WOLKITE UNIVERSITY

COLLEGE OF MEDICINE AND HEALTH SCIENCES,

ASSESSMENT OF USE OF INSECTICIDE TREATED BED NET AND FACTORS AFFECTING IT IN WOLKITE TOWN, ETHIOPIA, 2021. A RESEIRCH RESULT TO BE SUBMITTED TO WOLKITE UNIVERSITY , COLLEGE OF MEDICINE AND HEALTH SCIENCE DEPARTMENTE OF PUBLIC HEALTH IN IN PARTIAL FULFILLMENT FOR THE REQUIREMENTS OF A BSC DEGREE IN PUBLIC HEALTH.

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Acronym and Abbreviation

ITN	Insecticide Treated Net
KAP	Knowledge Attitude Practice
SNNPR	Southern Nation Nationality and People Region
WHO	World health organization
SPSS	Statistical package for social sciences
FMOH	Federal minister of health
AOR	Adjusted odds ratio
COR	Crude odds ratio

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Abstract

Background: Among malaria control measures, use of mosquito nets is the one that is getting more acceptances and is being used in large scale worldwide. Despite ongoing distribution and use of nets in Ethiopia.

Objective: To assess utilization of mosquito nets and determine factors associated to its use in Wolkite town Gurage zone, south Ethiopia from October- 2021 G.C

Method: the study was used employed by cross-sectional study design, with sample size 422 household. The sample was taken by using a systematic random sampling technique with 24 intervals. Quantitative methods were used. Interviewer administered that closed ended questionnaire was used to assess in Wolkite town from October 21- 23/2021.Data were entered into computer. After cleaning and checking for completeness of the filled questioner format, were used coded and entered in to Statistical software SPSS 20.0 for analysis. Logistic regression was used in the process to identify associated factors for utilization of ITN.

Result: In multiple logistic regression, those having good knowledge about current ITN use were near three times more likely to bed net use compared to those with poor knowledge [AOR=2.7, 5%CI;(1.6-4.5)].the sex of respondent female about higher ITN use were two times more likely to bed net use compared to those with male net user [AOR=2.3, 5% CI; (1.4-4)].the occupational status of merchant are nine times more likely to bed net use compared to respondent of other [AOR=9, 5%CI;(3.7-21)].

Conclusion: There was a higher utilization of ITN in Wolkite Town compared to the objectives set by FMOH In 2007E.C .In this was because of high knowledge about prevention and cause of malaria and the high availability of ITN in the current.

1. Introduction

1.1 Background

Malaria is a parasitic disease spread by mosquito bite, results in 300 to 500 million clinical cases globally of which 90% occur in Sub Saharan Africa (1). Mostly it is under five children in Sub Saharan Africa who are affected, dying at a rate of nearly 3000 per day; contributing to 20% of the all deaths among children (2). Some suffer from the acute lethal complications; others succumb to the severe anemia or consequences of low birth weight. Among survivor's malaria hinders optimal growth and development (2). During pregnancy malaria poses substantial risk to the mother, fetus and the neonate as it can lead to severe clinical illness, anemia and low birth weight (3). Beyond the individual ailments, the disease results in increased burden to health institutions, poor pregnancy outcome, poor growth of economy and others (2). It also causes significant impediment in the economic development. It costs the region between $3-12billion and inhibiting economic growth by as much as 1.3% each year (1). Ten percent of the continent's disease burden is due to malaria (4). It accounts for about 40% of public health expenditures, up to 50% of inpatient admissions and outpatient visits in areas of high transmission (2). Coming to the Ethiopian situation, in a non-epidemic year, 5-6 million clinical cases and over 600,000 confirmed cases are reported from health facilities (5). Malaria would be reported as the major cause of morbidity and mortality, accounting for 15.5% of outpatient consultations, 20.4%of admissions and 27% of inpatient deaths (6). In Oromia alone more than 6 million cases were diagnosed and treated at different health institutions between 1995-2000(7). In the same. Region and during the same time interval, malaria accounted for 11.2% of all admissions and 14.26% of all deaths in hospitals and health centers (8). Generally, highlands or highland fringe areas between 1000 and 2000 meters of altitude can be considered as highly epidemic prone; however, as a result of ecological degradation and increase in temperature, malaria transmission will be also detecting at altitudes as high as 2300m (6). Only few areas in the western lowlands of the country have relatively stable transmission (6). The other areas have unstable transmission i.e. are epidemic prone. Unlike stable transmission the unstable one

renders no or little protective immunity against malaria (9).malaria is common and life-threatening disease across the globe with higher burden in tropical and sub-tropical countries, including Ethiopians Of the parasite species P. falciparum contributes for 60% and P. vivax for the rest of the burden (5). The major vector is Anopheles arabinoses, followed by Anopheles pharoensis, Anopheles funestus and Anopheles nini (9).

Selection of control measures should consider the magnitude of the problem, behavior of vector species involves, vector breeding site, availability of resources, level of transmission, and sustainability of the selected intervention (10, 6). Use of chemical insecticide has been the principal method of vector control since early 1960s. Later, insecticide resistance, high cost and high plastering rate of houses necessitated the utilization of all appropriate technologies in an integrated approach (11). The national prevention and control approach employs early diagnosis and prompt treatment, selective vector control including use of insecticide treated bed net (ITN),and environmental management early detection and control of epidemics and prevention of malaria during pregnancy (6).

Mosquito nets have been among the means of prevention for long. Nevertheless, they are given limited consideration as control intervention until an overwhelming interest arose in the treated ones (12, 10). If used properly, nets provide physical barrier and with treatment generate a chemical halo that extends beyond the mosquito net itself (13). Protection within a community may also extend to non-users due to the mass killing effects of ITNs on vectors (10). Nets significantly decrease death of under five children and during pregnancy provide significant protection against maternal anemia and low birth weight (2).

1.2. Statement of problem

A parasitic disease spread by mosquito bite, results in 300 to 500 million clinical cases globally of which 90% occur in Sub Saharan Africa (1). Mostly it was under five children in Sub Saharan Africa who are affected, dying at a rate of nearly 3000 per day; contributing to 20% of the all deaths among children (2). It also causes significant impediment in the economic development. It costs the region between $3-12billion and inhibiting economic growth by as much as 1.3% each year (1). Ten percent of the

continent's disease burden was due to malaria (4). It accounts for about 40% of public health expenditures, up to 50% of inpatient admissions and outpatient visits in areas of high transmission (2). Coming to the Ethiopian situation, in a non-epidemic year, 5-6 million clinical cases and over 600,000 confirmed cases are reported from health facilities (5). Malaria would be reported as the major cause of morbidity and mortality, accounting for 15.5% of outpatient consultations, 20.4%of admissions and 27% of inpatient deaths (6). In Oromia alone more than 6 million cases were diagnosed and treated at different health institutions between 1995-2000(7). In the same Region and during the same time interval, malaria accounted for 11.2% of all admissions and 14.26% of all deaths in hospitals and health centers (8).The Implementation of ITNs' use for malaria prevention was still at an early stage. Strong seasonal transmission of malaria renders malaria much more sensitive to anti-vector measures such as the use of ITNs (6, 11). In line with the Roll Back Malaria objective and strategies, the national malaria prevention and control approach in Ethiopia focuses on four main strategies. These include early diagnosis and prompt treatment, selective vector control including use of ITNs, malaria epidemic prediction, early detection and containment and prevention of malaria during pregnancy (9). In Ethiopia the distribution of ITNs through the health care delivery system was first introduced in 1997. 14 Following a number of small scale distributions, in 2000-2003 UNICEF donated a total of 1.42 million ITNs and the distribution continued thereafter(6). The country has also waived tax on ITNs. The national strategic plan for ITNs aims to scale up use and coverage by target districts to 60% by the end of 2007. Major constraints mentioned were low awareness, poor institutional capacity and low income of the population to buy nets(6). Despite the activities pertaining to the distribution of ITNs, many questions remain unanswered. The extents to which people are aware and acquire nets were not understood clearly. Observation and rumors of not hanging nets at all, hanging nets in a wrong manner and place and not giving priority to children and pregnant mothers deserve close examination. The perception of the population on the role of ITNs in the prevention of malaria is still another issue. Thus, this study tries to describe the status of utilization and factors affecting it in Wolkite Town, SNNPR region, where ITNs have been distributed.

1.3 Significance of study

Inescticide-treated bed net (ITN) is a type of vector approach which has to be treated with chemicals and it a cost-effective type of malaria prevention. Malaria during pregnancy has different impacts like maternal infection, maternal anemia, low birth weight, prematurity, and other. Malaria infection during pregnancy is a major health problem in sub-Saharan Africa including Ethiopia. So, assessing utilization and associated factors of ITNs is very important. The results from this study will help the malaria control program by identifying area that need improvement. This result finding will inform evidence based policy and utilization of ITN to plan and implemet program. The recommendation from survey will also be utilized or helpfull for local area planner and adeministration and organization working on utilization of ITN and prevention of malaria. Findings from this study will help health planners and community as whole through providing basic informaion on about ITN and Associated factors. It will also provid baseline information and directions for further research activityes in the area.

2 Literature review

Net are now made of cotton, nylon, polyester, polyethylene and synthetic with cotton mixtures (11). They can have rectangular, circular wedge or other shapes and are produced in different colors (10). Nets are preferably treated with insecticides. Insecticide treated ones either kill or irritate the mosquitoes beyond being physical barriers (10). They serve as human baited traps when somebody is sleeping inside by attracting and killing mosquitoes and other biting insects (15). Insecticide treated nets (ITNs) have to be treated regularly for maximal benefit. The commonest chemicals used are second and third generation synthetic pyrethroids (10, 16)

2.1. Impact on mortality and morbidity

Large scale trials of ITNs conducted over two years' period in various epidemiologic settings across Africa reported a 15-33% reduction in all cases of child mortality (17). Proper use of ITNs can cut malaria transmission by at least 50%(2, 1). During pregnancy ITN use provides significant protection against maternal anemia and low birth weight, which is a major contributors of neonatal morbidity (2). The above mentioned mortality reduction in many trials appeared to be associated with malaria transmission pressure,

with a lower efficiency detected at sites with higher transmission (18). Yet, in a study conducted to assess the efficacy of ITNs in the prevention of mortality in young children in an area of high perennial malaria transmission in western Kenya, it found that the overall reduction in all cases of child mortality were 16% (18).

Another area of concern and fierce debate was the hypothesis that reducing malaria transmission levels might slow the development of clinical immunity leading to a shift in child mortality to older ages, i.e. delayed mortality, with little or no long term survival gains (17). One study in Burkina Faso was conducted to assess the impact of insecticide treated curtains over a six-year period. Over the period of the study, no evidence of a shift over time in the mortality from younger to older children was found (17). Nevertheless, it is worth noticing that what nets provide is far from absolute protection for adults who go to sleep late and might leave their bed any time during the night. Some who had used the nets might develop malaria as infection occurring before going to bed (19). It was found that 10.5% of bites were not prevented and those were mostly before down. Potential exposure occurring when people leave the bed to check on noise or urinate. People might not tuck in the net properly when returning (20).

2.2. Factors associated to use of mosquito net

2.2.1Role of treated nets

The practical scenario in different parts Africa is that after mosquito net trials, when the responsibility of retreating is left for individual households, retreatment rates rapidly fall (16, 21). Nets without insecticide treatment are said to have limited use because insects use small holes to enter, easily attack a neighboring unprotected individual or persist until the individual comes out (10,16).

2.2.2 Possession and use of ITNs

All the mentioned benefits of ITNs can be obtained through proper practice (11). Households are supposed to hang the nets and sleep under them even during seasons when their use is uncomfortably hot and there may not be enough biting by nuisance insects to make net use seem worthwhile (15). Users should tuck them in under the mattress before sleeping, follow treatment schedules when possible, mend any holes, and give priority to children and pregnant women (15, 22). Community members must also

make sure that people, especially children, go to bed before vectors start biting and do not get up before they stop (15). Therefore, better understanding of people's perception of malaria and its perceived cause, preventive action and values attached to ITNs will needed for planning mosquito net program (10). Household possession data indicate the extent to which distribution channels will be enabling high coverage and may be particularly valuable at the early stage of program development and implementation. Studies on the other hand have repeatedly indicated existence of improper practice in using the nets. In a study conducted in western Kenya to assess factors affecting ITNs use during a trial approximately 30% of the nets already in the households will unused (23). Among the variables that had significant effect on mosquito net use will age, for which a 14.5% reduction in the probability of adherence will be observed in children under five years of age compared to individuals' greater than five years of age (23). Adherence in this study meant that corners of a rectangular ITN will attach to the eaves and walls of the room users lower the ITNs before sleeping and tuck them in under the bed or mat (23). In a study conduct in Kenya to assess the impact of untreated mosquito nets 21 % of the nets will have worn (21). In another study conducted in Uganda, among non-users of ITNs 18% had used in the past but not at the time of the study. Cost, reduced risk of exposure to malaria and inconvenience will their main reasons (24)

In studies in Latin America, use of nets will higher for infants and young children than for other children and adults (25, 26). But this does not appear to be the situation in Africa, where traditionally, adults by virtue of their age and position as family income earners get priority coverage(23, 28, 29, 27, and 24). In one study it will sated that child protection will simply a coincidence when the child happens to share a bed with parents (29). In many parts of Africa, the proportion of children under five years of age who slept under a net during the night preceding the survey will considerably lower than the proportion of households that possess a net (22). The gap will of concern for malaria control program not only because young children are the most vulnerable to malaria (except in epidemic areas) but nets will be also relatively effective for the group. Their long sleeping hours will more often include the dusk hours of greatest mosquito abundance than do the sleeping hours of adults (22).The discrepancy between possession and use by children was remarkably consistent across countries and sub regions.

2.2.3 Cost of nets and their use

Possession of nets was seen as being markedly affected by their cost. In a study in Tanzania families with high income were almost three times more likely to have a mosquito net than those with low income (31). In a study pertaining to malaria related belief in Ghana, the main reason for the low mosquito net usage was cost (32). In a study in highland Kenya, reason for not having a mosquito net was mainly financial. The same study suggested that purchasing ITN for households would be the cost of sending three children to primary school for the year (33). In Burkina Faso high cost of nets was the most frequently stated reason for not owning nets(28)

2.2.4 Seasonality and net use

Nets were not use all days in all seasons. Nets were used mainly in the cold rainy season and stop when the mosquito population was perceive to be low (30). In three African countries net use was between 1.2 and 5 times higher in the rainy cooler months than in the dry and hotter months. The lower use in dry and hot months related to less mosquito nuisance. Even in the malaria season, not all existing nets are being used, as shown in a number of in depth surveys that compared net use reporting with visual inspection of sleeping places. In a rural area in Burkina Faso, where malaria transmission is holo endemic, but markedly seasonal, seventy-three percent of respondent use their mosquito nets only during the rainy season (28).

Health beliefs and mosquito net use

Health belief pertaining to causation of malaria and role of nets is an important factor. In one municipality in Uganda people who use nets would more likely to believe that malaria is caused by mosquitoes and could be cured by modern medicine (24). In the same study it wasseen that favorable beliefs were be important in predicting use of mosquito nets. Users were more likely to believe that mosquito nets prevent malaria and are worth their cost (24). In a study in Southern Ghana mosquitoes were incriminate by most respondents as cause of malaria. But many of those who share this concept and others who do not, believe that malaria can be acquired by other ways as the heat from scorching sun and any other heat related work, poor eating habit, constipation and others (32). In a study conducted in Rural Burkina Faso although most people mentioned

mosquito as transmitter of malaria, humidity exposure to rain and cold were also mentioned as causative factors (28). Another observation is that nets are perceive by many as means of protection to mosquito bite rather than malaria prevention. In a study to monitor community responses to malaria control measures in Nigeria, the proportion of people who perceive that mosquito net prevent malaria (22%) wasless than those who believe in its prevention against mosquito bite (96%) (20). In 11 Burkina Faso, all respondents were interest in future use of treated nets, since it provides protection against mosquito (87%) (28). only minority(3%) stated better protection against illness (28).

2.2.5 Housing condition and mosquito net use

Few studies mention logistical problems of households to use nets. In Kenya sleeping arrangements were generally perceive as posing challenges, as sleeping areas for children in living rooms and kitchens require daily commitment to mount and dismount nets (30). In a study in Afghan refugees, 11% of the study population slept on floor. For such people nets were suspend from ceilings or between four upright poles held in mud filled ghee cans (19). Among technical problems mention in a study in Kenya was ‘no room to hang child’s net’ (23). Housing condition also appears to contribute to washing of nets.

Impact of Plasmodium species type on net efficacy

Most of studies on efficacy of ITNs were conduct in areas where as falciparum infection predominates, which seems to respond to insecticide treated materials. In studies conduct in Latin America, better results were seen in areas where high proportion of P. falciparum was relatively higher (25). A study was conduct in Nicaragua, in a place where P. vivax is themajor strain, to estimate the variation of protective efficacy according to the coverage of ITNs. It was found that where the individual coverage was around 50%, the protective efficacy of ITNs against clinical malaria episodes was 68%.There was no protective efficacy when coverage will be less than 16%. The above mentioned paper stated that in areas with a high proportion of P. falciparum infection, ITNs would probably reduce clinical malaria episodes (25). It is worth noticing that the degrees of effectiveness witness were attained through high coverage, mostly higher than 50%. In a trial conducted in Turkey, where P. vivax is the major strain, it was found that untreated nets did not confer significant protection against clinical malaria (35). It might therefore

be difficult to say, with certainty about the efficacy of ITNs where their coverage is low, and P. vivax infection contributes to about 40% of the morbidity like the different parts of Ethiopia.

Studies pertaining to ITNs in Ethiopia are scarce. A KAP study in 1995/96 on ex-refugees showed that 70% knew that mosquito net use could prevent malaria and 100% stated that mosquito nets would be used if available (36). In the same study 24% of households were using nets purchased at a mean cost of 32 Birr. The mean amount a family could spend on mosquito nets was 13 Birr (36). This study will try to answer relevant issues in the use of ITNs in the Ethiopian context. Since the use of the nets is relate to perception and the view of the population require.

3. Objectives of the study

3.1. General objective

- To assess utilization of insecticide treated nets and determine factors associated to its use in Wolkite town from October 21- November 21/2021

3.2. Specific objectives

- To assess the availability and utilization of ITNs in Wolkite town from October 21- November 21/2021
- To determine factors associated with the utilization of ITNs' In from October 21-November 21/2021.

4. Methodology

4.1. Study area and population

Wolkite were an administrative center of the Gurage Zone of the Southern Nations, Nationalities and Peoples' Region (SNNPR), it has a latitude and longitude of 8°17′N 37°47′E/8.283°N 37.783°E and an elevation between 1910 and 1935 meters above sea level. It found in the southern side of Addis Ababa in 158km distance. The structural plans of Wolkite town were set up from 5 kebeles and 3 sub towns. The three sub towns was Bekure, Addis birhan and Gubrea and the corresponding kebeles (the smallest

administrative unit in Ethiopia) were Selamber, Edgetber, Menaheria, Addis birhan and Addis hiwot. There is one hospital, two health centers and six health posts. It was surrounded by Kebena woreda and it was part of former Goro woreda. Wolkite town had been a total population of 66410, of whom 53% are men and 47% are women. The plurality of the inhabitants practiced Ethiopian Orthodox Christianity, with 48.17% of the population reporting that belief, while 42.31% were Muslim, 7.86% were Protestants, and 1.34% were Catholic.

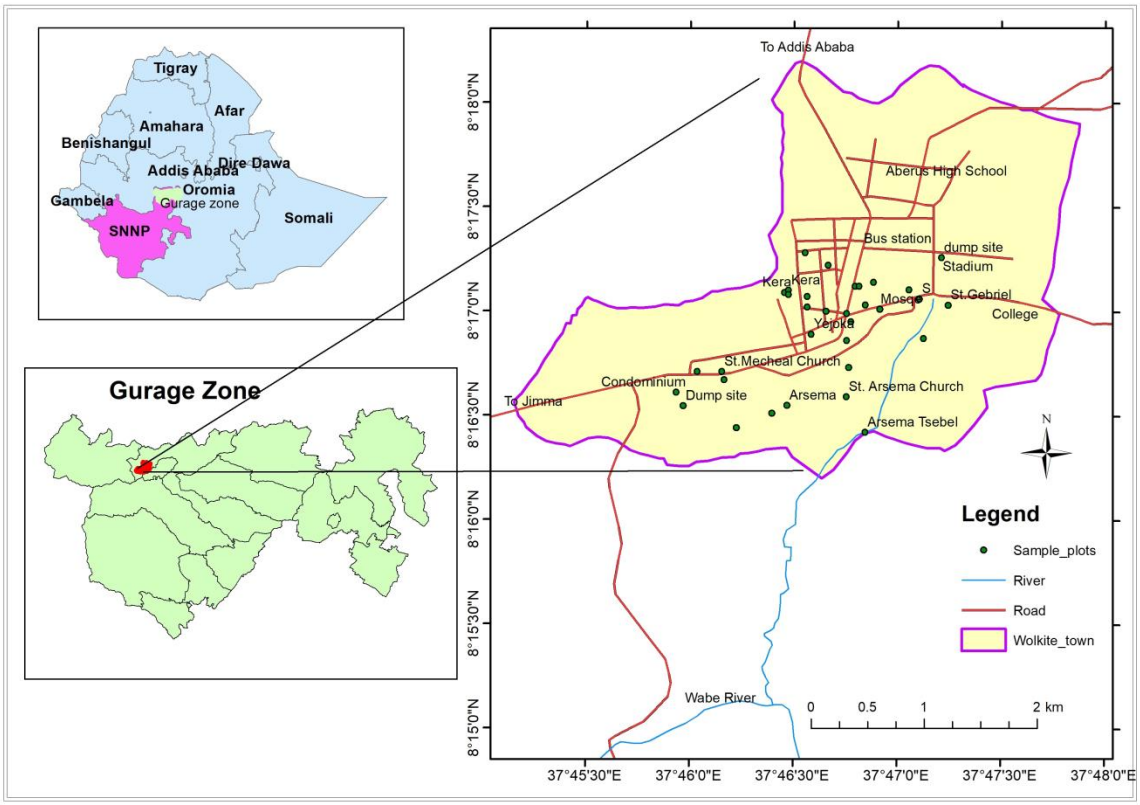

Figure 1: showing map of Wolkitetwon. [Guragea zone socio-economic profile, accessed 4 September 2007](34)

4.2 study period

This study was done October 21- November 21/2021 G.c.

4.3. Study design

Based on cross-sectional study design was employed

4.4 Population

4.4.1 Source population

All households in Wolkite town

4.4.2 Study population

Selected households in Wolkite town

4.5. Inclusion and Exclusion Criteria

4.5.1. Inclusion criteria

All household in Wolkite town

All rental household which was occupied for at least 6 month

4.5.2. Exclusion criteria

All places which was used for commercial (Bank, hotel, supermarket and industrial place)

All rental houses which was occupied for less than 6 month

4.6. Sampling strategy

4.6.1 Sample size

To estimate a single population proportion, where P were the proportion of households that let all children aged five and under to sleep under the net, provided that there was at least one child. Since P was used unknown the maximum, i.e. 0.5 is taken.

The following formula is used $n= Z_{a/2}^2 p(1-p)/d^2$

$n =Zd^2$ n=initial sample size

Where Z = standard normal value 95%cl=1.96

Z=1.96 q=Proportion of failure

p =0.5 p=Prevalence of ITN use is 0.5

d=0.05 d=marginal error 5%=0.05

$n= (z_{(a/2)})^2 p(1-p)/d^2$ =

$(1.96)^2(0.5)(1-0.5)/ (0.05)^2 =384$

With 10% none response rate the total sample size was 422.

K (interval)=total household/sample size =10000/422=24

4.6.2 Sampling techniques

The houses in Wolkite town were given a house number (10000). Those households based on sampling interval (24). The first house was taken by lottery method or probability.

4.7. Study Variables

4.7.1 Dependent variable

Utilization of ITN, knowledge about malaria and ITN

4.7.2 Independent variable

Socio-demographic characteristics (age, sex, religion, marital, educational and occupational status)

4.7. Data collection method (Quantitative)

Field activities were started on the October -21/2021.Training includes briefing about the objectives, relevance of the study and administration of the questionnaires. The questionnaire was prepared in English and was translated in Amharic. Main points included were socio-demographic characteristics, knowledge on malaria and nets, about sleeping condition and use of nets.

4.8. Operational definition of terms

Tear – Loss of integrity of a net that communicates with the edge and greater than 2 centimeters

Hole- Loss of integrity or opening of a net that does not communicate with the edge and is greater than1centimeter.

Knowledgeable-A respondent who answered at least three of the five knowledge related questions. Better perceived benefit-mentioning malaria prevention as a benefit of net use and believing in lesser probability of getting ill while using a net. Exposed to health

Education-Claimed to get health education on malaria in general and mosquito net in particular Worn out net-a net that is not hanged and is labeled by the respondent as no more useable.

4.9. Data analysis and processing

At the field, Data was checked for consistency and completeness. Then Data entered into computer. Were used coded and entered in to Statistical software SPSS 20.0 where further cleaning was done to check for inconsistencies and missing values. Finally, the cleaned data was processed and analyzed. Frequencies distributions were computed to summarize the variables. Logistic regression was used in the process to identify associated factors it. The variables with a p-value of less than 0.05 in the Binary logistic regression analysis were entered into the multivariable logistic regression analysis. A p-value of less than 0.05 at multivariable logistic regression analysis was considered statistically significant.

4.10. Ethical consideration

Ethical clearance was obtained from Wolkite University Medical Faculty- Department of Community Health Ethical Committee. Official letter of co-operation also were written to Wolkite town Administration. The aim of the study was explained to study subjects and their values, culture, belief, religion and norms were respected. Both written and verbal informed consent were obtained from each participant. Privacy and confidentiality was strictly kept Individuals who wasn't not volunteer to continue from the beginning or from any part of the interview have respected right to stop their participation in the study.

5. Results

Socio-demographic and housing characteristics of the respondents

A total of 422 respondents were involved about 21-30 (39.8%) of the participants were in age group .about the respondents were 205 male and 217 female. The majority 235 (55.7%) of respondents were married. About 171 (40.5%) of the participants were Muslim religion follower. the respondents were 113 (26.8%) secondary educations and 131(31.0%) merchant occupation.

Table 1 Distribution of households by socio-demographic characteristics in Wolkite Town, Gurage Zone, and southern Ethiopia. October 2014.

	Category	Frequencies	Percentage
Age of respondent	14-20	125	29.6%
	21-30	168	39.8%
	>30	129	30.6%
	TOTAL	422	100.00
Sex of respondent	Male	205	48.6%
	Female	217	51.4%
Education of respondent	can't read and write	31	7.3%
	read and write	108	25.6%
	primary school	66	15.6%
	secondary school	113	26.8%

	diploma and degree	104	24.6%
Occupational status of respondent	Governmental employed	120	28.4%
	Merchant	131	31.0%
	Farmer	44	10.4%
	Student	82	19.4%
	Other	45	10.7%
Marital status of respondent	Married	235	55.7%
	Single	91	21.6%
	Divorced	43	10.2%
	Widowed	53	12.6%
Religion of respondent	Orthodox	135	32.0%
	Muslim	171	40.5%
	Protestant	48	11.4%
	Catholke	48	11.4%
	Other	20	4.7%

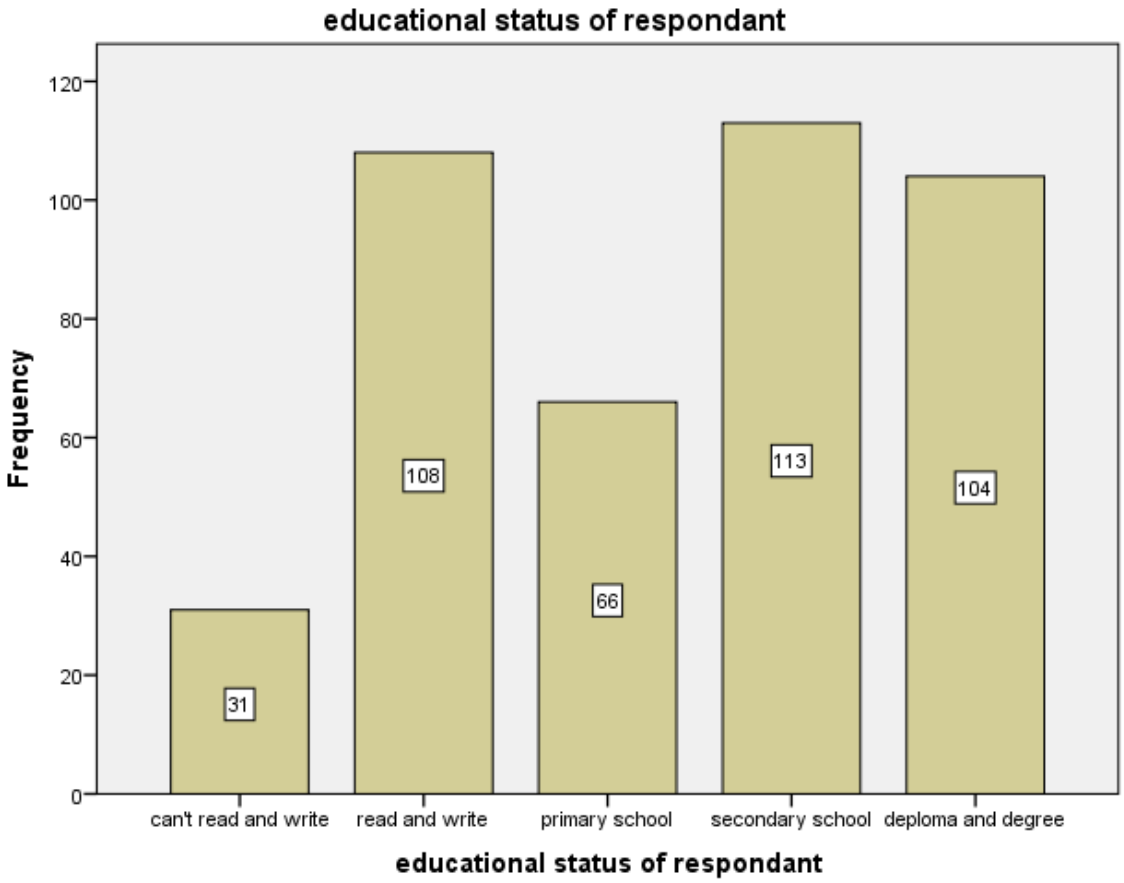

Figure 2 proportion of educational status in Wolkite town, southern Ethiopia.

II. Sleeping conditions

Not everyone in the Town slept on bed and net. One hundred Seventy seven (73.4%) of the households had bed less than two people use in household. As in Table 4, 166(69.6%) had two and more than two sleeping floor while 74(30.8%) had less than two. In 120(51.5%) households up to equal or more than three people slept on bed net.

Table 2 Distribution of the households by sleeping arrangements Wolkite town, Gurage Zone, SNNPRs Ethiopia, October 2014.

Variables	Categories	Frequency	Percent
Number of beds	1 bed	177	73.4%
	≥2 bed	64	26.6%
Number of sleeping floor	1 floor	74	30.8%
	≥2 floor	166	69.2%
Number of people sleeping on floor /bed net	< 3 people	113	48.5%
	≥ 3 people	120	51.5%

III. Access to information, knowledge and perception.

As depicted in Table 3, three hundred and six (72.5%) got health information pertaining to malaria in general and nets in particular. Three hundred and four (72.0%) were labeled as good knowledgeable as they correctly answered at least three of the five knowledge questions (Table 2). Three hundred and nineteen (75.6%) were labeled as having a better perceived benefit as they specifically mentioned malaria prevention as benefit and that users were at least less likely to develop malaria. Common sources of information were radio and TV about ITN.

Table 3 Distribution of the respondents by factors predisposing to net use Wolkite Town, Gurage Zone,Southren Ethiopia, October 2014.

Variables	Categories	Frequency	Percent
Got health education	Yes	306	72.5%
	No	116	27.5%
Knowledgeable	Good	304	72.0%
	Poor	118	28.0%
Perceived benefit	Yes	319	75.6%
	No	103	24.4%

IV. Malaria and its prevention

At least three symptoms of malaria were mentioned by 254 (60.2%) of respondents. Two hundred and fifteen (50.9%) were the main cause of malaria are mosquito bites while Two hundred eighty nine (68.5%) were can malaria prevented by ITN use. Three hundred and six (72.5%) were educate about malaria and one hundred and thirty nine (45.4%) from educate were by TV.

Table 4 Distribution of the respondents by their knowledge pertaining to malaria and its prevention. Wolkite Town, Gurage Zone,Southren, Ethiopia,Octobre 2014.

Characteristics	Category	Frequency	Percent
Have you seen or hear any education about malaria	Yes	306	72.5%
	No	16	27.5%
If yes you seen or heard about malaria	TV	139	45.4%
	Radio	106	34.6%
	Health worker	51	16.7%

	Other	10	3.3%
Know the main symptoms of malaria	Knows less than three symptoms	254	60.2%
	Knows symptoms of three and above	168	39.8%
Know the cause of malaria	Being the rain or cold	111	26.3%%
	Living near to collected water	86	20.4%%
	Being bitten by mosquitoes	215	50.9%%
	Don't known	10	2.4%
How to prevent malaria	Bed net use	289	68.5%
	Avoid collected water	123	29.1%
	Don't known	10	2.4%

As shown in Table 5, a total of 189(44.8%) households had no currently mosquito net, 233(55.2%) had currently use net, and 233(55.2%) had use nets the previous. The reasons not using mosquito nets due to were because of not available. Two hundred and sixteen 216 (92.7%) Currently used net were given for free.112 (48.1%) were most of nets acquired every two and greeter than two year (during the nationwide distribution campaign). one hundred seventy eighty 178 (42.2%) were problem associated with sleep under bed net.129 (72.5%) were problem hot. one hundred and thirty fife 135 (57.7%) were washed the bed net and washings for those who have net was 103 (76.2) three times per year. Three hundred and eighteen 318 (75.4%) were seen or heard about ITN. Common source of seen or heard was by TV and radio.

Table 5 Distribution of households in Wolkite Town by use of mosquito nets, Gurage Zone, Southern, Ethiopia, and October 2014.

	Category	Frequency	Percent
ITN use in currently	Yes	233	55.2%
	No	189	44.8%
ITN use in previous	Yes	233	55.2%
	No	189	44.8%
Reason of not using bed net currently	Due to too expensive	15	8%
	Bed net not protect to malaria	67	35.4%
	Bed net are not available	107	56.6%
How you obtain your bed net	They were given to for free	216	92.7%
	Bought it them	17	7.3%
Have washed bed net	Yes	135	57.7%
	No	98	42.3%
How often do washed	Every day	7	5.2%
	Every week	14	10.4%
	Every month	11	8.2%
	Three times per year	103	76.2%
	Category	Frequency	Percent
Have seen or heard about ITN use	Yes	233	55.2%
	No	189	44.8%
If yes where you see or heard about ITN	TV	101	31.8%
	Radio	141	44.3%
	Health worker	48	15.1%
	Other	28	8.8%

	No	116	27.5%
Duration of getting bed net	Every 3 month	9	3.9%
	Every 6 month	8	3.4%
	Every 1 year	104	44.6%
	Every 2 or >2 year	112	48.1%
Do you think problem associated with sleep under bed net	Yes	178	42.2
	No	169	40.0
	I don't know	75	17.8
If yes what is the problem	It is too hot	129	72.5
	Mosquito can get in to bed net	49	27.5

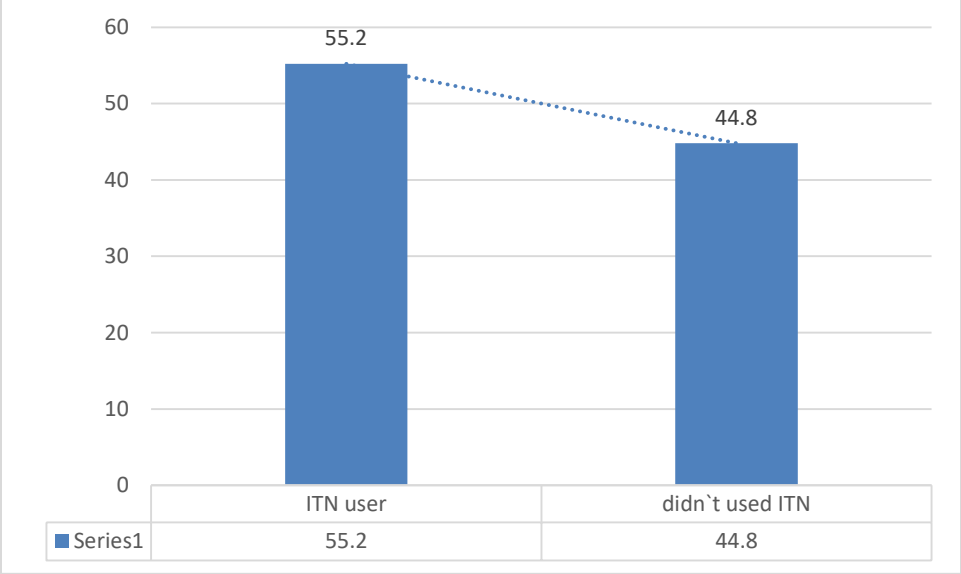

Figure 3 proportion of ITN use in Wolkite town, southern Ethiopia.

Factors affecting ITN use

In the bed net use, five variables including sex, knowledge, occupation, farmer and previous net use significant associated factors. The multivariable logistic regression result shows that, those having good knowledge about current ITN use were near three times more likely to use bed nets as compared to those with poor knowledge [AOR=2.7,9 5%CI;(1.6-4.5)].the sex of respondent female about higher ITN use were two times more likely to bed net use compared to those with male net user [AOR=2.3,95% CI; (1.4-4)].the occupational status of merchant are nine times more likely to bed net use compared to respondent of other [AOR=9, 95%CI;(3.7-21)]. The respondent farmer are seven times more likely to bed net use compared to other [AOR=7, 95% CI; (2.6-18)].The respondent who are previous net use more than six times likely to bed net use compared to who are not use bed net the previous [AOR=6, 95%CI;(3.4-10)].

Table 6 Logistic regression of related factors current net use for households in Wolkite Town, Gurage Zone, Southern Ethiopia. October 2014.

Variables		Bed net use		COR(CI) 95%	AOR(CI) 95%	P-value
		Yes	No			
Sex	Male	116	89	1	1	
	Female	73	144	2.6(1.7-4)	2.3(1.4-4)	0.001
Occupation of respondent	Govn`t worker	62	58	2.6(1.2-5.5)	1.8(0.8-4)	0.14
	Merchant	26	105	11(5-24)	9(3.7-21)	0.000
	Farmer	19	25	3.6(1.5-9)	7(2.6-18)	0.000
	Student	49	33	2(0.8-4)	1.5(0.6-4)	0.4
	Others	33	12	1	1	
Marital status	Married	88	147	1	1	
	Single	53	38	0.4(0.3-0.7)	1.1(0.5-2)	0.9
	Divorced	24	19	0.5(0.3-0.9)	0.7(0.3-1.5)	0.3
	Widowed	24	29	0.7(0.4-1.3)	0.7(0.3-1.4)	0.3

Heard information about bed net	Yes	191	42	2.2(1.4-3.5)	1.4(0.7-2.5)	0.3
	No	127	62	1	1	
Previous use of ITN	Yes	188	45	4.8(3-7.4)	6(3.4-10)	0.000
	No	88	101	1	1	
Knowledge	Good	120	183	2.1(1.4-3.2)	2.7(1.6-4.5)	0.000
	Poor	69	50	1	1	

6. Discussion

The study poses its own strength and limitation. Among the 422 respondent, the utilization of ITN current use was 233(55.2%). This is similar to report of world Malaria Report of 2011 (56%) (44). Our finding is higher not only than those of studies conducted in Adama, Ethiopia, 34.9% [37] and eastern Ethiopia 21.5% (39) and previous studies of Oromia and SNNPR (47.5%) (45) but also higher than compared to findings the studies done in Nigeria and two studies in Ghana, 45.3% [38], 34.4 and 41.7% (42,43) respectively. It was slightly lower than the target set 60% in 2007 by Federal Democratic Republic of Ethiopia Ministry of Health (FMOH) [6] and East Belessa District, Northwest Ethiopia were 56.5% (40). This result was also lower than other studies conducted in selected malaria prone area of Ethiopia (81.3% to 99.3%) (46), national malaria indicator survey of 2007 (65.6%) [47] And 85.5%, 86.6%, 73%, kefta – Humera- Tigray [48], Afar [49] and Arbaminchi (41) respectively and in other African countries like Kenya (75%) (50) and Sierra Leone (83.4%) [51].

In this study 55.2% of those households were slept under ITNs in previous. This was higher than other studies in Ethiopia: Oromia and SNNPR (35.4) [45]. Gursum (21.5%) [52] And national malaria indicator survey of 2007(53.2%) [47]. It is also higher than study conducted in Kenya (46.7%) [50].But it was lower than Sierra Leone (67.2%) [51] and 80% utilization recommended by WHO (44). Various reasons were ascribed by households not used nets, some of them include too hot to sleep under the net and not available.

The ITN utilization in the current study could be `partly explained through participant's good knowledge of ITN use compare to that of non-ITN user so this was seen malaria can reduce

spreading. For instance, 72.0% of the respondents had good level of knowledge on ITN. Bed net is very effective in the prevention of malaria 68.5% the respondent. Most of the households have Knowledge about ITNs use and malaria can be transmitted by mosquitoes bites so this is may be good understand benefits of bed nets. Among the 422 respondents less than three symptoms are 60.2% and main cause malaria is bitten by mosquitoes 50.9%. . Most of the households have Knowledge about ITNs use and malaria can be transmitted by mosquitos' bites. This lower than study conducted in Afar [49] and SNNPR, Amhara and Oromia [53] which showed about 89.5% and 93% of respondents Knew that malaria could be transmitted through mosquito bite, respectively.

The majority of the respondent, who had ITNs, noticed benefits obtained from using ITNs. The benefits include protection from malaria, repelling off or killing of mosquitoes. In the five year strategic plan for malaria prevention and control in Ethiopia, it was indicated that ITNs are useful to control malaria through either prevention of mosquito bites or prevention of disease [22]. Similar finding from a study conducted in western Kenya reported that most respondents killed ITNs because they protect against malaria and some other stated liked bed nets because they kept off and killed mosquitoes [24].

The multivariable logistic regression, those knowledge about current ITN use were near three times more likely to bed net use compared to those with poor knowledge [AOR=2.7, 95%CI;(1.6-4.5)].the respondent female about higher ITN use were two times more likely to bed net use compared to those with male net user [AOR=2.3,95% CI; (1.4-4)]. the occupational status of merchant are nine times more likely to bed net use compared to respondent of other [AOR=9, 95%CI;(3.7-21)]. the marital status of single are almost equal to likely bed net use compared to respondent who married [AOR=1.1,95% CI; (0.5-2)]. The respondent farmer were more likely to utilize ITNs than other occupation [AOR=7, 95% CI; (2.6-18)]. The respondent who are previous net use more than six times likely to bed net use compared to who are not use bed net the previous [AOR=6,9 5%CI;(3.4-10)].

7. Conclusions and recommendations

Conclusion

There is a higher prevalence of ITN utilization in Wolkite Town compared to the objectives set by FMOH in 2007(E.C) but lower than the national target (100%). This is because of high knowledge about prevention and cause of malaria. it was significantly associated with knowledge, previous ITNs use, merchants, farmers and females.

Recommendations

Zonal health department should work on improvement of based intervention to reduce poor knowledge of malaria prevention and regular use of ITN. Provide support for health professionals to strengthen the activities of health education and promotion. Health education should be provided on continuous and when possible on house to house basis rather than as a onetime activity and awareness creation about ITN use and prevention of malaria

NGO

Provide net for the reduction of malaria burden.

Community

Actively participate in awareness creation programmed in order to improve their knowledge about ITN and malaria.

8 Strengths and Limitations of the study

Strengths

Since the study was community based and interview was conducted by going house to house and chart reviews, and usage of observational checklist could be mentioned.

Limitations of the study

Recall bias, and since the study didn't include observation under or over reporting of the frequency, duration of stay. In this study lacked qualitative assessment and the cross sectional study design nature it didn't provides temporal relationship of cause and effect.

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Annex - Questionnaire (English version)

Questionnaire no.....

WKU Department of public Health

Utilization of Mosquito Nets and Factors affecting it in Wolkite Town

Hello, my name is..... . I am one of the data collectors on the study with the above topic. I would like you to cooperate in answering the questions that follow. The information you will provide contributes to measures that are taken to control malaria any information you provide will be confidential. You have the right to not to participate in the study.

Name of Interviewer: _____ Date: _ _/_ _/_ _ Start time: _ _/_ _ End time: _ _/_ _

Interviewer agreement 'we are certify that we have filled this questionnaire in accordance with the training we was give and instructions state in it. We were confirmed that the information in it is correct.' Signed_____
Date_____

1) General information on individuals who are currently members of the household and their use of ITN

ser.no (put the respondent first)	age in years 14-20(1) 21-30(2) >30(3)	sex male-1 female-2	occupation n (1)	educational status(2)	Religion Orthodox-1 Muslim-2 Protestant-3 Other -4	Marital status Married=1 Single=2 Divorced=3 Widowed=4

1						
2						
3						
4						
5						
6						

(1)Occupation

Government employee 1

Merchant 2

Farmer 3

Student 4

Other 5

(2) Educational status

can't read and write 1

Read and write 2

Primary school 3

Secondary school 4

Diploma and certificate 5

2. Have you seen or heard any education messages about bed nets/mosquito nets from any source? 1 Yes 2 No

3. If yes where did you see or hear these education messages from? (Multiple responses possible)

TV 1 Radio 2 Health worker 3 other 4

4. Has the net (have the nets) been used in the previous? Yes 1 No 2

5. Do you have a bed net in the household currently? Yes 1 No 2

6. If you have no bed net what is the reason? (Multiple responses possible)

Bed nets are too expensive 1 Bed nets do protect against malaria 2
Bed nets are not available 3 don't know 4

7. How many people in your home usually sleep on beds(if any)...

8. How you obtain your bed net(s)?

They were given to for free 1 other 3

Bought it them 2

9. Have any of your bed nets ever been washed?

Yes 1 No 2

10. If yes how often did you wash your bed net(s) (the highest frequency if more than one net was washed)?

Every .....day every.....month

Every .....year every .....three times per year

11. Do you think bed nets have any benefit?

Yes 1 No 2 I don't know 3

12. If yes what do you think are the benefits of sleeping under a bed net? (Multiple responses possible).

Don't get bitten by mosquitoes 1 It's warmer 3

Don't get other insects 2 other 4

13. Do you think there are problems associated with sleeping under a bed net?

Yes 1 No 2 I don't know 3

14. If yes what are they? (Multiple responses possible)

Its hot sleeping under net 1 there is not enough air 3

Mosquitoes can still bite through the net 2 other 4

15. Have you seen or heard any education messages pertaining to malaria from any source in the past one year? Yes 1 No 2

16. If yes where did you see or hear these education messages from? (Multiple responses possible)

TV 1 Radio 2 Health worker 3 other 4

17. Main cause of malaria?

Being in the rain or cold 1 another person with malaria 3 don't know 5

Living near collected water 2 Being bitten by mosquitoes 4 other 6

18. What main symptom of malaria are you aware of?

Known less than three symptoms =1

Knows symptoms of three and above =2

19. Number of bed

Less than two =1 Two and above =2

20. Number of sleeping floor

Less than two =1 Two and above =2

This is the end of the interview. Thank you very much for participating in this research