HAWASSA UNIVERSITY COLLEGE OF MEDICEN AND HEALTH SCIENCE DEPARTMENT OF ENVIRONMENTAL HEALTH

UTILIZATION OF LONG-LASTING INSECTICIDE TREATED-NETS AND ASSOCIATED FACTORS AMONG MODEL AND NON-MODEL HOUSE HOLDES OF MALARIOUS KEBELES IN WONDO GENET DISTRICT, SIDAMA REGION, ETHIOPIA

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MAY, 2024

HAWASSA, ETHIOPIA

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We, the undersigned, members of the Board of Examiners of the final open defense by Ageze Buta have read and evaluated his thesis entitled "Utilization of Long-Lasting insecticide treated nets and associated factors among model and non-model households in Wondo Genet District ,Sidama Region, Ethiopia 2024", and examined the candidate, this is therefore, to certify that the thesis has been accepted in partial fulfilment for the masters degree

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DECLARATION

I declare that this Masters public health in Environmental Health research is my original work and has not been presented for a degree in other University and all sources of materials used for this research have been duly acknowledged.

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This Masters of public health in Environmental Health has been submitted for evaluation with my approval as research advisors

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ACRONOMYS AND ABBREVIATIONS

AOR	Adjusted Odd Ratio
CDC	Center of Disease Control and prevention
COR	Crude Odd Ratio
CI	Confidence Interval
EPHI	Ethiopia Public Health Institute
FMOH	Federal Ministry of Health
HHs	House Holds
HEWs	Health Extension Workers
IRB	Institutional Review Board
IRS	Indoor Residual Spraying
ITNs	Insecticide-Treated Bed Nets
LLINs	Long-Lasting Insecticide-Treated Nets
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

ABSTRUCT

Background: Long-lasting insecticidal-treated nets have been widely used as an effective measure to prevent malaria.. Despite the long lasting insecticide distribution in the district, malaria morbidity increased in the study area.

Objectives: To assess the utilization of Long-Lasting Insecticide-Treated nets and its associated factors among model and non-model households in Wondo Genet District, Sidama, Ethiopia

Methods: The community based comparative cross-sectional study was conducted in Wondo Genet District, Sidama Region, Ethiopia, from April 1 to 30, 2024. By a simple random method, 636 households that had at least one long-lasting insecticide-treated bed net were selected. Model and non-model households were taken from the registration books of health post. Data was collected through face-to-face interviews and observation techniques using the KOBO tool. The SPSS was used to analyze the data. Bivariate and multivariable logistic regression analyses were used to identify associated factors with the utilization of long lasting insecticide-treated nets. Finally, the result was presented by using the crude odds ratio and the adjusted odds ratio with a 95% confidence interval. In all analyses, variables with a p value less than 0.05 were used to declare a state of significance.

Result: The finding indicated that overall utilization of long-lasting Insecticide Treated Nets was 50.8%(95%CI=46.5-54.5) of which 61.3%(95%CI=55.6-66.8) were from model households and 40.3% (95%CI=34.8-46) from non-model households. Factors significantly associated with the utilization of long lasting insecticides were model householdss (AOR=2.751, 95%CI=1.931-3.918), the presence of under five children (AOR=1.795, 95%CI=1.271-2.535), washing of Long-Lasting Isecticide Treated Netts (AOR=2.378, 95%CI=1.675-3.374**),** health extension workers visit (AOR=1.453, 95%CI=1.020-2.070),positive attitude (AOR=1.745, 95%CI=1.221-2.494), and female (AOR=0.590, 95%CI=0.413-0.843) were significantly associated with utilization of Long-Lasting Insecticide Treated Nets..

Conclussion: Study showed that model Households were more utilize Long-Lasting Insecticide-treated Nets than non-model households. However, overall utilization of Long lasting treated nets were below national malaria elimination targets.The result of this study indicated that, being model households, washing of Long-Lasting Insecticide-Treated Nets, presence of underfive children, health extension workers visit, attitude, and sex were significant associated factors.

Key words: Utilization, Long-Lasting Insectide Treaated Nets, associated factors, comprative cross sectional study.

1. INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Malaria is an acute febrile illness caused by Plasmodium parasites, which are transmitted to people by the bites of infected female *Anopheles* mosquitoes. The parasite agent responsible for human malaria is a member of the *plasmodium* genus and goes by the names *p.falciparium, p.vivax, p.ovale, p.malarie,* and *p.knowlesi* (1). And another malaria vector, *Anopheles stephensi* (2). A female *Anopheles* mosquito bites a person who has malaria and draws blood from them, delivering parasitic *plasmodium*. The parasites are multiplied in the liver discharged into the bloodstream. Then it cause illness by infecting and killing red blood cells in the bloodstream and therefore make person feel sick (3).

Ethiopia introduced three main malaria control strategies, such as indoor residual spraying (IRS), long-lasting insecticidal nets (LLINs), and larval source reduction (LSM), to those malaria endemic areas. Out of these, LLINs are useful instruments for dramatically lowering malaria-related morbidity and mortality. It has three main functions: i) When mosquitoes are in contact with the net, it has a knock-down effect, killing mosquitoes; ii) It has a repellent effect; and, iii) It reduces contact between the person sleeping under the net and mosquitoes by acting as a physical barrier (4) . LLINs have been widely used as an effective alternative to ITNs for over a decade. Evidence showed that LLINs utilization can reduces 56% of risk of malaria transmission. In most countries, ITN has now been replaced by more durable, longer-lasting insecticidal nets (5).

As WHO recommendation, only LLINs, which require no further treatment during their expected life span (of an average of 3–5 years, depending on the use, type, and fabric origin), should be purchased. LLIN's allow for better and effective protection against mosquitoes and other insects. It is considered as part of an overall strategy related to malaria control. It decreases morbidity 50% up to 70% (6). Sleeping under insecticide-treated mosquito nets is one of the most effective ways to reduce mosquito human contact. It is an essential preventive measure that many people at risk of malaria utilize. WHO suggests universal coverage of LLINs interventions in all malaria-endemic settings as part of its Global Malaria Technical Strategy 2016–2030, which aims to reduce the burden of malaria worldwide by 90% by 2030 at the baseline of 2015 (7).

For those at risk of malaria, the WHO recommends an overall ratio of one LLIN for every 1.8 persons in the target population (since many households have an odd number of members, the number of LLINs needed to be adjusted at the population level) (7). The Federal Minister of Health (FMOH) National Malaria Guidelines, Fourth Edition, specify that LLINs should be given to homes in malaria-endemic areas with the aim of universal (100%) LLINs coverage with one LLIN per sleeping space and achieve and maintain levels of LLINs use above 80% by all age and gender groups (4).

According to Ethiopian National Malaria elimination strategy of 2021-2025, country is striving to lower malaria mortality and morbidity by 50% a baseline of 2020. By 2025, 85% of households in malaria-endemic areas should have adopted appropriate behavior and practices toward anti-malarial interventions, and 100% of the population at risk should have received the globally advised vector control interventions (8).

1.2 STATEMENT OF THE PROBLEM

Malaria is one of the most widespread public health issues, almost half of the world's population are at risk (9). As of the recent 2023 data, there were an estimated 249 million malaria cases reported worldwide. Globally, 5 million cases reported between 2021 and 2022, were mainly concentrated across five countries. Out of this, Pakistan experienced the most increase, with 2.1 million more cases, followed by Nigeria and Ethiopia (1.3 million each), Uganda (597 000), and Papua New Guinea (423,000). Most of the cases were concentrated in African countries. Despite developments in the healthcare sector, it remains a serious threat to public health(10).

Since sub-Saharan Africa accounts for the majority of the global malaria burden, the disease remains as serious public health threat (11). Most of the cases globally were found in the WHO African Region. Additionally, number of malaria death in 2022 is higher from 2019. Ethiopia, one of the sub-Saharan African nations, is among the five countries with the greatest number of malaria cases reported worldwide. Incidence of cases increased by 32% (10).

In Ethiopia, malaria was one of the main public health and economic problems. It is a major concern in the country, and it was one of the leading causes of morbidity and mortality (12). In country, 75% of the landscape areas below 2000m above the sea level are affected by malaria case and around 68% of the population is at risk of the disease (13).

With the Ethiopian Public Health Institute (EPHI) report, the current malaria situation in Ethiopia is considered to be series problem. Within a month, there is a 25% rise in the number of cases of malaria. As of October 29, 2023, 901 woreda’s excluding of Amhara region woredas, reporting having at least one confirmed case of malaria. Because of security concerns, a significant percentage of cases more than 50% come from Oromia, with a Western region (14). In order to achieve universal coverage (one LLIN for every two people in high-risk areas), FMoH has distributed about 73.6 million ITN/LLINs between 2006 and 2016 (15).

As Sidama Regional malaria trend report in 2023, 151,061 malaria case is reported. In the Region, according to national guideline, the replacement of net is done every 3 years or one net expects to be functional for 3 consecutive years. Coverage of LLINs from endemic areas is 96% (16). A report from the health office of Wondo Genet District states that, 3346 cases of malaria were registered in 2022. However, 8049 cases of malaria were reported in 2023 more than twice

as many as in 2022. Every three years, the District distributes LLINs and conducts an IRS spray, particularly in response to a large number of recorded cases of malaria in Kebeles (17).

Currently Ethiopia is on Malaria elimination strategies by using vector control intervention methods like: -Maintaining universal coverage of ITNs among at risk populations, using IRS in selected districts, and Implementing environmental management and larviciding (8)**.** Study conducted in Addis Ababa, Bole sub city showed, prevention of malaria by using of ITN among model HHs is 66%, and non-model HHs is 54% (29). Different studies show that utilization of LLINs is low. According to different literatures, feeling uncomfortable of sleeping under LLINs, forgetfulness, LLINs having torn are contributing factors for low or poor LLINs utilization (20), (36), (37).

Despite the LLINs distribution, still number of people experience malaria disease increased in the study area. To the best of our knowledge, the status of LLINs utilization and the factors associated with the utilization, especially, among model and non-model households in Wondo Genet District is understudied. Therefore, this study aimed at assessing and comparing status of LLINs utilization and its associated factors among model and non-model HHs in Wondo Genet District, Sidama, Ethiopia.

1.3 SIGNIFICANCE OF THE STUDY

Distribution of LLINs and its utilization were main strategies to prevent and control malaria. Hence, the aim of this study was to assess and compare the status of utilization of LLINs among model and non-model HHs and identify the factors that affect the utilization of LLINs in malarious Kebeles of Wondo genet District. The result of this study helps to identify gaps in LLINs utilization status and to design appropriate interventions towards improving its utilization among HHs. It could be help as base line information for woreda's health office to develop strategies of LLINs utilization and for other researchers.

2. LITRATURE REVIEW

2.1 UTILIZATION OF LLIN

According to study conducted in Bangladesh among 2640 HHs, 77.9% HHs had slept under LLINs the previous night (18). The study in Nepal shows, among 450 HHs, the proportion of use of long-lasting insecticidal net was 60% (19). Study conducted in Ghana among 9,977 HHs, 65.6% utilize with at least one LLIN before the night of survey (21). In Uganda out of 2170 children age 2-10 Only 64.7% of children were reported to have slept under a LLIN the previous night (22). According to study conducted in Cameron among 418 HHs, 24.9% of respondents slept under LLINs the previous night (20). Similarly, study conducted in In Benin among 806 HHs indicated that, 291 (36.1%) HHs slept under an ITN before night of data collection (23).

Community based cross sectional study was conducted in Ilu Galan Oromia among 532 selected HHs, about 72.2%, of the respondents utilized insecticide-treated nets in the night preceding the data collection (24). like wise Study conducted in Mirab Abaya, South Ethiopia among 540 HHs, 85.1% had used LLIN during the night before the survey (27). Study conducted at Limu Seka District among 830 HHs, 68.3% had slept under the net night before the survey (28).. Study conducted in Arsi Districts among 1250 HHs 27.1% of them had slept under the net the night before the survey (25). Similarly, study conducted in Zuway Dugda, Arsi Zone among 821 HHs only 18% had used the night before the data collection day (26). Systematic-review and meta analysis study conducted in Ethiopia with 7,161 participants showed, prevalence of ITN utilization among all pregnant women who had access to ITN in Ethiopia was 59.42% (31).

2.2 FACTORS ASSOCIATED WITH UTILIZATION OF LLINs

2.2.1 Socio-demographic factors

Study conducted in Guinea among 2694 HHs, being female 1.92 times, being younger age 0.38 times influences the utilization of LLINs (32). According to study conducted in Somalia among 1283 study participants, increase of age group affects the utilization of LLINs, HHs age 36 to 45 years old, and 46 years old or older had 55.0%, and 63.4% lower odds of mosquito net use, respectively (33). Galan Oromia, being female, age less than 25 years, monthly income who earned lower income, were significantly associated with ITN utilization (24). HHs with under five in Kenya, having very older age was 0.14 times less likely to ensure that children slept under an ITN. HHs with four or less members were 1.36 times more likely to ensure that children below five years of age sleep under an ITN as compared to those HH with more than four members. Regarding the gender, HHs headed by female are 1.26 times more likely to ensure children slept under ITN (34). Institutional based study in North-western Ethiopia among 226 pregnant mothers who had an educational status of college and above were 2.8 times more likely utilize ITN than mothers who could not read and write. Mothers whose age was >30 were 70% times less likely utilized ITN bed net than mothers whose age was less than 30 (35).

2.2.2 LLINs related and other factors

In a study conducted in Rwanda, among 384 study participants, heat 56 (94.9%), feeling uncomfortable sleeping under LLINs 20 (33.9%), skin itch 42 (71.2%), and reduced ventilation 45 (76.3%) are the factors that affect the utilization of LLINs (36). In Cameron, Heat (21.1%) and forgetfulness (6.5%) were the main reasons that affect utilisation of LLINs (20). Study conducted in Ethiopia on effects of physical integrity of LLINs on its utilization shows that LLINs which has torn on physical condition had higher odds (1.76 times) of not being used compared to those LLINs with no holes. Older LLINs had higher odds of not being used compared to newer nets. LLINs that were never washed were 1.86 times likely not to be utilized compared to those that were ever washed. LLINs owned by household heads that had negative perceptions towards bed net care and repair had lower odds. LLINs owned by households that have more than one LLINs for every two people were highly likely 1.31 times not to be utilized (37). Study conducted in Gurage Zone among households of 591 with under five children shows, odds of ITN utilization for respondents who had 2 ITNs were 2.58 times higher compared to

those who had 3 ITNs. Respondents who didn't report skin irritation related to ITN utilization were 58% less likely to have ITN utilization compared to those who reported skin irritation as a side effect of ITN utilization (38).

2.2.3 Housing conditions and Environmental factors

Study conducted in Galan Oromia showed that having more than 3 beds (24), and in Arsi Districts, HHs having two and above sleeping rooms were less likely to use LLINs (25). Study conducted in East Belessa, Northwest Ethiopia, indicated that, corrugated iron roof of the house, ≥ 2 number of rooms in the house were significant associated factors of LLIN utilization (39). Study conducted in North Gonder among 260 showed that, who have Houses made from cement were 97.7% times less odd of using insecticide-treated bed net than HHs made from mud (40). Presence of suitable mosquito breeding sites, greater number of bed nets in houses and the prioritized groups (children < 5 years and pregnant women) had positive impacts on bed net utilization in HHs (41).

2.2.4 Knowledge, attitude towards LLINs utilization and malaria

Study conducted in Gurage Zone among 591 HHs, with under five children showed that, HHs who had low knowledge about ITN were 2.07 time more likely utilized ITN compared to those who had good knowledge about ITNs (38). In Mirab Abaya, Southern Ethiopia, among respondents, knowledge that LLIN prevents malaria is predictors of LLIN utilization (27). HH heads that had negative perception towards bed net care and repair had higher odds of not being utilize the LLINs compared to those with positive perceptions towards LLNs (37). Study conducted in Army troops, Ethiopia showed that, those who have positive attitude towards ITN utilization had more utlize than those who had negative attitude towards ITN utilization (42).

2.3 CONCEPTUAL FRAME WORK

This is conceptual frame work,selected and taken from different literatures regarding LLINs utilization and associated factors among HHs and it showed the relationship between independent and dependent variables in the study.

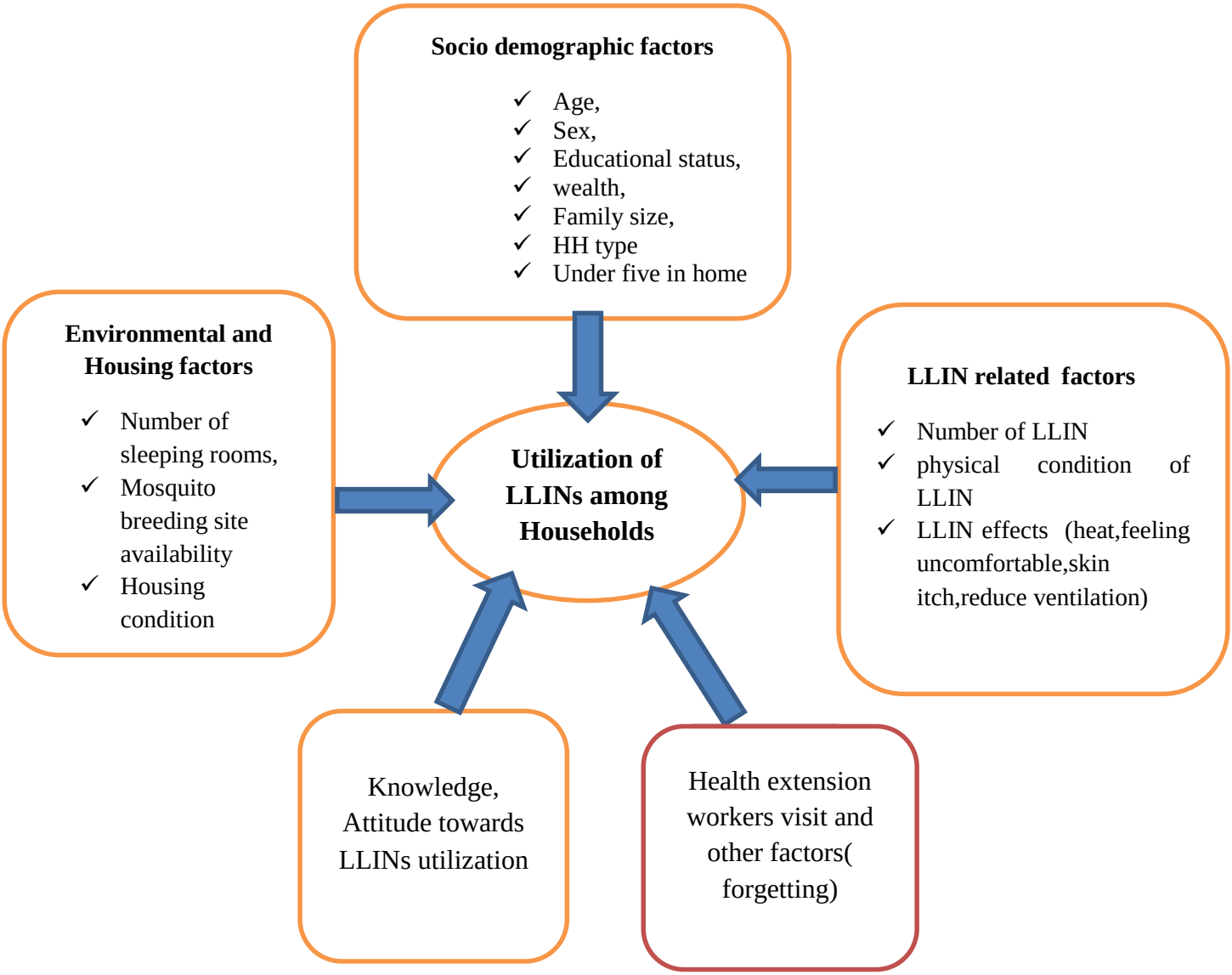


Figure 1; Conceptual frame work of LLINs utilization and associated factors among households among Wondo Genet District, Sidama Ethiopia; - Source(37,39,40,43,44)

3. OBJECTIVES

3.1 GENERAL OBJECTEIVE

- To assess utilization of long lasting insecticide treated nets and associated factors among model and none model households in malarious area in Wondo Genet District Sidama Region, Ethiopia

3.2 SPECIFIC OBJECTIVES

- To assess utilization status of long-lasting insecticide treated nets among model and non-model households in Wondo Genet District
- To determine factors associated with households LLINs utilization in Wondo Genet District

4. METHODS AND MATERIALS

4.1 STUDY AREA

Study was conducted in Wondo Genet District, Sidama Ethiopia 2024. Wondo genet district is located in Sidama Regional state in the Great Rift Valley of Ethiopia. It is found in altitude about1270-2620m. The capital town of District is Basha which is located at 24 km far from regional state capital city Hawassa and 270 km from Addis Ababa. It is bordered on the north by Oromia region, south by Habela Tula Kifle Ketema, East by Malga Woreda and West by Oromia region. Based on the estimated statistics total population of District are 164, 045 among this 81366 are male and 82679 are females. In the District there are 13 Kebeles; from these 8 Kebeles are malarious (endemic for malaria) which are found in Kola and others which are found in Dega. Woreda is included in high malaria endemic area in the region. In malaria endemic Kebeles, there are 25,370 HHs, among this about 783 households are model. According to the Health care services, the Woreda has one primary hospital, 3 health centers, 14 health posts and 13 clinics with 54 Health extension Workers (HEWs) (17)**.**

4.2 STUDY DESIGN AND PERIOD

A Community based comparative cross-sectional study was conducted from April 1 to 30/2024.

4.3 POPULATIONS

4.3.1 Source population

All HHs in Wondo Genet District have at least one LLINs was source population.

4.3.2 Study population

HHs of randomly selected Kebeles have at least one LLINs was study populations.

4.4 INCLUSION AND EXCLUSION CRITERIA

4.4.1 Inclusion criteria

HHs who are belongs in eight malaria endemic Kebeles and have at least one LLIN are included in study.

4.5 SAMPLE SIZE DETERMINATION AND SAMPLING TECHNIQUES

4.5.1 Sample size determination

- For the first specific objectives, Sample size was determined by using double population proportion formula assuming 68.3% of HHs using LLINs previous night before data collection (28). Since studies conducted only on non-model HHs, there is no literature done on model HHs, assuming 50% of the proportions of model HHs. Therefore, the sample size is calculated as following:

$$n = \frac{(Z\alpha/2 + Z\beta)\ 2\ X\ (P1\ (1-P1) + P2\ (1-P2))}{(P1-P2)2}$$

$$= \frac{(1.96+0.84)2*(0.683(1-0.683) +0.84(1-0.84))}{(0.683-0.84)2}$$

=112,

=123 after adding 10% none response rate

Therefore, total sample size is 246(123 model HHs and 123 non-model HHs).

- ❖ For second specific objectives:-By using Epi info Version 7.2
- ✓ Proportion of 95% confidence level
- ✓ Power (1-β) = 80%;
- ✓ Ratio (unexposed to exposed) = 1:1;

Table 1. Sample size calculation for the second objectives.

Variables	% 0f exposed	% of unexposed	power	AOR (95% CI)	Ratio	10% non-response rate	Sample size (n)	Reference
LLINs being Age 3	85.5	14.5	80%	7.52	1:1	18.8	207	(37)
LLINs used over floor spaces without mattress	72.4	27.6	80%	3.68	1:1	24.3	178	(37)
HHs age	61.7	38.3	80%	2.03	1:1	57.8	636	(45)

Therefore sample size of second objective is larger, so second objective sample size was used. After comparing three different sample sizes of second objectives, the largest one was selected. finally 318 model and 318 non-model total of 636 HHs were as final sample size to address our objectives.

4.5.2 Sampling procedure

A simple random sampling method was used to get the required sample size. Wondo Genet District was purposively selected from malaria endemic Districts in the Region. At the first stage, the sampling procedure was stratified into model and non-model HHs who owned LLINs. The district selected has a total of 8 malarious Kebeles. Of the total malarious Kebeles in the district, there are 783 models HH. The list of eligible HHs was obtained from Kebeles Health Post registration. A proportional allocation of the sample size had been used to determine the number of HHs that had included in the study from each Kebeles. Finally, the study participants were selected using a simple random sampling technique.

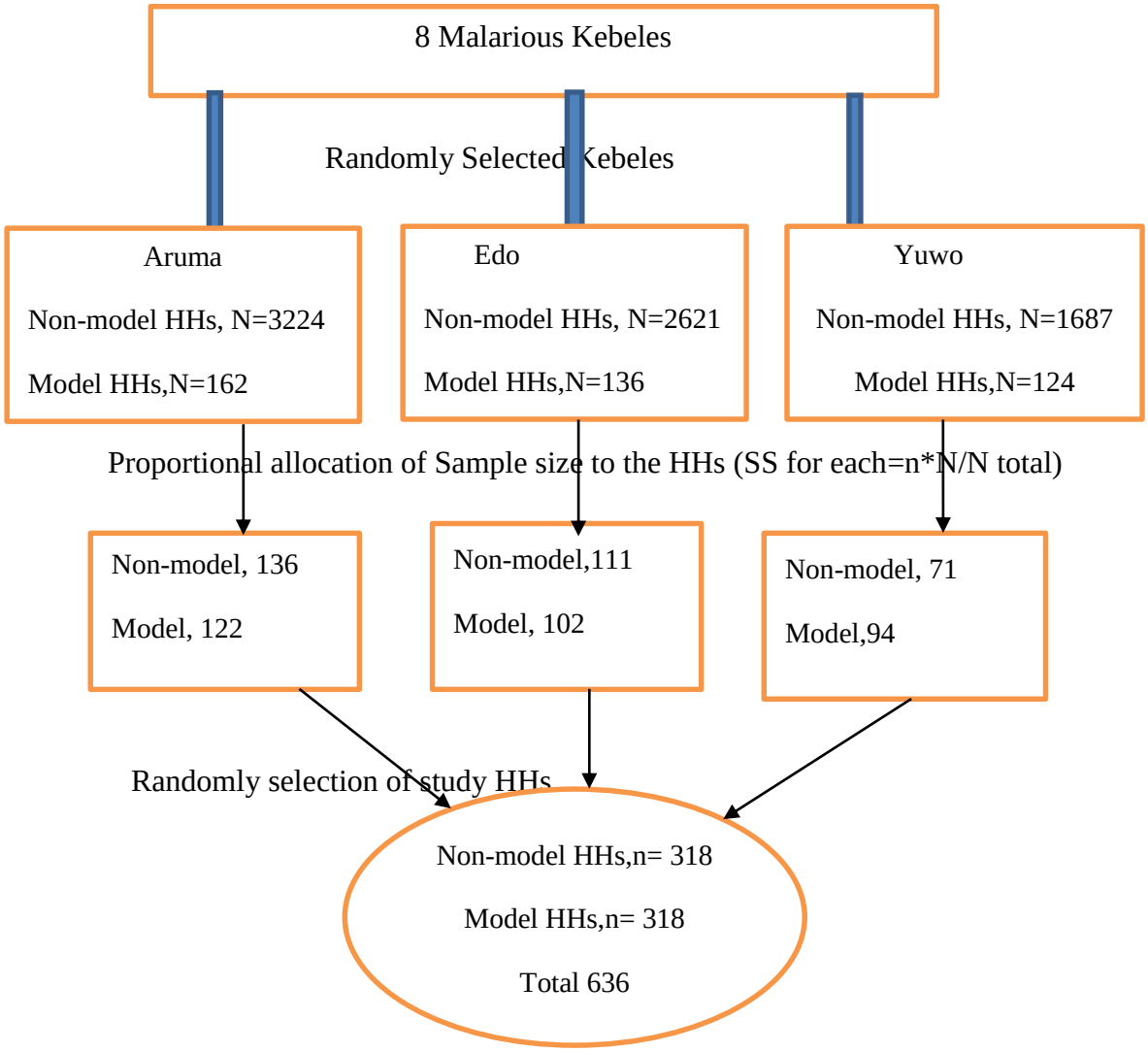


Figure 2: Schematic presentation of sampling procedure among HHs of Wondo Genet District Sidama, Ethiopia, 2024

4.6 STUDY VARIABLES

4.6.1 Dependent Variable:-

LLINs utilization status

4.6.2 Independent Variables:-

- Socio-demographic factors (Age, sex, educational status, occupation, weath, family size, HEWs visit, HH type, presence of under five)
- Knowledge, attitude towards LLINs Utilization
- LLINs related and other factors (number of LLIN, physical condition of LLIN)
- Housing conditions (number of sleeping rooms, space to hang LLIN, wall type, floor, roof, eave)
- Environmental factors (mosquito breeding habitat availability)

4.7 OPERATIONAL DEFINITION

Model household: Household who are nominated as 'model household' by health extension workers (household utilization above 85% of health extension packages). **Non-model household**: Household who are not nominated as 'model household' by health extension workers (17).

LLIN utilization: Members of households slept under the LLINs during the night prior to the date of data collection (observation of hanged LLINs over the bed net) LLIN utilization was measured based on respondents self-report together with direct observation. Accordingly, LLIN utilization was recorded as "yes" if HHs reported that they slept under LLINs during the night prior to the survey date, and LLINs was observed to be hanged (mounted) over the bed/ or sleeping area during the observation day. On the other hand, LLIN utilization was labeled "no" if HHs reported that they were not sleeping under LLINs during the night prior to the survey date or if the LLINs were not observed to be hanged (mounted) over the bed/ or sleeping area during the observation day (24,46).

Knowledge towards LLIN utilization: Knowledge about LLINs measured by using knowledge assessing questions and categorized as good knowledge (scores greater than average), poor knowledge (scores less than average) (39).

Attitude towards LLINs utilization: attitude measured by using attitude questions and categorized as positive attitude(scores greater than average), negative attitude(scores less than average) (42).

Unimproved water source, Surface water drinking directly from a river, dam, lake, pond, stream, canal or irrigation canal. **Improved water source**, safe for drink. This includes piped water, protected dug wells, protected springs, rainwater, and packaged or delivered water (47)

Improved toilet facilities; designed to hygienically separate human excreta from human contact. These include wet sanitation technologies such as flush and pour toilets connected to sewers, septic tanks, or pit latrines, and dry sanitation technologies such as dry pit latrines with slabs and composting toilets. **Unimproved toilet facilities,** facilities that do not hygienically separate human excreta from human contact. This includes dry pit latrines without slabs, bucket latrines, and flush and pour-flush toilets discharging to an open drain (47).

4.8 DATA COLLECTION TOOLS AND TECHNIQUES

A structured questionnaire adapted from different literatures and modified with an observation checklist was used for data collection. The questionnaires were prepared in English, translated into the local language, "Sidamu Afoo," and later translated back to English to ensure reliability. The interview was conducted by six health professionals. Supervisors who are skilled in malaria prevention and control programs were also employed to follow up on the data collection process. The data was collected by face to face interviews and observation. Questionnaires were pre-tested before the collection of data. HHs heads were primarily interviewed, and then LLIN utilization was checked with the interview responses of HHs through direct observation. It was checked to see whether LLINs were utilized or hanged up properly just above sleeping beds/areas or not, and they were asked to demonstrate how they were being used during sleep.

4.9 DATA QUALITY ASSURANCE

To ensure the quality of the data, data collectors and supervisors were trained by the principal investigator, including the practice of familiarizing them with the data collection tool. The questioner was pretested on 5% of sampled HHs outside the study Kebeles. After the pretest, some adjustments to some variables were made to make it more understandable by the respondents. Supervision was conducted by supervisors and the principal investigator. Every day, the collected data was cross checked for completeness by supervisors and the principal investigator..

4.10 DATA PROCESSING AND ANALYSIS

The data was collected by Kobotool, after checking the completeness of the questionnaire. Then the data was exported to SPSS version 27.0 for further analysis. Descriptive statistics were used to describe the frequency and percentage of household LLIN utilization status. Bivariate analyses were performed to nominate candidate variables for multivariable analysis with a p value less than 0.25. Kolmogorov-Smirnov test and Shapiro-Wilk test was used to check normal distribution of data. Hosmer and Lemeshow test of model fitness was used. Multivariable logistic regressions were used to identify associated factors with HH's LLIN utilization. The odds ratio with a 95% CI was estimated to measure the strength of the association. Variables with a p value less than 0.05 was used as significant.

4.11 ETHICAL CONSIDERATION

Ethical clearance was obtained from the Institutional Review Board (IRB) of Hawassa University College of Medicine and Health Sciences. A permission letter was obtained from the Wondo Genet District Health Office. Informed, voluntary, and oral consent was also obtained from each household head. In order to maintain confidentiality, study subjects were not identified by name, and data collection was done by health professionals.

5. RESULT

5.1. SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

A total of 636 HHs, 318 (50%) models, and 318 (50%) non-model HHs were selected for the study, of which 626 HHs, 313 (50%) models, and 313 (50%) non model HHs were successfully interviewed with a response rate of 98.4%. The mean age of model HHs was 41.34 years(41.34±11.25SD) and the mean age of non-model HHs was 38 years (38±11SD). Regarding the sex of respondents, 207 (66.1%) model HHs head and 176 (56.2%) non-model HHs head were female. The study showed that 295 (94.2%) and 294 (93.9%) of model HHs and non-model HHs, respectively, were married. Regarding the source of drinking water, about 93% of model HHs and 94.9% of non-model HHs have improved water. Concerning latrine, more than three-fourths (79.9%) of model HHs and about 59.1% of non-model HHs have improved latrine. The average family size of model HHs was 6.06(6.06±1.675SD), whereas non-model HHs were 5.73 (5.73 ±1.914SD) (table 2).

Table 2, Socio-demographic and economic status of model and non-model HHs of Wondo Genet District Sidama, Ethiopia, 2024(n=626)

	Model HHs		Non-model HHs		
Variables	frequency	%	Frequency	%	Total
Age					
19-28	42	13.4%	67	21.4%	109
29-38	93	29.7%	110	35.1%	203
39-48	85	27.2%	64	20.4%	149
49-58	67	21.4%	54	17.3%	121
59 and above	26	8.3%	18	5.8%	44
Sex					
Female	207	66.1%	177	56.5%	384
Male	106	33.9%	136	43.5%	242
Marital status					
Never married	12	3.8%	15	4.8%	27
Married	301	96.2%	298	95.2%	599
Occupation					
Farmer	75	24.0%	74	23.6%	149
Housewife	151	48.2%	119	38.0%	270
Student	15	4.8%	31	9.9%	46
Merchant	65	20.8%	82	26.2%	147
Health professional	7	2.2%	7	2.2%	14

Educational Status					
Illiterate	140	44.7%	101	32.3%	241
Able read and write	118	37.7%	97	31.0%	215
Primary	7	2.2%	32	10.2%	39
Secondary	15	4.8%	41	13.1%	56
Diploma	21	6.7%	29	9.3%	50
Degree and above	12	3.8%	13	4.2%	25
Toilate facilities					
improved	258	82.4%	221	70.6%	446
Unimproved	55	17.6%	92	29.4%	147
Economic status					
Lowest	77	57.5%	57	42.5%	134
low	69	53.9%	59	46.1%	128
Medium	48	38.7%	76	61.3%	124
High	45	40.2%	67	59.8%	112
Highest	74	57.8%	54	42.2%	128

5.2 KNOWLEDGE STATUS OF HHs TOWARDS MALARIA AND LLINs UTILIZATION

The majority of the participants, 306 (97.8%) model and 310 (99%) non-model HHs, heard about malaria, and friends were the major source of information for both model and non-model HHs. Among study participants, 263 (84%) model and 273 (87.2%) non-model HHs were ever seen as mosquitoes responsible for malaria transmission, but most of them could not identify them from other mosquitoes. Most of the study participants 300 (95.8%) model and 305 (97.4%) non-model HHs knew malaria symptoms. The main symptoms listed from model HHs were fever (94.2% headache (93.3%, feeling cold (80.8%), and from non-model HHs fever (93% headache (90.1% feeling cold (73.2%). Among study participants, 89.8% of non-model HHs and 90.4% of model HHs responded that LLINs can prevent malaria. If there was not enough LLIN in their home, 79.9% gave for pregnant women, 15.3% for under five children, 77.6% for pregnant women, and 20.1% for under-five children from non-model and model HHs, respectively. Overall, the results of the study indicated that 53.5% of HHs (model and non-model) had good knowledge and the rest, 46.5%, had poor knowledge about malaria transmission, prevention, and utilization of LLINs. Regarding the malaria mosquito biting time, 73.5% of both model and non-model HHs reported malaria mosquito bites at midnight. Regarding the benefits of LLINs most of HHs respond as LLINs helps to protect from mosquito bite(table3)

Table 3. knowledge towards LLINs, among model and non-model HHs of Wondo Genet Sidama, Ethiopia, 2024(n=626)

Variables	Answer	Model HHs		Non-model HHs	
benefits of LLINs	To protect from the mosquito bite	frequency	%	frequency	%
		264	84.3 %	249	79.6%
	To kill mosquito	248	79.2%	185	59%
	To protect from the bite of nuisance insects	107	34.2%	95	30.4%
	To protect from malaria	79	25.2%	40.6	40.6%
	Used as curten	2	0.6%	23	7.3%
	Used as matress	0	0	3	1
Can someone get malaria while using LLINs	Yes	210	67.1%	212	67.7%
	No	24	7.7%	36	11.5%
	I don't know	79	25.2%	65	20.8%
Can LLINs protect you from being bitten by malaria mosquito	Yes	296	94.6%	284	90.7%
	No	8	2.6%	5	1.6%
	I don't know	9	2.9%	24	7.7%

5.3 ATTITUDE STATUS OF HHs TOWARDS UTILIZATION OF LLINs

Among the study participants, about 58.5% of model HHs and 64.2% of non-model HHs agreed that LLINs can prevent malaria. Regarding proper utilization, 40.3% of model HHs and 39.9% of non-model HHs disagreed that proper utilization of LLINs is too difficult. Among study participants, most HHs agreed to protect their families from malaria by taking care of their LLINs. Overall, the study showed that 58.1% of HHs (model and non-model) had a positive attitude towards LLIN utilization, and the rest, 41.9%, had a negative attitude towards LLIN utilization (table 4).

Table 4. Attitude towards utilization of LLINs among householgs of Wondo Genet District Sidama, 2024 (n=626)

variables		Model HHs		Non-model HHs	
Regular sleeping under LLINs helps to prevent malaria	1, strongly disagree	5	1.6%	5	1.6%
	2, disagree	27	8.6%	4	1.3%
	3, neutral	63	20.1%	51	16.3%
	4, agree	203	64.9%	222	70.3%
	5, strongly agreee	15	1.8%	31	9.9%
You can protect your family from malaria by taking care for your LLINs	1, strongly agree	6	1.9%	7	2.2%
	2, disagree	10	3.2%	10	3.2%
	3, neutral	51	16.3%	38	12.1%
	4, agree	183	58.5%	201	64.2%
	5,strongly disagree	63	20.1%	57	18.2%
It is possible to repair LLINs	1, strongly disagree	4	1.3	3	1%
	2, disagree	11	3.5%	17	5.4%
	3, neutral	70	22.4%	71	22.7%
	4, agree	222	70.9%	201	64.2%
	5, strongly agree	6	1.9%	21	6.7%
The LLINs I'm using is given freely from government	1, strongly disagree	6	1.9%	4	1.3%
	2, disagree	8	2.6%	3	1%
	3, neutral	22	7%	60	19.2%
	4, agree	251	80.2%	201	64.2%
	5, strongly agree	26	8.3%	45	14.4%

5.4 LLINs, ENVIRONMENTAL AND OTHER RELATED FACTORS

Among the total HHs who participated in the study and had at least one LLIN, 318 (50.8%), of which 192 (61.3%) were model and 126 (40.3%) were non-model HHs, slept under LLINs the night before the data collection. Almost all (model and non-model) HHs respondents replied that sleeping under LLINs has no problems. Regarding the care of LLINs, 209 (66.7%) from model HHs and 169 (49.8%) non-model HHs replied as they washed her LLINs. Among study participants, 64.5% of model HHs and 47.3% of non-model HHs responded as they had health extension visits twice or three times within a year. Regarding the other methods of malaria prevention, among the model HHs study participants, 87.9% were draining stagnant water, 27.8% used IRS, 83.1% kept the environment clean, and 63.9% closed doors and windows at night. From non-model HHs, 83.4% drain stagnant water, 34.8% use IRS, 82.4% keep the environment clean, and 50.2% close doors and windows at night. Among study participants, 94.6% of model HHs and 90.7% of non-model HHs responded that LLINs protect them from being bitten by malaria mosquitoes. Regarding the place of hanging LLINs, most HHs (model and non-model) do not properly hang (tuck the bottom of LLINs under the mattress) their LLINs on the bed. About 85.6% of non-model HHs and 84% of model HHs have no visual habitat within 500 meters of the nearby house. Related to sleeping spaces, about 85.3% of model HHs and 71.6%. non-model HHs slept on beds with mattresses. LLINs was not clean and there was no mosquito in this season were most factors that HHs were not utilize LLINs(figure 4). Regarding the physical appearance of LLINs, most of observed LLINs were looks dirty and clean(figure 5).

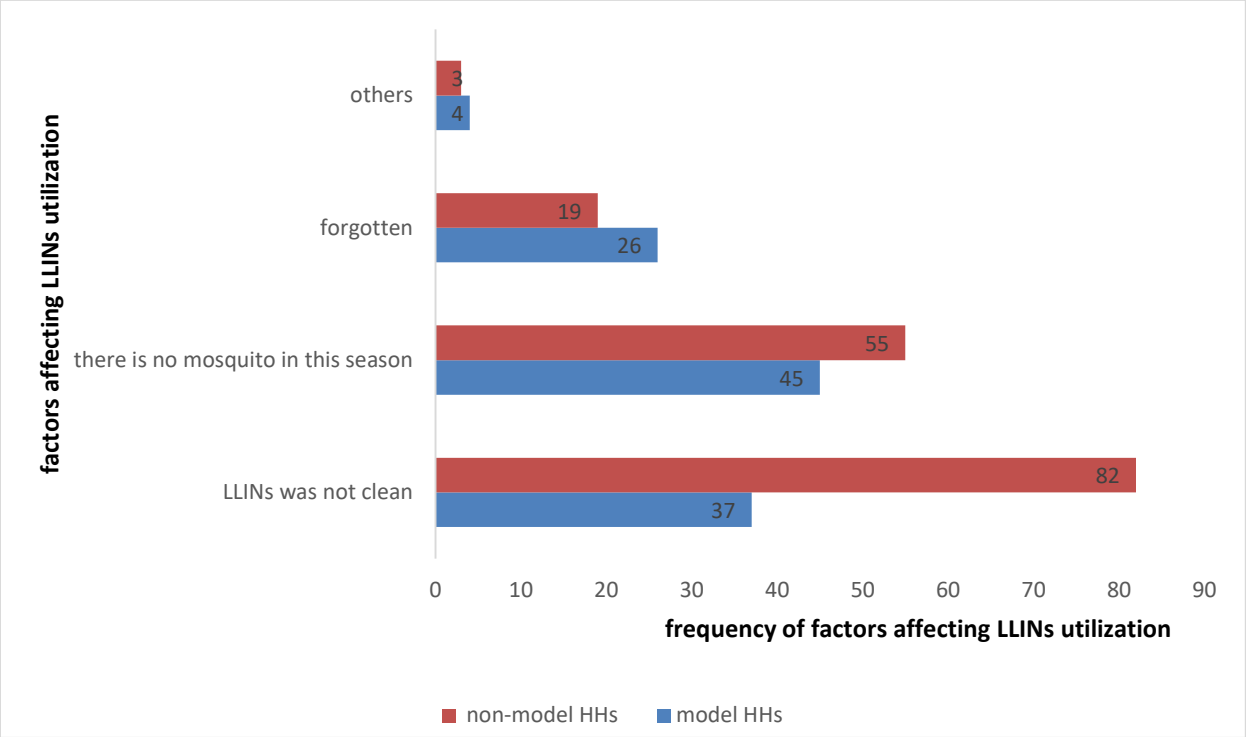


Figure 4. Factors affecting long lasting insecticide treated nets utilization among model and non-model HHs in Wondo Genet District, Sidama Ethiopia, 2024

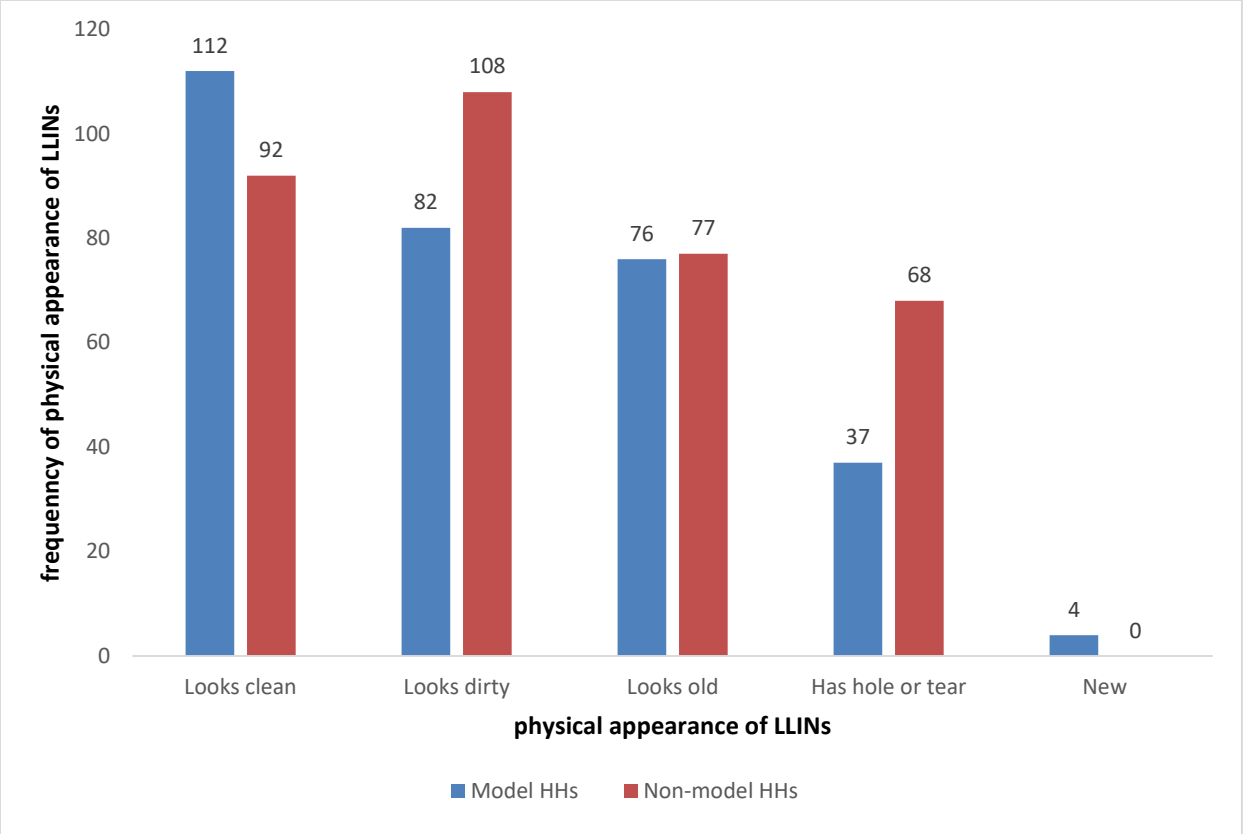
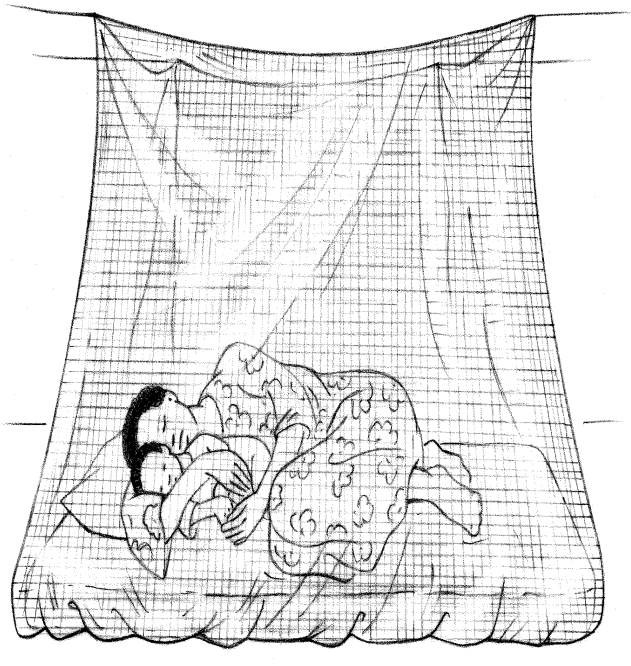


Figure 5. Physical appearances of LLINs among Model and non-model HHs in Wondo Genet District Sidama, Ethiopia 2024

Figure, LLINs not properly hanged/tucked under the mattress, taken during data collection



Figure, LLIN properly hanged/tucked under the mattress, taken from WHO.

5.5 FACTORS ASSOCIATED WITH UTILIZATION OF LLINs AMONG MODEL AND NON-MODEL HHs

Bivariate logistic regression analysis with a p-value **< 0.25** showed that LLIN utilization among HHs had a significant association with the following variables: HH status (model and non-model households), sex, presence of under five, health extension workers visit, washing of LLINs, attitude, and knowledge. However, family size, number of LLINs, wealth index, number of beds, education status, and occupation had no significant association with LLIN utilization. Variables in bivariate analysis that had significant associations were nominated for multivariable logistic regression.

In multivariable logistic regression analysis with **p-value <0.05**, HHs status (model and non-model), sex, under five, HEWs visit, attitude, and washing of LLINs were factors significantly associated with LLIN utilization among HHs.

Model HHs heads were 2.751 times more likely utilize the LLINs (AOR=2.751**,** 95% CI= 1.931–3.918) compared to non-model HHs. HHs who had health extension visits were 1.453 times more likely to utilize LLINs (AOR=1.453, 95% CI=1.020–2.070) than HHs who did not have health extension visits. HHs being female are 0.590 less likely to utilize LLINs (AOR= 0.590, 95% CI=0.413–0.843) compared with HHs being male. HHs who had under-five children in the home 1.795 times more likely to utilize LLINs (AOR=1.795, 95% CI=1.271, 2.535) than HHs who did not have under-five children in the home. Among HHs who washed LLINs, 2.378 were more likely to utilize LLINs (AOR=2.378, 95% CI=1.675–3.374) than HHs who had not washed LLINs. Among study participants, HHs who had a positive attitude towards LLIN utilization were 1.745 times more likely utilize LLINs (AOR=1.745, 955CI=1,221,2.494) compared with HHs who had a negative attitude towards LLIN utilization (Tables 4). Hosmer and Lemeshow model test, p-value 0.212, which is greater than 0.05, so the model was fitt

Table 5. Bivariate and multivariable logistic regression analysis for factors associated with utilization of LLINs among model and non-model HHs of Wondo Genet District,Sidama Ethiopia 2024 (n=626)

variables	Utilization of LLINs				
HHs type	no	yes	COR(95%CI)	AOR(95%CI)	p-value
Non-model	186	127	1		
Model	121	192	**2.324(1.687, 3.202)**	**2.751(1.931,3.918**)	0.000
Sex					
Male	102	140	1		
female	206	178	**0.630(.455, 0.871)**	**0.590(0.413,0.843)**	0.005
Occupation					
Farmer	72	81	1		
Housewife	137	132	0.74856(0.576,1.2)		
Student	25	22	.782(0.4061.508,)		
Merchant	66	77	1.037(0.657,1.638)		
Health professional	7	7	0.889(0.297,2.56)		
Education					
illiterate	169	162	1		
literate	139	157	1.171(0.856,1.604)		
Wealth					
Lowest	63	71	1		
Low	68	60	0.783(0.482,1.272)		
medium	69	55	0.707(0.453,1.155)		
High	52	60	1.024(0.619,1.693)		
Highest	56	72	1.141(0.701,1.856)		
Family size					
<5	124	120			
≥5	183	199	1.124(0.815,1.550)		
Number of LLINs					
≤2	272	273	1		
>2	35	45	1.2810,799, 2.055)		
Presence of under 5					
No	181	127	1		

Yes	126	192	**2.172(1.578,2.989)**	**1.795(1.271,2.535)**	0.001
HEWs visit					
No	130	101	1		
Yes	178	217	**1.569(1.132,2.176)**	**1.453(1.020,2.070**	0.038
Washing of LLINs					
No	161	146			
Yes	100	219	**2.415(1.744,3.345)**	**2.378(1.675,3.374**)	0.000
Number of beds					
≤2	179	177	1		
>2	129	141	1.105(0.805,1.517)		
knowledge					
Poor	153	138	1		
Good	155	180	**1.288(0.940,1.764)**	1.338(0.950,1.885)	
Attitude					
Negative	152	110	1		
positive	156	208	**1.842(1.336,2.541)**	**1.745(1.221,2.494**)	0.002

1, Reference categories, cut of point for COR: p-value <0.25, for AOR: p-value <0.05 In bivariate analysis variables with p-value less than 0.25 were selected and nominated for multivariable logistic regression.

6. DISCUSSION

This study has tried to assess and compare LLIN utilization among model and non-model HHs. Among the study participants who had at least one LLIN, overall 50.8%(95%CI=46.5-54.5), of which 61.3%(95%CI=55.6-66.8) were model and 40.3%(95%CI=35.1-45) were non-model HHs, slept under LLINs the night before the data collection day.

In this study we found that, LLINs utilization was 50.8% (95%CI=46.5-54.5), among HHs who had at least one LLIN was lower than the study conducted in Uganda (64.7%), Ghana (65.6%), Oromia Limmu Seka (68.3%), Mirab Abaya (South Ethiopia) (85.1%), and Ilu Galan Oromia (72.2%) (21,22,24,27,28). However, the findings of this study was higher than, the studies done in Benin (36.1%,) Cameron (24.9%), and Arsi Oromia (27.1%),(20,23,25). This difference might be due to the malaria season of study done, difference in study settings, community awereness and households being model and non-model.

The multivariable logistic regression results indicated that being a model HH head was a predictor of LLIN utilization and showed that utilization of LLINs among model HHs were (AOR=2.751, 95%CI, 1.931,3.918**)** times higher compared to non-model HHs. This is due to the fact that model HHs had better understanding or knowledge (71.6%) than non-model HHs (35.5%) regarding malaria transmission, prevention, control, and LLIN utilization..

This study revealed that HHs who had under five were (AOR=1.795, 95% CI, 1.271-2.535) more likely to utilize LLINs than HHs who had no under five. The possible reason might be due to having health promotion information from health extension visits, during a vaccine program follow and houesholds who had under five children in home more pay attention for their childrens. This study was not supported by the study conducted in Keniya (34), showed that HHs with under five were 0.14 times less likely to sleep under ITN. This variation might be because our study included model HHs who had better knowledge and understanding to gave priority for risky groups in families. But a study done in Cameron showed that HHs with prioritized groups (pregnant and under five) were more likely to utilize LLINs (41).

This study indicated that HHs who washed LLINs were (AOR=2.378,95%CI, 1.675-3.374) more likely utilize LLINs than HHs who did not wash LLINs. The possible reason might be that washed LLINs were more suitable and comfortable to use. The washing of LLINs helped remove

the debris and make it clean. This study, supported by a study conducted in Ethiopia, showed that LLINs that were never washed were 1.86 times more likely not utilized compared to those that were ever washed (37).

Regarding the sex of the study participants, this study finding showed, HHs being female were (AOR=0.590,95%CI, 0.413,0.843) less likely utilizethe LLINs than HHs being male. This might be because females in home hold more work loads and can forget the using, and it might be due to socio-cultural belief, as males are more dominant than females, there fore priority might be given for males. This study had similar findings with study done in Ilu Gelan Oromia, showed that, HHs being females were less likely utilize LLINs than being males (24). However, this study had no similar fiding with study conducted in Guinea showed that HHs being females were more likely utilize LLINs than HHs being males (32).

Our study find indicated that HHs who had positive attitude towards LLINs utlization, were (AOR=1.745,95%CI,1.221-2.494) more likely utilize LLINs than HHs who had negative attitude. This might be because of HHs who had positive attitude towards LLINs utilization had better views, feelings and behaviors towards LLINs. This study had similar finding with studies conducted in Ethiopia,Oromia, Tigray, Amhara and South region, wester command showed, HHs who had positive attitude towards LLINs were more likely utilize LLINs than HHs who had negative attitude towards LLINs (37,42). This study found that HHs who had health extension worker visits were more likely to utilize the LLINs than those who had no HEW visits. This might be because HHs who had health extensions visited had more information and were encouraged towards LLIN utilization.

6. STRENGTH AND LIMITATION

6.1 STRENGTH,

- Direct observation of LLINs tucking status under the matress with demonstration and using the picture of mosquitos to check wether respondents can identify it or not

6.2 LIMITATION

- Study being done at one point at a time

7. CONCLUSSION AND RECOMMENDATIONS

7.1 Conclussion

In this study we found that model households were more utilize Long Lasting Insecticide treated Nets than non-model households. However overall, utilization of Long lasting treated nets were below national malaria elimination targets. After adjusting confounding factors, being model households, washing of LLINs, presence of under five children, health extension workers visit, attitude and having female household head were the factors significantly associated with LLINs utilization.

7.2 Recommendation

Based on findings of this study, we would like to forward the following reccommendations,

For Health extension workers

- Regural health extension home to home visit should beprepared and done, and health education for each house families should be encouraged and demonstration should be done, regarding how to hang LLINs properly on the bed or tuck undr the matress of bottom border of LLINs
- community mobilization

For Woreda Health office

- Work on making all HHs model through implementing time bounded training about LLINs utilization and put in place a strong supportive supervision , regular monitoring, and evaluation
- Enhancing comprehensive health education to realize proper utilization of LLINs reminding the important of utilization of LLINs for all population domain wherever LLINs is avialable

For other Researchers

- Further studies about LLINs utilization should be done with malaria season
- Longitudinal study should be done

8. REFERENCES

1. Nureye D. Old and Recent Advances in Life Cycle , Pathogenesis , Diagnosis , Prevention , and Treatment of Malaria Including Perspectives in Ethiopia. Hindawi. 2020;Article 12:1–17.
2. President US, Initiative M. U . S . PRESIDENT ' S MALARIA INITIATIVE Ethiopia Malaria Operational Plan FY 2023. PMI. 2023;1–55.
3. Ministry of Health and Medical Services, Solomon Islands. Healthy Village Facilitator ' s Guide Malaria Prevention and Control. Japan International Cooperation Agency; 2021.):1–19.
4. FMOH. National Malaria Guidelines, Fourth edition. Adis Ababa Ethiopia. 2017;3rd:1–108.
5. Yang G geun, Kim D. A Meta-Regression Analysis of the Effectiveness of Mosquito Nets for Malaria Control : The Value of Long-Lasting Insecticide Nets. Environ Res Public Heal. 2018;1–12.
6. WHO. Mosquito net, 1.90x1.50x1.80m, LLIN, PE Overview. IOM, UN Migr Emerg Man. 2023;1–6.
7. WHO. Achieving and maintaining universal coverage with long-lasting insecticidal nets for malaria control. Glob Malar Program. 2017;20:1–4.
8. FMOH. Ethiopia malaria elimination strategic plan: 2021-2025. ADDIS ABABA. 2021:1–89.
9. CDC. MALARIA. US Presdents Malar Initiat. 2021;1–2.
10. WHO. World malaria report 2023. Geneva. 2023:1–23.
11. Elsevier. Increasing challenges of malaria control in sub-Saharan Africa : Priorities for public health research and policymakers. Ann Med Surg. 2022;81:1–6.

12. Kendie FA, W TH, Semegn EN, Ferede MW. Prevalence of Malaria among Adults in Ethiopia : A Systematic Review and Meta-Analysis. Trop Med. 2021;Artilce ID:9.

13. Girum T, Shumbej T, Shewangizaw M. Burden of malaria in Ethiopia , 2000-2016 : findings from the Global Health Estimates. Trop Dis Travel Med Vacines. 2019;5–11.

14. EPHI. Ethiopia Health Cluster Bulletin October 2023. Heal Clust Ethiop. 2023;.

15. Taffese HS, Hemming-schroeder E, Koepfli C, Tesfaye G, Lee M chieh, Kazura J, et al. Malaria epidemiology and interventions in Ethiopia from 2001 to 2016. 2018;1–9.

16. Sidama Regional Health Bureau. Malaria Report. Hawassa; 2023.

17. Wondo Genet Health Office malaria report . Wondo Genet; 2023.

18. Khanam F, Hossain B, Chowdhury TR, Rahman S, Kabir M. Exploring the gap between coverage , access , and utilization of long - lasting insecticide - treated nets (LLINs) among the households of malaria endemic districts in Bangladesh. Malar J. 2018;17:455:1–12.

19. Thakurathi B, Sangroula RK, Joshi OP, Giri R. Factors associated with use of long lasting insecticidal net in Kailali District , Nepal. 2021;8(1):61–9.

20. Fru PN, Cho FN, Tassang AN, Fru CN, Fon PN, Ekobo AS. Ownership and Utilisation of Long-Lasting Insecticidal Nets in Tiko Health District, Southwest Region, Cameroon: A Cross-Sectional Study. J Parasitol Res. 2021;ID 8848091.

21. Alhassan Y, Kenu E, Ansah OO, Guure C. Universal coverage and utilization of free long-lasting insecticidal nets for malaria prevention in Ghana : a cross-sectional study. 2023;

22. Cote CM, Goel V, Muhindo R, Baguma E, Ntaro M, Sa BES, et al. Malaria prevalence and long - lasting insecticidal net use in rural western Uganda : results of a cross - sectional survey conducted in an area of highly variable malaria transmission intensity. Malar J. 2021;1–12.

23. Enato IG. Determinants of ownership and utilisation of insecticide treated bednets in children with sickle cell anaemia in Benin City.PAMJ-One Health. :2022;8(20).

24. Mekuria M, Binegde DN, Derega J, Bala ET, Tesfa B, Deriba BS. Insecticide-Treated Bed Net Utilization and Associated Factors Among Households in Ilu Galan District , Oromia. Environ Health Insights. 2022;16:1–9.

25. Hunde OY, Hailu HE, Wondimu J, Dinku B, Ewnetu W. Assessment of long-lasting insecticide nets coverage, utilization, and associated factors among households in malaria elimination districts of Arsi Zone, Oromia Region, Ethiopia: A cross-sectional study. PLoS One [Internet]. 2023;18

26. Azeb SR, Legesse TW, Hailu FD. Proper utilization of long lasting treated net and associated factors at Zuway Dugda district, Arsi zone, Ethiopia. J Public Heal Epidemiol. 2019;11(1):13–24.

27. Tassew A, Hopkins R, Deressa W. Factors influencing the ownership and utilization of long-lasting insecticidal nets for malaria prevention in Ethiopia. Malar J. 2017;16(1).

28. Hambisa MT, Debela T, Dessie Y, Gobena T. Long lasting insecticidal net use and its associated factors in Limmu Seka District , South West Ethiopia. 2018;1–7.

29. Yenet S. Assessment of Urban Health Extension Program Packages Utilization and Healthcare- Seeking Behaviors Among Model and Non-Model Households. School of Public Health Msc Thesis. Addis Ababa, Ethiopia. 2021;

30. Nadew J, Obsa MS, Alemayehu A, Haji Y. Utilization of insecticide treated nets among pregnant women in sodo zuria woreda Southern Ethiopia. 2022; 1–15.

31. Kassie GA, Adella GA, Gebrekidan AY, Gebeyehu NA, Gesese MM, Abebe EC. Insecticide-treated bed net utilization and associated factors among pregnant women in Ethiopia : a systematic review and meta- analysis. Malar J [Internet]. 2023;22:223:1–17.

32. Martínez M, Martínez PM, Gabong R, Balanza N, Luana S, Sanz S, et al. Coverage , determinants of use and repurposing of long - lasting insecticidal nets two years after a mass distribution in Lihir Islands , Papua New Guinea : a cross - sectional study. Malar J. 2021;1–12.

33. Hirai M, Umar U, Darikwa P, Osman AA, Mohamed A, Jama AM, et al. Exploring

Potential Determinants of Mosquito Net Ownership and Use in Somalia :. 2022;1–9.

34. Kyalo GM, Kioko UM. Factors Affecting Use of Insecticide Treated Nets by Children Under Five Years of Age in Kenya. 2018;6(4):86–92.

35. Yitayew AE, Enyew HD, Goshu YA. Utilization and Associated Factors of Insecticide Treated Bed Net among Pregnant Women Attending Antenatal Clinic of Addis Zemen Hospital , North-Western Ethiopia : Hindawa, Malaria Research and Treatment. :2018, 9.

36. Habimana A, Tuyizere M, Gikunju J, Magu D. Assessing Knowledge and Factors Associated to Long Lasting Insecticide Nets use among pregnant women in southern Rwanda. 2020;3(1):60–70.

37. Hiruy HN, Zewde A, Irish SR, Abdelmenan S, Woyessa A, Wuletaw Y, et al. The effect of long - lasting insecticidal nets (LLINs) physical integrity on utilization. Malar J. 2021;1–10.

38. Kebede W, Tolcha A, Soboksa NE, Negassa B, Kanno GG AM. Utilization of Insecticide-Treated Nets in Households for Under-5 Children and Associated Factors in East Meskan District, Gurage Zone, Southern Ethiopia. SAGE publishing. Envoronmental Heal Insight. 2023;17:1–9.

39. Yirsaw AN, Gebremariam RB, Getnet WA, Mi MS. 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. 2021;1–12.

40. Alemu MB, Asnake MA, Lemma MY, Melak MF. Utilization of insecticide treated bed net and associated factors among households of Kola Diba town , North Gondar , Amhara region , Ethiopia. BMC Res Notes. 2018;1–5.

41. Fokam EB, Kindzeka GF, Ngimuh L, Dzi KTJ, Wanji S. Determination of the predictive factors of long-lasting insecticide-treated net ownership and utilisation in the Bamenda Health District of Cameroon. 2017;1–10.

42. Gebru BK, Duguma FK, Tefera W. Assessment of Knowledge , Attitude and Practice on Insecticide Treated Net Utilization towards Malaria Prevention among Ethiopian Army

members of 24th Division , 2016. Int J Environ Sci Nat Resour. 2019;21(3).

43. Wudineh KG, Bantie SA, Teshome DF. Long lasting insecticide bed net utilization and associated factors among pregnant mothers in, Fogera district, North West Ethiopia. Res Sq. 2020;:1–14.

44. Babalola OJ, Sambo MN, Idris SH, Ajayi IOO, Ajumobi O, Nguku P. Factors associated with utilization of LLINs among women of child - bearing age in Igabi , Kaduna State , Nigeria. Malar J. 2019;1–9.

45. Okiring J, Gonahasa S, Nassali M, Namuganga JF, Bagala I, Maiteki-Sebuguzi C, et al. LLIN Evaluation in Uganda Project (LLINEUP2)—Factors associated with coverage and use of long-lasting insecticidal nets following the 2020–21 national mass distribution campaign: a cross-sectional survey of 12 districts. Malar J. 2022;21(1):1–12.

46. WHO Region Office for Africa.National Malaria Control Department GUIDELINES FOR LONG-LASTING INSECTICIDAL NETS CARE , REPURPOSING AND DISPOSAL Ministry of Health. Kampala Uganda. 2019;

47. Ababa AE. MINISTER OF HEALTH ETHIOPIA. National Standard Definitions for Sanitation , Hygiene , and Water. 2021;.

9. ANNEXES

9.1 QUESTIONNAIRES, IN ENGLISH VERSION

Informed consent form

Good morning, my name is _____. I came from Hawassa University. I'm here to collect information for the research being conducted on Long lasting insecticide treated nets utilization. As part of this research, I want to see the level of I LLINs utilization and factors which affect its utilization among model and non-model HHs. I will ask you some questions related to insecticide treated nets. The questions will takes 30 to 40 minutes. Please be assured that the information you gave should be confidential since I do not register names and you may choose stop your participation or refrain from answering any question at any time. If you decide not to participate, your care is not affected.

At this time do you want to ask me anything about this study?

Do I have your agreement to participate _____ (yes or no?)

A, Socio demographic Characteristics

Code	Questions	Response	Skip
101	Age of the respondent(years)	……	
102	Sex	1, male 2, female	
103	What is your marital status?	1, single 2, married 3, widow 4, divorced	
104	What is your educational status?	1, illiterate 2, Able read and write 3, primary 4, Secondary 5, Diploma 6, Degree and above	
105	What is your occupation?	1, Farmer 2, Housewife 3, Student 4, Merchant 5, health professional 6, other specify	
106	How many numbers of families in your home?	…….	
107	Is there under five children in your home?	1, Yes 2, No	
108	If, there is under five, number of under five	……	

B. ECONOMIC INFORMATION

Q. No	Questions	Responses	skip
109	Source of drinking water in your home?	1,Improved 2,Unimproved	
110	Toilet facility you use in your home?	1,improved 2,Unimproved	
111	Do you have a separate room which is used as a kitchen?	1, Yes 2, No	
112	Do you have your own income?	1.Yes 2. No	If no, skip to 114
113	If Yes, how much do you earn in a typical month?	----------Birr	
114	In total how much is the monthly income of your household?	----------Birr	
115	Does your household own any land that can be used for agriculture?	1.Yes 2.No	If no, skip to 118
116	How many (local units) of agricultural land does the household own?	1. _____Units. Write the local unit here 2. I don't know/Not sure	
117	How many of the following animals do this household own? 1,Milk cows or oxen? 2,Horses, 3 donkeys, 4,mules?	 1,…… 2------ 3------ 4-------	

	5,Goats 6 sheep? 7,Chickens?	5------- 6…….. 7……	
118	Does your household have electricity?	1.Yes 2.No	
119	Does your household have other improved energy source?	1,Yes 2,No	
120	Does your house have windows?	1.Yes 2.No	
121	What is the main material of the floor of your house?	1. Natural floor 2. Wood or bamboo floor 3. Finished floor 4.If other specify _____	
122	What is the main material of the roof your house?	1. Thatched/Leaf 2. Plastic sheet 3. Corrugated iron 4. If other specify ____	
123	What is the main material of the wall of Your house?	1. Bamboo/Wood 2. Stone with mud 3. Trunks with mud 4. Bricks/Cement 5. If other specify _____	
124	Does any member of this household have an account with a bank/credit association/ microfinance?	1. Yes 2. No 3. I don't know/Not sure	

125	What type of fuel does your household mainly use for cooking?	1. Wood 2. Charcoal 3. Animal dung 4. Kerosene 5. If other specify…….	
126	Do you have telephone	1,Yes 2,No	
127	Do you have radio	1,Yes 2,No	
128	Do you have television	1,yes 2.No	

B, LLIN related, Environmental and other factors

Code	Questions	Response	Skip
129	Do you have LLIN?	1. Yes 2. No	
130	If yes, how many LLIN do you have? (observe during visit)	……..	
131	Had you sleep under LLIN last night?	1, yes 2, no	
132	If no, for question no 131 why do you not sleep?	1, there is no mosquito 2, forgotten 3,LLINs was not clean 4, sleeping under LLINs is not convenient 5, LLINs was not hanged 6, other specify….	
133	Does sleeping under bed net cause any Problem?	1.Yes 2. no	If no, skip to 135
134	If yes, what are the problems?	1. No comfort 2. Cause heat 3. Air hanger 4. other, specify….	
135	When your LLIN is torn or gets a hole, how likely are you to mend it?	1. I mend all holes 2. I sometimes mend holes	

		3. I never mend holes	
136	Do you wash your LLIN?	1, yes 2, no	If no, skip to 137
137	If you say yes, what type of washing material do you use when you wash LLINs?	1. Ordinary soaps 2. Detergents (Berekina) 3. Water only	
138	How often do you wash your LLINs?	1. Whenever it gets dirty 2. 1 time a year 3. 2–3 times a year 4. 4–5 times a year	
139	Was health workers/health extension workers visited your home within one year?	1. Yes 2. No	
140	If yes, How long ago, health worker /health extension worker visited your home?	……	
141	What other methods of prevention of mosquito bite do you use?	1, draining stagnant water 2, Bed nets 3, IRS 4, Environmental sanitation 5,Closing of doors and windows early in evening 6, oil application to stagnant water 7, others…	

C, **Questions through observation during study (Housing condition, Environmental and LLIN related factors)**

Code	Points of observation	Response	Skip
142	Number of beds for sleeping	1.One 2.Two 3.Three and above	
143	Number of rooms	1,one 2,two 3,three and above	
144	Number of beds /places of sleep observed with bed nets hanged.	1.One 2.Two 3.Three and above	
145	Is there a place for hanging LLIN?	1.Yes 2. No	
146	Physical appearance of LLINs?	1. has hole or tear 2. has dead mosquito 3. look dirty 4. looks old 5.new 6. clean	
147	Sleeping place	1,On earth/floor space with mattress 2, on earth/floor space without mattress 3, on bed with mattress 4, other specify…..	
148	Is there any open vent space (Eave) on roof and wall?	1, yes 2, no	
149	Presence of potential mosquito breeding habitat nearby house	1, less than 100m 2, between 100&200m 3. between 200m &500m 4, no visual habitat within 500 meters	

D. Knowledge related questions

Code	Questions	Response	Skip
150	Have you heard about malaria?	1, yes 2, no	If no, skip to 152
151	If yes, source of information	1, broadcast (TV& radio) 2, friend 3, Health facilities 4, community health workers 5, other specify	
152	Have you ever seen the mosquito responsible to transmit malaria?	1, yes 2, no	If no, skip to 154
153	If yes, Check on given picture	1, correct 2, incorrect	
154	Do you know sign and symptom of malaria?	1, yes 2, no	If no, skip to158
155	If yes, what are main signs and symptoms?	1, fever 2, headache 3, joint pain 4, feeling cold 5, loss of appetite 6, Nausea and vomiting 7, body weakness 8, dizziness 9, other specify	
156	In your opinion, what causes malaria?	1, Mosquito bite 2, Drinking dirty water 3, close contact with malaria infected person 4, I don't know 5, other specify	
157	Do you think malaria can be prevented?	1, yes 2, no 3, I don't know	
158	Do you think malaria can kill you, if it is untreated?	1, yes 2, no 3, I don't know	
159	What time can malaria start biting?	1, midnight 2, early evening 3, any time	
160	Do you think malaria is still a problem in your area?	1, yes 2, no 3, I don't know	

161	What are the benefits of the mosquito net? List as many options as possible	1,To kill mosquitoes 2, to protect from the mosquito bite 3,To protect from the bite of nuisance insects 4,To protect from malaria 5,Used as a curtain 6, Used as a mattress 7, Other (specify)…	
162	Do LLINs prevent malaria transmission?	1, yes 2, no 3, I don't know	
163	Can LLINs protect you from being bitten by malaria mosquito?	1, yes 2, no 3, I don't know	
164	Can someone get malaria while using LLINs?	1, yes 2, no 3 I don't know	
165	If there are not enough LLINs in home for everyone, Who should be given priority in malaria prevention in the household?	1, pregnant women 2, under five children 3, old age 4, adults 5, other, specify…	

E, Attitude related questions

code	Questions	Answer	skip
166	LLINs can prevent malaria transmission,	1, strongly disagree 2, disagree 3, neutral 3, agree 4, strongly agree	
167	The LLINs I'm using is given to me free by the government	1, strongly disagree 2, disagree 3, Neutral 4, agree	

		5, strongly agree	
168	Regular sleeping under LLINs helps to prevent malaria	1, strongly disagree 2, disagree 3, neutral 4,agree 5, strongly agree	
169	Sleeping under LLINs is enjoyable	1, strongly disagree 2, disagree 3, neutral 4, agree 5, strongly agree	
170	LLINs can be used to build cage and fencing	1, strongly disagree 2, disagree 3, neutral 4, agree 5, strongly agree	
171	You can help protecting your family from malaria by taking care of your net	1, strongly disagree 2, disagree 3, neutral 4, agree 5, strongly agree	
172	Proper utilization of LLINs is too difficult	1, strongly disagree 2, disagree 3, neutral 4, agree 5, strongly agree	
173	Mosquito nets are valuable in eliminating malaria from your community	1, strongly disagree 2, disagree 3, neutral 4, agree 5, strongly agree	
174	It is possible to repair holes in LLINs	1, strongly disagree 2, disagree 3, neutral 4, agree 5, strongly agree	
175	Repaired LLINs can be effective in preventing mosquito bite	1, strongly disagree 2, disagree 3, neutral 4, agree 5, strongly agree	

9.2 **QUESTIONNAIRES IN SIDAMU AFOO VERSION**

Fajjote forme

Quwa 1. Meessaneeto egensiisa la'inohunni

Keere haara: - Keere galitta/galitto

Ane su'ma ……Yinanni. Dawommohuno Hawaasi Universite rosu Fayyimmate uurinshanniiti. Daa'ya korkaatino, Shekkeerete xisso hunnanninna gargadhinanni doogo aana xiinxallote taje gamba assateeti. Tenne xiinxallo ledo amadisiise, Binicho gargadhinanni hocco woyi Agobere horoonsi'nanni garanna horoonsira hoolanno kora la"a hasireemmo/mma. Tini xa'mo adhitano/Fajjitannohu 30-40 xiqeessa ikkanno. Ootto'e/tta'e taje wolu manni afannokkite/dikullannite, konne agarate yinesu'makki diboreessinanni Tenne xiinxallora dibeeqeemmmo/mma yiittaro/ttoro digadachchinannihe. Jeefoteno xa'mattaeri/ttoeri heeriro xa'mie

Beeqqate sumuu yootta/tto…….. (Ee/dee'ni)

Quwa 2:- Xa'minanni xa'mo, Sidaamu Afiinni

Ayimmate Xawishsha

Olluu su'ma……Xa'mo bandanni kiiro…….

A, Ayimmatenna mannoomishshu taje

T. k	Xa'mo	Dawaro	Sai
101	Dirikki me'eho? (Dawaraanchu)	……	
102	Koo/tee	1, koo 2, tee	
103	Adhamme	1, adhaminokkiha/adhantinokkita 2, adhaminoha/adhantinota 3, shiidhinota/shii'noha 4, tirtinota/tirinoha	
104	Rosikki deerri me'eho?	1, Qalamete roso rosinokkiha/rossinokkita 2.Nabbawanna boreessa dandiinoha/dandiitinota 3,1-8 geeshsha rosinoho/rossinota 4,9-12 geeshsha rosinoho 5, 12 nna hakuyi ale rosinnoha/rossinota	
105	Loosikki dani maati?	1, irsha loosire galinoha/galtinota 2, mini ama 3, rosaancho 4, daddalaancho 5, fayyimmate ogeessa/ogeette 6, wole ikkiro…..	
106	Me'e maate no minekki?	1, 2 2, 3 3, 4 4, 5 nna hakkuyi ale	
107	Ontu diri woroonni noo qaaqqi no minekki?	1, ee 2, dino	
108	Nooha ikkiro 5 diri woro noo qaaqqi me'u no?	……	
109	Agatto waa hiikkinni afiratto?	1, woyyaawinoho 2, diwoyyawinoho	
110	Toilet facility you use?	1,woyyaabbinote 2, diwoyyaabbinote	
11	Kuushiinu noohe minekki?	1, yes 2, no	

B. Miinja la'inohunni

K,	Xa'mo	Dawaro	Sa'i
112	Umikki e'o noohe?	1. ee 2. dino;e	Dino ikkiro1 14 sai
113	Ee ikkiro aganunni mageeshsha afiratto? birrunni	----------Birra	
114	Minikkinni aganu e'o mageeshsha ikkitanno? Birrunni	----------Birra	
115	Loosidhe heeratto baatto noohe?	1.ee 2.dinoe	Dino ikkiro 118 sai
116	Ee ikkiro mageeshshi hectare ikkitanno	1. _____ hectare 2. diafoommo	
117	Saada noohero mageeshshansa kuli 1,lalu woy handu	1,……	
	2,farashshu	2------	
	3 harrichu	3------	
	4,gaangiichu	4-------	
	5,meichu	5-------	
	6 gerechu	6……..	
	7,lukkuwu	7……	
118	Caabbicho(electric) afirootto?	1.ee 2.diafiroommo	
119	Woyyaabbinota wolqate(caabbichu) bue noohe?	1,ee	

		2, dino’e	
120	Miniki maskoote afirinno	1.ee 2diafirinno	
121	Minikki uullado mayiinni loosaminno?	1. kalaqamu bushshaati 2.haqqunni/leemmichunni 3. simintotenni 4.wole ikk_____	
122	Minikki iimiido/qaaxo mayiinni loosaminno?	1. hayiissotenni 2. sharunni 3. qorqorrotenni 4. wole ikkiro____	
123	Minikki uurrinsha mayiinni loosaminno?	1. leemmichunni/haqqunni 2. kinchunninna/sabbunni 3. sabbunni 4. simmintotenni 5. wole ikkiro _____	
124	birra wodhattaha/ttoha baankete maxaafa afirootto?/afidhinoonni	1.ee 2. dinoe 3. diafoommo	
125	Sagale ra’isirate maricho horoonsiratto?	1. haqqa 2. kasale 3. saadate kose 4. laamba 5. wole ikkiro…….	
126	telephone noohe?	1, ee nooe 2, dinoe	
127	radio noohe?	1,ee noo’e 2, dino’e	
128	television noohe?	1, ee 2.dino’e	

B, Argobere nna Qarqaru Korinni

Code	Xa'mo	Dawaro	Sai
129	Me'e argobere afirootto?	1, 1 2, 2 3, 2 aleenni	
130	Mamootenna me"e higge horoonsiratto argobere?	1. wo'manka hashsha 2. binicho leellitanno woyite 3. Sae sae 4. wole ikkiro….	
131	Argobere gulgu'le gala qarra abbitanno?	1. ee 2. dee'ni	Dee'ni ikkiro sai , 112
132	Ee ikkiro qarra ikkiri maati?	1. injo ho'litanno 2. iibbille abbitanno 3. foole fugganno 4. wole ikkiro…	
133	Fayyimmate ogeeyye minekki towaanyo assitanno?	1. ee 2. dee'ni	Dee'ni ikkiro sai
134	Ee ikkiro, towaanyo assitunkunni mageeshshi yanna ikkanno?	1. 3 agani giddo 2. 3–6 agani giddo 3. 6 agana albanni	
135	Argoberekki dadhanturo/ xullo afidhuro hiissatto?	1. wo'manka woyte goweemmo 2. sae sae goweemmo 3. digoweemmo	
136	Argoberekki xurturo hiissatto?	1. hayishsheemmo/mma 2. dihayishsheemmo 3. huneemmo/mma	
137	Argobere gulgu'lite galootto ankaro?	1. ee 2. dee'ni	Ee ikkiro sai 39
138	Dee'ni ikkiro, mayira gulgu'lite digoxootto/tta?	1, biinnicho nookki daaffo 2, hawe 3, argobere xurteenna 4,gulgu'le gala injiitanno'e ikkihura 5,Argoobere sutoommoikihura 6 wolere ikkiro….	
139	Biinnicho qassannohe ikkii gede maa horoonsiratto?	1, argobere	

		2, garino waa huna 3,IRS/spray horoonsireemmo/mma 4, qarqara feyaatenni 5,hashsha hashsha saanqanna maskoote cufatenni 6,garino wayira oil horonsiratenni 7, wole ikkiro…	
140	Argoberekki hayishshatto?	1, ee 2, deen'ni	Dee'ni ikkiro sai, 121
141	Ee ikkiro maricho horoonsidhe hayishshatto/tta?	1. samuna 2. Detergents (Berekina) 3. Waa calla 4. wole ikkiro……	

C, **la'atenni qolantanno xa'muwa(minu gara, qarqaranna argobere lainohunni)**

Code	La'nannire	Dawaro	Sai
142	Gonxanni daallasi batinye	1.mitto 2.lame 3. 3 nna hakkunni ale	
143	Gonxanni kifile batinye	1, mitte 2, lame 3, 3 nna hakkunni ale	
144	Miniki xullo iimaanni/uurrinsha xullo afirinno?	1, ee 2, diafirino	
145	Argoberete ledo noo daallasa/gonxanni bayichi batinye	1. mitte 2. lame 3. 3 nna hakkunni ale	
146	Argobere suntanni bayichi garunni no?	1. ee 2. dino	
147	Argoberete akata lainohunni?	1. dadhamme/xullo afidhino 2.reyition binicho aanaho no 3. xure afidhino 4. akkaltion	

		5, haarote 6, co'ittete	
148	Gonxanni bayicho	1, uullate aana frashe kadhe 2,ululate aana frashe nooikkiha 3, daallasu aana frashe kadhe 4, wole ikkiro…	
149	Minu mule garino wayi/binicho sirtanno bayichi afama gara	1, 100m woro 2, 100 nna 200m mereero 3. 200m &500m mereero 4, 500 m woro dino	

D. Egennote/afate xa'muwa

Code	Xa'mo	dawaro	Sai
150	Shekere macciishshite egennootto?	1, ee 2, macciishshe diegennoommo	Dee'ni ikkiro sai 139
151	Ee ikkiro hiikkinni macciishshitto?	1, tuqu xaadinni (TV& radio) 2, jaalla'ya wayinni 3, fayyimate mininni 4, fayyimmate ogeeyye wayni 5, wole ikkiro…	
152	Binicho shekkere abbitannota lae egennootto?	1, ee 2, la'e diegennoommo	Dee'ni ikkiro sai 140
153	Ee ikkiro misile la'e kuli	1, garaho 2, digaraho	
154	Shekerete malaate afootto?	1, ee 2, diafoommo	Diafoommo ikkiro sai 141
155	Ee ikkiro malaatta maatiro kuli?	1, iibbabbo 2, umu damuume 3, edhote xisso 4, biso qiidisa 5, sagale giwisa 6, loolaqisa nna tushshiisha 7, biso daafursa	

		8, umoho shotisa 9, wole ikkiro….	
156	Shekere mayini dagganno?	1, biinicho qassuro 2, xurino waa agatenni 3, shekerete xissamino manniwa gamba yiniro 4, diafoommo 5, wole ikkiro	
157	Shekere gargadha dandiinanni yite hedatto?	1, ee 2, didandiinanni 3, diafoommo	
158	Shekkeere xaa geeshsha qarqarikkira qarra ikkite no yite hedatto	1, ee 2, dihedeemmo diafoommo	
159	Shekkere shaa dandiitanno yite hedatto, buuxo assiissira hoongiro?	1, ee 2, dishitanno 3, diafoommo	
1160	Argoberete horo maati?	1, binicho shaate 2, woloota binicho labemere gargarate 3, shekere gargarate 4,magareja aasirate kaal'tanno 5, frashete ikkitano 6, wole ikkiro…	
161	Argoobere shekkere gargatanno	1, ee 2, digargaartanno 3,diafoommo	
162	Argoobere biinnicho qassannoheikkii gargartannohegede	1.ee 2.digargartannoe 3, diafoomo	
163	Argobere horonsi'nanni shekerete xissama dandiinanni?	1, ee 2, didandiinanni	
164	Minekki argobere ikkado geeshshinni afama hoogguro ayeera balaxisiissatto?	1, godowiinni noo amara 2, 5 diri woro qaaqquwira 3, geerraho 4, jajjabbaho 5, wole ikkiro…	
165	Argobere shekkere gargartanno?	1, ee 2, digargartanno	
166	Argobere shekere,binicho nna biniocho lawannore gargarate kaa'litanno	1, duure sumuu diyeemmo 2, sumuu diyeemmo 3, maano diyeemmo 4, sumuu 5, duure sumuu	

167	Horonsiranni noommo argobere baatooshshiweello gashshootu uyinoe	1, duure sumuu diyeemmo 2,Sumuu diyeemmo 3,Maano diyeemmo 4, sumuu 5, duure sumuu	
168	Wo'ma woyte argobere horonsira shekkere gargartanno	1, duure sumuu diyeemmo 2, sumuu 3 maano diyeemmo 4, sumuu 5, duure sumuu	
169	Argobere gulgu'le gala dibaxisannoe	1, duure sumuu diyeemmo 2, sumuu diyeemo 3,maano diyeemmo 4, sumuu 5, duure sumuu	
170	Argobere huxxa huxxiratenna qalcho usudhate kaa'litannoLLINs	1, duure sumuu diyeemmo 2, sumuu diyeemmo 3 maano diyeemmo 4, sumuu 5, duure sumuu	
171	Argobere'ya garunni amaxxe maate'ya shekkeeretenni gargara dandeemmo	1, duure sumuu diyeemmo 2, sumuu diyeemmo 3,Maano diyeemmo 4, sumuu 5, duure sumuu	
172	Argoobere ragunni horoonsira kabbaaddanno	1, duure sumuu diyeemmo 2, sumuu diyeemmo 3,Maano diyeemmo 4, sumuu 5, duure sumuu	
173	Shekkere hunate argoobere waagu noosete	1, duure sumuu diyeemmo 2, Sumuu diyeemmo 3,Maano diyeemmo 4, sumuu 5, duure sumuu	
174	Argoobere xullo fulturo woy dadhanturo gowa dandiinanni	1, duure sumuu diyeemmo 2, sumuu diyeemmo 3,Maano diyeemmo 4, sumuu 5, duure sumuu	
175	Dadhanturo gombe horoonsi'nanni argoobere	1, duure sumuu diyeemmo	

	shekkeere garunni gargaartanno	2, sumuu diyeemmo 3,Maano diyeemmo 4, sumuu 5, duure sumuu	