

Knowledge, Attitude and Practice on Malaria and Associated Factors Among Residents in Pawe District, North West Ethiopia: A Cross-Sectional Study

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Abstract: Introduction: A high knowledge score about the cause, transmission and habit of practicing the available preventive and control measures by the individual households and the community at large contribute much to the overall reduction of the malaria burden. Hence this study is aimed to assess the Knowledge, attitude and practice towards malaria and associated factors. *Methods:* A community-based, cross sectional study was carried out in the period November, 2010 to January, 2011 in Pawe district, North West Ethiopia. A multi-stage random sampling technique was carried out to select representative households. A pre-tested structured questionnaire was used for data collection. Data was entered and analyzed using SPSS 16.0. Proportions, Odds ratio and 95% CI were computed. *Results:* A total of 406 subjects were included in this study. Two hundred eighty (67%) of them were females. Subjects who mentioned at least three symptoms of malaria constituted 71.5%. Fifty six percent associated malaria with skipping meals, as a cause and most (67%) affirmed that mosquitoes transmit the disease. Significant proportions (79.8%) were aware that mosquitoes bite during night. Sleeping under bed net and avoiding collected water sources were identified as major malaria preventive measures by 89.7% and 34% of subjects respectively. About 69.2% reported that they were using bed nets correctly. Over 50% of the respondents stated that they would not seek treatment within 24 hours of onset of symptoms. Participants who had education > 5th grade and those who received health education from a health facility scored high on knowledge about malaria, correct use of bed nets and early treatment seeking habits [OR (95%CI) = 4.9(1.4-8), 1.8(1.4-2.5), 2.2(1.7-4.1), respectively]. Living in locations away from a health facility with walking time of 60 minutes or longer was associated with delay in treatment (OR=1.3, 95%CI= (1.1-2.0)). *Conclusions and recommendations:* Though malaria knowledge and Attitude scores were high, the practice of nationally approved malaria preventive and control measures including early treatment seeking behavior were poor. Inaccessibility of health facility, illiteracy, and lack of health education were determinant factors that affected community KAP towards malaria. Hence, a comprehensive health education, promotion of community education and health facility coverage should be prioritized. Responsible bodies are also urged to ensure that all individuals in a household use ITNs correctly, adapt integrated vector control approach and seek treatment early.

Keywords: Malaria, Determinants, KAP, Pawe, Northwest Ethiopia

1. Introduction

Malaria is one of the major causes of morbidity and mortality among people living in tropical and sub-tropical regions [1]. Humans are infected through a bite of an infected female Anopheles mosquito that inoculates spindle shaped sporozoites into the bloodstream [2]. There are four malaria species that infect and cause disease in

humans, *Plasmodium falciparum*, *P. vivax*, *P. malariae* and *P. ovale*. Approximately 75% of the landmass in Ethiopia is malarious with about 68% of the total population living in areas at risk of malaria. Malaria cases that had occurred in Ethiopia at altitudes of >2000 meters above sea level are almost exclusively due to *Plasmodium vivax* unlike in the lowlands (<1500 meters above sea level) where *P. falciparum* is the dominant parasite species. According to Ethiopia's

Federal Ministry of Health (FMOH) report in 2008/2009, malaria was the first cause of outpatient visits, health facility admissions and in-patient deaths, accounting for 12% of outpatient visits and 9.9% of admissions. However, as 36% of the population does not have access to health care services, these figures probably under-represent the true burden of malaria in the country [3]. The mortality due to malaria is reported to be 70,000 deaths each year. The socioeconomic burden resulting from malaria is immense, to mention a few: (1) it significantly reduces production activities (2) the prevalence of malaria in many resource-rich regions of the country prevents the movement and settlement of people in resource-rich low-lying river valleys (3) the increased school absenteeism during malaria epidemics significantly reduces learning capacity of students (4) imposes undue increases in public health expenditures [4]. On the other hand over the last decade, the morbidity, hospital admissions and fatality rates related to malaria have been reduced significantly. The annual inpatient admissions of malaria cases, malaria deaths, and malaria epidemics in Ethiopia have substantially decreased through 2012, compared to the baseline year of 2004 [5]. Community perceptions relating to causation, diagnosis, treatment and prevention are the main socio-cultural factors which can influence malaria prevention and control [6]. Factors such as the household socio-economic status, parents' education, the household head's sex and age, distance of homesteads to health facility, and the quality of health care services have all been found to influence people's treatment and provider choices [7]. Only a few studies have been conducted in Ethiopia regarding community knowledge about malaria and how to combat it [7, 8]. Moreover, despite high endemicity of malaria in Pawe district, no data exists regarding the awareness of local community and determinants of KAP towards malaria. The understanding of the possible causes, modes of transmission, and individuals' preference and decision about adoption of preventive and control measures vary from community to community and even among individual households [9]. Moreover, KAP studies unequivocally would therefore provide information necessary to support and guide the malaria control approaches and policies regionally and locally. The main aim of this study was therefore, to assess some of the determinants of knowledge, attitude and practice (KAP) of the local community about malaria transmission and its control measures in Pawe District, North Western part of Ethiopia.

2. Materials and Methods

2.1. Study Area

The study was conducted among residents of a rural community in Pawe district which is located 565 kilometers to the North West of Addis Ababa, capital of Ethiopia. The total population of the district was about 42,443 of which 21,588 were males and 20,855 females, yielding a male to female ratio of approximately 1:1 at the time of data collection. The district had a total of 20 villages from which 3 were urban

and the rest 17 were rural with an estimated 10,610 households. Each village had an average family size of 4 persons per household.

2.2. Study Design

A cross-sectional community based study design was employed among permanent residents of Pawe district to study the Knowledge, attitude and practice (KAP) of control measures and associated factors in 2012.

2.3. Study Population

The study subjects included randomly selected household heads living in the selected villages. They were permanent residents in the village.

Inclusion criteria: adults (>18 years old) who qualify for interview and were volunteers.

Exclusion criteria: Some members of the community members were excluded from the study, either because they were unable to communicate or couldn't fulfill the inclusion criteria.

2.4. Sample Size and Sampling Technique

Sample size was determined using single population proportion estimate for descriptive study considering the level of significance at 0.05 and with an estimated 50% of population would have an understanding of malaria, as there were no studies done in this area. Stat cal of Epi info 7 was used for this purpose. Hence using the formula $(n = Z^2 p (1-p) / d^2)$ where n = sample size, z = z statistic for a level of confidence ($z = 1.96$ at 95% CI), p = expected proportion of population ($p = 0.5$), d = precision (if 5%, $d = 0.05$). Hence considering 10% non response rate, the final sample size was calculated as $n = 406$.

A multistage sampling technique was used to select the representative households. Accordingly, three villages were randomly selected from the list of 20 villages. Secondly, for each of the selected villages, a list of all clusters was made with the assistance of village/sub-village heads from which two clusters were randomly selected from each kebele. Then, a total of six clusters were drawn from three villages. Finally, the list of all households were made for each cluster from which households were randomly drawn proportionally to bring a total sample size of $n = 406$.

2.5. Data Collection Technique

Questionnaire: a standard KAP questionnaire adapted from reviews from previous studies was used. The data collection tool consisted of (1) sociodemographic characteristics (2) knowledge, attitude and practice (KAP) related questions and (3) Factors associated with KAP. The questionnaire was first prepared in English, then translated into the national language (Amharic) and then translated back to English to check consistency and phrasing of difficult concepts. Three data collectors and two supervisors were involved. Face to face interview was employed to obtain information from

participants. In cases when a respondent was not found, at home during the first visit, one more visit was undertaken.

Variables: The independent variables include socio demographic characteristics (age, sex, marital status, residence, educational status, source of income, health education, access and utilization of mass media, housing condition of the community members, and distance of homesteads from health facilities.

Data Quality Assurance: Data collectors and their supervisor were retrained for all aspects of data collection. Before actual data collection was commenced pre-test was conducted involving 21 households (5% of the sample size) which were not included in the main study. Any incomplete and ineligible questionnaires were corrected accordingly. The supervisor and principal investigator closely supervised the performance of the data collectors on a daily basis and the collected record sheets were thoroughly scrutinized every.

Data analysis: Data was entered and cleaned through EPI Info Version 3.5.1 and analysis was done by SPSS V. 20. Bivariate analysis was carried out to determine the association among various variables. A multiple logistic regression analysis was carried out. P-Value of less than 0.05 was used as a cut off point for declaring the presence of statistically significant association. Odds ratios and 95% confidence intervals were also computed.

Measurement of Knowledge and Attitude

A series of questions were used to assess KAP level of participants. Scores were generated for each question related to knowledge, attitude and practice. One mark was awarded for every correct answer. Based on the number of correct answers, the average scores percent was generated for the attitude, knowledge and attitude. A total score of less than 50% was rated as poor, and over than this as high. To seek treatment not later than 24 hours of the onset of symptoms was defined as an 'early treatment seeking behavior'. 'Correct utilization of bed nets' if in the house hold all family members use nets all year round.

Ethical clearance: Ethical approval was obtained from Research and Ethics Committee (REC) of the Department of Microbiology, Immunology and Parasitology and Institutional Review Board (IRB) of the College of Health Sciences, Addis Ababa University. A verbal informed consent was obtained from each respondent. All respondents were informed about the objectives, procedures and benefits of the study in detail. The consenting procedure ensured that participants were giving consent voluntarily by explaining that refusal/withdrawal from participation would not bring any adverse consequences in terms of accessing any services they are entitled to as other members of community.

3. Results

3.1. Socio Demographic Characteristics of Study Subjects

A total of 406 subjects were included in this study. Two hundred eighty (67%) of them were females. The mean (SD)

age of participants was 40.6(13). More than half of the respondents (67%) had no formal education and were unable to read and write. Above 75% of the subjects were married at the time of data collection. Regarding housing condition 55.5% and 29% of the house wall was made up of mud and bare wood respectively, though 58.4% of the roof is made up of corrugated iron sheet. About 66 % of the households had no access to mass media like radio, television and/ or magazines (Table 1)

Table 1. Sociodemographic characteristics of the respondents Pawe District, Ethiopia, November, 2010 – January, 2011.

Variables	N(%)
Sex	
Male	126(31)
Female	280(69)
Age	
18-24	26(6.7)
25-34	139(35.6)
35-44	78(20)
45-54	82(21)
>55	65(16.6)
Mean age +SD	40.6+13
Residence	
Rural	142(35)
Urban	264(65)
Educational status	
No formal education	281(67)
1-4 th grade	71(16)
5-8 th grade	45(11)
9-12 th grade	17(4)
College/University level	5(2)
Religion	
Orthodox christian	182(45)
Muslim	142(35)
Others	82(20)
Family size	
1-4	230(56.6)
5-8	153(37.7)
>8	23(5.6)
Access to media	
Yes	138(34)
No	268(66)

3.2. Knowledge and Attitude Towards Malaria.

Out of 406 participants, 402(98.5%) had stated at least one of the signs and symptoms of malaria and about 71.5% stated at least three symptoms. A substantial number of respondents had reasonable knowledge about malaria, including correct association between malaria and mosquito bites, its potential impacts and treatment options. As shown in (Figure 1) below, about 344(84.7%) and 341(83%) of the respondents stated fever and headache respectively as the most common primary symptoms associated with malaria.

Hunger, fatigue and mosquitoes were mentioned by 228 (56.7%), 180(44.6%) and 184 (45.3%) of the respondents as causes of malaria respectively (Figure 2)

Malaria was perceived as serious diseases that lead to

hostile consequence by 89% of subjects. Similarly, 58% believed that malaria could cause death unless proper treatment is sought. Moreover, 156(38%) stated loss of family income as a negative impact of the disease and 97% believed that malaria is preventable. The overall knowledge score was rated as over 50% /high.

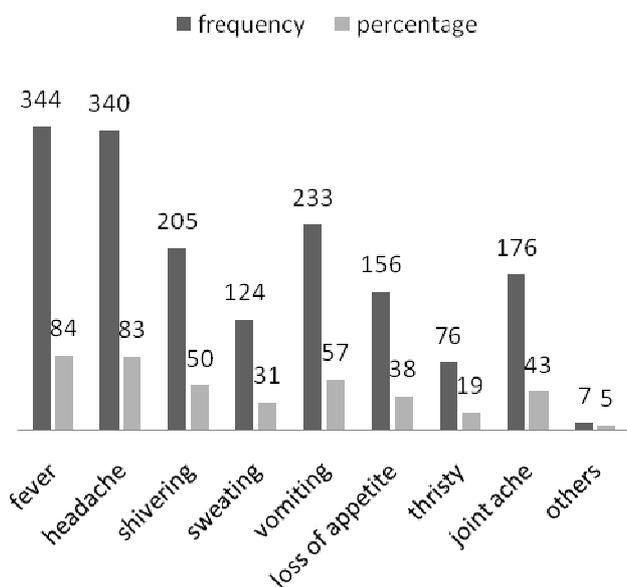


Fig1. Malaria symptoms reported by subjects, Pawe District, Ethiopia, November, 2010 – January, 2011.

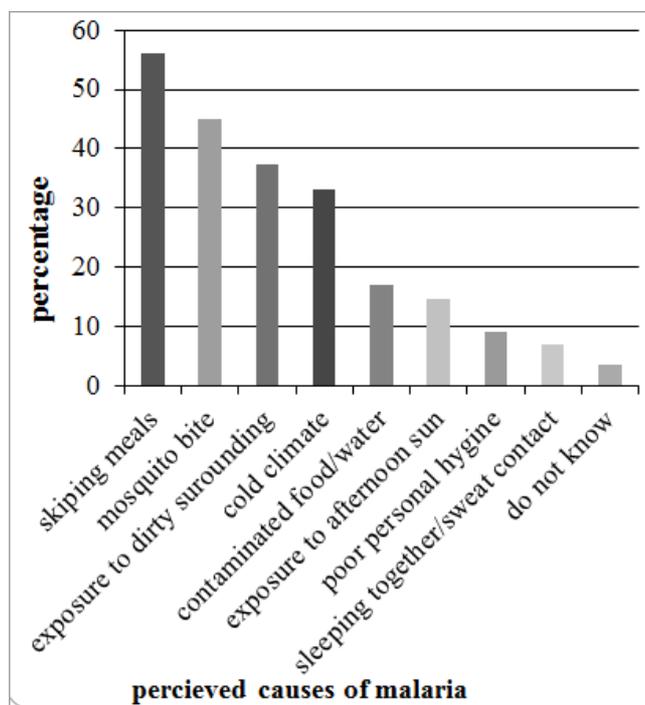


Fig 2. Perceived causes of malaria, Paw District, January 2011

3.3. Malaria Prevention and Control Measures

Over 97% of the study subjects believed that malaria can be prevented and almost all(99%) stated that malaria is a curable disease. Sleeping under bed net and avoiding

collected water sources were mentioned by 89.7% and 33.7% of subjects respectively as preventive measures of malaria (Table 2).

Table 2. Malaria preventive measures reported by the respondents, Pawe district, Benishangul Gumuz Regional State, November, 2010 – January, 2011.

Preventive measure	Frequency	Percent
Use of bed net	364	89.7
Chemical spray	82	20
Drainage of stagnant water	222	34
Personal hygiene	45	11
Smoking certain type of leaf	56	14
Appropriate nutrition	17	4
No action	45	11

A 92% (n= 373) of the respondents reported that all family members used ITNs and <10% mentioned that only children under the age of five and women use ITNs. It was 70% of the respondents that mentioned correct use of ITNs both in terms of season (throughout the year and following the rainy season) (Table 3).

Table 3. Pattern of bed net use, in Pawe District, Pawe-Ethiopia, November, 2010 – January, 2011.

Family member who use bed net	Frequency	percent
All	373	92
Children	19	5
Women	6	1.5
Pregnant	2	0.5
Time of using bed net		
Consistent (every day)	255	70
Inconsistent	107	30
Consistent use of bed net		
Rainy season	19	5
Following rainy season	117	32
Throughout the year	228	63
Correct use of bed net (all year round with all family members)	281	69

Most subjects (71%) perceived early diagnosis and prompt treatment at health facility to cure malaria. A similar proportion of subjects stated that good nutrition as important as medical therapy to prevent and cure malaria. Early treatment seeking habit for malaria was reported by only 234(57.6%) subjects. Delays were mentioned by 42.4% of respondents.

3.4. Factors Associated with Knowledge, Attitude and Practice

The results of multivariate analyses showed that: persons who were 9th grade or above were 4.9 times more likely to report a high score of malaria knowledge compared to those who had no formal education. Respondents from urban setting frequently reported high knowledge score [OR= 1.5, 95%CI= (1.2, 4.5)]. Participants who had constant monthly income reported higher knowledge scores [OR=1.8, 95%CI= (1.08, 3.8)]. To not have attended health education regarding malaria was significantly associated with low score of malaria knowledge [OR=2.2, 95%CI= (1.9-3.2)]. Inaccessibility of mass media (such as radio, television or

both) was significantly associated with low score of malaria knowledge [OR=1.7, 95%CI= (1.3,4.2)].

Participants' age was significantly associated with correct utilization of ITNs [OR=1.2 95%CI= (0.3-5.0)]. At least to have attended a formal, education despite grade level had a significant association with the use of ITNs [OR=1.8, 95%CI= (1.39-2.5)]. Similarly, health education had significantly affected correct utilization of ITNs [OR=2.5, 95%CI= (1.2, 2.7)]. There was no observed significant association between use of mass media and correct use of bed nets [OR=1.3, 95%CI= (0.5, 3.7)].

The respondent's educational level was significantly associated with treatment seeking habit [OR=5.1, 95%CI= (2.9-6.2)]. Subjects who completed at least 9th grade were five times more likely to seek treatment early compared to those who do not have attended formal education. Subjects in urban setting were more likely to seek early therapy [OR=2.1, 95%CI= (1.2, 3.6)].

It was also shown that those who received health education were more likely to seek treatment earlier than those who did not [OR=2.3, 95%CI= (1.3, 4.1)]. Out of 135 respondents who own and use any of mass media like (radio, television, magazines), 99 (73.3%) reported that they would seek treatment early. Fifty-four percent of those who did not use mass media had sought treatment within 24 hours of the onset of malaria symptoms. Utilization of mass media was significantly associated with early treatment seeking behavior [OR= 1.9, 95%CI= (1.2, 3.4)]. It is shown that 160 (65%) of the respondents who lived farther than 60 minutes of walking distance to health facilities and 76 (54.3%) of those who lived close to any of the health facilities reported having sought treatment within 24 hours of the onset of malaria symptoms. There was no statistically significant association between living farther than 60 minutes of walking distance to health institution and delay in treatment seeking [OR= 1.3, 95%CI= (1.1, 2.0)].

Table 4. Predictors of malaria knowledge and practice in Pawe Woreda, Pawe, Ethiopia, November- December, 2010. Logistic regression analysis showing the adjusted OR for all variables and their 95% confidence intervals (95% CI).

Variables	Malaria knowledge score(a)		Correct use of ITNs		Early treatment seeking	
	Crude OR(95%CI)	Adjusted OR(95%CI)	Crude OR(95%CI)	Adjusted OR(95%CI)	Crude OR(95%CI)	Adjusted OR(95%CI)
Age (years)					NA	NA
18-24	1		1			
25-34	0.82 (0.2-3)		0.6 (0.07-4.3)			
35-44	0.71 (1.2-2.7)		1.1 (0.3-3.5)			
45-54	0.4 (0.1-1.4)		0.8 (0.2-3.4)			
> 55	0.5 (1.1-2.2)		0.3 (0.06-2.0)			
Level of education						
No formal education	1	1	1	1	1	1
1-4 th grade	1.6 (1.2-4.1)	1.7 (0.7-1.8)	0.5 (0.08-2.7)	0.2 (0.1-1.7)	0.5 (0.2-1.7)	0.5 (0.1-2.5)
5-8 th grade	2 (0.6- 2.2)	2.9 (1.1-4.6)	1.7 (0.05-2)	1.8 (1.39-2.5)	1.4 (1.1-3.4)	2.2 (1.7-4.1)
9 th and above	6.2 (1.9-10.2)	4.9 (1.4-8.0)	3.1 (0.04-2.8)	2.1 (1.09-4.3)	1.5 (1-6)	5.1 (2.9-6.2)
Residence						
Urban	0.7 (0.4-1.2)	1.5 (1.2-4.5)	1.1 (0.4-3.2)	1.2 (0.4-3.7)	2.2 (1.4-3.4)	2.1 (1.2-3.6)
Rural	1	1	1	1	1	1
Source of income						
Variable	1	1	NA	NA	1	1
Constant	1.3 (0.5-2.2)	1.8 (1.08-3.8)			1 (0.5-1.9)	1.7 (1.1-2.2)
Health education						
Yes	1	1	1	1	1	1
No	0.6 (0.3-1.1)	0.2 (1.9-3.2)	0.5 (0.1-1.8)	2.5 (1.2-1.7)	2 (1.09-3.30)	2.3 (1.3-4.1)
Access to mass media						
Yes	1.5 (0.8-2.6)	1.7 (1.3-4.2)	1.4 (0.4-3.2)	1.3 (0.5-3.7)	2.3 (1.5-3.6)	1.9 (1.2-3.4)
No	1	1	1	1	1	1
Distance from Hf						
<60 minutes	NA	NA	0.9 (0.3-2.7)	1 (0.3-2.7)	1.6 (1-2.4)	1.3 (1.1-2.0)
> 60 minutes travel			1	1	1	1

Hf: Health Facility, (a) = high knowledge score

4. Discussion

In this study most subjects (98.5%) were aware of at least one symptom of malaria and 71.5% mentioned at least three symptoms. However, only 45.3% of subjects associated malaria with mosquito bite as a cause. The level of knowledge about malaria transmission was low when compared to the

findings in previous studies carried out in other regions within Ethiopia [6, 10]. Our study findings about the mode of malaria transmission was also lower than those reported from studies carried out in other African countries [11, 12, 13], and in countries like India and Mexico [14, 15]. On the other hand, while 58 % of subjects reported that malaria would cause death unless treated, 97% believed that it could be

prevented. Similar results were found in other studies [16,17,and 18].This could be due to similarity in study setting and the role of health information and communication equally reached.The level of awareness regarding malaria signs and symptoms, as well as the perceived seriousness of the disease reported in this study were higher than the findings in holo-endemic areas of Western Kenya [19]. This could be probably be due to the fact that people in malaria endemic areas are more likely to be more knowledgeable about disease than those in malaria free or low endemic areas.Only a small proportion (31.8%) of the subjects in this study stated that mosquitoes would rest indoors and 78% stated that mosquitoes bite during night. This was lower than a study done in Asossa Western Ethiopia. [16]. A substantial proportion of the study subjects (89.7%) mentioned that they would prefer sleeping under bed net to prevent malaria.This was higher than the results reported in different studies [19, 22,23, 17, and 18]. This attitude may be due to increased health promotion activities and campaigns by the government and time reference of the study. Regarding the pattern of bed net utilization, 281(69.9%) of the respondents reported correct use of ITNs (all year round and all family members slept under net). This was higher than the result reported in Tigray [18]. This may be due to difference in study setting, the local community socio-cultural factors and time reference of the study.In the present study 42.4% of the study participants seek treatment after 24 hours delay of the onset of malaria symptoms. This was higher than that reported in Swaziland [23] and lower than the result reported in Bangladesh and Sudan[24, 25]. Access to health facility, availability of anti-malaria drugs, socio-cultural beliefs and exposure to health information might explain the observed variations.

*Determinants of malaria knowledge, attitude and practice:*In this study, being 5th grade and above was significantly associated with high malaria knowledge score. This finding was consistent with the study done in Assosa and Tigray regions of Ethiopia [17, 18]. This similarity may be explained by the fact that educated communities had better access to multiple source of information such as magazines, radio, and television and from their school education.Our current study showed that urban residents were more likely to report higher comprehensive knowledge of malaria than the rural people. This could be due to the fact that large proportions of literate participants in the study were from the urban settings.Respondents who had not reported attendance of health education were less likely to report a high score of malaria knowledge. This may imply that health education had played a role by increasing the people's comprehensive knowledge in both settings.

Those who own and use radio and or television were more likely to mention a high malaria knowledge score than those who do not have access to mass media. Similar results were reported in other studies [18]. This could be due to similarity in the study design and socioeconomic status of the study participants in both settings and may imply that use of mass media and promotion of health education supplement

the sources of malaria information.

Having attended any formal education and health education were associated with correct use of ITNs. This was in line with a study done in other settings[17, 18].However living close (less than 60 minutes walking) to any health facility was not associated with correct use of bed nets. This contrasts with the findings reported in Tigray[18]. In our study, the use of mass media like radio was not associated with correct use of ITNs.This finding was in contrast with a study done in Tigray region of Ethiopia [18], which may be explained by difference in study setting and frequency of radio use.

Regarding treatment seeking behavior, those having formal education, and constant monthly income, were significantly associated with early treatment seeking habit within 24 hours of the onset of malaria symptoms. This finding was consistent with the study done in other study [18, 26].

In this study we have shown that those who did not receive health education and live further than 60 minutes of walking to any of the health institution were less likely seek therapy early than those who live close to health facilities. A similar result has been reported in other studies [18, 26]. This may be due to similarity in socioeconomic status of study participants, study design and accessibility of health facilities in both settings.

5. Conclusions and Recommendations

Despite a high knowledge and attitude scores towards malaria, there were still misconceptions about the causes of the disease and curative means.Sleeping under bed net was the single most common malaria prevention measure reported. But a gap in appropriate utilization of bed net identified.A significant proportion of the study participants would not seek treatment early.To not have a formal education was strongly associated with low knowledge score. To not have attended both general education and health education were significantly associated with low Knowledge score,inappropriate use of ITN, and delay in treatment. To be rural resident and not to own radio/television were both associated with low knowledge score and delay in treatment. Lack of health education and to live farther than 60 minutes distance walking from health facility were factors associated with a delay in treatment seeking. Hence, we recommend a comprehensive health education and promotion of community education to be given. Health facility coverage to remote areas should also be emphasized.Responsible bodies including Community Health Workers/CHWs are also urged to ensure that all individual in a household use ITNs correctly, adapt integrated vector control approach and seek treatment early as these are crucial to realize malaria elimination program by 2020 in selected endemic areas of Ethiopia.

Authors' Contributions

HBBeyene wrote the proposal, participated in data collection, analyzed the data and drafted the paper. NFTeleand

AHMekuriatake part in proposal development, participated in data analysis and revised subsequent drafts of the paper. All authors read and approved the final manuscript.

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