oromia region, Ethiopia, where the prevalence of ITN utilization was 34.9% [15].

The possible explanation for this discrepancy might be due to the sociodemographic differences, sample size differences, different methodological approaches, lack of adequate ITN per the number of household member, life span of ITNs vary widely between individual nets used within a single household or community, lack of free distribution, lack of free and continuous distribution through ANC and EPI programs are also other reasons for the discrepancy of the finding. In the current research, after adjusting confounding variables, the finding of this study showed that those women headed households were 2.48 times more likely to the odd of utilize ITN than households with men headed households [AOR= 2.48 (95% CI: 1.22, 5.05)]. This might be the reason that being women were more experienced in health seeking behaviours, especially in her ANC and PNC follow up and acquire more informations about importance and purposes of usage of ITNs and malaria causes, prevention methods and its impact. This finding was inconsistent with a study performed in Arbaminch, Ethiopia [15], and in Illu Galan district, oromia region, 2022 [12] that found that men were more likely to utilize ITNs than women. This might be the reason that sociocultural background in which men are given prioritized over women in Ethiopia. Moreover, the above studies were conducted in rural areas where men were more educated than women that leads men to have more awareness about ITN utilization. This inconsistency might be the reason in difference in study setting and sociocultural background of the community. Moreover, households with higher educational level (secondary and above) were 1.47 times more likely to odd of utilize ITN than households with lower educational level [AOR= 1.47(95% CI: 1.13,17.11)]. This finding was congruent with a study performed in Arbaminch, Ethiopia, 2022 [1], Kallu district, SSNP, Ethiopia,2007 [7], in sub-Saharan Africa [8], survey in sub-Saharan Africa, 2023, in 2008 and 2018 [10] and in East Belessa District, Northwest, Ethiopia, 2022 [11], that found that those households which have higher households educational level were more likely to the odd of utilized ITN than those households whose have lower households educational level. This might be the reason that those households which have higher households Education level is also an important factor in ITN utilization. Studies have shown that households with higher levels of education are more likely to own and use ITNs than those with lower levels of education. Education can increase knowledge about malaria and its prevention, as well as improve socio-economic status, which can increase access to ITNs. Therefore, interventions that focus on increasing education levels may also contribute to increase ITN utilization all economic quintiles reported an increasing trend in the utilization of ITNs among pregnant women. For example, in the poorest quintile, ITN usage was 1.0% (95% CI: 0.1, 6.6) in 2003, and increased to 2.3% (95% CI: 1.4, 3.7) in 2008. In the following study years, 2013 and 2018, ITN utilization increased to 12.8% (95% CI) and 67.8% [10]. In addition, households' family size was also affecting the outcome variable (ITN utilization). Those households had family size >5 nearly two times more likely the odd of utilized ITN than those household with family size <5 [AOR= 1.89(95% CI: 1.02, 3.50)]. This finding was congruent with a study performed in East Belessa District, Northwest, Ethiopia, 2022 [11], that found that large households family size were more likely the odd of utilized ITN than those household with lower family size. This might be the reason that large households' family size was more frequently invited to child health visits and more experienced in health seeking behaviours, when they received professional support from the prenatal midwife, nurse team, and child health nurse and can easily access more informations about importance and purposes of usage of ITNs and malaria causes, prevention methods and its impact. In addition to this, it might be as

household family size increases the frustration of being caught by malaria increases and make households to utilized ITNs.

Furthermore, number of beds of households was also an exposure variable that affected utilization of ITNs. Those households whose bed number >3 were 2.81 times more likely to odd of utilized ITN than those households whose bed number <2 [AOR= 2.81(95 % CI: 1.50, 5.25)]. Having 3 or more beds was positively associated with ITN utilization in this study. This finding was congruent with a study performed in sub-Saharan Africa [8], and in Illu Galan district, oromia region, 2022 [12], that found that those households whose bed number >3 were more likely to the odd of utilized than those households whose bed number <2 . This might be the reason that those households whose bed number >3 were facing a challenge in shortage of enough ITNs in households which make them bother to utilize ITNs. In addition, households with higher family income (≥ 5,001) were 1.47 times more likely to odd of utilize ITN than households with lower family income [AOR= 1.47(95% CI: 1.13,17.11)]. This finding was congruent with a study performed in Arbaminch, Ethiopia, 2022 [1], in Nigeria, in 2018 [9], survey in sub-Saharan Africa, 2023, in 2008 and 2018 [10], in East Belessa District, Northwest, Ethiopia, 2022 [11] and in Illu Galan district, oromia region, 2022 [12], that found that those households which have higher households family income were more likely to the odd of utilized ITN than those households whose have lower households family income. This might be the reason that those households which have higher households' family income can afford ITNs and utilized it. Moreover, Economic status is also an important factor in ITN utilization. Studies have shown that households with higher socio-economic status are more likely to own and use ITNs than those with lower socio-economic status. This is because households with higher socio-economic status have better access to health care services, including ITN distribution programs. Additionally, households with higher socio-economic status have more resources to purchase ITNs if they are not distributed free.

Strength and Limitation of Study

This study was a community-based survey designed to explore different exposures that can predict the ITN utilization by focusing on household members who cannot visit health institutions for different reasons. Despite this strength, the study has some limitations. This study may be susceptible to social desirability bias. Assessment of ITN utilization was based on self-report measures, and may have a possibility of social desirability bias. Another limitation of this study is that just one family member was questioned if all household members slept under a net or not the previous night. This might result in respondent bias.

Conclusion

Based on the present study, ITN utilization among households in Harbu town was low. Sex, educational level, number of beds, households' family sizes and household income level were significantly associated with ITNs utilization.

Recommendation

Based on the findings of this study, the following recommendations were forwarded to the Harbu town health department, health professionals, different NGOs and researchers working in health and other sectors. The Harbu town administration also recommended to offer basic health facilities that are needed to provide and make ensure for free access of ITNs for households and their family members. Additionally, it is recommended to provide further health education on the significance of ITN utilization.by using different mass media. NGOS in collaboration with other sectors are better to provide further attention to the utilization of ITNs and support better to offer to households and provide training for health care providers regarding to incorporate their service with information related ITN utilization. Health care professionals are recommended in the district need to provide information, education and communication (IEC), and behavioral change communication (BCC) to the community on the importance ITN utilization. The significant predictors better to considered especially households who are illiterate or lower educational level, economic problems, larger family size, and provide them education in order to enhance ITN utilization. It is recommended that researchers conduct further research by using different designs (longitudinal, mixed study).

Abbreviations

CSA: Central Statistical Agency, DHMT: District Health Management Team, EPI: Expand Program Immunization, HP: Health Post, ITNs: Insecticide-Treated Nets, MOH: Ministry of Health, NGOs: Non-governmental Organizations, SPSS: Statistical

Package for the Social Science, WHO: World Health Organization

Declarations

Ethical approval and consent to participant

Ethical clearance was obtained from Ethical review committee of School of Public health Alkan health science, business and technology collage. Formal letter has been written for Harbu town office. The letter was written for each of respective kebeles from Woreda Health bureau and informed before going for data collection. Households of study kebeles was told about the objectives and aims of the study in detail. Participants was informed that their participation is purely voluntary and assured of the confidentiality of all information. This was to ensure that individuals were not identified by their names. Individuals was aware that they could change their mind from participating in the study and could leave freely without any harm.

Availability of data and material

All related data has been presented within the manuscript. The data set supporting the conclusions of this article is available from the authors on request.

Consent for publication

Not applicable

Competing interests

The authors declare that no one has competing interests.

Author contribution

AA conceived the study and undertook the statistical analysis. AA and YY supervised the study design and statistical analysis. AA, MA, and GM contributed to the writing of the manuscript and all authors read and approved the submitted version of the manuscript.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Acknowledgment

The authors thank Alkan Health Science Business and Technology College, for approval of ethical clearance, and technical and financial support of this study. Then, we would like to thank all study participants who participated in this study for their commitment to responding to our interviews and observations. Lastly, we are indebted to each department's health offices for their assistance and permission to undertake the research.

Reference

1. Ayalew Astatkie, Amsalu Feleke. Utilization of insecticide treated nets in Arbaminch Town and the malarious villages of Arbaminch Zuria District, Southern Ethiopia.
2. Jemaneh Nadew, Mohammed Suleiman Obsa, Akalewold Alemayehu. (2022). Utilization of insecticide treated nets among pregnant women in kallu woreda Northeast Ethiopia.
3. (2018). Insecticide-Treated Nets Utilization and Associated Factors among under-5 Years Old Children in Mirab-Abaya District, Gamo-Gofa Zone, Ethiopia.
4. (2023). Utilization of insecticide treated nets among pregnant women in Arbaminch Zuria woreda SSNP, Southern Ethiopia.
5. Tedros Adhanom Ghebreyesus. World Malaria Report 2022.
6. World Malaria Report 2022 Briefing kit.
7. frehiwot MD. Willingness'to pay for, ITS utilaztion and influencing factors in Kallu district SNNP, Ethiopia.
8. Factors associated with ownership and utilization of insecticide treated nets among children under five years in sub-Saharan Africa.
9. (2018). Rural–urban variation in insecticide-treated net utilization among pregnant women. *Nigeria Demographic and Health.*
10. Socio-demographic and economic inequity in the use of insecticide-treated bed nets during pregnancy: a survey-based case study of four sub-Saharan African countries with a high burden of malaria 2023.
11. Amlaku Nigusie Yirsaw, Resom Berhe Gebremariam, Wallelign Alemnew Getnet & Muhabaw Shumye Mihret. (2022). Insecticide-treated net utilization and associated factors among pregnant women and under-five children in East Belessa District, Northwest Ethiopia: using the Health Belief model.
12. Mulugeta Mekuria, Dereje Negasa, Bengede, Jirenga Derega, Elias Teferi, Bikila Tesfa ans Berhanu Senbeta Deriba. (2018). Insecticide-Treated Bed Nets Utilization and Associated Factors among Household in Ilu Galan District, Oromia Region, Ethiopia.

13. World malaria report 2021 - World Health Organization (WHO).
14. Ousmane Oumou Diallo, Ifeoma D. Ozodiegwu, Alioune Camara, Beatriz Galatas & Jaline Garadin. factors associated with in ownership and use of Insecticide-treated net utilization in Guinea: an analysis of the 2018 Demographic and Health Survey.
15. Wakgari Deressa, Gash Fentie, Shoa Girma & Richard Rithinger. Ownership and use of utilized insectcidial treatned bed nets in Oromia and Amhara Regional states of Ethiopia 2 years after a nationwide campaign.
16. Clifford Affoakwah, Jacob Nunoo and Francic Kwaw Andoh. (2015). Effect of Insectcide-treated bed net usage on under five mortality in northern Ghana.
17. A systematic review conducted in sub-Saharan Africa on knowledge, Attitude and Practice about ITNs of malaria prevention, 2011.
18. Knowledge, Attitude and Practice towards Malaria Prevention among School Children aged 5 -14 years in Sub-Saharan Africa - A review of Literature Marie Louise Umwangange, Geldine Chironda, Madeleine Mukeshim.
19. Utilization of insecticide treated bed nets (ITNs) ownership, usage and malaria transimision in the highland of western Kenya, 2011.
20. Nankinga Z, Muliira JK, Kalyango J, et al. (2012). Factors associated with utilization insecticidal treated bed nets in children seeking health care at a Uganda Hospital: perspective of child care giver. *J Community health*, 37:1006-1014.
21. Berie Y, Alemu K, Belay A, Gizaw Z. (2013). Factors affecting utilization of insecticidal treated bed nets among people living with HIV/AIDs in Bahir Dar city, Northwest Ethiopia. *Sci J Clin Med*, 2:147-152.

Cite this article: Assefa A, Yimer Y, Animaw M, Misganaw G. (2025). Insectside Treated Nets Utilization and Associated Factors Among Households in Harbu Town, South Wollo Zone, Northeast Ethiopia, 2024. *Journal of Women Health Care and Gynecology*, BioRes Scientia Publishers. 5(3):1-13. DOI: 10.59657/2993-0871.brs.25.085

Article History: **Received:** January 28, 2025 | **Accepted:** February 15, 2025 | **Published:** February 22, 2025