

HARAMAYA UNIVERSITY

COLLEGE OF HEALTH, AND MEDICAL SCIENCE



**Long-lasting insecticidal net utilization status and its associated factors among households in Lume District, Oromia Region, Ethiopia.**

By

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**APPROVAL SHEET**

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HARAMAYA UNIVERSITY

LONG-LASTING INSECTICIDAL NET UTILIZATION STATUS AND ITS ASSOCIATED FACTORS AMONG HOUSEHOLDS IN LUME DISTRICT, OROMIA REGION, ETHIOPIA, 2020

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I was born in 1984 in Zuwey Dugda district, Arsi zone, Oromiya region, Ethiopia. I completed my primary and junior education in Kiynesho in zuwey dugda district Arsi Zone and Batu School, secondary school in Batu East Shoa Zone comprehensive school. Then I have graduated from Hawasa University in Environmental Health Science with Degree 2000. After graduation, I have been working at East Shoa zone, and Modjo Town Oromia Region in different institutions for 10 years.

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## TABLE OF CONTENTS

ACKNOWLEDGMENT.....	iv
<b>LIST OF TABLE</b> .....	<b>v</b>
LIST OF FIGURES .....	ix
ACRONYMS AND ABBREVIATIONS .....	x
1. INTRODUCTION .....	1
1.1. BACKGROUND .....	1
<b>1.2. Statement of the Problem</b> .....	<b>2</b>
<b>1.3. Significance of the study</b> .....	<b>3</b>
1.4. OBJECTIVE .....	3
1.4.1. General objectives.....	3
1.4.2. Specific objectives .....	3
2. LITERATURE REVIEW .....	4
<b>2.1. Utilization of ITNs Status</b> .....	<b>4</b>
2.2. Factors associated with ITN utilization in households .....	5
2.2.1. Socio-demographic factors .....	5
2.2.1.1. Age factors .....	5
2.2.1. 2. Sex factors.....	5
<b>2.2.1.3. Education Factors</b> .....	<b>5</b>
<b>2.2.1.4. Family size factors</b> .....	<b>5</b>
<b>2.2.1.5. Income factors</b> .....	<b>5</b>
<b>2.2.2. Knowledge about ITNs utilization</b> .....	<b>6</b>
2.2.3. Conceptual framework.....	7
3. METHODS AND MATERIALS.....	8
<b>3.1. Study area and Period</b> .....	<b>8</b>
<b>3.2. Study design</b> .....	<b>8</b>

3.3.	Source of Population.....	8
3.4.	Study Population.....	8
3.5.	Inclusion and Exclusion criteria.....	8
3.5.1.	Inclusion criteria .....	8
<b>3.5.2.</b>	<b>Exclusion criteria .....</b>	<b>8</b>
<b>3.6.</b>	<b>Sample size determination.....</b>	<b>8</b>
<b>3.7.</b>	<b>Sampling procedure/Technique.....</b>	<b>10</b>
3.8.	Data Collection .....	12
3.8.1.	Data Collection Methods .....	12
3.8.2.	Data Collection Instrument .....	12
3.8.3.	Data Collector .....	12
3.8.4.	Procedure of Data Collection.....	12
3.9.	Variables (Dependent, Independent).....	13
3.9.1.	Dependent Variables.....	13
3.9.2.	<b>Independent Variables.....</b>	<b>13</b>
<b>3.10.</b>	<b>Operational Definition.....</b>	<b>13</b>
3.11.	Data Quality Control .....	14
<b>3.12.</b>	<b>Methods of Date Analysis.....</b>	<b>14</b>
<b>3.13.</b>	<b>Ethnical Consideration.....</b>	<b>14</b>
<b>3.14.</b>	<b>Information Dissemination.....</b>	<b>14</b>
4.	Results.....	15
4.1.	Socio-demographic characteristics .....	15
4.2.	Knowledge of households about malaria transmission and ITNs uses .....	17
4.3.	Availability and status of LLINs.....	18
5.	Discussion .....	23
6.	CONCLUSIONS.....	27
7.	RECOMMENDATION .....	28
8	REFERENCE.....	29

9 ANNAXES .....	33
Annex 8.1: PARTICIPANT INFORMATION SHEET AND INFORMED VOLUNTARY CONSENT FORM FOR HEAD OF HOUSE HOLDS.....	33
Annex 8.2. English version Questionnaire.....	35
Annex 8.3.: Participant Information Sheet and Voluntary Consent (Afaan OromoVersion) .....	39
Annex 8.4. English version Gaaffannoo Afaan Oromoffaa.....	41
Annex 8.5: CARRICULUM VITAE (CV).....	44

## LIST OF TABLES

Table 1: Sample size determination of study participants for ITNs utilization and factors associated in the study population. ....	9
Table 2:- Socio-demographic characteristics of the respondents Lume District, East Shoa, Oromia Ethiopia, February, 2020. ....	15
Table 3: Knowledge about ITNs use and malaria transmission of households in Lume District East Shewa Zone Oromia Regional, Ethiopia, 2020.....	17
Table 4:-Ownerships and their status in Lume district, East Shewa, Oromia Region, Ethiopia ..	18
Table 6:- Bivariate analysis of Factors associated with ITNs utilization the night preceding the survey among households in Lume District, Eastern Ethiopia, 2020 .....	20
Table 7:- Multiple logistic regression analysis factors independently associated with LLIN utilization the night preceding the survey among households in Lume District, Eastern Ethiopia, 2020.....	21

## LIST OF FIGURES

Figure 1:-Conceptual frameworks for utilization of insecticide treated nets among house hold in Lume District. ....	7
Figure 2: Schematic presentation of sampling procedures, Lume District, Nov. 2019 .....	11

## ACRONYMS AND ABBREVIATIONS

AOR	Adjusted Odds Ratio
CI	Confidence Interval
ET	Ethiopia
EFY	Ethiopian Fiscal Years
EMIS	Ethiopia National Malaria Indicator Survey
EPI	Expanded Program on Immunizations
EPHI	Ethiopia Public Health Institute
ENMIS	Ethiopia National Malaria Indicator Survey
EOS	Enhanced Outreach Strategy
FMOH	Federal Minister of Health
HH	House hold
HU	Haramaya University
IRS	Insecticide Residual Spray
ITNs	Insecticide Treated Bed Nets
LLINs	Long Lasting Insecticide Treated Bed Nets
MIS	Malaria Indicator Survey
OR	Odds Ratio
PMI	President Malaria Initiative
REC	Research and Ethical Committee
RHB	Regional Health Bureau

## ABSTRACT

**Background:** In Ethiopia, Long Lasting Insecticide bed Nets were being distributed based on the average number of person per household. Despite the large scale distribution of Insecticide Treated Nets in many malaria endemic countries, there is a wide variation in the availability and use of Insecticide Treated Nets Long Lasting Insecticide bed Nets at the household level especially in Lume District

**Objective;** This study aimed to assess Long Lasting Insecticidal Nets utilization and its' associated factors among households in Lume district, Oromia region, Ethiopia, from 1 December 2019 up to 30 February 2020

**Methodology:** A community-based cross sectional study was conducted. The study subjects were randomly selected 592 households by simple random sampling. Data was collected through interview and observation checklist.

Data was coded entered and cleaned using Epi- info version 3.5.1 and Statistical analysis was conducted using SPSS version 21

Bivariate analysis were used to select candidate variables for multivariate analysis at ( $p < 0.25$ )

Variables found to have association was entered into multiple logistic regression models for controlling the possible effect of confounders. Model fitness was checked by Hosmer and Lemeshow test.

OR along with 95% CI were estimated to measure the strength of the association. Level of statistical significance were declared at  $P\text{-value} \leq 0.05$ .

**Result:** Among households who owned Long Lasting Insecticide Net 509 (86.6%), only 63.5% of household members had slept under Long Lasting Insecticide Net during the previous night prior to interview while the remaining 36.5% did not use their available nets the previous night prior to interview. Four variables showed statistically significant association with the outcome of interest at  $p < 0.05$  showed that The Educational level of Household head elementary were 1.86 times more likely to utilize Long Lasting Insecticide Nets compared to those unable to write and read (AOR = 1.86, 95% CI 1.20, 2.87). , Those household who living in

the Corrugated iron roof houses were 1.91 times more likely utilize Long Lasting Insecticide Nets compared to those households living in Thatched houses (AOR = 1.91, 95% CI 1.17, 3.11). The average monthly income of respondents above 1501 ET birr were 2.58 times more likely to utilize LLINs compared to those respondents whose monthly income was under 1500 ET Birr (AOR = 2.58, 95% CI 1.17, 4.52) and also those households who properly hanged bed nets over sleeping place were 4.01 times more likely to utilize Long Lasting Insecticide Nets compared to those respondents those not properly hanged bed nets over the sleeping place (AOR = 4.01, 95% (2.72, 5.89)).

**Conclusion:** This study found that Long Lasting Insecticidal Net utilization was low compared with national target (Federal Minister of Health).

**Keywords:** Long Lasting Insecticide Nets Utilization, Associated Factors, Households, Ethiopia Its utilization was associated with the Educational level of Household head, Roof types of HH living houses, Average Monthly income and the bed net hanged (placed) properly over the bed or sleeping area.

# 1. INTRODUCTION

## 1.1. BACKGROUND

In Ethiopia, Long Lasting Insecticide bed Nets were being distributed based on the average number of person per household. As per the 2015 National Malaria Guidelines, the aim of LLIN distribution was to cover all sleeping spaces in households in malaria-endemic areas so that universal coverage—one LLIN for every two persons in a household could be ensured (EPHI, 2015).

The use of insecticide-treated nets (ITNs) is one of the main malaria control strategies in most malaria endemic countries to reach the Roll Back Malaria (RBM) targets to reduce the malaria burden by 50% in 2010 compared to 2000 levels and at least 75% by 2015. Despite the large scale distribution of ITNs in many malaria endemic countries, there is a wide variation in the availability and use of ITNs/LLINs at the household level (Tesfaye G et al,2012) and especially Lume district distribute LLINs 100% coverage however still malaria was the ten top diseases in the district.

By protecting people from being bitten by infected mosquitoes, LLINs are an effective tool to significantly reduce morbidity and mortality due to malaria. Additionally, when coverage rates are high and if a large proportion of human biting by local vectors takes place after people have gone to sleep, LLINs also can have an impact on vector populations. A LLIN has three main functions: i) When mosquitoes are in contact with the net, it has a knock-down effect, temporarily incapacitating or even 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. Long Lasting Insecticide bed Nets also have an effect on other insects, such as head lice, sandflies, ticks and other household pests (e.g. bedbugs and cockroach)(FMOH , 2012)

The ownership and use of treated mosquito nets is the primary prevention strategy for reducing malaria transmission in Ethiopia from since2005. Furthermore, Ethiopia has adopted the goal of achieving universal coverage of LLINs (100%), which involves free distribution so that there is one LLIN for every two persons in a household and targeted for universal (100%) LLIN coverage with one LLIN per sleeping space on average. To increase coverage, timely mass LLIN distribution campaigns are conducted in malarious areas (below 2,000m ASL) On average, households in malarious areas own two LLINs per household .(EPHI, 2015 ).

As per the National Malaria Strategic Plan (NMSP) 2014-2020, the Ethiopian Federal Ministry of Health (FMOH) conducted a mass campaign in 2015-2016, distributing 29.6 million long-

lasting insecticide-treated mosquito nets (ITN) to protect all Ethiopians living in areas with ongoing malaria transmission, representing 60 percent of the total population. These LLINs have been distributed through a variety of channels, based on plans developed by regional states as well as circumstances at the time of distribution. The majority of LLINs have been distributed through standalone campaigns and others through campaigns integrated with the Expanded Program on Immunizations (EPI) and the Enhanced Outreach Strategy (EOS) or from static health facilities(FMOH, 2012)

## **1.2. Statement of the Problem**

World health organization in 2017, an estimated 219 million cases of malaria occurred worldwide compared with 239 million cases in 2010 and 217 million cases in 2016 and In 2017, there were an estimated 435 000 deaths from malaria globally, compared with 451 000 estimated deaths in 2016, and 607 000 in 2010. The WHO African Region accounted for 93% of all malaria deaths in 2017. Although the WHO African Region was home to the highest number of malaria deaths in 2017, it also accounted for 88% of the 172 000 fewer global malaria deaths reported in 2017 compared with 2010(WHO ,2018).

As the study conducted by Ethiopian National malaria indicator survey in 2015 showed that In Ethiopia, between 2005 and 2015, about 64 million LLINs were distributed through mass campaigns to achieve 100% coverage and 80% utilization (CDC,2017). However, According to 2015 national Malaria indicator survey report, only 64% of households (HHs) Own at least one LLIN, and 40% of the population slept under the LLINs the night before the survey. The households with at least one LLIN For every two people were 31.7% in 2015. In Oromia region, where this study was conducted, about 58.5% of HHs owned one LLIN and 41% of the population slept under the LLINs the night before the survey. In order to support this part of malaria prevention aspect there was much effort and resources allocated from donors. On the other hand as many study showed that the proper utilization coverage of bed nets among priority and high risk groups were found to be very low. Since three-fourth of the land mass in Ethiopia is malarious and Oromia is the 1st largest Region, it shares majority of the health and economic burden of malaria in this country and region. Similarly high proportion of resources to prevent and control malaria is expended in the region, especially in District with intensive transmission (EPHI, 2015). Among these, LumeDistrict (76.4% of the land malarious and 74.7% of population at risk) stands among the top. Therefore, in addition to the governmental effort, and Non-Governmental Organizations in the District were distributing bed nets in their respective catchments (Lume District Health office,2019). Despite different preventive measures taken, the

magnitude of the disease has remained the leading cause of morbidity and mortality, always raising the question why?

Research about bed nets utilization rate among House hold and LLINs ownership, factors affecting utilization will remained unassessed in the study area. The present study will examine the situations and tries to identify the gaps.

### **1.3. Significance of the study**

The finding from this study is considered to generate information that helps malaria control program to improve ITN policies and design interventions to prevent malaria. The result of this study helps to identify gaps in ITN status and to design appropriate information, education and communication (IEC) interventions towards improving its utilization among House hold. The result will also be useful to evaluate the progress of the District towards achieving the regional and national target and to take immediate actions in planning and implementation of prevention and control strategies. It will be used as a base line for the District Health Office to develop appropriate strategies to increase ITN utilization among House hold. Information generated in this regard also helps as a baseline for further intervention study of other project.

## **1.4. OBJECTIVE**

### **1.4.1. General objectives**

To assess Long Lasting Insecticide Nets utilization among households, and its' associated factors among households in Lume district, Oromia Region, Ethiopia from 1 December 30/2019. Up to 30 February 2020

### **1.4.2. Specific objectives**

- To assess house hold insecticide treated bed nets utilization.
- To identify factors associated with ITNs utilization among Households.

## 2. LITERATURE REVIEW

### 2.1. Utilization of ITNs Status

Global in the period 2010–2017, household ownership of at least one ITN increased from 47% to 72%, while the percentage of households with at least one ITN for every two people increased from 20% to 40%. The percentage of the population that could be protected by an ITN, assuming that each ITN in a household is used by two people (defined as access to ITNs), increased from 33% in 2010 to 56% in 2017(WHO, 2018).

According to the cross sectional study done in Rivers State, Nigeria in 2013 a total of 400 pregnant women were examined,317(79%) used LLINs with 29 (9.1%) positive for malaria parasites while 83(21%) did not use LLINs with 75 (90.4%) positive for malaria parasites (Michael N et al,2013)

According the study conducted in Kola Diba town, North Gondar, Amhara region, Ethiopia 2018 showed that Utilization of bed net Out of the 260 respondents, 91.9% (95% CI 88.5–95) were found to sleep under bed net in the night preceding the day data were collected (Melaku Bet al,2018)

According the study done in Jimma Zone, South western Ethiopia, 2015showed that only, 217(38.4 %)(95 % CI: 36.9–39.9) had slept under LLIN the previous night with females and children having priority to sleep under LLIN and In these households, children aged 0–4 years were more likely to use LLIN as compared to older people (AOR = 7.22; 95 % CI: 1.74–29.88) (Zewdie B et al, 20015).

According to the cross sectional survey done in kersa Eastern Ethiopia 2012 showed that out of the total surveyed households, 65.5% (1879) had at least one LLIN, but 33.5% (630) LLINs owned households had used at least one LLIN the night before the survey. (Tesfaye G et al, 2012)

According to the cross sectional study conducted in Ethiopia showed that Universal LLIN coverage is higher among urban households compared with rural households (42% versus 30%, respectively). Twenty-two percent of households in the lowest wealth quintile have attained universal LLIN coverage, while in all other wealth quantile over 30 percent of households achieved universal coverage (EPHI, 2015).

## 2.2. Factors associated with ITN utilization in households

### 2.2.1. Socio-demographic factors

#### 2.2.1.1. Age factors

As the study conducted on factors affecting using treated insecticide bed nets for under five showed that families with an average of four members were 1.36 times more likely for their children below five years to sleep under an ITN compared with households with more than four household members. (Minoo G and Mutuku U, 2018)

According to the study conducted in Jimma zone South western Ethiopia showed that, children aged 0–4 and 5–9 years 2.28 times were more likely to use LLIN compared to older people (age  $\geq 50$  years) and other household members (Zewdie B et al, 20015)

Additional a cross sectional survey done in Ethiopia in 2015 showed that LLIN use among the general population is higher for children under age 5 years (45%) and adults 35-49 (43%) compared with other age groups (EPHI, 2015)..

#### 2.2.1. 2. Sex factors

According to the study conducted in Jimma Zone South western Ethiopia showed that Females were 1.5 times more likely to use LLIN compared to males in the household members (Zewdie B et al, 20015)

#### **2.2.1.3. Education Factors**

According to the community cross section study done in 2016 in Adama District shows that those households who are literate (AOR = 2.05, 95% CI =1.53-7.09), were almost two times more likely to slept under LLIN than illiterate during the previous night prior to interview (Asnakech G and Worku D, 2016)

#### **2.2.1.4. Family size factors**

According to the study conducted in Jiga Yelmdar village, Jabi Tehnan District of north-western Ethiopia about 81% of the respondents reported current LLIN use in their households of whom 58.2% only had slept under an LLIN the previous night. LLIN use by all the family was cited most (57.6%; followed by use by father and mother (17.8% and use by children and mother (10.2% (Abebe A et al, 2014)

#### **2.2.1.5. Income factors**

By region, LLIN use is lowest among Oromia as compare with Afar (51 percent) and Amhara (43 percent). LLIN use steadily increases with wealth; 47 percent of those in the fourth wealth quintile compared with 26 percent of those in the lowest wealth quintile slept under an LLIN the previous night (EPHI, 2015).

### **2.2.2. Knowledge about ITNs utilization**

Study on knowledge of malaria and its association with malaria related behaviors in Ethiopia reported a wide gap between awareness of the study subjects to associate mode of malaria prevention by ITNs via protection from mosquito bites and knowledge of the symptoms of malaria (Hwang J et al, 2010). Since ITN is an effective mechanism of malaria prevention in Ethiopia, it is important to assess knowledge and perception of mothers towards ITN utilization. A study about ITNs usage against malaria in Tigray Region found that three fourth of the respondents claimed that children under-five years of age should be given priority to sleep under ITN in the household (Tomass Z et al, 2011). Similarly the study done in Kola Diba town, North Gondar, Amhara region, Ethiopia showed that Households who do not know about transmission of malaria is 90.8% times less odd of using insecticide-treated bed net than who know about transmission (Melaku B et al, 2018). whereas the other a cross-sectional survey done in kersa Eastern Ethiopia showed that presence of ITN colour preference, women's lack of awareness on prevention of malaria, and urban background of residents were independent predictors of LLIN non-use (Tesfaye G et al, 2012)

### 2.2.3. Conceptual framework

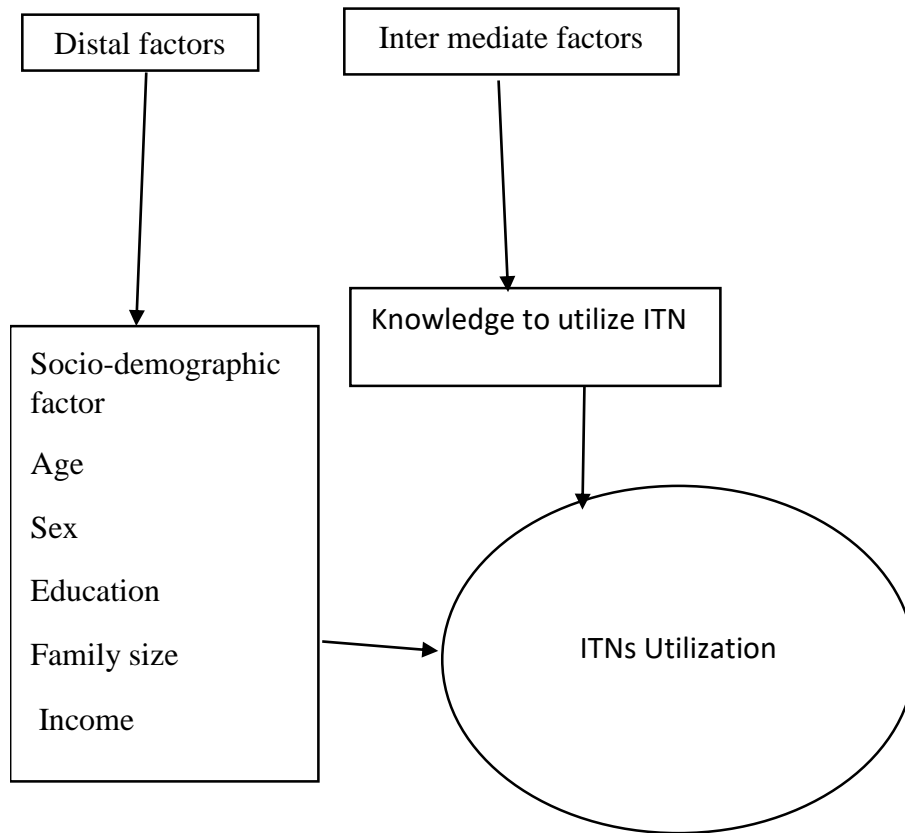


Figure 1:-Conceptual frameworks for utilization of insecticide treated nets among house hold in Lume District.

(Source:-Variable are taken from literature review of related study)

### 3. METHODS AND MATERIALS

#### 3.1. Study area and Period

Lume district is one of the 11 districts which is found in the East shoa zone, Oromia Region. The district is located 70 Km far from Addis Ababa at east direction. Total area of the district is 720 square km. The range of altitude and average annual rain fall is 1500meter to 2300meter above sea level and 800ml to 1200ml per year, respectively. The average annual temperature is 28<sup>0</sup>C. The district has three climatic zone. 'kola', 'Weina dega' and 'Dega'. 'Kola' encompasses 25% (9 kebeles), 'Weinadega' encompasses 45 % (16 kebeles) and Dega encompasses 30 % ( 10 kebeles). Projections from the 2007 population and housing census estimated total population for the year 2011 E.C (2018/19) in the district to be 123,244. Of these, 62,854(51%) were males and 60,390(49%) female(Lume District Health Office,2019). Data collection was started inDecember 1/2019–February 30/2020.

#### 3.2. Study design

A community based cross sectional study design was conducted by using quantitative methods.

#### 3.3. Source of Population

All House Hold in Lume District at least have one LLIN was the source population.

#### 3.4. Study Population

Randomly selected households in the selected kebeles at least have one LLIN during the study period.

#### 3.5. Inclusion and Exclusion criteria

##### 3.5.1. Inclusion criteria

Inclusion sampling criteria for this study was being a household living in a registered housing unit from the eight high malaria endemic kebeles of Lume District.

##### 3.5.2. Exclusion criteria

A respondent who didn't belong to the household family and the individual family who had not slept in the household in the previous night prior to survey was also excluded from the study.

#### 3.6. Sample size determination

Sample size for the first objective was determined with the assumption of single population proportion calculation formal considering proportion of 41% LLINs utilization in Oromia, Ethiopia (EPHI, 2015) considering 5% margin of error, 95% confidence interval (CI) and 10% non-respondent rate.

$$n = \frac{(Z_{\alpha/2})^2 p(1-p)}{(d)^2}$$

$$n = \frac{(1.96)^2 0.41 (1-0.41) * 10\%}{(0.05)^2} = 408$$

For the second objective to determine sample size with the assumption of Double population proportion calculation formal considering proportion of 95% confidence level,%; power (1-β) = 80%; ratio (unexposed to exposed) = 1:1; taking proportion of Knowledge about the use of ITNs (Non exposed), households with secondary school education and Knowledge about malaria transmission 38.9%, 28.6% and 38.7%, respectively, and odd ratio closest to 1 = 2.4, 1.8 and 1.7 LLIN access proportion is from 2015 MIS in Oromia Region 46% (Zelalem T et al, 2015).

Table 1: Sample size determination of study participants for ITNs utilization and factors associated in the study population.

Variable	Exposed	Non-exposed	Adjusted odd ratio (95% CI)	Sample size with 10%	Sample size (n)	Reference
Knowledge about the use of ITNs	61.1	38.9	2.4(1.593,3.615)	17	203	(Zelalem T et al, 2015)
households with secondary school education	71.4	28.6	1.775(1.047,3.009)	46	502	(Zelalem T et al, 2015)
Knowledge about malaria transmission	61.3)	(38.7	1.653(1.156,2.365)	54	592	(Zelalem T et al, 2015)

After comparing three different sample size the largest one was selected. Finally 592 households was final sample size because it was the largest one and helped to address our objectives of ITNs utilization status and its associated factors among households. This calculated sample size was allocated proportionally to 8 randomly selected malarious kebeles to each kebele based on the number of HH population.

### 3.7. Sampling procedure/Technique

The study district was selected purposely. The district has a total of 28 kebeles malarious kebeles. Primarily, the source population from 28 kebeles was stratified in to 26 Rural and two urban malarious kebeles with a population proportion of 74.7%. 28.6% were included in the study which were 8 kebeles. These had 8 kebeles with 5,690 households that were selected by lottery method. Hence, 7 rural kebeles, and one urban kebele were selected by simple random sampling method. The kebele was selected by simple random sampling using the list of each stratum as sampling frame. These are Sherri Dibandiba, Momo Shoke, Kolba Gode, Kurma Fatole, Biqe, Dungigi Bekele Koka Negewo, and Ejeresa 01 were selected for this study. To select household a sampling frame existed with family folder registration at kebele's level. Households in kebeles were selected with a systematic simple random sampling technique. The first household selected by lottery method and the next by Kth interval. Finally 592 households selected proportionally for this study. The number of households which was selected from each randomly selected kebele was determined by the households (population) proportion of respective kebeles. The  $K^{\text{th}}$  value was  $5690/592$  which is equal to 9.3. So every 9<sup>th</sup> households was asked. The first household was selected by lottery methods as first household from strata and every 9<sup>th</sup> household was asked.

Figure 2: shows the proportion kebele sample was taken from malarious kebeles

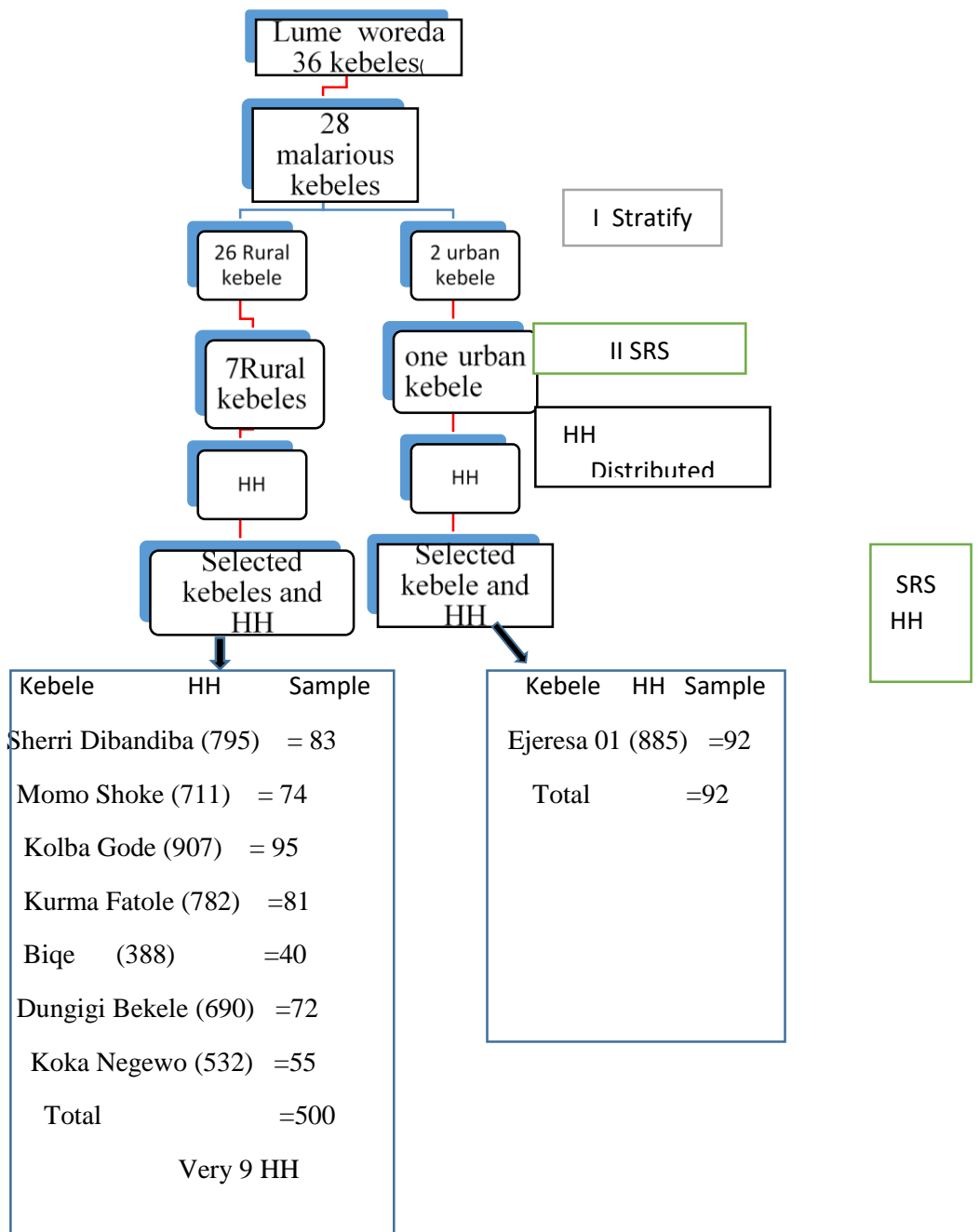


Figure 2: Schematic presentation of sampling procedures, Lume District, Nov. 2019

### 3.8. Data Collection

#### 3.8.1. Data Collection Methods

This survey was conducted after the main rainy season, when the population experience intense mosquito nuisance, which helped to observe and assess mosquito nets use by the residents. A slightly modified Malaria Indicator Survey (MIS) questionnaire that was implemented in Ethiopia in 2007 was used for this study [WHO,2005]. Observation was used for net use and its conditions includes questions about the respondent's socio-demographic characteristics, knowledge about malaria and ITNs utilization of each individual household during the night preceding the survey. The questionnaire also contains observational check list containing variables such as number of ITN and number of beds available in the household, number of ITN already hanged for use and the condition of the net that was used for observation from December 1/2019 to February 30/ 2020

#### 3.8.2. Data Collection Instrument

It was used the National Malaria Indicator Survey semi structured questionnaire and it was translated the English version in to the local language (Afan oromiffaa) then back to the origin version to maintain its reliability. The questionnaire consists socio-demographic and variables related to ITNs utilization.

#### 3.8.3. Data Collector

A total of 15 experienced and trained female data collectors, who were high school graduates and familiar with the study area; and spoke the local language, was involved. There was experienced two male BSc Health officer have continuously supervised the data collection in the field. Initially the data collectors and supervisors was given one day training on their specific duties. Then the study team was deployed to the study sites to collect the data from the selected study units by following the data collection procedures (Express greeting-take verbal consent-collect the data based on the questionnaire - express thanks).

#### 3.8.4. Procedure of Data Collection

Data was collected using semi structured, data collector's questionnaire through house to house and observational check list. Questionnaires was translated in to local language. In order to identify the clarity of questions, pre-testing of the instrument was done. The data collectors was 15 high school graduates with ability of speak Oromia. Two public health officers was engaged in supervision activity. Training was given for both the supervisors and the data

collectors for one day before the pretest and for a day after the pretest. The training includes the objectives of the study, method of data collection, checking completeness of questionnaire and the way approaching to the households.

### 3.9. Variables (Dependent, Independent)

3.9.1. **Dependent Variables:**-ITN-utilization status was the dependent variable of this study.

In this study, the definition of ITN includes long lasting insecticide treated nets and all other insecticide treated nets. Therefore, all insecticide treated nets, whether long lasting insecticide treated nets or retreated nets are referred to in this paper as ITNs. Non treated nets were not included in the definition of use

3.9.2. **Independent Variables:**-was categorized as socio-demographic, Knowledge ITNs Utilization, ownership of ITNs-related factors. Variables used in this study was defined operationally to make them measurable:

### 3.10. Operational Definition

**Household:** - A household is defined as a group of people living in the same area and who share a common source of food and/or income. Houses with only one person was also considered as household.

**Household head** = a leader of a family (household) who is designated by the other members

**Household ownership of ITNs:** -Households was considered as ITN owners if they had at least one LLIN at the time of the interview. All nets was considered as ITNs in our study.

**LLINs utilization-** The use of standardized properly hanged (mounted) over the bed or the sleeping area and less than 5 years of age child, pregnant women and other population group sleeping under the mosquito net during the early morning of observation day.

**Long Lasting Insecticide Nets:** - is a net treated with insecticide by the manufacturer and does not need to be retreated until after 20 washes or four years of use. That was considered as ITNs in our study.

**Knowledge of use of Insecticide treated mosquito nets:**Common principles used to measure knowledge about malaria include questions about transmission and interventions [Obol J.et al, 2011].According to Likert scale among the six multiple-choice questions those whose score equal or above 50%of questionswas taken as having good knowledgewhile those with score of less than 50% was considered as having poor knowledge about ITNs utilization.

### 3.11. Data Quality Control

Quality of data was assured by giving a one days training for the data collectors and supervisors towards the objective of the study, the right and benefit of the study participant, how to fill data on hard copy and daily supervision activities . Data collectors was enrolled from the study District and who have diploma and working experience on health data collection and supervisors was also recruited based on their educational back ground(BSc and above) with supervising experience. We wasused semi structured questionnaires which consist of socio economic questions and determinant risk factors associated with utilization of insecticidetreated nets (ITNs). The data was collected thoroughly from systematic selected house hold by interviewing the house hold head/or any other member age abvee+18 years. There was daily supervision for the data collectors in their daily activities from the beginning up to the end of data collection period.

### 3.12. Methods of Date Analysis

Data was coded entered and cleaned using Epi- info version 3.5.1 and Statistical analysis was conducted using SPSS version 21.Bivariate analysis were used to select candidate variables for multivariate analysis at ( $p < 0.25$ ).Variables found to have association was entered into multiple logistic regression models for controlling the possible effect of confounders. Model fitness was checked by Hosmer and Lemeshow test.OR along with 95% CI were estimated to measure the strength of the association. Level of statistical significance were declared at  $P\text{-value} \leq 0.05$ .

### 3.13. Ethnical Consideration

Ethical clearance was obtained from Institutional Health Research Ethics Review Committee(IHRERC) Haramaya University College of Health, and Medical Sciences. Permission was obtained from ORHB, East Shoa Zonal Health office and Lume District Health Office. Informed, voluntary, written and signed consentwas also be obtained from each HeadHouse hold. In order to maintain confidentiality, study subjects was not identified by name and data collection was done by health professional.

### 3.14. Information Dissemination

The study result was disseminated to Haramaya University, School of Public Health, Ethiopia Field Epidemiology Training Program. And also the study result was submitted to Oromia RHB East Shewa Zone Health Office and Lume District health office. A one day briefing was prepared at Lume district health office in related to the study result.

## 4. Results

### 4.1. Socio-demographic characteristics

From 592 sample size included in the study 588 households responded making response rate (99.3%). Majority of the respondents 84% (494) were rural. Regarding sex of the respondents 56.6 % (333) were female. Of 588 households included in the study, 86.1% (509) of the respondents were heads of the household is male and the remaining were other household family members. The median age of the respondent was 35 years (35±14SD). Majority of the respondent 84.4 % (499) were Oromo in ethnicity. Regarding marital status of the respondents, majority (76.7%) were married. Most of the respondents 65.1% (383) were farmers by occupation and less than half 34.5% of them had unable read and write. Around 53.6% (315) of the households had a family size  $\geq 3$ , with a mean of 3.54 persons per households and 41.7% (245) of the households had at least one child below 5 years of age. Few pregnant women were encountered in this study, only in 62 (10.5%) of the households surveyed. Majority of the house living house roofs (66.2%) were made of corrugated iron sheet and 69% of the respondents had only one sleeping room. Only 38.6% of respondents had the average monthly income of 151-450 ETB and above.

Table 2:- Socio-demographic characteristics of the respondents Lume District, East Shoa, Oromia Ethiopia, February, 2020.

Variables	Character	Frequency(n=588)	Percentage
Places of Residence	Urban	94	16
	Rural	494	84
Sex of Respondents	Male	255	43.3
	Female	333	56.6
Relationship of the respondent to the head of household	husband	227	38.6
	Wife	269	38.6
	Son/daughter	64	45.7
	Sister/brother	22	10.9
	Others	6	3.7
Sex of Household head	Male	506	86.1
	Female	82	13.9
Age of Household head	18-24	86	14.6
	25-34	191	32.5

	35-44	143	24.3
	45-54	76	12.9
	55-64	50	8.5
	>=65	42	7.1
Ethnicity of Household head	Oromo	499	84.9
	Amhara	78	13.1
	Tigray	3	0.5
	Gurage	6	1
	Others	2	0.3
Marital status of Household head	Married	451	76.7
	Single	73	12.4
	Divorced	24	4.1
	Widowed	40	6.8
Educational level of Household head	Illiterate	203	34.5
	Literate	306	52
Occupation of Household head	Farmer	383	65.1
	House wife	30	5.1
	Students	47	8
	Daily laborer	42	7.1
	Merchant	40	6.8
	Governmental employee	18	3.1
	Unemployed	19	3.2
	Others	9	1.5
Family size	<=3 persons	315	53.6
	>3 persons	273	46.4
Children under 5 years	Yes	245	41.7
	No	343	58.3
Pregnant women	Yes	62	10
	No	526	89.5
Types of Roof	Thatch	199	33.8

	Corrugated iron	389	66.2
Average Monthly income	<150 ET birr	160	27.2
	151-450ET.Birr	227	38.6
	451-1500ET.birr	108	18.4
	1501 and above ET. Birr	93	15.8

#### 4.2. Knowledge of households about malaria transmission and ITNs uses

Knowledge about utilization of ITNs: nearly 82.8%, 6.8%, 9.4%, and 1% of the households responded use of ITNs as it is prevent from malaria, kill mosquitoes, to protect from the bite of nuisance insects, and others respectively. The overall knowledge of household about ITNs utilization was 87.6%. Most of the participants 523 (88.9%) responded as there is low risk of getting malaria while sleeping under ITNs. Almost all of respondents 568 (96.6%) know that ; malaria is transmitted by bite of mosquitoes. priority to sleep, under the ITN 50.5% and 35.7% of them replied for Under five children and Pregnant women given were respectively.

Table 3: Knowledge about ITNs use and malaria transmission of households in Lume District East Shewa Zone Oromia Regional, Ethiopia, 2020.

Variables		Number (%)
What are the benefits of the mosquito net	To kill mosquitoes	40 (6.8%)
	To protect from the bite of nuisance insects	55 (9.4%)
	To protect from malaria	484(82.8%)
	Used as a curtain	4 (0.7%)
	Used as a mattress	1(0.2%)
	Other(specify)	4(0.7%)
Can someone get malaria while sleeping under LLINs	Yes	59(10%)
	No	529((90%)
Do you have knowledge about malaria	Yes	574(97.6%)

transmission by mosquito bite	No	14(2.4%)
For whom Priority is given if you have only one ITNs in your house to sleep under LLINs	Adults >15 years old	35(6%)
	Children years 5–15 old	42(7.1%)
	Children < 5 years old	297(50.5%)
	Pregnant women	210(35.7%)
	No priority group	4(0.7%)

#### 4.3. Availability and status of LLINs

From the total households participated in survey, 86.6 % ( 509) have at least one LLINs. From total number of nets available (used and unused) by these 808 households was, putting an average of around 1.6 nets per household regardless of family size. The proportion of bed nets actually in use was 63.5 % (323) from the nets owned by the households. Most of Nets were generally in good condition, and only 8.2 % (48) of the nets available were found to have holes that could allow entry of mosquito.

Table 4:-Ownerships and their status in Lume district, East Shewa, Oromia Region, Ethiopia

Variables		Number (%)
Do you have ITNs	Yes	509(86.6)
	No	79(13.4)
number of ITNs do have in the household	One	209(35.5)
	Two	265(45.1)
	Three	31(5.3)
	Greater than three	4(0.7)
Had you sleep under ITNs last night	Yes	323(63.5)
	No	186(36.5%)
Reasons for not sleeping under ITNs last night	It is too hot to use	69(28.9%)

	There are no mosquito	33(5.6%)
	Nets don't suit their house	64(10.9%)
	It is not the season	20(14.5%)
When had you get the ITNs?	in the last 6 months	471(80.1%)
	before 6-12 month	30(5.1%)
	Before one years	8(1.4%)
Is the bed net hanged(placed) properly over the bed or sleeping area	Yes	299(50.9%)
	No	210(35.7%)
Is there any hole(tear) in the bed net	Yes	48(8.2%)
	No	461(78.1%)

#### Utilization of LLINs

Among households who owned LLIN (86.6%), only 63.5% of household members had slept under LLIN during the previous night prior to interview while the remaining 36.5% did not use their available nets the previous night prior to interview. According to the respondent's perception a group of household's members who had priority to LLIN usage was 50.5% for children under five years, 35.7% for pregnant women, and 7.1% Children years 5–15 old. Concerning the major reasons for not sleeping under the net in the previous night, 28.9% of respondents said that sleeping under LLIN was too hot to use, 14.5% said it is not the season and 10.9% said that nets don't suit their house. Regarding the time of received LLINs and properly hanged LLINs where as 80.1% were get LLINs before 6 months ago and Of the households reported to utilized LLIN, 50.9% (299) kept at least one bed net hanging, whereas 35.7% (210) did not hang any bed net and 461(78.1%) in good conduction during interviewer

#### 4.4. Bivariate analysis of Factors associated with utilization of LLINs

Bivariate logistic regression analysis was performed to select candidate predictors for net utilization. Place of residency, Sex of respondents, educational level of household head, Can someone get malaria while sleeping under LLINs, average Monthly income, and bed net hanged(placed) properly over the bed or sleeping area were showed significant association at  $p <$

0.05. Socio-demographic variables such as,marital status,age of respondent and occupational status of respondent as well as family size did not show significant association to ITNs utilization at  $p < 0.05$

Table 5:-Bivariate analysis ofFactors associated with ITNs utilization the night preceding the survey among households in Lume District, Eastern Ethiopia, 2020

Variables		LLINs utilization		OR 95 CI (Crude	P- valu e
		Yes	No		
Place of Residence	Urban	86(91.5%)	8(8.5%)	1.00	
	Rural	423(63.5%)	7114.4%)	2.25(1.40,3.61)	.001
Sex of households head	Male	227(89%)	28(11%)	1.711(1.16,2.52)*	.007
	Female	282(84.7%)	51(15.3%)	1.00	
Educational level of Household head	Illiterate	128(63.1%)	75(36.9%)	1.00	
	Literate	223(72.9%)	83(27.1%)	1.57(1.08,2.30)	.019
Someone get malaria while sleep under LLINs	Yes	40(83.3%)	8(16.7%)	2.41(1.10,5.28)	.028
	No	311(67.5%)	32.5%)	1.00	
Average Monthly income	<150 ET birr	138(86.3%)	22(13.8%)	1.00	
	151-450ET.Birr	184(81.1%)	43(18.9%)	.942(.591,1.50)	.799
	451-1500ET.birr	103(95.4%)	5(4.6%)	1.11(.64,1.91)	.712
	1501 and above ET. birr	84(90.3%)	9(9.7%)	3.13(1.55,6.34)	.712
proper placement of ITN over sleeping area	Yes	296(99 %)	3(1.0 %)	.026(.015,.04)	.000

	No	204(97.1 %)	6(2.9 %)	1.00	
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1. COR Crude odds ratio
2. \* Significantly associated at  $p < 0.25$

#### 4.5. Multiple Logistic Regression analysis factors associated with utilization of LLINs

A multiple logistic regression was performed to identify factors which independently predict of LLIN utilization the night preceding the survey. Accordingly, Place residency, Educational level of Household head, Average Monthly income and the bed net hanged properly over the sleeping area are likely predictors of LLIN utilization at  $p < 0.25$ . Four variables showed statistically significant association with the outcome of interest at  $p < 0.05$  showed.

Place of residency were urban 1.94 time more likely to utilize LLINs compare to those rural (AOR=1.94, 95%CI 1.94(1.13,3.32)). Household head literate were 1.71 times more likely to utilize LLINs compared to those illiterate (AOR = 1.71, 95% CI 1.71(1.13, 2.59)). It is consistent with study conducted in Zuwey dugda district Arsi zone (Azeb S. et al, 2019), Adama district East shoa Zone (Asnakech G. et.al, 2016) and Harari National Regional State (Teklemariam Z et.al, 2015).

The average monthly income of respondents above 1501 ET birr were 2.30 times more likely to utilize LLINs compared to those respondents whose monthly income was under 1500 ET Birr (AOR = 2.30, 95% CI 2.30(1.17, 4.52)\*) and also those households who properly hanged bed nets over sleeping place were 4.01 times more likely to utilize LLINs compared to those respondents those not properly hanged bed nets over the sleeping place (AOR = 4.01, 95% (2.72, 5.89)). It is similarly with a study conducted Botswana (Chihanga S. et.al, 2012).

Table 6:- Multiple logistic regression analysis factors independently associated with LLIN utilization the night preceding the survey among households in Lume District, Eastern Ethiopia, 2020

Variables		LLINs Utilization		OR 95 CI (Crude)	P-value	AOR 95 CI (Adjusted)
		Yes	No			
Place of Residence	Urban	86(91.5%)	8(8.5%)	1.00		1.00
	Rural	423(63.5%)	71(14.4%)	2.25(1.40,3.61)**	.016	1.94(1.13,3.32)*
Sex of HH head	Male	227(89%)	28(11%)	1.48(1.04,2.12)*	.659	1.098(.73,1.66)
	Female	282(84.7%)	51(15.3%)	1.00		1.00
Educational level of Household head	Illiterate	128(63.1%)	75(36.9%)	1.00		1.00
	Literate	223(72.9%)	83(27.1%)	1.57(1.08,2.30)	.012	1.71(1.13,2.59)*
Someone get malaria while sleep under LLINs	Yes	40(83.3%)	8(16.7%)	2.41(1.10,5.28)	.028	
	No	311(67.5%)	32(7.5%)	1.00	.318	1.75(.58,5.28)
Average Monthly income	<150 ET birr	138(86.3%)	22(13.8%)	1.00		1.00
	151-450ET.Birr	184(81.1%)	43(18.9%)	1.18(.76,1.84)	.596	1.14(.69,1.89)
	451-1500ET.birr	103(95.4%)	5(4.6%)	1.59(.95,2.68)	.333	1.34(.74,2.44)
	1501 and above ET. birr	84(90.3%)	9(9.7%)	2.58(1.44,4.62)*	.001	2.30(1.17,4.52)**
bed net properly placed over the sleeping area	Yes	296(99 %)	3(1.0 %)	3.04(2.10,4.41)*	.000	4.01(2.72, 5.89)**
	No	204(97.1 %)	6(2.9 %)	1.00		1.00

1. AOR adjusted odds ratio

## 5. Discussion

This study found that Long Lasting Insecticidal Net utilization was low compared with national target (Federal Minister of Health). Its utilization was associated with the Educational level of Household head, Roof types of HH living houses, Average Monthly income and the bed net hanged(placed) properly over the bed or sleeping area.

The study finding has showed that 63.5% of them used their LLIN on the night before the survey. This proportion was higher compared to the findings of similar studies in Ethiopia(Zewdie B 2015; Aklilu 2016; Azeb Semu Ragasa 2019) which were (38.4 %),(52.3%) and (18%). The possible reason for the difference between these three studies could be due to the awareness of the community and duration of net distribution in respect to each District.

According to malaria indicators survey report, for households living <2,000m (i.e., in malaria-endemic areas), 54.8% owned at least one LLIN which was less than our findings (63.5 %). The reasons may be due to the increase in the distribution of LLIN throughout the region.

Out of the total LLIN users, 50.5% were given priority to children under five years and 35.7% for pregnant women. In the same report, households that owned at least one net, 45% of children under five years had slept under LLIN and 44% of pregnant women had slept under LLIN the previous night [ENMIS, 2015]. When compared to this finding, the coverage for children under five years was almost similar,

but the coverage for pregnant women was even less than the 2015 coverage. The reasons may be not only distributing nets but the system needs proper follow-up of LLIN utilization and adequate surveillance.

In Ethiopia, the study done in Mirab Abaya District and Adama District, Oromia region, of Ethiopia revealed that LLINs utilization were 85.1% and 76% respectively (Admasu T, 2017) and (Asnakech G, 2016) which were greater than 63.5% this finding in Lume district. This difference may show due to the study period of conducted during malaria transmission season.

LLIN utilization was reported to be 58.2% in another a study done in Jabi Tehnan District, north-western, Ethiopia (Abebe A et al, 2014) which was also parallel to this study finding. Also the study done among households in Raya Alamata District, Tigray, Ethiopia 68.6% of them were utilized the LLIN(**Girmay D** 2015)which is slightly greater than this finding.

In different Africa countries research on LLINs utilization was conducted, like the proportion of households who owned insecticide treated bed net was less than with the study finding in among Residents of Kamwenge Town Council Kam wenge District-Uganda where reported as 60%, but the proportion of LLIN utilization among households in among Residents of Kamwenge Town Council Kam wenge District-Uganda (54.4%) (Antony I, 2019) which was less than this finding (63.5%).

On the other hand, LLIN utilization in southern Nigeria (43.2%) (Komomo, E. A. 2016). Which was less than this finding 63.5% this difference in LLIN utilization may be resulted from differences in the health priorities of the countries.

The presence of Place of residency urban, Educational level head of Household , , Average Monthly income of head house hold and proper placement of LLINs over sleeping area were important predictors positively associated with LLIN utilization in this study. The presence of place of residency urban, and Educational level head of Household were the predictor of high LLIN utilization among net owning households in this study. This is in harmony with previous studies conducted in Ethiopia(**Asnakech G**, 2016).The significant association between level of education by households was also reported in another study (Woyessa A 2014). Higher level of education affirmatively influences the knowledge of linking sleeping under bed net with malaria prevention [FMOH, 2006].

Similarly, a study from Botswana indicated that presence of hanging nets was a major predictor of LLIN use by households (Chihanga S, 2012). The proportion of net owner households hanging at least one LLIN in the present study was 50.9%, which was higher compared to earlier findings across Sub-Saharan Africa [Oyeyemi AO,2010,Deribew A, 2010].

The average Monthly income 1501 and above Ethio birr, another predictor of LLIN use, was positively related to households in the current study.

The respondents' knowledge that sleeping under a bed net prevents the transmission of malaria predicted utilization of LLIN by households. About 50.8% of LLIN user households associated sleeping under bed net with malaria prevention in the current study.

The proportion of LLIN owner households (86.6%) in this study was found to be higher compared to similar studies in Ethiopia(Zewdie B 2015)which was (70.9%).

Majority of the respondents had knowledge about the benefits of ITNs to protect from malaria(82.8%). This finding has shown an improvement compared to previous study that reported 49.4%(Woyessa A 2014).

In order to ensure consistent and efficient use of prevention tools, knowing that malaria is transmitted by mosquito bites is essential (FMOH EHNRI, 2012). In the present study, 97.6% of the respondents knew that malaria is transmitted by mosquito bite which was higher than the MIS 2015 (75%).The possible reason for this difference could be increased awareness of the community members from time to time through media or health information dissemination.

Generally, this survey was conducted during dry season in the study area when mosquitos'transmission is low. Consequently, such a reason should be taken into account in interpreting the findings as the season might have encouraged the people to use the nets more. Outcomes in ownership as well as LLIN utilization could show different proportions if studies conducted in other seasons of the year. As strength of this study, inspection by direct observation has been conducted by data collectors for all applicable questions in order to minimize response bias during the interviews.

### **Strengths and limitations of the study**

#### **Strengths**

Communitybased study method was used through collecting the primary data. Direct observation was done to verify the reported information. ITN use among households was calculated for each households

## LIMITATIONS

However, the utilization level was based on self-report of the respondents. Therefore, community desirability bias might affect the utilization coverage among households. The study was undertaken during the dry season when the malaria transmission is low and it might underestimate ITN utilization. There is also possibility that some of the nets being used might not be ITNs. Recall bias is also the other limitation for the specific questions like did you get ITN in the past 12 months and households ITN use during the night prior to interview.

The other limitation of this study it was not included questionnaire about source of information knowledge about malaria transmission and source of ITNs from where did they get , altitude about household ITNs utilization, and Stratification of demographic climatic zone.

## 6. CONCLUSIONS

This study found that Long Lasting Insecticidal Net utilization was low compared with national target (FMH). Its utilization was associated with the Educational level of Household head, Roof types of HH living houses, Average Monthly income and the bed net hanged(placed) properly over the bed or sleeping area.

## 7. RECOMMENDATION

Based on the findings of this study, we would like to forward the following recommendation. Both the coverage and utilization of LLINs by House hold not met national target coverage during data collection

### At Kebeles level

Health extension workers (HEWs) evidence based practice should be designed. Enhanced health education and community mobilization should be employed to increase proper utilization of ITNs by demonstrating proper hanging of ITNs. House to house visit should be done by HEWs to see HHs utilization ITNs. The health extension workers should also demonstrate each household how to properly hang on their house at the time of distribution of ITNs. They must also work on the sustainability of the use of ITNs and other malaria prevention and control measures via increased community participation. Better prepare and facilitate community conversation on why available ITNs could not be used properly and come to solution with community. Encourage those HHs those use ITNs properly and consistently. Cooperate with Kebeles leaders and control ITNs used for other purpose.

### At District Health Office Level

Review malaria control programs mainly ITNs utilization. Plan for gap filling those HHs who did not get ITNs and those reported worn-out.

### At Zonal Health Office Level

Conduct regularly supervision of the district on the utilization of LLINs by household. Plan for gap filling those HHs who did not get ITNs and those reported worn-out.

### At Federal Minister of Health Level

Monitor and evaluate LLINs utilization. Encourage qualitative and quantitative research's done around this program. Work with stake holders to improve housing quality. Distribute ITNs in

line with national target that is, 100% ownership. Jointly work with wash program to improve personal hygiene and washing habit of ITNs.

Finally, this study also recommends further study about the utilization status and its associated factors

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## 9ANNAXES

### Annex 8.1:PARTICIPANT INFORMATION SHEET AND INFORMED VOLUNTARY CONSENT FORM FOR HEAD OF HOUSE

My name is \_\_\_\_\_, I am working as a data collector for the study being conducted in this community by (**Ahmed Ereso**) who is studying for his/her master's degree at Haramaya University, the Collage of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and Your Institution being selected as the study setting.

#### **Title the study**

Long-Lasting Insecticidal Net Utilization Status and Its Associated Factors among Households in Lume District, Oromia Region, Ethiopia,

**Purpose of /aim of the study:-**The Findings of this study can be of a paramount importance for Lume District health office to plan intervention programs to prevent Malaria disease in your community; there by improve community health and survival in general population. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of master's program in **Field Epidemiology** for the principal investigator.

**Procedure and duration:**I will be interviewing you by using a questionnaire to provide me with pertinent data that is helpful for the study. There are 33 questions to answer where I will be fill the questionnaire by interviewing you. Theinterview will be take about 30 minutes, so, I kindly request you to spare me this time interview.

**Risks and benefits:-**The risk of being participating in this study is very minimal; but only taking few minutes from your time. There would not be any direct payment for participating in this

study. But the findings from this research may reveal important information for local health planners.

**Confidentiality:** The information you will provide us will be confidential. There will be no information that will identify you in particular. The findings of the study will be general for the study community and will not reflect anything particular of individual persons or housing. The questionnaire will be coded to exclude showing names. No reference will be made in oral or written reports that could link participants to the research

**Rights:** Participation for this study is fully voluntary. You have the right to declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the study at any time and this will not label you for any loss of benefits which you otherwise are entitled. You do not have to answer any question that you do not want to answer.

**Persons to contact:** If there are any questions about study, you can contact any of the following addresses

Ahmed Ereso: mobile number +251912137604

E-mail: ahmederesoch@gmail.com

Institutional Health Research Ethics Review Committee (IHRERC)

Tel: +251254662011

P.O. box 235, Harar-Ethiopia

**Declaration of Informed voluntary consent:** I have read/ was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits. Issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to answer any question that I do not want. Therefore I declare my voluntary consent to participate in this study with my initials (signature).

Name and signature of participant \_\_\_\_\_ Date \_\_\_\_\_

Name and signature of Data collector \_\_\_\_\_ sign \_\_\_\_\_ Date \_\_\_\_\_

N.B: This is to be signed face to face in the presence of the data collector. Please provide a copy of this signed consent to the participant.

**Thank you for your cooperation!**

Annex 8.2. English version Questionnaire

**Kebele Name** \_\_\_\_\_ **Date** \_\_\_\_/\_\_\_\_/\_\_\_\_ **Confidential**

Title of the study: Assessment of Long-Lasting Insecticidal Net Utilization and Its Associated Factors among Households in Lume District, Oromia Region, Ethiopia, 2019.

Dear participant, my name is -----, professionally I am medical doctor/ health officer/ nurse; and I am a worker of ----- health center and I am collecting data for research project intended to identify Using of ITNs and associated factors to improve community awareness on ITNs utilization. Now, I want to ask you, your willingness to participate on this research by your full interest. The research is important for you and for general community to increase Malaria intervention and to prevent Malaria disease by avoiding/decreasing Mosquito biting to be improve with their healthy. Also, I would like to tell you as you have full rights to participate or not participate on this study and as you have right to stop participation at any time on the process of study duration. Additionally, all information you will give us are confidential and used only for this study.

Dear participant, thank you for your cooperation in advance; and now I will read to you or you can read this written consent form; and you will sign for me as you agreed to participate in this study with your full will, after you understand the objective of the study, all procedures will be taken, and your benefits and rights.

Questionnaire for assessment on Long-Lasting Insecticidal Net Utilization Status and Its Associated Factors among Households in Lume District, Oromia Region, Ethiopia, 2019

**I. Section 1. Household Identification Information**

Questionnaire for assessment of Long-Lasting Insecticidal Net Utilization Status and Its Associated Factors among Households in Lume District, Oromia Region, Ethiopia, 2019

**I. Section 1. Household Identification Information**

S/No	Identification	Response
1	Name of Kebele	
2	Name of Gare/ got	
3	Questionnaire Number	
4	Date of Interviewer dd/mm/yyyy	

**Section 2 Socio-demographic characteristics of the respondents (intake from)**

S/no	Questions	Response	Skip to
Q101	Place of Respondents	1=urban 2=Rural	
Q102	Sex of the Respondents	1=Male 2=Female	
Q103	Relationship of the respondent to the head of household:	1= household 2=Wife 3=Son/daughter 4=Sister/brother 98= Other(specify)_____	
Q104	What is the sex of head of the household?	1= Male 2= Female	
Q105	What is your age in full years?	_____Years	
Q106	What is your Ethnicity?	1=Oromo 2=Amhara 3=Tigrai 4=Gurage 98=Others_____	
Q107	What is your current marital status?	1= married 2= Single 3= Divorced 4= Widowed	
Q108	What is your level of Educational?	1=Unable read and write 2=Able read and write 3=Elementary 4=Secondary 5=Above secondary	
Q109	What is your Occupational?	1=Farmer 2=House wife 3=Students 4=Daily laborer 5=Merchant 6=Governmental	

		employee 7=Unemployed 98=Other	
Q110	How many people currently live in this household, including <5yrs children and pregnant women	Total number of household members_____	
Q111	What is the main material of the roof of house of the household?	1=Thatched 2=Corrugated iron 98=Other (Specify)	
Q112	What is your average Monthly income?	1= <150 2= 151-450 3=451-1500 4= 1501 and above	
Section III:-Ownership and utilization of household about ITNs in Lume District Oromia Region Ethiopia,2019			
Q201	Do you have ITNs	1= Yes 2= No	If NO SKIP to Q301
Q202	If Yes Q1 How many ITNs do have per household	1= one 2=two 3=three 4=greater than three	
Q203	Had you slept under ITNs last night	1= Yes 2= No	If yes Skip toQ205
Q204	If No Q2 reasons for not sleeping under ITNs last night	1=It is too hot to use 2=There are no mosquito 3=Nets don't suit their house 4=It is not the season 5=It is dirty 98=Other 99=Don't know how to use	
Q205	When had you get the ITNs?	1=before 6 month 2=before 6-12 month 3=before more than 2 years 99= I don't know	
Section IV:-knowledge of households about ITNs and malaria transmission in Lume District ,Oromia Regional Ethiopia ,2019			
Q301	What are the benefits of the mosquito net? ✓ List as many options as possible	1=To kill mosquitoes 2=To protect from the bite of nuisance insects 3=To protect from malaria 4= Used as a curtain 5= Used as a mattress 98=Other(specify) _____	
Q302	Can someone get malaria while sleeping under	1= Yes	

	LLINs	2= No	
Q303	Do you have knowledge about malaria transmission by mosquito bite	1= Yes 2= No	
Q304	For whom Priority is given if you have only one ITNs in your house to sleep under LLINs	1= Adults >15 years old 2= Children years 5–15 old 3= Children < 5 years old 4= Pregnant women 5= No priority group	

**Section 4. Observational checklist:**-Now I would like to observe the ITNS and sleeping beds to see the condition of nets whether hanged correctly or not and verify what we have been talking so far.

S/No	What to Observe	Observation	Code
Q401	Number of separate beds or places of sleep	_____	
Q402	Number of bed nets observed in the Household	_____	
Q403	Number of beds /places of sleep observed with ITN hanged	_____	
Q404	Is the bed net hanged(placed) properly over the bed or sleeping area	1=Yes 0=No	
Q405	Is there any hole(throne) in the bed net	1=yes 0=No	

Checked by supervisor

Name of supervisor \_\_\_\_\_

Signature of supervisor: \_\_\_\_\_

Date: \_\_\_\_\_

Annex 8.3.: Participant Information Sheet and Voluntary Consent (Afaan OromoVersion)

Ibsa waaraqqa hirmaattotaa fi feedhumaa isaani ibsu

MaqaankooObbo/Aadde-----jedhama. Qorannoo hojjiin walqabatee miidhaa Namoota mana kessan jiraan qaqqabuu fi wantoota miidhaa kana waalinhidhaata qabani kan namoota mana adda adda aanaa Lume Gandota kessaa hojjetan irratti geggefamuu kana irratti ani akka oddefannoo saassabdu tokkotin tajaajila.Qorannon kun kan rawwatamu Haraamaya Univarsititti fayya haawasumaan digiiri lamaffaa barachaa kan jiru Obboo Ahimad Irreessoo kan jedhamuuni .Hirmaana keessani argisisuun yeroo muraasaf akka yaada keessani naaf kennitanif kabaajanisin gaffadha.

Mata-duree qorannoo:sakkata'insa itti faayyadaman Saphaan siree fi wantoota sababa kan fidaan aanaa lumee Godina showa bahaa keessa jira irratti adaa basu

Kayyoo qorannoo kana: Argannoon qorannoo kana irraa argaamuwajjiiri Hawasumaa fi hojjeta aanaa keessan akka ittisaa fi to'annaa dhibee buuse waliin walqabatu irratti xiyyeeffatu gargaara.Kara biron immoo qoraata kuni waaraqa qorrannoo kana dhiyeesse akka fayya haawasumaan digiiri lamaffaatin eebbifaamuf gargaraa.

Adeemsa qorannoo fi yeroo: Gaffilee bareeffamaninaaf kennaman kanani gaaffi fi deebi waalin tasaasifnu kuni qorannoo kanaf bu'a qaba. Gaffillee 57 qofatu jiruu, gaffilee kana daaqqiqaa 25

hanga 30 keessattini xumuraa.Kanafuu yeroo xiqqoo kana akka naaf gummachitani kabajaan isin gafaadha.

Midhaa fi bu'aa qorannicha:Midhaan qorannoo kana irraa nama mudaachu danda'u yeroo keessan xiqqoo kan fudhaatuirra kan hafee baay'ee xiqqoodha.Qoranno labooratorif dhigaa keessani akka kennitanif hin gaffatamtani.Kanan duraa raga dhibee hojjii irraatti isiin qunname yoo jiraate qofa nuti himtu

Qorannoo kana irratti hirmaachu keessanif kaffaltin addaa isinif kaffalaamu hin jiru. Garuu argannoon qorannoo kana irraa argamu uummaata fi karoorsituu fayyaaf odeeffannoo gaaggarii ni kena

Eeggannoo odeffannoo fi hirmaatootaf godhamu: Odeffannoon keessani nama kamiffu dabarfaamee hin kennamu.Odeeffannoon kamiyyu eenyumaa hirmaatoota kan addaa basuu hin jiru. Tokkoon tokko hirmaatoota kophaa isani bakka namni odeffannoo isaan hin dhageenyetti gaaffi fi deebbi godhu.

Argannoon qorannoo kana hojjettota dhaabilee fayyaa Lumee kessaa hojjetan mara bakka tokkotti kan addaa basuu malee tokkoo tokkon hirmaatoota kan addaa basuu miti.Gaffileen hirmaatotni gafaataman hunduu maqaa hirmaatota akka qabaneef kooddi godhamaa ni jiru. Afaaninis ta'e bareeffamani kan hirmaatotaa qorannoof wabii godhamuu hin jiru.

Mirgaa hirmaatoota: Hirmanaan qorannoo kanaf godhamuu hunduu fedhii hirmaatotatin qofa. Qorannoo kana irratti hirmaachuf yookin dhisuuf mirgaa guutu qabdani.Yoo qorannoo kana irratti hirmaatani, yeroo kamittu gaffifi deebi kana addaan kuutuf mirgaa qabdu.Sababi addan kuutanif waanti midhaani isin irra gahuuyookin bu'aan isin dhabdaani gonkumaa hin jiru.Bakka deebi kennu hin barbaadneetti deebi kennu dhisuun ni danda'ama.

Teessoo qunnamtif: yoo gaaffi dabaalata qabaatanif yeroo kammiyyuu teessa armaan gadiitin nuu qunnamuu dandeessu.Qorataa jalqaaba: obbo Ahimad Irreessoo, lakkoofsa mobaayila;

0912137604 yookin kara imeelitin [ahmederesoch@gmail.com](mailto:ahmederesoch@gmail.com)qunnamuu dandeessu. Yookin koree saakkatatu namuusa fi namumaa qorannoo fayyaa kan Haramayaa Univarsiiti lakkoofsa bilbilaa,0254662011;lakkofsaa sanduqaa postaa 235,Haramayaa Univaarsiiti Harar Itiyoophiya.

Mirkaannessa yaada feedhumaan hirmaachu fi tti himaamee:Yaadollee armaan olitti dubbiseef yookin natty himaamef,ani akka gaaritti waa'ee kayyoo qorannoo kana,adeemsa fi yeroo

qorannoo kana, midhaa fi bu'aa qorannoo kana, eeggannoo odeeffannoo fi hirmatootataf godhamuu, mirgoota hirmaatota fi tessoo qunnamiti qorannoo kana addaa bafaachu kootif. Akkasumaas bakka naaf hin gaalle irratti gaaffi akkan gafaadhuf carraa akkan qabuu fi yeroon barbaadeetti gaaffifi deebii addaan kuutu akkan danda'u, gaaffi deebi kennuf hin barbaannef irraa darbuu akkan qabuu sirritti addaan baafadhee jira. Kanafuu qorannoo kana irratti hirmaachuf yaada fedhuuma kooti mallattoo kiyyan nimirkaannessa.

Maqaa fi mallattoo hirmaata/ttu-----

Maqaa fi mallattoo odeeffanno sasaabduu-----

Gaaffilee Qorannoo itti fayyadamuu saphaan siree hojjin walqabatee umamuu fi wantoota miidhaa kana waalin hidhaata qabani kan Ummata aanaa lumee kessaa jiraata irratti geggefamuu dha

#### Annex 8.4. English version Gaaffannoo Afaan Oromoffaa

Gaaffannoo sassabii itti fayyadamaa saphaan siree fi rakkoo isaa waajjin wal qabate jiru abba warra aanaa lumee ,naannoo oromiyaa Itoophiya 2019

#### Kutaa 1: Oddeeffannoo Eenyummaa Maneennii

Lakk.	Gaaffii eenyummaa	Deebii
1	Maqaa Ganda	
2	Maqaa Garee ykn Gooxii	
3	Lakkoofsa waraaqa gaaffii	
4	Guyyaa gaaffiin itti gaaffatamee	

#### Kutaa 2: Haala hawaasumma fi ummaata namoota gaaffii deebisani

Lakk	Gaaffii	Deebii kennaa/ Coding	Irra Darbii
G101	Iddoo Jireenya	1 =Magaala 2= Baadiyaa	
G102	Saala	1=Dhiira 2=Dhaala	

G103	Walitti dhuufeenyi ati maatii mana kana waliin qabdu maalii?	1=Abbaa manaatii 2=Haadha warraatti 3=Ijolleedhiira/dubara4=obbooleesa/obboleetii 99=kan biroo (caqasii)_____	
G104	Itti gaafatamuuna manaa kana kani hooganuu eenyuu?	1=Abba warra 2=Hadha warra	
G105	Umriin kee meeqa?(Waggadhaan)	_____waggadhaan	
G106	Saban?	1=Oromo2=Amharaa 3=Tigraay 4=Somaalee 5=Guragee 99=Kan biraa	
G107	Haali Gaa'ela kee kan yeroo maal fakkatta?	1=Kan heerumte/fuudhe 2=Takaa kan hin heerumne/fuune 3=Kan hiikte/hiikee 4=kan haatti mana/abbaan manaa jalaa dute / du'e 5=kan adda jiratan	
G108	Sadarkaan barnoota kee meeqaa?	1=Barumsa idilee hin qabu 2=Marsaa jalqaba 3=Marsaa Lamaffaa 4=Kolleeji fi isaa oli	
G109	Hojiin kee maaliidha?	1=Qonnaan bulaa 2=Hojata mootummaa 3=Hojidhaabba4=Barata5=Daldalaa 6=Hojata Guyyaa7=Hidhamaa 8=Haadha worra99=kan biro_____	
G110	Ijoollee wagga 5 gadii fi dubarti ulfaa dablate nama meeqatu mana keesa jiraata?	1.Baayina maati waligala____ 2. Ijoollee waggaa 5 gadi_____ 3. Dubarti ulfaa_____	
G111	Meeshaan baaxiin mana ittin hojeetamee maali?	1=Citaa /Thatched/hay 2=Q oorqorro/corrugated iron99=Kanbiroo(caqasii)_____	
G112	Giddu galleessatti galiin ji'aan argatan meeqaa?	1= <150 EBir 2= 151-450 EBir 3=451-1500 EBir 4= 1501 EBir fi is olii	
kutaa III:-abba qabeenyuma fi itti fayyadama saphaan siree abba warra aanaa Lume Naannoo Oromiyaa Itiyooophiyaa,2019			
B201	Saphaan Siree qabduu?	1=eeyyeen 2= miti	Yoo G201 miti ta'e gara G301 Darbii
G202	Yoo G1 eeyyeen ta'e Saphan siree meeqa qabdan	1= tokko 2=lama 3=sadii 4=sadii fi isaa oli	
G203	Saphaan siree jala bultani beektu halkaan darbee?	1=eeyyeen 2= miti	Yoo G203 eeyyeen

			ta'e gara G205 darbii
G204	Yoo G203 deebiin isaa miti ta'e	1=baay'ee ho'aa 2=bookeen buusaa hin jirtu 3=saaphaan siree mija'aa waan hin taneef 4=waqiti isaa miti 99=akka itti fayyadaman hin beeku 6=xurawadha 98=kan biroo	
G205	Saphaan siree kan yoomi argate?	1=ji'a jahaa duraa 2=ji;aa 6-12 duraa 3=waggaa lama dura 99= kan biroo	

kutaa IV:-Haala beekusa itti fayyadama saphaan siree fi tata'imsaa dhibee buusa abba warra aanaa Lumee Naannoo Oromiyaa ,Itiyooophiyaa,2019

G301	Fayyidan saphaan siree maalii/	1=Bookee buuse ajjeessuuf 2=akka bookeen busa nama iddine dhorka 3=Busen akka nama hin qabne dhorka 4= akka addan baautii fayyada 5= akka mixafii gaargara99=kan biro _____	
G302	Namni tokko saphaan siree jala yoo bule buusan isaa ni qabaa?	1=Eeyyeen 2=miti	
G303	Dhibeen buusaa bookkee buusan akka darbitu hubbannoo ni qabda?	1=Eeyyeen 2=miti	
G304	Saphaan siree tokko qofa mana keessa yoo jiraate eenyuuf dursi kennama?	1= Dargaggoota Waggaa 15 olii 2= Ijoollee wagga 5-15 3= Ijoollee wagga 5 gadittif 4= Dubartoota ulfaa 5= Dursii kan kenamuuf hin mjiiru.	

**Kutaa 4. Cheeklistii daawanna saaphana siree:-**Amma immoo haala siree fi saaphana siree mana kessaa itti fayadaamtan ilaala. Cheeklistiin kun daawanna saaphana siree maneen abbaa warra haala saphaan siree haala gaariin faanisamuu isaa ykn waan hasawa turee mirkaneessuu qabaaniif kan tajaajilu dha.

Lakk	Wanta ilaalamuu	Ilaaluu	Koodii
G401	Lakkoofsa siree ykn iddoo bulti	_____	
G402	Lakkoofsa siree mana keessatti ilaalame	_____	
G403	lakkoofsa siree /iddoo bulti saphaan siree itti faanisame waliin argame	_____	

G404	Saphaan siree seeraan faanisame jiraa	1=eeyyeen 2=miti 99= kan biroo	
G405	Saphaan siree tarsa'ee ykn qalawa qaba?	1=eeyyeen 2=miti	

***Kun xumuraa gaaffii keenyatti. Yeroo kessan fuudhataanii gaaffii keenya waan nu deebiftaniif galatoomaa***

	Maqaa	Mallattoo	Guyyaa
Nama data fuunannee	_____	_____	_____

## Annex 8.5: CARRICULUM VITAE (CV)

### 1. PERSONAL DETAIL:

- ✓ Name ----- AHMED ERESO CHAKU
- ✓ Place of birth ----- ARSI, ASSELA
- ✓ Date of birth----- 10/08/1984
- ✓ Sex ----- Male
- ✓ Marital status----- Married
- ✓ Nationality----- Ethiopian
- ✓ Mobile----- +251912137604

### 2. EDUCATIONAL BACKGROUND

Elementary          Arsi Zuwey Dugda Kiynesho primary School (1-6)

Elementary          East Shoa Batu primary School (7-8)

Secondary:          Batu High School(9-10)

Preparatory:        Batu Zuwey DONBOSCO

### 3. Educational qualification

Graduate from Hawasa University 2000 with B.sc Environmental Health Science

### 4. Work experience 9 years

Job position Modjo Health Office Regulatory Experts

5. Language skill

Language	Listening	Speaking	Reading	Writing
Oromic	Excellent	excellent	excellent	excellent
Amharic	excellent	Good	Good	Good
English	Excellent	excellent	excellent	excellent

6. Skill –Basic Management skill

- training skill
- basic computer skill
- managing ,monitoring and evaluating skills

7. Interests

- Reading different books
- Helping Management work at different level

Conducting research and Serving community