

Malaria Prevalence and Society Awareness Against Malaria Control Strategies in Assosa District, Western Ethiopia

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How to cite this article:

Desta Ejeta Fereda, Malaria Prevalence and Society Awareness Against Malaria Control Strategies in Assosa District, Western Ethiopia, Indian J Comm Dis. 2021;7(2):55-62.

Abstract

Malaria remains leading causes of morbidity and mortality globally. In Ethiopia, malaria cause evidential public health and Socio-economic effect. This study targeted at assessing the current prevalence of malaria and society awareness against malaria control strategies in Assosa district western, Ethiopia. All malaria suspected individuals who have complains of febrile illness in selected health institutions in the study area from September 2020 to February 2021 was considered to determine the current malaria prevalence. Individuals who visited the health institutions for any kind of health care service and selected house holders were the study subjects. Highest rate of malaria positivity was recorded at health post with positivity rate of 9.1% followed by private clinic with positivity rate of 4.9% whereas Assosa hospital and health center has positivity rate of 3.2% and 3.1% respectively. More males (69%) were affected by malaria than females (31%). Malaria morbidity was more concentrated in the age of 15-25 (38%) followed by age from 5 to 14(25%). *P. falciparum* is the dominant Plasmodium species over *P. vivax* in the study site which is 89% and 10% respectively. Most of the respondents (97%) had heard about malaria and similar number of respondents believed that malaria is one of the serious diseases of the community, around 94% of participants have at least one ITN. Most of the respondent especially in Assosa town claimed that the type of ITN is not comfortable to use it in their home. The overall malaria prevalence of Assosa district is 3.4 % which implies very low infection prevalence. Also, this research indicated that the community in the study area have good awareness on malaria control strategies.

Keywords: Assosa; Blood smear; Malaria; Society awareness; Prevalence.

Introduction:

Malaria remained to be one of the most sever public health problem worldwide, particularly, in poor tropical and subtropical areas. In 2016, an estimated 445,000 people died of malaria, most were young children in sub-Saharan Africa (WHO, 2018).

Malaria is an infectious disease that causes morbidity and mortality in children and adults

in developing countries, including Ethiopia. In Ethiopia, malaria is a serious public health concern and has great impact on Socio-economy. Around 75% Ethiopian landmass is considered endemic for malaria, putting 68% of the total population more at risk of contracting the diseases (EPHI, 2016). The transmission of malaria is highly seasonal throughout the country that depends on altitude and climatic variations (WHO, 2019). *Plasmodium*

falciparum and *Plasmodium vivax* are the most dominant malaria parasites in Ethiopia accounting for 60% and 40% of malaria cases respectively (WHO, 2019). The major responsible vector for malaria transmission in Ethiopia is *Anopheles arabiensis* however in some other areas *A. pharoensis*, *A. funestus*, and *A. nili* are also responsible for the transmission of malaria (PMI, 2019).

Risk of malaria is high within the Benishangul-Gumuz Regional State, in which 98% of the landmass is prone to malaria transmission (CSA, 2017). For instance, three years malaria surveillance data from different districts of the region revealed that total prevalence of malaria and malaria specific deaths were 57.5% and 79 deaths, respectively (Yaregal, 2017). However limited studies have been carried out in Benishangul Gumuz regional state regarding malaria prevalence and control options. Therefore, the aim of the current study was to analyze malaria prevalence and society awareness against malaria control strategies in Assosa district, Western Ethiopia.

Methods and Materials

Descriptions of the Study Area

The study was carried out in selected urban and rural areas of Assosa district in Benishangul Gumuz Regional State, Western Ethiopia (Figure 1).

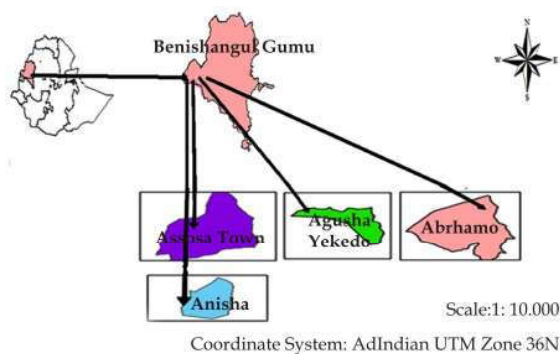


Fig. 1: Map of the study area.

Assosa town, the capital city of the region is located at 670 km toward west from Addis Ababa. The study area is located at latitude of 10°04'N and longitude of 34°31'E and an elevation of 1570 meters above sea level. The mean annual temperature and rainfall in the town and selected kebeles is about 21.6 °C and 1896.6 mill liters, respectively. The town is divided into 4 kebeles. The town has a total population of 20,226 of whom 10,929 were men and 9,297 women (CSA, 2004). Three public health institutions (one

hospital and two health center) and more than 10 medium private clinics are found in the town that provides health care service to the society.

Study design and population

The study used a health facility based cross sectional design. All malaria suspected individuals who have complains of febrile illness in the study health institutions from September 2020 to February 2021 was considered as study subjects to determine the current malaria prevalence. While individual permanently residing in the study area who visited the health institution and house holders in the study site kebele was the sample population to assess the knowledge of the society about malaria and its control strategies. The data was analyzed by using SPSS.

Sample Size and Sampling techniques

All 11086 the malaria suspected patients registered in the study health center from Sep 2020 to Feb 2021 were the sample size to determine the current prevalence of malaria. And the sample size for determining the society awareness on malaria and its control practices strategies was calculated by $n = \frac{N}{1 + N(e)^2}$ and simple random sampling method used to enroll the study participants.

Data collection

Malaria slides:

Blood film examination format was used; blood slide samples were taken from compliance of febrile patients at Assosa Hospital, Assosa health center, health post of each study Kebele, and 3 private clinics. The Socio-demographic data of patients was collected on patient separate sheet prepared for the study. Thick and thin blood smears were prepared to observe the presence of malaria parasite by direct microscopy techniques. The blood slides were read and then classified qualitatively as negative or positive, *P. falciparum* or *P. vivax* or mixed infection.

Measurement of Society awareness against malaria control strategies

A structured questionnaire was designed to collect information regarding Socio-demographics and knowledge of the study participants about malaria and its control practices strategies. The questionnaire was first developed in English and translated into Amharic. Data were checked for completeness, and incomplete questionnaires returned to data collectors for correction by revisiting the concerned households.

Data analysis

Data were checked for completeness and consistency and entered in to Microsoft Excel data sheets and exported in to Statistical Package for Social Science (SPSS) statistical data analysis. Descriptive statistics were carried out to measure percentages, averages, relative frequencies of the variables, mean, standard deviation and correlation of the response.

Results and Discussion

Results

Socio: Demographic characteristics of respondents

The socio demographic characteristics of the respondents are indicated in Table 1.

Table 1: Socio demographic characteristics of respondent in Assosa district selected kebeles.

Variable	Category	Frequency	Percentage
Sex	Female	283	67%
	Male	137	33%
Age	15-25	112	27%
	>=26	308	73%
Marital status	Single	61	15%
	Married	359	85%
Education	Illiterate	85	20%
	Read and write	178	42%
	Primary school	90	21%
	> Secondary school	67	16%
Occupation	Government employer	97	23%
	Farmer	164	39%
	Merchant	89	21%
	Other	70	17%
Mass media	Radio	133	27%
	Television	224	53%
	Internet	56	13%
Source of drinking water	No	42	10%
	Spring	8	2%
	Dug well	36	8%
	Surface water	57	13%
Kind of toilet	Public tab/stand pipe	328	78%
	No toilet	8	2%
	Pit latrine (no cement)	332	79%
	Have cement slab	80	19%

Knowledge and attitude of respondent towards malaria

Malaria related knowledge of the participants is summarized in Table 2.

Table 2: Knowledge of respondent in Assosa district.

Variable	Cate-gory	Frequ-ency	Percen-tage	Mean	Std. Devi-ation
Ever heard about malaria	Yes	409	97%	1.00	.049
	No	11	3%		
Source of information	Health worker	259	61%	1.86	.892
	Mass media	262	62%		
	Religion institute	3	0.7%		
	Other	3	0.7%		
What is malaria	Diseases	415	99%	1.01	.118
	I don't know	5	1%		
Have you contracted malaria before	Yes	285	68%	1.33	.474
	No	135	32%		
Malaria transmitted by	Mosquito	366	87%	2.38	.914
	Dirty water	225	53%		
	I don't know	19	4%		
	Fever	371	88%		
Sign / symptoms of malaria	Chills shivers	374	89%	5.32	1.533
	Headache	314	74%		
	Loss of appetite	328	78%		
	Vomiting	302	72%		
Mosquito breeding site	Stagnant water	348	82%	2.39	.896
	Waste material	281	67%		
	I don't know	43	10%		
Is there mosquito breeding site in your area	Yes	159	38%	1.62	.485
	No	261	62%		

The majority of the respondents 409 (97%) had ever heard about malaria and almost all (99%) of the respondents believed that malaria is one of serious and life threatening diseases of the community. 285 (68%) of the respondents mentioned that they contracted malaria before the rest 32% did not.

Practices of respondents towards malaria prevention and control in Assosa district

Using mosquito bed nets and drain stagnant water are the best malaria prevention method by the majority of the respondents having 325 (77%),

134(32%) respectively. The majority 395(94%) interviewees reported that they possessed at least one insecticide treated mosquito net in their houses as described in Table 3.

Monthly Malaria prevalence at different health institutions in Assosa district, Western Ethiopia.

The number of malaria suspected patients who visited the health institution showed fluctuating trend each month. Accordingly, as indicated in the table below higher rates of confirmed malaria cases was reported during spring (September-November) and dry season of the year from December to February had lower case (Table 4).

Table 3: Practices of respondents towards malaria prevention and control in Assosa district.

Variable	Category	Frequency	Percentage	Mean	Std. Deviation
Malaria prevention methods	Use mosquito net	325	77%	1.89	1.504
	IRS	101	24%		
	Cleaning home and surrounding	89	21%		
	Drain stagnant water	134	32%		
Is ITN in your home	Yes	395	94%	1.05	.217
	No	25	6%		
Did you use it currently	Yes	327	78%	1.06	.374
	No	93	22%		
ITN used last night	Yes	278	66%	1.13	.447
	No	117	44%		
ITN per family	One	58	15%	2.30	.868
	Two	141	36%		
	>= 3	196	50%		
Reason for don't use ITN	I don't have	25	26%	.44	1.053
	Do not prevent malaria	6	6%		
	Afraid of its toxicity	13	13%		
	Throw it away/ damage/	0	0%		
	Not comfortable to the home	53	55%		
Who use ITN	Children	15	4%	4.86	1.753
	Mother	8	2%		
	Father	3	1%		
	Mother and Father	27	7%		
	Mother and Children	141	36%		
	All of the family	201	51%		
Seasonal use of ITN	All of the year	210	53%	1.23	.670
	Some time	59	15%		
	During malaria season	126	32%		
	In a week	0	0%		
ITN condition	Good no hole	329	83%	1.04	.504
	Have small hole	48	12%		
	Not good have more than 4 holes	18	5%		
When did you get ITN	Before month	230	55%	1.96	1.163
	In a month	19	5%		
	Before 3 years	122	29%		
	I don't know	49	12%		
Your house spray with insecticide	Yes	303	72%	1.33	.473
	No	117	28%		
	6 month ago	196	65%		
	Before two years	28	9%		

Table 4: Monthly profile of malaria prevalence at Health institutions from (September 2020-February 2021)

Health institutions	Month	Examined number	Malaria positive	Percent of prevalence
Assosa hospital	September	464	15	3.2%
	October	734	36	4.9%
	November	542	25	4.6%
	December	310	8	2.6%
	January	557	10	1.8%
	February	847	16	1.9%
	Total		3454	110
Assosa Health center	September	1428	19	1.3%
	October	1081	58	5.4%
	November	766	42	5.5%
	December	1060	37	3.5%
	January	968	26	2.7%
	February	1123	16	1.4%
	Total		6426	198
Health post	September	41	4	9.8%
	October	24	2	8.3%
	November	31	4	12.1%
	December	23	4	17.4%
	January	46	3	6.5%
	February	54	3	5.6%
	Total		219	20
Private clinics	September	132	7	5.3%
	October	166	9	5.4%
	November	169	11	6.5%
	December	156	9	5.8%
	January	171	7	4.1%
	February	193	5	2.6%
	Total		987	48
Total	September	2065	45	2.2%
	October	2005	105	5.2%
	November	1508	82	5.4%
	December	1549	58	3.7%
	January	1742	46	2.6%
	February	2217	40	1.8%
	Total		11086	376

Prevalence of malaria cases by sex

In the present study, more males 69% were affected by malaria than females 31%. Distribution of malaria cases by sex is described in table 5.

Table 5: Distribution of malaria cases by sex Assosa district from September 2020-February 2021.

Sex	Total case examined	Slide positive, n (%)	P-value
Male	5504 (49%)	260 (69%)	1.12
Female	5592 (51%)	116 (31%)	
Total	11086 (100%)	376 (100%)	

Prevalence of malaria cases by age group

Regarding the age groups, the burden of malaria morbidity was more concentrated in the young of age 15-24 and 5-14 as described in the Table 6.

Table 6: Malaria prevalence in Assosa districts in association with age structures.

Age group	Total case examined	Slide positive n. (%)	P-value
0-4	4142	63(1.4%)	1.67
5-14	1340	57(4.2%)	
15-25	3057	173(5.7%)	
≥ 26	2546	83(3%)	
Total	11085	376(3.4%)	

Distribution of malaria cases by Age group at Assosa district from September 2020-February 2021.

Prevalence of malaria cases by medication history

Malaria prevalence varied by medication history, as described in the Table 7.

Table 7: Distribution of malaria cases by medication history at Assosa district from September 2020-February 2021.

Medication history	Total case examined	Slide positive n (%)
No malaria before	6769	123(2%)
Yes there is malaria before	4317	253(6%)
Total	11086	376(3%)

Prevalence of malaria cases by Occupation

Malaria prevalence varied among different occupation, as indicated in the table below the higher cumulative result of positivity 33(8%) was seen for Daily worker followed by 137(7%) of Farmer others like Merchant, civil servant and Others were 26(5%), 25(3%) and 155(2%) respectively which indicates Daily worker and farmers are the most affected occupational group.

Table 8: Distribution of malaria cases by Occupation at Assosa district from September 2020-February 2021.

Occupation	Total case examined	Slide positive n(%)
Civil servant	865	25(3%)
Farmer	1925	137(7%)
Merchant	484	26(5%)
Daily worker	428	33(8%)
Other	7384	155(2%)
Total	11086	376(3.4%)

Species composition of malaria parasites

The predominant Plasmodium species detected among the current study participants was *P. falciparum*.

Table 9: Species composition malaria parasite in Assosa district.

Slide positive (%)	<i>P. falciparum</i> n (%)	<i>P. vivax</i> n (%)	Mixed infection n(%)
376 (100%)	336 (89%)	35 (10%)	5 (1%)

Discussion

An overall malaria positivity rate of 3.4% was recorded in the current study area which is health post with positivity rate of 9.1% followed by private clinic with positivity rate of 4.9% whereas Assosa hospital and health center has positivity rate of 3.2% and 3.1% respectively. This figure is more or less in agreement with the result of the study done in Jiga area Northwest Ethiopia in which the prevalence is 2.8%, (Seble,2014). the result is very high as compared to 0.93% in Butajira area, south-central Ethiopia (Adugna 2012). The finding of this study contradicts with previous studies from southern and northern Ethiopia, reported overall malaria positivity rates between 11.5% and 28.1% among patients visited health facilities (Belete and Roro,2016 & Woday et al,2016) Possible factors for observed variations might be differences in the time of studies, microclimate, altitude, community awareness about malaria bed net application, its transmission, and health seeking behavior, and malaria intervention practices.

Higher rates of confirmed malaria cases was reported during spring (September-November) that indicates Transmission of malaria was higher, whilst the dry season of the year from December to February had lower case this finding Is in agreement with the study done chagni health center northwest

Ethiopia (Bogale et al, 2018)

In this study, more males (69%) were affected by malaria than females (31%). This finding is coincident with studies from several localities in Ethiopia that reported higher malaria burden among males than females (Bogale et al, 2018 and shiferaw et al, 2018). Prevalence rate in males is high might be due to the fact that male's activity is usually far from home. In addition, males travel to different malarious part of region to perform mining and agricultural activities and these expose them to the higher risk of contracting malaria infection. Conversely, this was not similar with a study conducted in jiga area north west Ethiopia where the prevalence of malaria was relatively higher among female than males (Seble, 2014).

In this study *P. falciparum* is higher than *P. vivax* in which 89% and 10% respectively. This finding is congruent with national figures and other similar studies in parts of Ethiopia that reported preponderance of *P. falciparum* than *P. vivax* (Alemu et al, 2012 & Shiferaw et al, 2018). However; this is in disagreement with the previous report from jiga north west area which reported a higher prevalence of *P. vivax* than *P. falciparum* (Seble,2014). The reason why *P. falciparum* dominated over *P. vivax* in the study area could be due to the severity of disease, drug resistance, and gap of program performance.

The results revealed that most of the respondents (97%) had heard about malaria and similar number of respondents believed that malaria is one of the serious diseases of the community affecting both sex and all age groups, which is in line with previous reports on Ethiopia and elsewhere (Tesfaye et al, 2017 and Amusan et al, 2017). Fever, headache, chills and shivering, loss of appetite and vomiting were mentioned as sign and symptoms of malaria. Similar results were found from different KAP studies in other regions of Ethiopia (Abate et al, 2013).

Conclusion

Malaria is preventable and curable. The most commonly preventive strategies like Using mosquito bed nets, drain stagnant water and cleaning the household surrounding would employed. Accordingly, majority of the respondents slept under bed net especially mother and children which given priority to sleep under bed net. An

overall malaria positivity rate of 3.4% was recorded in the current study area. The number of malaria suspected patients who visited the health institution showed higher rates of confirmed malaria cases was reported during spring (September-November) that indicate the Transmission of malaria was higher at this time. Highest rate of malaria positivity was recorded at health post.

Availability of data and materials:

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests:

The authors declare that they have no competing interests.

Funding:

The funding for this work was obtained from Assosa University.

Authors' contributions

SH conducted the laboratory work and interpreted the data and wrote the first draft of the manuscript. DE designed the field collection protocols and oversaw the collection and provided a critical revision of the manuscript. Both authors have read and approve the content of the submitted manuscript.

Acknowledgements:

We thank Assosa University for funding. We are very much grateful for lab technicians of Tropical and Infectious Diseases Research Center, Assosa University for technical assistant. We acknowledge community of Dangur district, particularly key informant of the study villages.

Authors' information

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