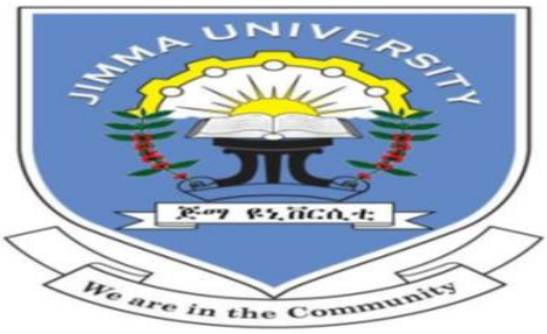

PREVALENCEOF MALARIA AND ASSOCIATED FACTORS AMONG INDOOR RESIDUAL SPRAYED VERSUS NON SPRAYED HOUSEHOLDS IN GOMBORA WOREDA, HADIYA ZONE, SNNPR ETHIOPIA.

BY: BERHANU SHIBESHI (BSC)

A RESEARCH THESIS TO BE SUBMITTED TO JIMMA UNIVERSITY, INSTITUTE OF HEALTH COLLEGE OF PUBLIC HEALTH, AND DEPARTMENT OF EPIDEMIOLOGY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR DEGREE OF MASTERS IN GENERAL PUBLIC HEALTH.

JUNE, 2017

JIMMA ETHIOPIA

ASSESMENT OF MALARIA AND ASSOCIATED FACTORS AMONG INDOOR RESIDUAL SPRAYED VERSUS NON SPRAYED HOUSEHOLDS IN GOMBORA WOREDA, HADIYA ZONE, SNNPR ETHIOPIA.A COMPARATIVE CROSS SECTIONAL STUDY

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ADVISOR:

CHERNET HAILU (MPH, ASSISTANT PROFESSOR)

TAMIRAT SHEWANEW (MPHE)

JUNE, 2017

JIMMA, ETHIOPIA

Abstract

Background: *Malaria remains the first important public health concernsacross the globe.The highest morbidity and mortality burden is in sub Saharan African countries. Little is known about indoor residual spraying (IRS) in areas with intense malaria transmission sub-Saharan Africa including Ethiopia.*

Objective: *This study assessedprevalence of malaria and associated factors among Indoor Residual Sprayed versus Non Sprayed households in Gomboraworeda , Hadiya zone ,South Ethiopia,March 2017*

Method: *we conducted community based comparative Cross sectional study among IRS households verses non sprayed households in Gombora woreda.Weselected 462 participants from IRS and 462from non IRS kebeles using stratified multistage sampling method.We used Epidata for data entry and SPSS ver.21for analysis.Bivaraite and multivariate analysis was done to examine the relationship between malaria and no malaria with IRS status.*

Result: *Four hundred twenty three participants from sprayed households and 423 from non sprayed total of 846 individuals were participated. In this study participants from non sprayed households more malaria AOR 1.798(95%CI 1.052-3.07)than participants from sprayed households. The prevalence of malaria in sprayed households* 29(6.63%) *lower than non sprayed households* 42(9.9%) from all participants.*Those individuals living in one kilometer to stagnant water source were more affected 1.873(95% CI 1.554-7.183)times than those far away.Children age ≤ 5 years weremore affected than age ≥ 15 years with AOR 3.384(1.554-7.366).Students that read and write only were more likely infected by malaria AOR 2.103(1.046-4.229) than grade 9 and above students.*

Conclusion:*Malaria infection among sprayed households was lower than non sprayed households. Therefore strengthening IRS is an important measure to eliminate malaria from Gombora woreda as well as Hadiya zone SNNPR Ethiopia.*

Keywords: *Malaria, Indoor Residual Spraying (IRS), Ethiopia*

Acknowledgment

First of all I would like to thank God. Then I would like to thank Jimma University School of graduate studies for providing me this chance to carry out this thesis. I would also to extend my thanks to my advisors Mr. Chernet Hailu and Mr. Tamirat Shewanew for their valuable advice and comments they have produced during the development of this thesis. Finally but not least I would like to say thanks Hadiya zone health department, Gombora woreda health office, supervisors, data collectors and all participants for their valuable advice and supports.

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Acronyms and Abbreviations

ACT	Artimecine Combination Therapy
AOR	Adjusted Odds Ratio
CI	Confidence Interval
COR	Crude Odd Ratio
DDE	Dichloro Diphenalyle Ethane
DDT	DichloroDipheliyl Trichloroethane
FMOH	Federal Ministry of Health
HMIS	Health Management Information System
LLITNs	Long Lasting Insecticide treated Nets
IRS	Indoor Residual Spray
PH	Hydrogen phosphate
PMI	Presidential Malaria Initiative
P.	Plasmodium
P. F	Plasmodium Falicparuim
P.V	Plasmodium Vivax
RDT	Rapid Diagnostic Test
SNNPR	South Nation Nationalities Peoples Region
WHO	World Health Organization

CHAPTER 1: INTRODUCTION

1.1 Background

Malaria remains one of the most important public health concerns across the globe.The burden is highest in sub Saharan African countries. According to WHO 40% of the worlds inhabited area mostly in the tropics is at risk of malaria. In Africa over 1 million deaths occurred among young children[1]. In Ethiopia 75% of the country is malarious with about 68% of the total population living in areas at risk of malaria. That is, more than 50 million people are at risk from malaria[2].

IRS is the application of long-acting chemical insecticides on the walls and roofs of all houses and domestic animal shelters in a given area, in order to kill adult vector mosquitoes that land and rest on these surfaces. IRS is one of the primary vector control interventions for reducing and interrupting malaria transmission.In IRS-targeted areas, structures sprayed should include all human habitations where vector-man contactlike farm huts, animal shelter, latrines, and storesimportant resting place for exophilic blood feed mosquito. IRS requires a high degree of coverage of potential resting places, including all walls, ceilings and furniture, window frames and both sides of doors[3].

According to WHO report about 153 and 116 million people worldwide protected by IRS in 2011,2014 respectively [1, 4]. During 2006–2008 the proportion of the population protected by IRS increased substantially in the African Region[1]. Over the last five years, Ethiopia has demonstrated significant success in scaling up IRS in epidemic prone populations, with 6.5 million households sprayed in 2009 representing 55% of the target population protected [5].

According to IRS assessment in 2012 districts have conducted IRS over 82% in the targeted communities[6].

An insecticide for IRS is selected in a given area on the basis of data on resistance, the residual efficacy of the insecticide, costs, safety, and the type of surface to be sprayed should be addressed .DDT has a comparatively long residual efficacy (≥6 months) as an insecticide for IRS [1].

The timing and prioritization of IRS program depends on Collection and analysis of parasitological confirmed, facility-based malaria incidence data, complemented by community-

based prevalence data when available, enables the district IRS coordinators to stratify their areas of operation by level of intensity of transmission. The epidemiological data should be correlated with the meteorological data, especially rainfall, for the previous 2–3 years. This will also provide guidance for prioritizing and limiting areas to spray, and identifying the best months for spraying and the number and timing of spray cycles required[7].

For IRS to be effective there must be high coverageusually > 85% of all structures that waspotential resting places in order to obtain the mass effect on the vector population within a given ecological situation[4].

1.2 statement of the problem

Malaria is one of the most severe public health problems worldwide with 3.2 billion people live at continuous risk of this disease. Each year, there are more than 350 million cases of malaria and more than a million deaths from the disease. From this more than two-thirds of malaria cases occur in Africa, as well as approximately 90% of deaths, which are mainly in children under five years of age[1]. It is the fourth leading cause of death of children under five years in developing countries. It is one of the major diseases of poor people in developing countries and one of the leading causes of avoidable death, of morbidity and mortality[8].

In Ethiopia, malaria is the leading cause of morbidity and mortality. About 70% of the population (Approximately 52 million people) is estimated to be at risk for malaria infection each year[9].According to FMOH Malaria accounts for up to 17% of outpatient consultations 15% of admissions and 29% of inpatient deaths which means 70,000 people die of malaria each year?Rainfall-associated breeding of the major vector *Anopheles arabiensis* is the main cause of seasonal malaria epidemics in Ethiopia, abnormal climatic changes have often given rise to major epidemics in the past[10]. The severity of malaria occur mainly young children and pregnant women in highly endemic areas where immunity is high among most adults[2].Currently, there are a number of epidemic precipitating factors in addition to natural environmental or climatologically factors including chloroquine-resistance of falciparum malaria, high-scale population movement due to resettlement and labor forces in agro-industrial development areas and expansion of developmental activities such as irrigation schemes[9].

The other problem is the agent plasmodium has developed resistance to a number of anti malaria drugs throughout most parts of tropics and mixed infections of p.vivax and p.falciparuim increase the problem [4, 5, 10].

Insecticide resistance is a major challenge to global malaria control efforts, especially in Africa and the India subcontinent. Resistance to at least one insecticide use for malaria control has been identified in 64 countries[5]. According to PMI report high level of insecticide resistance was made the spray program shift to more expensive classes of insecticides which hinder the program's ability to sustain and scale up the program due to the limited funding available [11]. Recent studies have shown resistance to DDT, pyrethroids and malathion with some resistance also detected to bendiocarb. Use of insecticides other than DDT and pyrethroids will mean that the cost for IRS will increase dramatically, and that vector control strategies may need to be revised in this context [12]. Bendiocarb and microencapsulated pirimiphos methyl are viable alternatives for indoorresidual spraying where resistance to pyrethroids and DDT is high and may assist in the management of pyrethroidresistance[13].According to Presidential malaria initiative 2015 report of Ethiopia, resistance to multiple insecticides by the primary malaria vector; epidemiological targeting of IRS to have the most impact; ensuring sustainability of the program; best use of limited portfolio of resources; re-plastering of houses after spraying resulting in decreased efficacy; and the need to improve pesticide management and environmental compliance. Concentration of DDT tends to increase with age; this is particularly noted on highly exposed population [14].

According to WHO 2015 report the proportion of the population at risk protected by IRS has declined globally from a peak of 5.7% in 2010 to 3.4% in 2014, with decreases seen in all regions except the WHO Eastern Mediterranean Region. The proportion of the population at risk protected by IRS is 6% in all of sub-Saharan Africa in 2014but coverage rates have declined in recent years. In recent years, however, IRS has received relatively little attention. But the estimated number of deaths worldwide is still too high for a disease that is entirely preventable and treatable[15].

According to Gombora woreda health office HMIS report malaria was the first top ten cause of morbidity in previous years.List of potential causes of the problem werefavorable climatic condition for anopheles mosquito breeding,marshy teff cultivationareas which was impossible

for environmental management,community resistance of house spraying , painting of the walls before six month of spray time, inappropriate use of LLITNS andnot priority given to children and pregnant mothers was the problems[16].IRS was one of the three main malaria control methods strongly recommended by WHO next to ITNS. But, experiences with effectiveness of IRS as public health intervention tools and the local factors influencing their usefulness were very limited. Despite several years of research and concerted efforts at control, the realization of a malaria-free world remains a dream. The prevalence of the disease continues to increase and re-emerging in many parts of the world[4]. Therefore, it would be of interest to find out whether the malaria infection affected more by the IRS program, or by non IRS status of households.From the woreda report every year spraying were done but the prevalence of malaria still the same as the previous years so what is the reason behind that malaria not eliminated. The aim of this study is to fill the identified gaps in the study area.

CHAPTER 2: LITRATURE REVIEW

2.1prevalenceof malaria

Globally the number of malaria cases fell from an estimated 262 million in 2000 to 214 million in 2015. Most cases in 2015 are estimated to have occurred in the WHO African region (88%) followed by the WHO south east Asian Region(10%) and western region(2%) [17].

A study conducted in West Africa results show those four years in which Indoor Residual Spraying implemented, prevalence of malaria reduced by 71% compared to periods preceding the implementation of Indoor Residual Spraying[18]. A study conducted in Malawi the prevalence of malaria parasitemia (22% versus 42%) is significantly lower in IRS versus non-IRS areas, respectively[19].A study conducted in western Kenyathe prevalence of malaria parasitemia was 6.4% in the IRS district compared to 16.7% in the comparison district (OR = 0.36, 95% CI = 0.22–0.59)[20].

Study conducted in northern Uganda IRS can significantly reduce malaria prevalence by 62% on average, and reductions are highest in areas with higher initial prevalence and multiple rounds of spraying [21].

The 2007 Malaria Indicator Survey (MIS) indicated that parasite prevalence measured by microscopy inEthiopia is 0.7% and 0.3%, respectively for *P. falciparum* and *P. vivax* below 2,000 meters altitude.

Study conducted in Butajira South Ethiopia estimated 0.93% of the participants had malaria infection. Prevalence of malaria high when the study includes October and November [OR=7.95] [22].

A study conducted in east showa zone Spraying wasassociated with a 62% reduction in malaria incidence 6.8% after spray and 9.9% before spray OR= 0.37 (95% CI 0.37_0.39)[23].

2.2 Factors associated with malaria

2.2.1 Socio demographic factors

A study conducted in Tanzania IRS reduced malaria transmission in age of 6 months to 14 year children by half compared to non IRS household. Prevalence of malaria infection varied with age

of participants. Increased malaria prevalence is observed in children aged below five and five to nine years [18].

A baseline malaria indicator survey in Amhara, Oromiya and Southern Nation Nationalities and People (SNNPR) regions of Ethiopia show that the RDT result is associated with age and sex.As the family size increases malaria infection increases (813) 27.7% with OR 10.3 [6.0–17.2] (1575)[24]. For one increase in family size, the number of persons infected by malaria in the household increased by 5.1% (OR = 1.057)[13].Male participants had 1.63 (95% CI: 1.22–2.18) times more risk of acquiring P.falicparium[25].The 2011 MIS shows that 1.3% of all age groups are positive for malaria using microscopy and 4.5% are positive for malaria using RDTs below 2,000 meters. *P. falciparum* constituted 77% of these infections [14]. Children aged below five years (adjusted OR= 3.62) and children aged five to nine years (adj.

OR= 3.39) were associated with malaria prevalence[22].

[8]. A study conducted in Mozambiquethe prevalence of malaria infection was 47.8% (95%CI: 38.7%–57.1%) in children 1–15 years of age [26].

2.2.2Socioeconomic factors

Individuals with poor socio-economic conditions are positively associated with malaria infection. [4]. There is strong evidence that uptake of preventive and treatment interventions are closely related to socio-economic status[27].A study conducted in Cameroon Malaria parasite prevalence and parasite density is higher in the individuals of wooden plank houses than those of cement brick houses [25].The prevalence of malaria for households with clean water found to be less. Malaria rapid diagnosis found to be higher for thatch and stick/mud roof and earth/local dung plaster floor. Its distance, have effect on prevalence of malaria.Time to collect water within 30–40 minutes and house made Wood OR 4.729 CI (0.821 to 9.220) and those households use Unprotected water and Mud block/stick/wood OR 0.018 CI (0.003 to 0.130).Houses with holes (adj. OR= 1.59) more malaria infection than those closed[22].Those households with a pit latrine were at lower risk of malaria diagnosis (OR = 0.725) than those did not have toilet as well as households with flush toilets (OR = 0.552)[28].Those households who have radio positively associated with malaria infection.Increase in the income (which ranged from 1.90 to 6.29) was significantly associated with reduction in malaria prevalence (OR = 0.79, 95% CI 0.66-0.94)[23].

2.2.3 Vector control variable

Individuals who live closer to the identified vector breeding site have more risk of malaria infection than those live faraway[25, 28]. A study conducted in southern Ethiopia Gedeo zone individuals living in nearby stagnant water are found to be two times more likely to get malaria parasites than those who were far away from these risky areas(OR=2.01, 95% CI: 1.50-3.85).[29].Living nearer to the vector breeding site increased the risk of acquiring falciparum malaria, that is, each 1 km closer to the vector breeding site added 4.93 (95% CI: 2.59–9.35) times more risk[25]. Prevalence of malaria low among households having at least one LLITN in the house [OR = 0.66,95% CI 0.43-0.96][28].A study conducted in Zewaye area density of malaria during dry season higher at indoor than outdoor and Peak indoor and outdoor activities of *An*. *arabiensis* were observed during the early period of the night, between 18:00-19:00 and 19:00-20:00 hours, respectively[30].

Spraying anti-malaria to the house was found to be one means of reducing the risk of malaria [23].

The study conducted in northern Uganda suggests that the majority of people in areas of high malaria transmission place a high value on vector control programs using IRS Districts are primarily responsible for organizing IRS operations in their respective areas, and should be coordinated between and closely supervised by the district health office and the district's primary health care unit [31]. IRS is indicated only in those settings where it can be implemented effectively, which calls for a high and sustained level of political commitment.IRS requires effective leadership and management for planning, organizing and implementation. Operations must be managed by skilled professional staff, based on an analysis of local epidemiological data and a sound understanding of transmission patterns, vector behavior and insecticide resistance status. Significant strengthening of human and technical resources, accompanied by sufficient financial resources, is needed to develop or reorganize existing IRS operations [32].

A recent entomological study in Tigray region has reported 5.9-7.2 times more adult *An. arabiensis* the main malaria vector in Ethiopia[33].Increases in densities of vector in previous two months showed a linear relationship with increased malaria incidence [10].

There is no research done in the study area that shows the stakeholders see the problem ofnot spraying the house. This study helps different stakeholders to compare status of malaria infection among sprayed and unsprayed households.

2.3Significance of the study

Indoor residual spray needs the participation of community, health workers, different level administrators, support of political systemand other stakeholders etc. This study assessed socio-demographic and socioeconomic factors, housing conditions, environmental factors, vector control factors that contribute for malaria occurrence. Since most kebeles was malarias it should given attention to carry out the study and based on the findings attained, important suggestions were made against IRS use. This study compares the burden of malaria infection among IRS versus non IRS area of the woreda and it alsoprovides information on prevalence of malaria by comparing both areas. Italso useful to increase number of kebeles sprayed and population protected per year.And it also recommends that the community to not paint the walls before six monthof sprayed insecticide and create awareness on conditions that favor malaria infection.

Thus, theresult of this study will contributed to the development and implementation of appropriate IRS programs to reduce occurrence of malaria among households. Additionally the study tried to fill the identified gaps and help community leaders, health workers, planners and policy makersto improve the program and also provide as baseline information and directions to alleviate the problem.

2.6Conceptual frame work

Aconceptual framework developed by reviewing different literatures[17,18,22,31] .

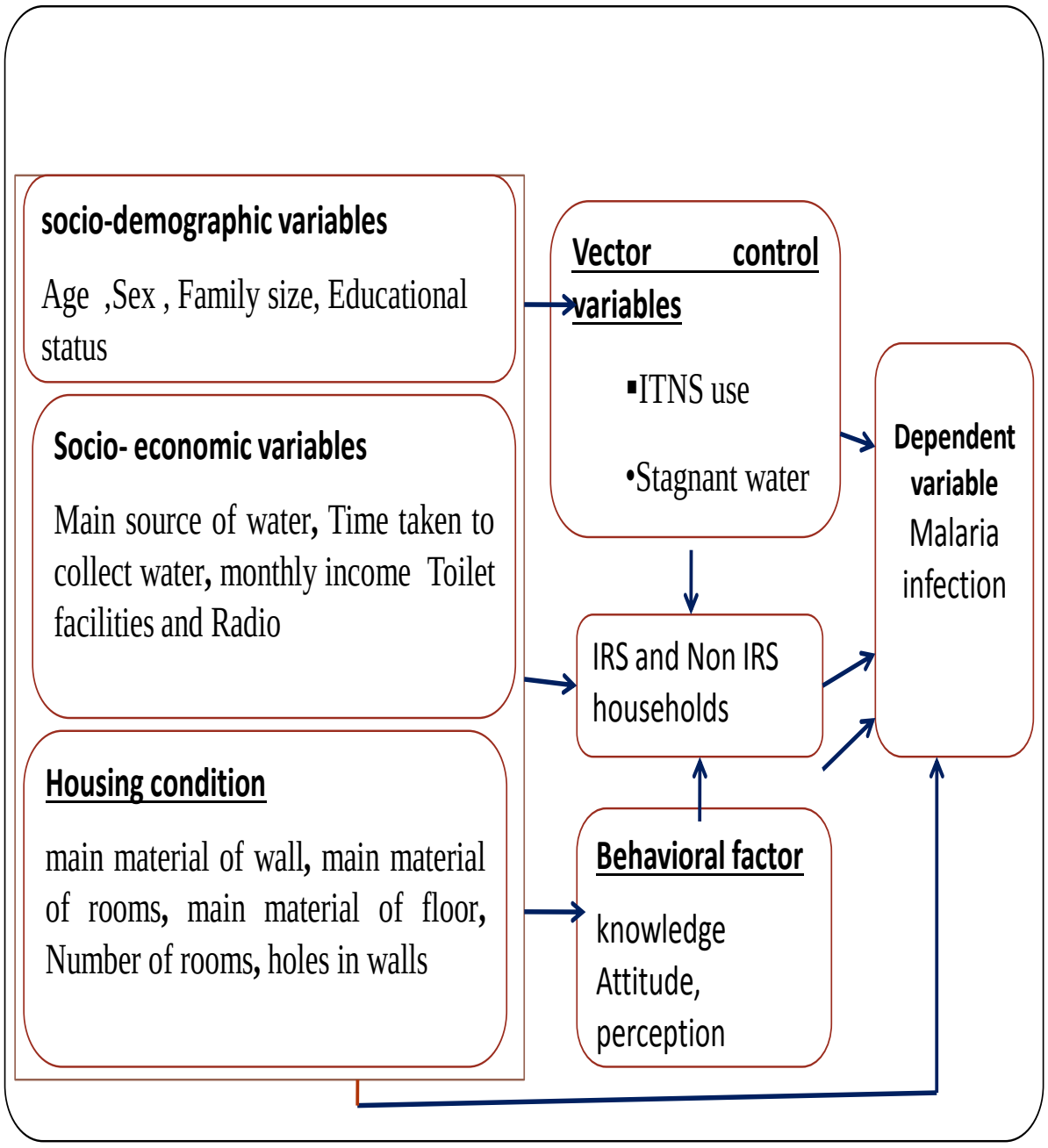


Figure 1:Conceptual framework of malaria infection among IRS and non IRS households.

CHAPTER 3: OBJECTIES

3.1. GeneralObjective

To assess prevalence of malariaand associated factors among Indoor Residual Sprayedversus non sprayed householdsin Gombora woreda, HadiyaZone, SNNPR Ethiopia.

3.2 Specific objectives

- To determine the prevalence of malaria among IRS and non IRS households
- To identify the factors associated with malaria among households.

CHAPTER 4: METHODS AND MATERIALS

4.1 Study area andperiod

This study was done in Gombora Woreda,Hadiya Zone SNNPR Ethiopia which located 264 km from the capital Addis Ababa, and226 km from the regional capital Hawassa. It bordered at the north Gibe woreda, at the east Lemo wereda, at the south Soro woreda and at the west Yem special woreda. It wasone of the 11(eleven) woredas found in the zone. The woreda had 24 kebeles (22 rural and 2 urban kebeles) from these 18 rural kebeles andone urban kebele were malaria risky and 3 kebeles were medium transmission. The altitude is 1200 m above sea level. Climatic condition of the woreda is 67% hottest 33% medium. The annual rainfall was 13000 mm in 2009 and the area covers 48851.55 square km. The woreda had19603 unit structures with the total population of 117392 andPopulation at risk were 96,053 and average household size was 5.04 individuals in rural area. The woreda had 29 health institutions (23 health posts and 6 health centers) and one district Hospital under construction. A health post is staffed by two HEWs who were accountable to health centers.IRS program weretechnically and administratively supported by woreda health office. According to 2015/16woreda health office report 86%households sprayedfrom 9 kebeles but from eligible 19 kebeles 47.4% only sprayed.[16]The data were collected from March 12 to 22/2017.

4.2 Study design

Community based comparative Cross sectional study design was used.

4.3 Source population

All populations were lived in rural area ofthe woreda.

4.4 Study population

Selected Individual from selected households of the study area

4.5 Inclusion and exclusion criteria

4.5.1 Inclusion criteria

4.5.1.1 *IRS area*

Individual living in Household sprayed within past six month were included to the study.

4.5.1.2 Non IRS area

Individual living in non IRS Household and not sprayed within six months were included.

4.5.2 Exclusion criteria

4.5.2.1 *IRS area*

Those participants living in households not sprayed but living in IRS area was excluded from the study.

4.6 Sample size and Sampling technique

4.6.1 Sample size

The sample size was determined using the formula for two population proportion with the following assumptions; a 95% confidence level (Z) and power of 80%, the prevalence (P) of malaria in non IRS area is 9.9%and in IRS area 6.6,odd ratio of 0.37[23],design effect of 1.5 and 10% non response rate.

Sampling size determination by Two population proportion formula.

$$n = \frac{[Z_{\alpha/2}\sqrt{(1+1/r)\,P\,(1-p)} + Z_{\beta}\sqrt{P_1(1-P_1) + P_2(1-P_2)}]^2}{r}$$

$$(P_1 - P_2)^2$$

Parameters:

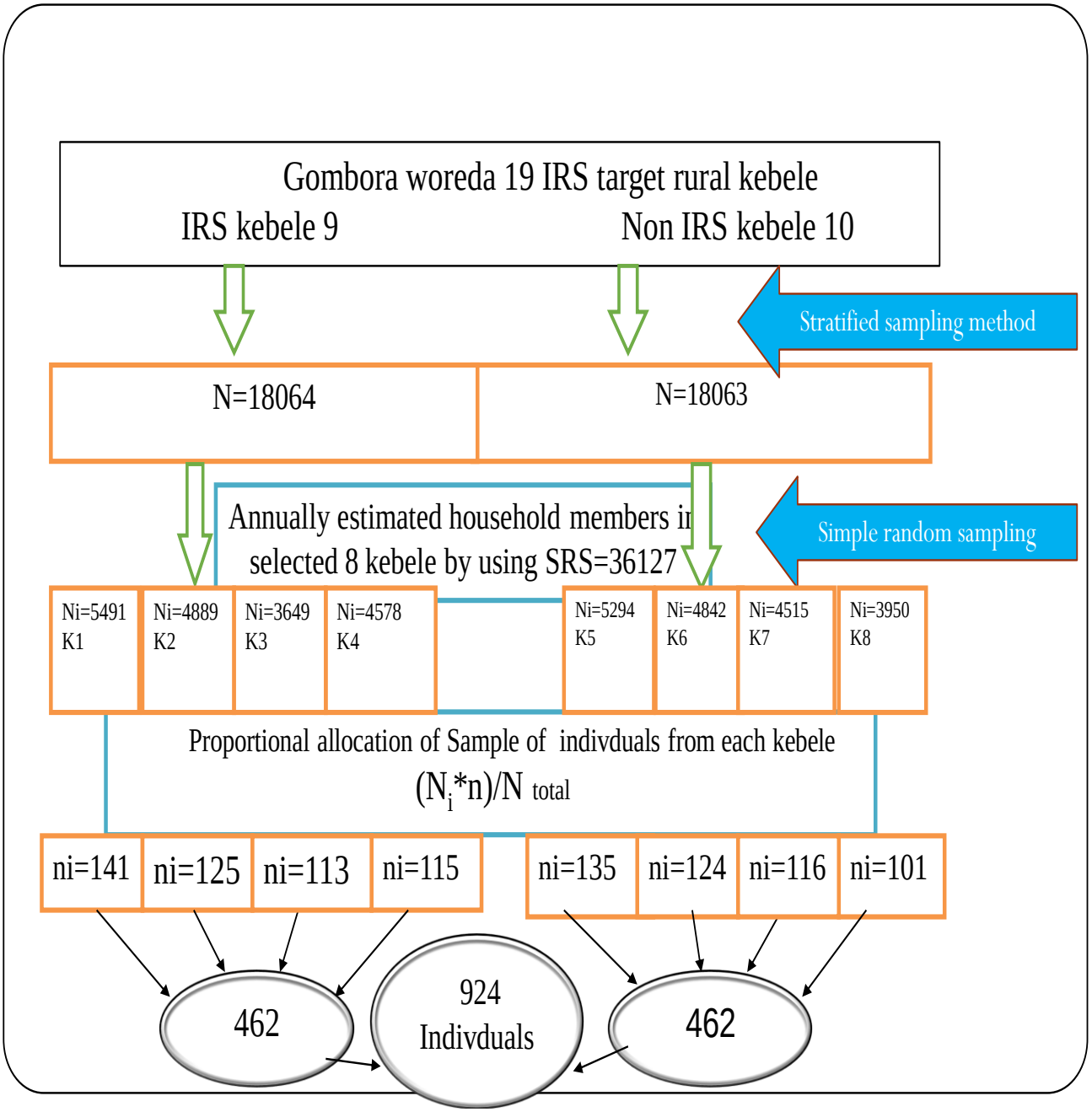
EPI Info™ 7 used to calculate the sample size

n - size of sample in each group=280 with design effect of 1.5 the sample size 420 and with non response rate of 10% the sample size was calculated to be 462 individuals from each group total sample size was 924 individuals.

4.6.2 Sampling technique

A stratified random sampling technique was used to select sprayed and non sprayed kebeles. By using a simple random sampling technique households were selected based on IRS status,then by proportional allocation individuals selected from households andusing computer programan individual selected from each households and assessed for malaria.

4.7:Schematic presentation of sampling procedure



K1,K2,K3,K4,K5,K6,K7,K8 were Adeana,Seghie,Olewicho,1st ole,Bole,Wondo,Tachgana and Wabeto respectively.

Figure 2: 4.7 schematic presentation of sampling procedure among IRS versus non IRS households in Gombora Woreda Hadiya Zone SNNPR Ethiopia.

4.8 Studyvariables

4.8.1 Dependent variable

- Malaria infection

4.8.2 Independent variables

Associated variables

Socio demographic and economic variables

- Sex
- Age
- Educational status
- Family size
- Occupational status
- Monthly income
- Main source of water
- Time taken to collect water
- Toilet facilities
- Radio

Housing condition

- Main material of wall
- Main material of roofs
- Main material of floor
- Number of unit structures
- Open Eaves in walls
- Illumination of the house

Vector control variables;

- Stagnant water

- ITNS use

Behavioral factors knowledge,attitude, and perception

4.9Operational definitions

- Indoor residual spray (IRS): is the application of long-acting chemical insecticides on the walls and roofs of all houses and domestic animal shelters in a given area, in order to kill adult vector mosquitoes that land and rest on these surfaces for last six month.[4]
- Non indoor residual sprayed household (Non IRS):a house hold not received indoor residual spray in last six month[1].
- Malaria infection positive:RDT test result showing positive when a line near letter"C'' followed by one or two lines near letter 'T' means the patient was positive for malaria.
- Malaria infection negative: RDT test result showing negative when a line near letter ''C'' followed by no lines near letter "T" means the patient does not have malaria [34].

4.10Data collection

The data collection form had two parts: household questionnaire and individual condition about malaria parasite prevalence.The questionnaire was collected by six diploma holder nurses. Training was given for data collectors for two days on procedures, techniques and ways of expressing the questionnaires to collect the necessary information.Samples and Patient Management was done by trained data collector nurses that use a single finger prick to collect blood samples for RDT. The test performed with trained nurses using RDT for each participant.

4.11Data processing and Analysis

The data were entered and double checked for missing values, outliers and analyzed using SPSS for windows version 21.0.Proportions were compared by household IRS status. First, bivariate analysis was carried out and results were presented using proportions, and crude odds ratios. Variables having p-value ≤ 0.25 in bivariate analysis were considered as a candidate for multivariate analysis. Then the multivariable logistic regression model was performed todetermine independent effect of indoor residual spray after adjusting for all potential confounder. The results were presented using adjusted Odds ratios along with 95% CI were

estimated to measure the strength of the association between variable of interest. *P*-Value <0.05 were declared to be statistically significant.

4.12Data quality management

The questioner were developed in English language and translated first to Hadiyissa languageand back translated to English language to check its consistency. The local language questionnaire was used to collect data. The questionnaire was pre-tested on 20 participantsand pretesting was given on instruments. Everyone in the sample was assured for confidentiality, and motivated to give true answers. Supervision was made by the principal investigator and supervisors by observing how data collectors were conducted the interview for10 days of data collection.At the end of each day data collectors submittedall completed questionnaire and each completed questionnaire was checked by the principal investigator for completeness and consistencies. All incomplete questionnaires were considered as non response rate.The reliability of the questioner were tested by cromebach alpha with 0.7-1 acceptable scale.

4.13 Ethical considerations

Ethical clearance was obtained from the ethical clearance committee of the Jimma University andwritten consent was obtained from each participants and parents of children.All people found to be malaria positive during the data collection were treated according to the national malaria treatment guide line.

4.14 Dissemination plan

The findings was presented to the Jimma University scientific community and submitted to the department of Epidemiology institute of health. The findings will also be communicated to the local health planners and other relevant stake holders at zonal and Woreda level in the area to enable them take recommendations in to consideration during their planning process. It can also be communicated to health planners and managers at regional level. Publications in peer reviewed, national or international journals will also be considered.

Chapter 5:Results

5.1. Socio demographic andsocioeconomic characteristic

The Response rate of this study was 91.6%(846)participants. The mean age of the participant in sprayed households was (23.93±0.682) and non sprayed households (23.28±0.721) years.From 846 individuals 423(50%) individuals were from sprayed households and 423(50%) were from non sprayed households. Majority of the respondents648(76.6%) were age greater than 15 years and under five year age group 41(4.8%). Most participants 750(88.65%) had more than 4 family members.From the total 413(48.8%) were male and 433(51.2%) individualswere females. Majority of the respondents in both area were Hadiya 805(95.15%) of the study subjects 541(63.95%) singleand 809(95.63%) were protestants. Most of the respondentsoccupational status from sprayed households 176(41.61%), from non sprayed households 177(41.84%), and total 353(41.73%) were students.(Table 1)

Table 1: Socio-demographic and socioeconomic characteristic of the individuals in Gombora woreda Hadiya zone SNNPR Ethiopia, March 2017

Variables	Categories	Respondents from		
		Sprayed HHS	Not sprayed HHs	Total
		N (%)	N(%)	N (%)
Age	<5 years	21(5%)	20(4.7%)	41(4.8%)
	6-14 years	63(14.9%)	94(22.2%)	157(18.6%)
	≥15 years	339(80.1%)	309(73%)	648(76.6%)
Sex	Male	221(52.2%)	192(45.4%)	413(48.8%)
	Female	202(47.8%)	231(54.6%)	433(51.2%)
Marital status	Single	275(65%)	266(62.88%)	541(63.95%)
	Married	142(33.57%)	149(35.22)	291(34.4%)
	Divorced	3(0.7%)	1(0.24%)	4(.47%)
	Widowed	3(0.7%)	7(1.66%)	10(1.18%)
Ethnicity	Hadiya	404(95.5%)	401(94.8%)	805(95.15%)
	Others	19(2.25%)	22(2.6%)	41(4.85%)
Religion	Protestant	407(96.22%)	381(90.07%)	788(93.14%)
	Catholic	2(3.78%)	29(10.1%)	31(3.67%)
	Orthodox	10(2.36%)	11(2.6%)	21(2.48%)
	Muslim	4(0.95%)	2(.47%)	6(.71%)
Educational status	Have no formal education	142(33.6%)	169(40%)	311(36.76%)
	Read and write only	18(4.26%)	16(3.78%)	34(4.02%)
	Grade 1-4	115(27.7%)	111(26.2%)	226(26.71%)
	Grade 5-8	94(22.2%)	85(20.1%)	179(21.16%)
	Grade 9-12	46(10.9%)	39(9.2%)	85(10.05%)
	Diploma and above	8(1.9%)	3(.7%)	11(1.3%)
Occupation	Farmer	81(19.15%)	78(18.45%)	159(18.79%)
	Housewife	83(19.62%)	90(21.28%)	173(20.45%)
	Merchant	17(4.02%)	5(1.18%)	22(2.6%)
	Unemployed	59(13.95%)	72(17.02%)	131(15.49%)
	Student	176(41.61%)	177(41.84%)	353(41.73%)
	Government employee	7(1.66%)	1(.24%)	8(.95%)
Family number	1-3	42(9.93%)	54(12.77%)	96(11.35%)
	>4	381(90.07%)	369(87.2%)	750(88.65%)

5.2 Prevalence of malaria among individuals from sprayed and non sprayed households

Prevalence of malaria among individuals from sprayed households were 29(6.63%) compared to 42 (9.9%) individuals from non sprayed households.

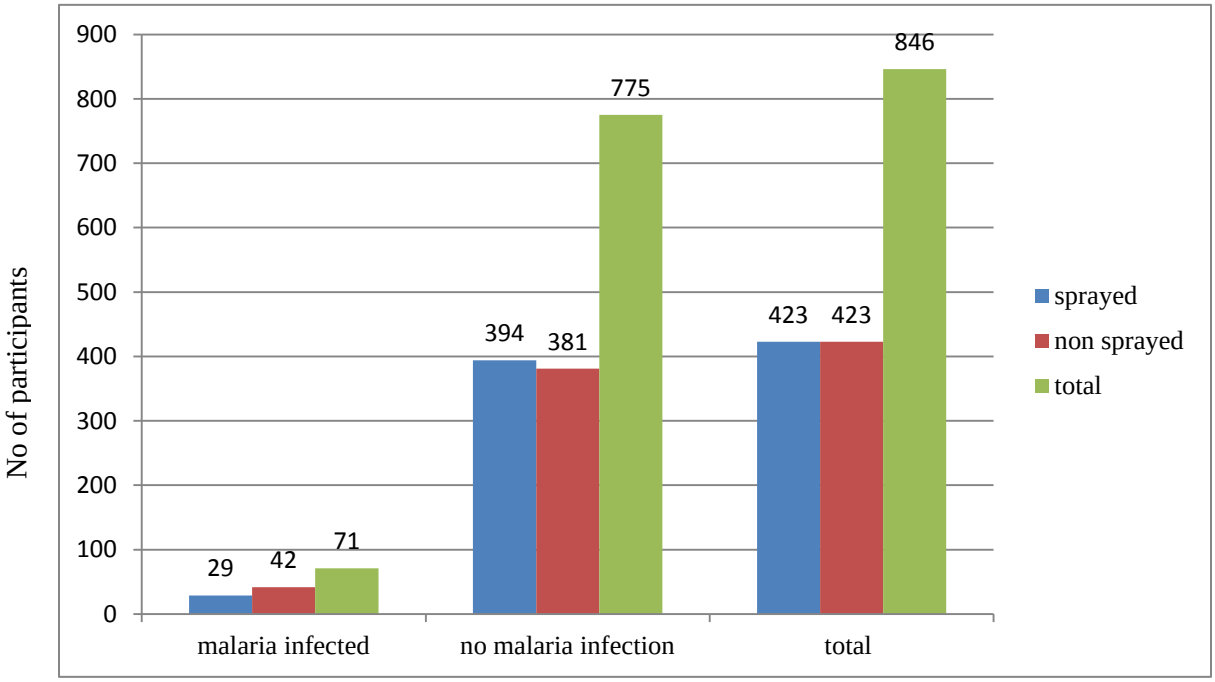


Figure 3: prevalence of malaria in sprayed and non sprayed households of Gombora woreda Hadiya zone March 2017

5.3 Housing condition

Majority of participants from sprayed households 331(78.3%), from non sprayed households 376(88.9%) and total of 707(83.57%) participants were lived in thatched households. In both sprayed and non sprayed households most participants 825 (97.52%) lived in earthen households. Majority of the individuals 339(80.1), 336(79.4%) and 675(79.79%) were lived in sprayed and non sprayed households were good illumination.Most households355(41.96%) and 319(37.71%) had 2 and 3 sleeping space respectively. From the total participants 289(34.16%) had radio and 557(65.84%) had no radio in their home. Five hundred sixty seven individuals get water from pure source the rest from different source and most 525(62.06%) had got water from less than 30 minutes walking time. Majority of the participants from sprayed households 307(72.6%), from non sprayed households 267(63.1%) and 567(67%) had latrine in their compound. (Table 2)

Table 2: Housing characteristic of the individuals in Gombora woreda Hadiya zone SNNPR Ethiopia, March 2017

Main material of roof	**Thatched**	**331(78.3%)**	**376(88.9%)**	**707(83.57%)**
	corrugated iron sheet	92(21.7%)	47(11.1%)	139(16.43%)
main material of wall	Wooden	423(100%)	423(100%)	846(100%)
main material of floor	Earthen	405(95.7%)	420(99.3%)	825(97.52%)
	Cemented	18(4.3%)	3(0.7%)	21(2.48%)
illumination of the house	Good	339(80.1%)	336(79.4%)	675(79.79%)
	Medium	65(15.4%)	55(13%)	120(14.19%)
	Poor	19(4.5%)	32(7.6%)	51(6.02%)
	Total	423(100%)	423(100%)	846(100%)
open eaves on the wall	Closed	351(83%)	274(64.8%)	625(100)
	Open	72(17%)	149(35.2%)	221(100%)
no unit structures1		205(48.5%)	226(53.4%)	431(50.95%)
	2	93(22%)	133(31.4%)	226(26.71%0
	3	73(17.35)	60(14.2%)	133(15.72%)
	4 and above	52(12.3%)	4(.9%)	10(6.62%)
Sleeping space per household	1	26(6.1%)	31(7.3%)	57(6.74%)
	2	169(40%)	186(44%)	355(41.96%)
	3	139(32.9%)	180(42.6%)	319(37.71%)
	4 and above	89(21%)	26(6.1%)	115(13.59%)
Radio	Yes	174(41.1%)	115(72.8%)	289(34.16%)
	No	249(58.9%)	308(27.2%)	557(65.84%)
Sources of water	pipe/hand pump	330(78%)	237(56%)	567(67%)
	Protected well/ spring	82(19.4%)	48(11.3%)	130(15.4%)
	Un Protected well/ spring	11(2.6%)	72(17%)	83(9.8%)
	River	0	66(15.6%)	66(7.8%)
Access of latrine	Yes	307(72.6%)	267(63.1%)	574(67.85%)
	No	116(27.4%)	156(36.9%)	272(32.15%0
Distance of water sources in minutes	≤30	263(62.18%)	262(61.94%0	525(62.06%)
	31-60	128(30.26%)	113(26.71%)	241(28.49%)
	≥61	32(7.57%)	48(11.35%)	80(9.45%)

5.4Vector control and behavioral characteristics

Majority of the participants 356(84.16%) from sprayed households, 369(87.23%) from non sprayed households and total725(85.7%) lived in one kilo mater fromstagnant water source. Participants who lived in sprayed households 375(88.65%) were attitude to spray their house compared to non IRS 265(62.65%) households. Individuals from the sprayed households 345(81.6%) hadknowledge about transmission way of malariacompared to non sprayed 247(58.4%) households. Majority of the participants from the sprayed households 375(88.7%) and from non sprayed households 276(65.2%) were belief spraying protect from mosquito bite. Individuals living in sprayed households more knowledge about malaria prevention methods 346(81.8%) than those 198(46.8%) lived in non IRS households. (Table 3)

Table 3:Vector control and behavioral characteristic of the individuals in Gombora woreda Hadiya zone SNNPR Ethiopia, March 2017

		Respondents from		
Variables	Categories	Sprayed HHs	Nonsprayed HHS	Total
		N (%)	N (%)	N (%)
presence of stagnant water	Yes	356(84.16%	369(87.23%)	725(85.7%)
	No	67(15.84%)	54(12.77%)	121(14.3%)
ITNs coverage	Yes	143(33.8%)	141(33.3%)	284(33.57%)
	No	280(66.2%)	282(66.7%)	562(66.43%)
ITNs use	Yes	89(21.0%)	74(17.5%)	163(19.28%)
	No	334(79%)	349(82.5%)	683(80.72%)
Attitude to spray house	Yes	375(88.65%)	265(62.65%)	640(75.65%)
	No	48(11.35%)	158(37.35%)	206(24.35%)
Knowledge about transmission way	Yes	345(81.6%)	247(58.4%)	592(70%)
	No	78(18.4%)	176(41.6%)	254(30%)
Belief IRS protect from mosquito bite	Yes	375(88.7%)	276(65.2%)	651(76.95%)
	No	48(11.3%)	147(34.8%)	195(23.05%)
Malaria prevention method	Yes	346(81.8%)	198(46.8%)	544(64.3%)
	No	77(18.2%)	225(53.2%)	302(35.7%)

5.5 Result of bivariate logistic regression analysis

Independent variables significant in bivariate logistic regression were anti-malaria spray, stagnant water , latrine facility ,age, sex, educational status, sleeping space , roof material were included at multivariate logistic regression analysis.

Table 4:Bivariate logistic regression analysis variables with malaria infection in Gombora woreda Hadiya zone SNNPR Ethiopia, March 2017

Variables	Malaria		COR
	Yes	No	
Age			
≤5 years	10(24.39%)	31(75.61%)	4.125(1.906-8.928)
6-14 years	14(10.62%)	143(89.38%)	1.252(0.671-2.337)
≥15 years	47(7.07%)	601(92.93%)	1
Sex			
Male	29(7.02%)	384(92.98%)	1
Female	42(9.7%)	391(90.3%)	1.422(0.868-2.330)
Educational status			
Unable to read and write	36(11.58%)	275(88.42%)	.739(.215-2.542)
Read and write only	3(8.82%)	31(91.18%)	2.825(1.372-5.826)
Grade 1-4	10(4.41%)	217(91.56%)	.500(0.248-1.009)
Grade 5-8			.881(.428-1.814)
Grade 9-12	46(10.9%)	39(9.2%)	1
Sprayed	29(6.86%)	394(93.14%)	1
Non sprayed	42(9.93%)	381(90.07%)	1.498(0.914-2.454)
Stagnant water			
Yes	44(7.18%)	569(92.82%)	1.695(1.023-2.808)
No	27(11.59%)	206(88.41%)	1
Sleeping space			
One	5(9.62%)	52(91.28%)	1.345(.988-1.831)
Two	33(9.43%)	317(0.57%)	2.178(0.896-5.293)
Three	22(6.9%)	297(93.1%)	1.346(0.531-3.407)
Four and above	6(5.2%)	109(94.78%)	1
Roof material			
Thatched	65(9.23%)	639(90.77%)	.446(.189-1.050)
corrugated iron sheet	6(4.22%)	136(95.78%)	1
Latrine access			
Yes	42(7.32%)	532(92.68%)	1
No	29(10.66%)	243(89.34%)	1.512(0.92-2.485)

Water source			
pipe/hand pump	49(8.64%)	518(91.36%)	0.682(0.238-1.954)
Protected well/ spring	7(5.39%)	123(94.61%)	1.134(0.320-4.020)
Unprotected well/ spring	11(13.25%)	72(86.75%)	0.422(0.128-1.393)
River	4(6.06%)	62(93.94%)	1
Water distance			
1-30 minute	35(6.67%)	490(93.33%)	1.477(0.852-2.56)
31-40 minute	23(9.54%)	218(90.46%)	0.368(0.185-0.731)
≥41 minute	13(16.25%)	67(83.75%)	1

5.6 Factors associated with malaria

According to analysis of Logistic regression modelvariables that showed significant association (p-value <0.25) during the bivariate logisticanalysis were anti-malaria spray, stagnant water , latrine facility ,age, sex, educational status, sleeping space , roof material were included at multivariate logistic regression analysis.

In multivariable logistic regression analysis individuals from non sprayed households were 2 times malaria infected than individuals from sprayed households with AOR=1.80(95%CI 1.052-3.073). Individuals living in one km near to stagnant water source were two times moremalaria infection than those living away from one km distance with AOR=1.87(1.081-3.245). Children age less than five years three times malaria infection than those age greater than 15 years and abovewith AOR=3.28(95%CI1.554-7.183). Prevalence of malaria with AOR=2.10(1.046-4.229)among students read and write only were 2 times more malaria infectionthan those students grade 9 and above.

Table 5 :Multivariate logistic regression analysis of vector control related characteristic with malaria infection in Gombora woreda Hadiya zone SNNPR Ethiopia,March 2017 (n=846)

Variables	Malaria		AOR(95%CI)
	Yes	No	
Sprayed	29(6.86%)	394(93.14%)	1
Non sprayed	42(9.93%)	381(90.07%)	1.798(1.052-3.073)
Stagnant water			
Yes	44(11.6%)	206(88.4%)	1.873(1.081-3.245)
No	27(7.19%)	569(92.81%)	1
Age			
≤5 years	10(24.39%)	31(75.61%)	3.284(1.554-7.183)
6-14 years	14(8.92%)	143(91.08%)	
≥15 years	47(7.25)	601(92.75)	1
Educational status			
No formal education	36(11.58%)	311(88.42%)	
Read and write only	3(8.82%)	31(91.18%)	2.103(1.046-4.229)
Grade 1-4	10(4.63%)	216(95.58%)	0.500(.248-1.009)
Grade 5-8	11(6.15%)	168(93.85%)	
Grade 9-12	11(12.46%)	85(88.54%)	1

Chapter 6:Discussion

This study compared malaria infection among indoor residual sprayed households with non sprayed households. Sprayed household more protected from malaria infection than individuals residing in non sprayed households. Since spraying anti-malaria to thehouse was found one means of reducing the risk of malaria infection as compared to individuals living in unsprayed households.In sprayed area prevalence of malaria infection 29(6.86%) was lower than non-sprayed areas 42(9.93%). Individuals who were from sprayed households were more likely protected from malaria infection as compared to non sprayed households.This finding similar with West Africa which was 72% reduction of malaria with spraying but it was lower than that of western Kenya which was non-IRS district had 16.7% and IRS district had 6.4% incidence of malaria[19].Our finding similar with that study conducted in East Showa zone of Ethiopia which was 9.9% prevalence of malaria in East Shewa Zone Ethiopia[23]. Spraying households with antimalaria insecticides increased mass preventionand increased community heard immunity when coverage greater than 85% households sprayed.

Malaria infection increased with presence of stagnant water in one kilometer distancefrom households. Individuals living near stagnant water source from sprayed households 8(3.18%) less affected compared to non sprayed households 36(9.94%). A study conducted in southern Ethiopia Gedeo zone individuals living in nearby stagnant water was found to be two times more likely to get malaria parasites than those who were far away from these risky areas .A study conducted in sepito temporal clustering south Ethiopia those who lived nearer to the vector breeding site had a greater risk of acquiring malaria infection increase as a function of living 1 km closer to the vector breeding site[25].The reason that presence of stagnant water in one kilo meter distancefavorable condition for mosquito breeding.

In this study children age less than five years more affected than the other age groups. This study similar with study done in Butajira children aged below five years and children aged five to nine years were associated with malaria prevalence[25].When the age of the person increases risk of malaria infection was decreased. A study conducted in Mozambiquethe prevalence of malaria infection was in children 1–15 years of age[26].This was because of that children spent most of their time in home and this made favorable condition for indoor feeding A. mosquitothat feed during day time.

Limitation of the study

Participants who were unable to respond, less sensitivity of RDTs, variables such as Metrologic conditions, temperaturewere not included in this study.

CHAPTER 7: CONCLUSION

This study confirmed that individuals from sprayed households were lower prevalence of malaria than individuals from non sprayed households. Prevalence of malaria among children age less than five years were more malaria infection than age greater than five years. Prevalence of malaria decreases as educational level increase.

In this study living one km near mosquito breeding site was one factor that increased prevalence of malaria.

CHAPTER 8: RECOMMENDATIONS

- The woreda should strength the spaying activities to eliminate malaria and those eligible kebeles who had not sprayed and all mosquito breeding sites should be included during spraying
- Malaria breading sites near one km distance from the households should be managed.
- Care must be given for under five children by family members.
- Vector monitoring activities should be continued to eliminate malaria from the woreda.

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ANNEX QUESTIONER

Annex 1 English version questioner

Part-I) HOUSHOLD SURVEYINTERVIEW TOOL

Informed Consent

Hello! How are you? My name is _____. I am here on behalf of the Jimma University post graduate student. I am going to collect information risk of malaria infection. You are selected to participate in this study, by chance & I would like to ask you few question about malaria your home that will take about 15-20 minutes. The information that you provided to me is confidential &will not be shared with anyone else without your consent, your personality information will not be registered &you are free answer or not to answer the questions but your support &willingness to answer the questions very important for success of this study.

Do I have your permission to continue? 1- Yes 2 - No

If yes, thanks! (Ask tools/questionnaires)& If no, thanks!, Jump (proceed) to next HH

Gote or Ketena _____House number/ HH Code _____

Date of interview (DD/MM/YY) _____Interviewer name _____Sign____

Part 1: - Background Information

No			Remark
101	Household Code	----------	
102	Sex of the Head of HH	1.Male 2.Female	
103	Respondent position in the HH	1.head 2.wife 3.son 4.dougther	
104	Age of the respondent?	_____	
105	Family number	_____	
106	Monthly income	_____	

Part 2:- House hold condition

No	Questions	Possible choices/Answers	Remark
201	Main material of the roof	1. Thatched 2. Corrugated iron sheet 3. Other specify_____	
202	Main material of the wall	1. Wooden 2. Bricks	
203	Main material of the floor	1. Earthen 2. Cemented 3. Wooden 4. Other, specify_____	
204	illumination of the house	1. Good 2. Medium 3. Poor	
205	Presence of open eaves on the wall	1. Open 2. closed	
206	Number of rooms	1. 1 2. 2 3. 3	

		4. 4 and above	
207	Sleeping space per household	1. 1 2. 2 3. 3 4. 4 and more	
208	Do you have radio?	1. Yes 2. No	
209	Is there stagnant water in one km ?	1. Yes 2. No	
210	Do you have LLITNs?	1. yes 2. no	If no jump to Q212
211	How many LLITNS do you have?	1. no LLITNs 2. 1 3. 2 4. 3 and above	
212	Did you sprayed insecticide your house last one year?	1. Yes 2. No	If yes skip to Q214
213	The reasons of IRS refusal in the last season?	1. Discoloring of inner house walls by insecticide 2. Difficulty in furniture's movement 3. Bad behavior of sprayers 4. Malaria is eliminated and IRS would not be useful 5. Other ----------	
214	Do you re-plaster/paint the wall after spray in last one year?	1. Yes 2. No	If no skip to Q216
215	What is the reason you re-plaster	1. Discolor of the wall	

	the sprayed house	2. Malaria eliminated 3. Other specify ----------	
216	Do you provide water for spraying	1. Yes 2. No	If yes skip to question 301
217	If no from where did spray men get water?	1. From neighbor 2. From water source	

Iv Condition of water Supply

No	Questions	Possible choices/Answers	Remark
301	What is the source of water?	1. Pipe/hand pump 2. Protected well/ spring 3. Unprotected well/spring 4. River/pond 5. Other, specify----------	
302	What is the approximate distance from home to water source (minute)?	_____	
303	How many liter of water the house hold consume/day	_____	

v. Latrine facility

s. no	Questions	Possible choices/Answers	Remark
401	Is there latrine facility in the compound?	1. Yes 2. No	If no skip to 403
402	Are the toilets in use?	1. Yes 2. No	
403	If no toilet, where do you use?	1. On forset 2. Near house 3. Other specify--------	

2. Individual information

No	Questions	Possible choices/Answers	Remark
500	Individual Identification code	_____	
501	Sex of the individual	1. Male 2. Female	
502	Age in years	_____	
503	Individuals position in the HH	1 .head 2.wife 3.son 4. daughter	
504	Marital status	1. Single 2. Married 3. divorced 4. widowed	
505	Religion	1. Protestant 2. Catholic 3. Orthodox 4. Muslim 5. Others --------	
506	Ethnicity	• Hadiya • kembata • Gurage • Oromo • Amhara • others(specify)----------	
507	Educational status	1.Unable to read and write 2.Read and write only 3.Grade 1-4 4.Grade 5-8 5.Grade 9-12	

		6.Diploma and above	
508	Occupational status	1. Farmer 2. Housewife 3. Merchant 4. Unemployed 5. Student 6. Governmental employee 7. Others (specify)_____	
509	Is she pregnant mother?	1. Yes 2. No	
510	Do you use ITNS last night?	1. Yes 2. No	
511	Do you believe spraying kill mosquito?	1. Yes 2. No	
512a	Do you believe spraying protect from mosquito bite?	1. Yes 2. No	
512b	Are you interested to spray your house?	1. Yes 2. No	
513	Do you believe malaria kill people?	1. Yes 2. No	
514	Do you know transmission way of malaria?	1. Yes 2. No	If no skip to Q516
515	Which transmission way you know?	1. From mosquito bite 2. From person to person 3. From contaminated food	

		4. From contaminated water 5. Other specify _____ 5.1 Poor personal hygiene 5.2 Lack of latrine 5.3 Lack of waste disposal site 5.4 Food shortage	
516	Do you know prevention methods of malaria?	1. Yes 2. No	If no skip to Q518
517	Which methods do you know?	1. Draining of stagnant water 2. Use of LLITNS 3. IRS Spraying of house 4. Treatment of malaria 5. Draining of open material 6. Other ----------	
518	Are there any arthropods in the household?	1. Yes 2. No	If no go to Q520
519	If yes which type?	1. Flies 2. Bedbugs 3. Flea 4. mosquito	
520	What is RDT test malaria result?	1. Yes 2. No	If no skip
521	Do you take treatment?	1. Yes 2. No	
522	Type of malaria?	1. P.f 2. P.v	

Thank you for your response?

Annex 2 Hadiyissa version questionnaire

HADIYISINE GUDU XAMMICHA

JIMMI UNIVERSTE'NI MINADPHPHI FAYAOOMI BAXANCHA

EPIDIMOLOGE'I BAXANCHA

Xammicha kachisi jabi amdoki duhaa qrare fugamuki minuwane fugamuki'bei minuwani xiggoni yoki anannatoma la'iminaa gudu xammichuwaa iximi Gomboli wordani, Hadiyyi Zonanne Dabubi gasi qoxone Ethiopia.

GAGA LAISHA

Baxaami gasi duha'a---------- Baxakami gasi summa ----------

Gasi beyi---------- gasi beyina uwakami summa ----------

Xammicha xammakami illage ishi yima xamima xumato uwimimi hasisoko

Hinikide xumanihe? Iki summi ----------yamamomo. Ani ka amanene JU fayyao'omi lossan'i baxanchi Lossanichi iha heumuyi, anni kabde kachis jabbi bikina hassisoki xamichuwaa wosha kachisi qarare'e fugako minuwis'e fugakobe'i minuwisi wixi'a'omula. Ati kabde kimineni yoki kachisi jabibikina 15-20 daqiqi afebe'e hasisoki xamichaa debtotoo. Ebikina kinaa saami ka'xamichaa xamonaa afubikina, kesse kaba ka xammichuwa xamena gudamo, xamichuwina dabato dabacha ayi maninami uwombisa ki' illagene kuromo eka amaniti bikinaa galaxumuyi. Ki sumi kitabamo be'isoma ka xamichuwina dabato dabacha matemi manchinami lo'beanoma kurumuyi

1- Eya yitilasi, xammicha asheromo
2- A'e yitilasi, kesse urima xanomo.

Xammicha dabaru manichi meikane(gote)----------, Furimaa---------

Xammicha xamako bala----------, Xammichi amane ----------

Bedu amane ---------- Holamomanchi suma ----------, Furimaa -------

ISSITAKO LUWINA HUNDINAMI GALAXOMMO.

BAXANCHI- 1 ;XAMICHA

Table 6Hadiyissa language version questioner

I ;MINNI'I DUHA'A

BAXANCHI –**1 GATI DUHA'A**

XIGO	XAMICHAA	DEBECHAA	MULICHO
101	Mini xigo'o	_____	
102	Mi'ni gasaanich albacha	1.Goncho 2.Meshera	
104	Gasaanichi Umura	_____	
105	Abroosi xigo	_____	
106	Abroosina agninin hasiso sixo dintea	----------tophphe'i Birra	

BAXANCHI- 2. MNI DUHA'A

XIGO	XAMICHAA	DEBECHAA	MULICHO
201	Mi'n iman bexamu luwa	1. Huqaa 2/Qoriqoro'o 2. mulane dise_____	
202	Gorite'i baxamu luwa	3. Haqaa 2. Kina	
203	Uulli gax duuha'a	5. Bucha 2. Simnito 3. Haqqa 4/mulane dise _____	
204	Mi'n chaakooma	4. chaakka 2. lemibe'aanicho 3. tuunso	
205	Mi'n gorte'i ?	3. afo'i yo'hane 2. afo'i be'ane	
206	Mi'n baxxanch'uw xigo	1/1 2/2 3/3 4/4 ehan'i hanane'te	
207	Mi'n abroos inse'eena daqoo beyi mee'o?	1/1 2/2 3/ 3 4/ 4 ehan'i hanane'te	
208	Radio'I kaminene hee'akatenihe	1.yookko 2 bee'e	

209	Leerru wo'i hegeegone mti kilo'i metri woro'ni hee'aa?	1. Eeyaa 2. Bee'e	
210	Zanziri hee'aa?	3. Eeyaa 4. Bee'e	Be'lsi xmichi 320 hige'e
211	Xigone hinka'ni Zanziri hee'aa?	5. Mhim'I Be'e 2. Mti yookko 6. lami. yookko 7. Sesoo eehanni hannanet'e	
212	Higuki mati hinchi worne kachisi qrare mini fugisaka'a?	1.Eeyaa 2. Aa'e	Eya yitilsi 214 xamichani hige'e
213	Higuki amani Mine kachisi qrare fugisako'bei mashika'i mericho?	1. Mini shoto'i hagrii bi'obikinate ? 2. Muta beyi'beyoni mesimi kemobikinate'e? 3. Qrare fugamo mani halati jori ihubikinat'e 4. Kachisi jabi keya be'bikinata qaarare fugsimi awadoo'bebikinate? 5. Kakoolo fugimina warkoobe'bikinate 6. Muli sawit'e ----------	
214	Higuki mati hinchi worne kachisi qaraare fugamiki gortenna muliluwin xalalitaka'a /labakka'a?	3. Eeyaa 2. Aa'e	
215	Kachchis qaraare fugamuki gorte'e borjoine nenitko'i meshiki mricho?	1. Fugakmi qerari gorte'e bi'esobikinte 2. Kachisi jebi be'ibikinate 3. mulane(dis'e)---------	
216	Wo'o qaarari fugo maaninna	2. Eeyaa 2. Aa'e	

	uwitakamnihe?		
217	Ae'e yitilasi qaraare fugo mani wo'o hanisete ebamookkok?	3. Ola'i/hegeegsete 4. Wo'o inkiirakam beyii	

3.WO'I DUUHA'A

XIGO	XA'MICHA	DABACHA	MULICHO
301	Wo'o hniisete inkitakamoki?	6. Bo'mibi 7. Mucurooma Egramaki bu'i 8. Mucurooma Egramu'bei bu'i 9. Daaji/leri 10. Mulikeno kitabee----------	
302	Kanii wo'o inkitakami beyi affebe'i yoki qelomi hinkani ihoko(amnine dise)?	_____	
303	Kam'n abroosi hundimi mti belan'e hinkani litrii wo'o awaxitakamo?	_____	

4.SHU'M MI'N OGORAA

XIGO	XA'MICHAA	DABACHAA	MULICHO
401	Shu'm min ki'nuwi uullani hee'aa?	2. Eeyaa 2. Aa'e	A,ea yitilasi xamich 329 hige'e
402	Kabade Shu'm'mine awaxitakkamulanihe?	3. Eeyaa 2. Aa'e	
403	Shu'm min beelas hannonetduye shume'lakkamoki?	4. Haq worone 5. Duubone 6. Muleki yoolasi kitaabe	

5.MI'N ABAROOSICHI DUHA'A

XIGO	XAMICHAA	DEBECHAA	MULICHO
500	Mi'n abroosichchi ananaax xigo	_____	
501	Mi'ni abrosichchi albacha	1. Goncho 2.Meshera	
502	Abrosichchi Umura	_____	
503	Mi'ni abrosichchi gassi ogoraa	1. Mi'ni ann'a 2.Mini ama 3.Beeto 4. Lendicho	
504	Idooxxi duha'a	1. Agisube'ane 2. Mine isakohane/istohane 3. Tirakohane/tito'hane 4. Aro'i lehako'hane/leto'hane	
505	Amanato	6. Amananicho 2. Catholicicho 3. Orthdoxicho 4.Muslima 4.mulikeno----------	
506	Shumoi maricho	1 Hadiya 2 Kembata 3 Gurage'e 4 Ormo'o 5 5 Amhara 6 Mulan'e--------	
507	.Losani duuha'a	1. Kitabimaa qanaanaa'ima xanobeanea 2. Kitabima qennei a'ima xale'a 3. baxanchi 1-4 afakohane 4. baxanchi 5-8 '' 5. baxanchi 9-12 '' 6. Diploma'aa eehani hanannet'e	
508	Baxi duuha'a	1. abulaanicho 2. Mi'n amaa 3/dadaraanicho 4/baxo sidubee'ane 5/losaanicho 6/adili bexaanicho 7/ kakeeni mulane(dise)_____	

509	Amati ikkolasi Lamiforaatenihe?	1. Eeyaa 2. Aa'e	
510	Higuki himo zanziri worne inse'la?	1. Eeyaa 2. Aa'e	
511	Kachchiss bi'iso qaraare mine'ni fugsimi kachisi higisoo binbekicho shoko yitaa amnitohinhe?	1. Eeyaa 2. Aa'e	
512	Kachisi mati matone higo'be'isa mine qaararine fugisimi horohinhe?	1. Eeyaa 2. Aa'e	
512	Mini kachisiqrarine fugamubikini lirentaa?	1. Eeyaa 2. Aa'e	
513	Kachisii jubi mana shoko yita amnito?	1. Eeyaa 2. Aa'e 3. le'omoyo	
514	Kachisii jubi higooki gogo laqo?	1. Eeyaa 2. Aa'e	
515	Eyaa yitilesi hinki googo laqoto?	1. Jabo higiso mikimiko sokuwine 2. Mani mannane 3. Hurbatine 4. Mucurooma egerakkobee'i wo'ine 5. Mulanine'te dise_____	
516	Kachisi hoo'lakami ogoraa laqo?	1. Eeyaa 2. Aa'e	
517	Hinki ogoraa laqoto?	1. Leruki wo'o daasima 2. Zanzira awaaxima 3. Kachisa bi'eso qerar'e mine fugisma 4. Kachisi qaarari itima 5. Wo'o amdo mutuwa dunimaa 6. mulane ----------	
518	Kechisa higsoo binbe'ikichi kaminenne sidamoo?	1. Eeyaa 2. Aa'e	Be'lsi xmichi 316 hige'e
519	Eeya yitilasi hinkane?	1. Tikkaayaa 2. Tukaana 3 Kora 4. Kachisi biinbekicho	

520	mni abrosichi RDT bexakoi kachisi amduki duha'a	1. Eeyaa 2. Aa'e	
521	kachisi'ne sidamulasi qerari mesitahinhe?	1. Eeyaa 2. Aa'e	
522	Kechisi hagari hinkane?	1.p.v 2.pf	

Xamicha dabatibikina galaxomo?