

Prevalence of Malaria and Associated Factors among Households in Guanga, Abaya District, Oromia Regional State, Southern Ethiopia: A Community Based Cross-Sectional Study

Girma Worku Obsie^{1*} and Belay Negasa Gondol²

¹Department of Public Health, University of Arsi, Assela, Ethiopia

²Department of Public Health and Health Science, Dilla University, Dilla, Ethiopia

Abstract

Nearly half of the world's population is at risk of malaria. While most malaria cases and deaths occur in Africa. In the same way in Ethiopia also a major public health problem that every year it is the leading cause of outpatient consultations, admissions and death. Thus it was requested to identify the prevalence and causes of malaria cases timely. A community-based cross-sectional study was conducted among households in Guanga town southern Ethiopia; 2018. Systematic random sampling technique was employed for 227 participants with face to face interview. Logistic regression models were computed considered odds ratios with 95% Confidence Intervals at P-value<0.05 to identify factors associated with prevalence of malaria cases at study area. The result of this study showed that a total of 227 were participated with response rate of 99%. Of the total respondent more than half 127(59.1%) of individuals were females and 100(41.9%) of them were males. Overall prevalence of malaria infection in the study area was 50(21.9%). In finally logistic regression analysis showed that levels of tertiary education (AOR 4.209, 95% CI (1.160-15.267)), wall sprayed in last 12 months (AOR 2.867, 95% CI (1.842-14.276)), mosquito nets using status (AOR=2.654, 95% CI: 1.247-5.648) and presence of stagnant water (AOR=6.579, 95% CI (2.921-14.816)) were significant association with prevalence of malaria morbidity. In conclusion the present study revealed that malaria is still a major source of morbidity in the study area. This prevalence was the result of several factors. Therefore, effective malaria control measures should be implemented in order to reduce the prevalence of malaria and hence ensure the public health at large by improving prevention and control practices.

Keywords: Malaria; Infection; Prevalence; Diseases; Population

Abbreviations: AOR: Adjusted Odd Ratio; CI: Confidence Interval; FMOH: Federal Minister of Health; GO: Government Organization; IRS: Indoor Residual Spraying; ITN: Insecticide Treated Net; OR: Odd Ratio; SNNPR: Southern Nations, Nationalities and Peoples Region; SPSS: Statistical Package for Social Sciences; WHO: World Health Organization

Corresponding author:

VGirma Worku Obsie, Department of Public Health, University of Arsi, Assela, Ethiopia,

E-mail: belaynegasa13@gmail.com

Citation: Obise GW, Gondol BN (2021) Prevalence of Malaria and Associated Factors among Households in Guanga, Abaya District, Oromia Regional State, Southern Ethiopia: A Community Based Cross-Sectional Study. Health Sys Policy Res Vol.8 No.5: 93.

Received: September 3, 2021; **Accepted:** September 17, 2021; **Published:** September 24, 2021

Introduction

Malaria is the vector born diseases in the world. Globally, an estimated 3.3 billion people are at risk of being infected with malaria and 1.2 billion are at high risk (>1 in 1000 chance of getting malaria in a year). According to the 2014 WHO report, 198 million cases of malaria occurred globally (uncertainty range 124-283 million) and the disease led to 584 000 deaths (uncertainty range 367 000-755 000) [1].

In 2008, there were 243 million estimated cases of malaria worldwide. The vast majority of cases (85%) were in the African Region, followed by the South-East Asia (10%) and Eastern Mediterranean Regions (4%) [2].

Nearly half of the world's population is at risk of malaria. While most malaria cases and deaths occur in Africa, four other WHO regions carry a significant disease burden: the Americas, the Eastern Mediterranean, South-East Asia and the Western Pacific [3].

In Africa, it accounts for 40% of public health expenditure and 25% of the household income [4]. The disease epidemics affect non-immune populations in many highland and semi-arid areas of the continent [5].

The control of malaria and its anopheles vectors in Africa is less successful because of the occurrence of drug resistant parasites and insecticide resistant vectors, change in the resting behavior of mosquitoes (from indoor to outdoor) as a result of frequent indoor insecticide sprays, lack of efficient infrastructure, shortage of trained manpower, lack of equipment, lack of appropriate management, financial constraints and inability to integrate several methods of control [4-6].

Malaria also a major public health problem in Ethiopia, every year it is the leading cause of outpatient consultations, admissions and death [2,7]. The burden of malaria has been increasing due to a combination of large population movements, increasing large scale epidemics, mixed infections of Plasmodium vivax and P. falciparum, increasing parasite resistance to malaria drugs, vector resistance to insecticides, low coverage of malaria prevention services, and general poverty [8,9]. Approximately 75% of Ethiopia's landmass is endemic for malaria, with malaria primarily associated with altitude and rainfall. The Carter Centre reported, about 55.7 million people in Ethiopia faced the risk of malaria, and approximately 80% of the 736 districts in Ethiopia are considered malarias. Malaria transmission peaks bi-annually from September to December and April to May, coinciding with the major harvesting seasons. This seasonality has serious consequence for the subsistence economy of Ethiopia's countryside and for the nation in general FMOH [1,10,11]. Malaria affects over 68% of the population in Ethiopia, a country of 94 million people in 2013. The disease is highly seasonal with varying intensity of transmission owing to altitudinal and climatic variations [12,13]. Seventeen million people are at risk in Oromiya with annual clinical cases numbering between 1.5 and 2 million. This accounts for 20%-35% of outpatient visits, and 16% of hospital admissions in the region where 18%-30% of annual deaths are caused by malaria [10]. While the focus is on Oromiya the President's initiative has a larger national goal [5,14]. As a result the aim of this study was to assess prevalence of malaria and its influencing factors in the study area.

Materials and Methods

Study design and setting

A community based cross-sectional household survey was conducted. The study was conducted in Guanga Town Abaya district. It is 365 distances from Addis Ababa capital city of Ethiopia and 100 Kilo Meter (KM) from zonal Administration town Bule-Hora as well as 7 Km again from Dilla town Gedeo Zone SNNPR. The town is located along side of Addis Ababa to Moyale high way. Demographically it has population 5470 and 2637 male and, 2833 female with heterogeneity of their religion and ethnicity.

Ethical approval

Ethical clearance was obtained from the ethical review committee

of the College of medicine and Health Sciences of Dilla University with Protocol Unique number 008/17-02. After permission is obtained, support letters written from University were submitted to all concerned sectors in Guanga, Abaya district. Finally written informed consent was obtained from all participants before the questionnaire was administered.

Study participants

The study population was households' selected in being selected kebeles in Guanga town and who lived six month and more at the study area were included in the study while the households who came from another area during data collecting period and critically ill and with mental health problems were excluded from the study. A community based cross-sectional household

Sampling technique

Systematic random sampling method was used by taking the list of household to select the households until the required number of households was achieved and the structured face to face interview questionnaire were conducted on selected households. Finally, the randomly selected household every 4th attendant from estimated sampling was selected and interviewed.

Sample size determination

Single population proportion formula was used to calculate the sample size, previous malaria parasite prevalence testing and associated factors was assumed an expected prevalence of 16% from the study conducted Dilla Town and Dilla Zuria, Ethiopia had been used, margin of error for 95% Confidence Interval (CI), 5% level of significance [3].

$$n = \frac{(Z\alpha / 2)^2 * P(1 - P)}{d^2}$$

Where n=Sample size, p=Prevalence of malaria, d=Tolerable margin of sample error

Z α /2=Critical value at 95% confidence interval (1.96)

P=0.16, q=(1-p)

$$n = \frac{(1.96)^2 * (0.16) * (1 - 0.16)}{(0.05)^2}$$

Data collection, entry and statistical analysis

After review of relevant literatures, the questionnaires of the study were adapted from previous similar studies. The study utilized a combination of a pre-coded questionnaire that was prepared in English then translated to local language that was Afan Oromo by language of experts and finally returned to original language. Socio economic, demographic, household characteristics and risk factors, prevention and control and burden of malaria information were parts of tools that were developed for interview. Data was collected by four trained data collectors. Data cleaning and entry were carried out by the principal investigator using Statistical Package for Social Sciences

(SPSS) version 20.0. Descriptive and analytic methods were done with summary frequencies, tables, crude and adjusted odd ratio was computed. The relative contribution of each selected variables to the outcome of interest were assessed using logistic regression at P-value less than 0.05 with confidence interval 95% considered as associated statistically significant.

Results

Socio-demographic characteristics of participants

A total of 227 were participated in the study with response rate of 99%. Of the total respondent more than half 127(59.1%) of individuals were females and 100 (41.9%) of them were males and 4 in 9 participants 96(42.3%) were in the age group 25-40 years. Around a third 74 (32.6%) of respondents was reported to had attained tertiary education whereas 64(28.2%) were no ability to read and write. Regarding the occupational status of the participants, private business was greater than half 133(58.6%) and nearly one-third 69(30.4%) monthly income were estimated from 500-1000 ETH Birr (**Table 1**).

Prevalence of malaria

Of the 227 study subjects were examined in Gunaga Town by collected data from households, study subject reported that the overall prevalence of malaria infection in the study area was 50(21.9%) and 8.3% were confirmed when 13.6 were not confirmed. Concerning symptoms and occurrence of malaria, the majority 183(80.7%) of the respondents claimed to know the occurrence of malaria in study area and around 9 of 10, 203(89.4%) reported that they know at least one symptom of the disease. Among those who claimed the occurrence of malaria in their respective areas nearly four-fifth 185(81.1%) claimed that they preferred to seek treatment for malaria for themselves and their family from health center or private clinic.

Knowledge of malaria transmission, prevention and risk factors

The majority 210(92.1%) of the respondents claimed to know risk factors for malaria transmission. Of this stagnated water were

most reported 163(71.7%), followed by dusty area 138(65.7%). In the same way the most of respondents 204(89.5%) knew common mode of transmission of malaria. Above three fourth 174(76.3%) of the respondents gate information disease from mass media (radio, television) and of them 189(94.1%) reported just one method of prevention. Less than half of the respondents 107(46.9%) reported that the wall sprayed once in last 12 months and just 17(7.5%) reported that they didn't know either sprayed or not (**Table 2**).

Bed net condition and availability

A total of 141(64.5%) of the respondents self-reported that they own at least one bed net. Among these, 22(15%) households couldn't show any bed net during observation of Household's bed nets. Hence, a total of 124(85%) households were observed owning at least one bed net. More than half 117(51.7%) reported that bed net available for all members of the households. source of the bed net were 198(87.1%) government supplied, whereas only 11(4.8%) were self-purchase (**Table 3**).

Factors associated with prevalence of malaria morbidity

The analysis was done to identify association of risk factors likes Scio-demographic, presence of stagnant water, mosquito nets used during sleeping, wall sprayed with anti-mosquito. At the end after used backward condition in analyzed, it indicated that malaria morbidity was four fold high in those low educational levels when compared to those had tertiary educated with (AOR 4.209, 95% CI (1.160-15.267)). The wall sprayed in last 12 months of household more than two times protects malaria morbidity compared to not sprayed (AOR 2.867, 95% CI (1.842-14.276)). The proportion of house hold with morbidity of malaria in which house not been used mosquito nets during sleep were almost three fold higher compared to those individuals getting this particular prevention measure (AOR=2.654, 95% CI: 1.247-5.648)). Similarly, it was indicated that almost seven fold increased prevalence of malaria was observed in individuals' who had stagnant water in their compounds (AOR=6.579, 95% CI (2.921-14.816)) (**Table 4**).

Table 1: Socio demographic characteristics of respondents Guanga town, Abaya district, Oromia Region, Southern Ethiopia, 2018.

Variables	Frequency	Percentage	
Sex of respondent	M	100	44.1
	F	127	55.9
Age category	18- 24	84	37
	25-40	96	42.3
	40-60	40	17.6
	>60	7	3.1
Head of household	M	200	88.1
	F	27	11.9
Marital status	Married	200	88.1
	Single	12	5.3
	Widowed	15	6.6

Religion	Orthodox	61	26.9
	protestant	128	56.4
	Muslim	36	15.9
	catholic	2	0.9
Education status	read and write	64	28.2
	Primary education	31	13.7
	Secondary education	58	25.6
	Tertiary education	74	32.6
Ethnicity of house hold	Oromo	212	93
	Gedeo	5	3.2
	Amara	8	3.9
	Others	2	0.9
Members of the household	01-Feb	19	8.4
	03-Apr	81	35.7
	05-Jun	86	37.9
	07-Aug	27	11.9
	>8	14	6.2
Monthly income in birr	<500	30	13.2
	500-1000	69	30.4
	1000-2000	36	15.9
	2000-4000	48	21.1
	>4000	44	19.4
Occupation	Private business	133	58.6
	GO employed	79	34.8
	House wife	12	5.3
	Daily laborer	3	1.3

Table 2: Knowledge of Malaria Transmission, Prevention and Risk factors in Guanga town, Abaya district, Oromia Region, Southern Ethiopia, 2018.

Variables	Frequency	Percentage	
Do you know risk factor	Yes	210	92.1
	No	17	7.8
Known risk factors for malaria	Stagnated water	162	71.7
	Dusty area	138	65.7
	Living in lowlands	32	13.9
Is there stagnant water in your compound?	Not use of bed nets.	25	12
	Yes	43	18.9
Do you know common modes of transmission of malaria?	No	184	81.1
	Yes	204	89.5
What are the modes of transmission you know	No	23	10.5
	Mosquito bites	197	86.7
	Blood transfusion	22	9.7
Have you taken any measures	Organ transplantation	6	2.6
	Yes	200	88.2
	No	27	11.8

Measure you takes against malaria	Destruction of mosquito breeding sites	167	73.6
	Changing the residence	22	9.7
	Avoiding water pooling	21	8.7
	Two of the above	17	7
What is the main source of you information?	Health workers	39	17.1
	Media	174	76.6
	Community leaders	8	3.5
	Two and more source	6	2.6

Table 3: Bed nets condition and availability Guanga town, Abaya district, Oromia Region, Southern Ethiopia, 2018.

Variables		Frequency	Percentage
Mosquito net used during sleeping	Yes	141	64.5
	No	86	35.5
Can I see the mosquito nets	Yes	124	85
	No	23	15
Condition of nets	Valid Good (no holes)	88	38.8
	Fair (no holes)	22	9.5
	Unsafe (Holes that fit a torch)	117	51.7
	Unused (still in package)	10	8.2
Source of the Net	Government	198	87.1
	Self-Purchased	11	4.8
	Both	18	8.2
Is the bed net available for all Household members	Yes	117	51.7
	No	110	48.3
Who is/are priority given	Children	101	44.3
	Pregnant/lactating mothers	39	17.2
	Head of the household	97	42.8

Table 4: Analysis of logistic regression of factors associated with prevalence of malaria morbidity in Guanga town, Abaya district, Oromia Region, Southern Ethiopia, 2018.

Variables categorized		B	S.E	Wald	df	Sig.	Exp(B)	95% CI for Exp(B)	
								Lower	Upper
Educational Status	Read and write	0.477	0.393	1.47	1	0.23	1.611	0.745	3.48
	Primary	1.437	0.657	4.78	1	0.03	4.209	1.6	15.267
	Secondary	0.793	0.428	3.426	1	0.06	2.21	0.954	5.117
	Tertiary	0.796	0.251	10.052	1	0	2.217	1.459	11.962
Age of Respondents	18-24 years	0.529	0.385	1.892	1	0.17	1.692	0.799	3.608
	25-60 years	-0.55	0.409	1.81	1	0.13	0.577	0.259	1.285
Wall sprayed in last 12 months	No	0.473	0.325	2.113	1	0.15	1.605	0.848	3.032
	Yes	1.053	0.212	24.668	1	0	2.867	1.842	14.276
Mosquito nets	Not available	0.976	0.385	6.42	1	0.01	2.654	1.247	5.648
	Available	0.984	0.185	28.188	1	0	2.675	1.762	9.635
There is stagnant water	No	0.632	0.191	10.945	1	0	1.881	1.263	8.63
	Yes	1.884	0.414	20.686	1	0	6.579	2.921	14.816

Discussion

This study was carried out in Guanga town, Abaya District where the primary objective of the study was to determine the prevalence of malaria and its influencing factors. By holding its final targeted, the result of this study showed that overall prevalence of malaria in the study area was 21.9%. The prevalence of malaria infections found in this study was low as compared to a previous study conducted on malaria prevalence surveys in Southern Mozambique, parasite rate were 35.3% [15]. And a study conducted in Bolfamb, south-west Cameroon has shown that malaria parasite was prevalent throughout the year but was significantly higher in the rainy season (50.1%) than in the dry season (44.2%). This finding was also slightly high when compared to prevalence of malaria investigated in Dilla town and Dilla Zuria, 16% [4] but fivefold higher than the study was conducted in Hawassa town, 3.9% [16]. The discrepancy was might be the approach to source of information and use of mosquito nets properly in study area was low.

Several studies indicate that the use of Insecticide Treated Nets (ITNs) significantly reduce the malaria morbidity and mortality [13]. A difference was observed in malaria prevalence among ITNs users and non-users in our study. The proportion of house hold with morbidity of malaria in which house not been used mosquito nets during sleep were three times higher protect compared to those individuals getting this particular prevention measure those who not used. But the mere presence of ITNs in households may not protect individuals from malaria morbidity unless it is properly used that could also be the implication of this finding.

Several factors were observed to be associated with the high prevalence, such as: Socio-demographic part factor and physical/ environmental factors are favors the mosquito breeding sites as well as ineffective implementation of malaria control measures such as the use of ITNs and Indoor Residual Spraying (IRS) have high role to reduce the risk of malaria morbidity. The findings of this study was indicated that Plasmodium infection in study participants were existence of stagnant water (adjusted OR=6.576; 95% CI: 2.92-14.82, p=0.000) almost the same with the study was conducted in Jimma town, South-West Ethiopia showed that significant predictors of plasmodium infection in study participants were existence of stagnant water (adjusted OR=4.8; 95% CI: 1.4-17.7, p=0.015) [17-20]. This is because of both of the studies area have the same weather condition that causes existing stagnant water due to frequency rainy season in the year.

Limitations

As any cross-sectional study, it is difficult to establish a causal relationship in this study in addition; there is a possibility of both over-or underreporting of malaria episodes by the respondents.

Conclusion

The present study revealed that malaria is still a major source of morbidity in the study area. This prevalence could be the

result of several factors as explained in this study such as: Poor prevention practices of not using bed net, presence of stagnant water around their compound, the wall sprayed or not at least within 12 months and educational status of respondents were factors associated with malaria morbidity in the study area. As a result if the all control measures will be implemented appropriately then the prevalence of malaria will be decreased. In addition, strengthening the services provided by community health development army, health extension service and health facilities services as well as focusing on increasing malaria intervention coverage and mobilization of information, education and communication should be applied to improve prevention and control practices.

Acknowledgement

The authors are very grateful to College of Medical and Health Science Dilla University, for approval of ethical clearance and materials support. The authors are also grateful to all study participants and data collectors.

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