Knowledge, attitude and practice towards malaria among people attending in Mekaneeyesus primary hospital, South Gondar, Northwestern Ethiopia: A cross-sectional study.

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Research

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Abstract

Background : Malaria is worldwide health problem causing high mortality and morbidity, not only a major cause of suffering and death, but also the cause of socioeconomic problems, especially in developing country like Ethiopia.

Methods: This study is aimed to investigate knowledge, attitude and practice towards malaria and its preventive and control methods among people attending in Mekaneeyesus primary hospital, South Gondar, Northwestern Ethiopia. Cross sectional study was employed by using random sampling technique was carried out to select representative individuals. A structured questionnaire was used to collect data on socio-demographic characteristics and KAP. The data quality control was tested by using pretest and study protocol of the research was approved by the Ethical Review Committee.

Results: The overall prevalence rate of malaria was 8.5%. Individuals having poor knowledge and poor practice toward malaria were 26.93 (CI = 3.67-197.47, p=0.001) and 13.09 (CI=0.93-183.47, p=0.036) times higher respectively as compared to individuals who are knowledgeable and had good practice toward malaria. Level of education was significant predictor of practice level which, education status of being uneducated and attaining grades 1-8. Respondent's less than 500 family economic statuses were also significantly associated with practice level ($P < 0.05$) among study participants. The overall knowledge, attitude and practice level was relatively good, but its practice towards ITN utilization was poor. Poor knowledge and practice were significantly increase malaria risk.

Conclusion: Malaria is still causes a serious health burden so special attention should be taken to malaria prevention and control by giving awareness and using different intervention method.

Introduction

Malaria is a mosquito borne infectious disease caused by an obligate intracellular protozoan parasite of the genus Plasmodium. There are five Plasmodium species causing malaria in human, P. falciparum, P. vivax, P. malaria, P. ovale and P. knowlesi. Plasmodium falciparum and P. vivax account for more than 95% of the cases of malaria worldwide in which the falciparum species is the most important as a result of fatal in its characteristics and responsible for most of the malaria overall death (Gilles et al, 1996). Understanding knowledge level, perception towards and practical behaviors of individuals and communities is crucial to ensure appropriate intervention measures. For successful malaria intervention, community's knowledge level is crucial and views are great in guiding practices to ensure appropriate treatment, prevention and control measures (Legesse et al., 2017).

There have been varying reports regarding the knowledge on malaria in different parts of Africa and around the world reveals that there is a gap between the knowledge and the malaria disease condition which leads them not to participate actively in the control programs (Shimaponda-Mataa et al., 2017). The knowledge of the community is far from perfect, and misconceptions are rampant. Despite reasonable knowledge on malaria and its preventive measures, there is a need to improve availability of

information through proper community channels. Special attention should be given to illiterate community members. High acceptance of indoor residual spraying and high level of bed net ownership should be taken as an advantage to improve malaria control (Mazigo et al., 2010).

Many of the human behaviors (poverty, population mobility, agricultural and industrial development) favor malaria transmission stem from broad social, cultural and economic forces. In addition to these broad social forces, malaria transmission and control are invariably affected by local beliefs, attitudes and practices. Taking socioeconomic and socio-cultural aspects that affect understanding of the causes, the relationship between mosquitoes and the disease, diagnosis, treatment and practices about prevention of particular communities into consideration in developing tailor-made interventions to avoid disrupting economic and cultural activities, and hence succeed with community commitment (Aderaw and Gedefaw, 2013). It is clear that a change in behavior is an important component in malaria prevention and control, but the basis of the behavior elucidated by determining the levels of malaria knowledge and the attitude and practices of the community is even more crucial (Shimaponda-Mataa et al., 2017). Knowledge in malaria reinforces the capacity of the host to affect transmission intensity through informing attitudes and behavior.

Studies reported in Zimbabwe showed lower level of awareness about malaria (Tsuyuoka et al., 2001). Pertaining to Knowledge, attitude and practice of the communities living in Kenya towards malaria prevention and control options were low (Mugao et al., 2014). Studies in Mumbai show, 39.7% have a low knowledge level and 53.7% obtained an average level and very few have high level of knowledge. With regard to attitude levels, very few respondents have a low and high level, with a large proportion of the respondents, 71.8%, have the average level score for attitude. In the practices category, 83.1% of people have an average level, while 2.2% found a low level score and 14.7% found high level score (Ambadas et al., 2015). The study in Malaysia showed that more than three-fifth (62.1%) of the study population had low knowledge level on malaria. About two-thirds of the study respondents had low attitude score on malaria prevention and use of ITNs (Oo et al., 2013). Study conducted in Oromia of Ethiopia the community overall awareness about the symptoms, cause, transmission and prevention measure of malaria was found to be high. Increasing awareness and access to early malaria diagnosis prompt treatment before the disease become complicated and participation in the health education is vital components in terms of malaria knowledge and practice (Gutasa et al., 2015).

Increased ITNs use throughout a community reduces transmission and thus has a more powerful impact than individual change (Teklehaimonot et al., 2007). It is also worth mentioning that even when knowledge is a predictor of ITN use; it may not assure protection from malaria unless there is proper use and strong adherence (Ezeigbo et al., 2015). The main focus of the elimination program is the scaling-up of parasitological and entomological surveillance through early diagnosis (by microscopy and/or rapid diagnostic tests) and prompt treatment, and vector control activities, i.e. using rotating insecticides for indoor residual spraying and distribution of long-lasting insecticidal nets (LLIN) to at-risk populations(Kirkby et al., 2013). The control programs still face many challenges include low coverage by long-lasting insecticidal nets or indoor residual spraying, weak malaria surveillance system and

insufficient well trained human resources limited implementation of the updated malaria treatment policy for artemisinin-based combination therapies (WHO, 2007).

Knowledge, attitude and practice of the community towards malaria prevention and control options are still at low level. Therefore, the existing effort must be strengthened and continued to improve the community knowledge, attitude and practice towards malaria prevention and control options (Abate et al., 2013). Community Knowledge on malaria prevention and control options is important and the effort is related to either to environmental management, personal protection or vector control (Aderaw and Gedefaw, 2013). Malaria intervention goals in endemic areas should be to prevent mortality and reduce morbidity as well as associated socio-economic losses. This requires the progressive creation of capacities for assessing local malaria situation and the selection of appropriate control measures (Erhun et al., 2005). Malaria itself is a challenge to be eliminated and eradicated completely. Despite continuous efforts by private as well as government sectors and advancement, and researches have been carried out all around the globe with regard to different aspects of the disease. However, it is still a persistent infectious disease in tropical and subtropical region of the world. It is also an important public health problem in Ethiopia. In general, this study were tried to fill the stated information gaps so as to alleviate the effect of malaria and ensure appropriate prevention and control measures.

Materials And Methods

Study Area And Design

A cross-sectional study design was conducted from September 2017 to April 2018 to determine the knowledge, attitude and practice towards malaria among people attending in Mekaneeyesus primary hospital, South Gondar, Northwestern Ethiopia. Mekaneeyesus is the capital of the district. Estie is one of the 105 districts in Amhara Regional state of Ethiopia. Geographically the study area lies on the coordinates of 11°34’N, latitude and 36°41’E, longitude and at an altitude range of 1500–4000 meters above sea level (m.a.s.l). The minimum and maximum mean annual rainfall of the area is 1307–1500 mm and the mean annual minimum and maximum temperature is 8.3^0C -25^0C. The district exhibits four climate zones:Wurch(upper highlands above 3200 m a.s.l), Dega ((highlands 2,300–3,200 m a.s.l), Woinadega (midlands 1,500–2,300 m a.s.l), and Kola (lowlands500–1,500 m a.s.l). The peak times of malaria transmission occur between September and December following the main rainy season from June to August and from April to June.

Estie is about 676 km northwest of Addis Ababa and about 110 km north of Bahr Dar. The total area of this Woreda is 132,373.9 km^2. It has 42 rural kebeles and 3 urban kebeles. Based on figures published by the Central Statistical Agency (CSA) in 2005, Estie has an estimated total population of 403,956, of whom 199,325 are men and 204,631 are women; 16,014 (3.96%) of its population are urban dwellers.

Sample Size Determination And Sampling Techniques

The sample size of the study were determined using single population proportion formula by taking the proportion with confidence interval at 95% and alpha at 5% (Naing et al., 2006).

$$n = \frac{z^2 p\,(1-p)}{d^2}$$

Where: - n = sample size

Z = Z statistic for a level of confidence (z = 1.96 at 95%CI)

d = precision (if 5%, d = 0.05)

P = proportion of malaria prevalence (p = 0.5) were considered, since there was no similar previous studies in the study areas. Accordingly, the sample size of the study was

$$= \frac{3.8416 \times 0.5 \times 0.5}{0.0025} = 384.16 \approx 384$$

In addition, 5% non-response rate was added for individuals who fail to participate in the study. Then the final sample size was 403. Based on these assumptions random sampling techniques was employed.

Inclusion Criteria

Individuals who consented to participate in the study.

Exclusion Criteria

Individuals, who cannot communicate due to impairment or sever sickness and mentally sick people, and those people who did not provide consent and assent, were excluded from the study.

Data Collection

Questionnaire survey

A standard KAP questionnaire was compiled and adapted. A Structured questionnaire was used to collect data on socio-demographic characteristics, knowledge and attitude of the study participants about transmission of malaria, symptoms, its preventive measures and practice towards ITNs ownership and use. The questionnaire was first developed in English and translated into the local language, Amharic and then translated back to English to check consistency and phrasing of difficult concepts.

The knowledge of malaria for participants was determined. Each correct response was given a score of 1 while a wrong or unsure response was scored 0. The original Bloom's cut-off points where a score of 80.0–100.0% of correct responses meant a good knowledge, a score of 60.0–79.0% put a scorer in a level of satisfactory knowledge and a poor knowledge was for the respondents with a score ≤ 59.0% of the correct responses were adapted and modified. Therefore, the scores with their respective knowledge levels were 8–10 good knowledge, 6–7 satisfactory knowledge, and 0 – 5 poor knowledge. Attitude was assessed by Likert's scale. The questions on Likert's scale had positive and negative responses that ranged from strongly agree (score 5), agree (score 4), undecided (score 3), disagree (score 2) and strongly disagree (score 1). The responses were summed up and a total score was obtained for each respondent. The mean score was calculated and respondents with score of greater than or equal to the mean score (4.14) were considered as having positive attitude while those with score of less than the mean score (4.14) were taken as having negative attitude towards malaria.

Practices were also determined using Likert's type. The scoring system of Likert's type scales with respect to respondents response ranging from never (score 0), sometimes (score 1), always (score 2) were used. The responses were summed up and total score was obtained for each respondent and mean practice score was computed across all the study participants. An individual was claimed as having good practice when his/her overall practice score (1.03) was equal to or more than the mean practice score. However, an individual was having poor practice when his/her overall practice score is less than the mean practice score (1.03).

Laboratory Examination And Parasite Detection

Capillary blood samples were collected by finger pricking using 70% isopropanol and sterile disposable lancet. Immediately, thin film was spread on grease free, frosted end of labeled slide using a smooth edged slide spreader. The thick smear was also prepared on the same slide by spreading larger drop of blood. The thin blood smear was allowed to air dry for 10 minutes and then fixed with absolute methanol for 5 seconds and then air dried. The thick smears were air-dried for about 30 minutes, not fixed in methanol but dipped in water to dehaemoglobinize. The blood films were stained with 10% Giemsa for 10 minutes (Cheesbrough, 2005). Finally, the films were examined under the microscope using an oil immersion microscope objective (100x) for Plasmodium spp.

Data Analysis

The data gathered were double entered in to Microsoft Excel data sheets and were crosschecked and imported into SPSS version 21 for analysis. Descriptive statistics was carried out to measure relative frequencies and percentages of the variables. Frequency distribution tables were used to quantify socio-demographic variables, knowledge and attitude of respondents related to symptoms, causes, transmission, prevention and control measures of malaria, and practices toward malaria prevention and control methods.

Logistic regression analysis was performed to examine associations between variables by using odd ratio. Variable having significance at p-values 0.25 in univariate test was selected and entered for multivariate logistic regression analysis to identify the most important predictors of malaria risk factors based on the test from logistic regression (Bursac et al., 2008). Odds ratios (OR) were calculated with 95% confidence interval (CI). The values were considered to be statistically significant when p-values are less than 0.05.

Data Quality Control

The survey questionnaire was made based on the malaria indicator survey questionnaires, which was filled by the participants. Before going to the actual data collection, pretest of the questionnaires were conducted involving 5% of the sample size that were not part of the sample population in the actual study at Mekaneyesus hospital to ensure the validity of the data collection tool.

Ethical Consideration

The study protocol of the research was reviewed and approved by the Ethical Review Committee under the research and community service coordinating office of College of Science, Bahir Dar University. Mekaneyesus primary hospital grants permission for the study to be conducted at the target health center after explaining the purpose and objective of the study. Informed written and oral consent was also obtained from the study participants before interview. For those who did not read and understand the consent form, the objectives of the study was explained to them and verbal consent was obtained. For children less than 18 years, consent was obtained from their parents or guardians.

Result

Socio Demographic Characteristics

A total of 403 individuals were invited to participate, among these 390 individuals were participated in the study and the remaining 13 individuals who refused to participate were excluded from the study. About 211(54.1%) of the participants were males and the remaining 179(45.9%) were females. More than half 242(62.1%) of the respondents were urban residents and majority 186(47.7%) were married. The educational background of the study participants varied from those who were illiterate to those who attained the levels of college and above. The mean age of the sampled population was 31.48 ± 15.62 years and the highest number of participants 108(27.7%) were found to be within the age range of 25–34 years (Table 1).

Table 1
Socio demographic characteristics of respondents in Mekaneeyesus hospital, South Gondar, Northwestern Ethiopia, 2018.

Variable	Category	Frequency	Percentage%
Sex	Male	211	54.1
	Female	179	45.9
Age category	Under 5	12	3.1
	5–14	26	6.7
	15–24	94	24.1
	25–34	108	27.7
	35–44	72	18.5
	45–54	40	10.3
	≥55	38	9.7
Marital status	Unmarried	176	45.1
	Married	186	47.7
	Widow/widower	15	3.8
	Divorced	13	3.3
Education	Uneducated	109	27.9
	1–8	42	10.8
	9–12	41	10.5
	College and above	198	50.8
Religion	Orthodox	273	70.0
	Muslims	95	24.4
	Protestant	20	5.1
	Catholic	2	0.5
Occupation	Unemployed	45	11.5
	Daily laborer	30	7.7
	Student	73	18.7
	House wife	20	5.1

Variable	Category	Frequency	Percentage%
	Farmer	71	18.2
	Merchant	74	19.0
	Government employee	77	19.7
Residence	Rural	148	37.9
	Urban	242	62.1
Family income (in Birr/month)	Less than 500	74	19.0
	500–1000	63	16.2
	1001–1500	43	11.0
	1501–2000	31	7.9
	Above 2000	179	45.9

Out of the 390 microscopically examined blood samples, 33 samples were found positive for malaria infection with the overall prevalence rate of 8.5%. In univariate analyses KAP of the study participants had significant difference ($p < 0.05$) with malaria prevalence (Table 4).

From multiple regression analysis of malaria the odds of malaria was significantly twenty seven times higher in individuals who had poor knowledge than those who had good knowledge toward malaria (AOR = 26.93 95% CI 3.67-197.47, p = 0.001). While, statistically non-significant three times (AOR = 2.97 95% CI 0.51–17.46, p = 0.228) increased risk of malaria infection was detected among participants with satisfied knowledge score as compared to those with good knowledge score. Prevalence of malaria did not show any significant association with regard to attitude levels of the preset participants. On the other hand, the odds of positive malaria diagnosis was thirteen times higher in those who had poor practice than those who had good practice and it was statistically significant (AOR = 13.09 95% CI 0.93-183.47, p = 0.036) (Table 2).

Table 2
Multivariate logistic regression analysis of malaria prevalence with KAP

Variable	N (%)	n (%)	B	SE	Crude OR (95% CI)	Adjusted (OR 95% CI)	P. value
Knowledge level	52(13.3)	22(42.3)	3.29	1.02	59.40(16.77,210.35)	26.93(3.67, 197.47)	0.001
Poor knowledge	92(23.6)	8(8.7)	1.09	0.90	7.71(2.00, 29.75)	2.97(0.51, 17.46)	0.228
Satisfied	246(63.1)	3(1.2)			1.00	1.00	
Good knowledge							
Attitude level	146(37.4)	26(17.8)	0.79	0.82	7.34(3.09, 17.39)	2.22(0.44, 11.12)	0.330
Negative attitude	244(62.6)	7(2.9)			1.00	1.00	
Positive attitude							
Practice level	192(49.2)	31(16.1)	2.57	1.35	18.87(4.45, 80.04)	13.09(0.93, 183.47)	0.036
Poor practice	198(50.8)	2(1.0)			1.00	1.00	
Good practice							

Note: N = total number of study participants, n = positive for Plasmodium infection

Knowledge About Malaria

Amharic version of malaria is known as “webba”, which is most commonly used term in the study areas. The study indicated that majority 320(82.1%) of respondents had knowledge how malaria is transmitted and more than three quarter 294(75.4%) of the study subjects implicated anopheles mosquitoes in the transmission of malaria. However, some participants had misconceptions about the mode of malaria transmission the remaining 66(16.9%) did not know how malaria is transmitted (Table 3).

On the other hand, most (86.2%) of the respondent associated malaria infection with mosquito bite. Two hundred sixty five (67.9%), 80(20.5%), 41(10.5%) and 4(1.0%) of the study participants mentioned that stagnant water, tall grass, bushes and running water as breeding sites of mosquitoes respectively. 354(90.8%) was identified that mosquito bite during night time. Misconceptions regarding the causes of malaria were also reflected in 10 (2.6%) of the subjected who related it with flies and 44(11.3%) of the participants did not know the causes of malaria. Almost all respondents identified the major sign and symptoms of malaria correctly; 386(99.0%), 382 (97.9%), 383(98.2%), 377(96.7%) mentioned fever, headache, chill and shivering and loss of appetite as symptoms of malaria, respectively. In the present study, 256 (65.6%) and 251(64.4%) of study participants identified correctly that under five children and pregnant women as the most susceptible segments of the population to malaria respectively (Table 3).

In response to knowledge about prevention strategies, majority of the respondents knew about preventive methods of malaria. With regard to intervention measures for indoor prevention and vector control responders that were understood insecticide treated bed net 218(55.9%)as best malaria preventive methods. While only 21.8% of respondents believed that malaria can be prevented using indoor residual spray (IRS) and few of them said fumigation 3(0.8%) can serve as one of the preventive measures. Regarding outdoor vector the presence of stagnant water 265(67.9%) and weeds 334(85.6) should be avoided as means of malaria prevention (Table 3).

The study indicated that all of the respondents had information about malaria from different sources. Of which, 255(65.4%) received information through radio/television, 249(63.8%) from hospital, 242(62.1%) health extension workers, 168(43.1) family, 166(42.6%) teachers, and 165(42.3%) neighbors/friends (Fig. 1).

Overall knowledge level was assessed based on knowledge score, which was calculated for each participant. Accordingly, 246(63.1%), 92(23.6%) and 52(13.3%) of the study participants had good, satisfactory and poor knowledge about malaria respectively (Table 2).

In the cross tabulation of chi- square analyses, no significant difference was observed between knowledge and marital status of the participants ($p > 0.05$). However, statistically significant associations were observed on knowledge with other socio demography and environmental risk factors (Table 4).

Table 3

Knowledge of respondents related to cause, sign and symptoms, transmission of malaria, and mosquito breeding areas Mekaneeyesus hospital, South Gondar, Northwestern Ethiopia, 2018.

Variables	Categories	Frequency
Cause of malaria	Mosquito	336(86.2)
	Fly	10(2.6)
	Does not know	44(11.3)
Do you know how malaria is transmitted	Yes	320(82.1)
	No	70(17.9)
Malaria transmission	Mosquito bite	294(75.4)
	Untreated drinking water and eating dirty food	13(3.3)
	By contacting a malaria patient	17(4.4)
	Does not know	66(16.9)
When do mosquitoes mostly bite	Day	8(2.1)
	Night	354(90.8)
	Any time	24(6.2)
	I do not know	4(1.0)
Mosquitoes breeding site	Stagnant water	265(67.9)
	Tall grass	80 (20.5)
	Bushes	41(10.5)
	Running water	4(1.0)
Indoor preventing method of malaria	Insecticide treated bed net	218(55.9)
	Insecticide residual spray	85(21.8)
	Fumigation	3(0.8)
	Close window/ door	84(21.5)
Outdoor preventing method of malaria	Avoid weeds Yes No	334(85.6) 56(14.4)
	Avoid stagnant water Yes No	363(93.1) 27(6.9)
	Insecticide spray Yes No	37(9.5) 353(90.5)

Variables	Categories	Frequency
Susceptible group for malaria	Under five Yes No	256(65.6) 134 (34.4)
	Pregnant women Yes No	251(64.4) 139(35.6)
	Elderly Yes No	153(39.2) 237(60.8)
	Equal for all Yes No	119(30.5) 271(69.5)
Symptoms of Malaria	Fever Yes No	386(99.0) 4(1.0)
	Head ach Yes No	382(97.9) 8(2.1)
	Chill and shivering Yes No	383(98.2) 7(1.8)
	Loss of appetite Yes No	377(96.7) 13(3.3)

Table 4

Cross tabulation of Chi-square analysis of association of knowledge with socio demography, environmental risk factors of the study participants

Variables	**Poor knowledge**	**Satisfied**	**Good knowledge**	**χ2, p**
Sex Male Female	32(61.5) 20(38.5)	58(63.0) 34(37.0)	121(49.2) 125(50.8)	6.513, 0.039
Age categories Under 5 5–14 15–24 25–34 35–44 45–54 ≥ 55	6(11.5) 7(13.5) 7(13.5) 11(21.2) 9(17.3) 6(11.5) 6(11.5)	3(3.3) 8(8.7) 19(20.7) 28(30.4) 18(19.6) 6(6.5) 10(10.9)	3(1.2) 11(4.5) 68(27.6) 69(28.0) 45(18.3) 28(11.4) 22(8.9)	28.250, 0.005
Marital status Un married Married Divorced Widowed/widower	26(50.0) 19(36.5) 3(5.8) 4(7.7)	43(46.7) 40(43.5) 3(3.3) 6(6.5)	107(43.5) 127(51.6) 7(2.8) 5(2.0)	9.888, 0.129
Education status Uneducated 1–8 9–12 College and above	31(59.6) 14(26.9) 2(3.8) 5(9.6)	51(55.4) 10(10.9) 5(5.4) 26(28.3)	27(11.0) 18(7.3) 34(13.8) 167(67.9)	131.946, 0.000
Occupation Student Daily laborer Unemployed House wife Farmer Merchant Government employee	12(23.1) 1(1.9) 10(19.2) 2(3.8) 20(38.5) 6(11.5) 1(1.9)	12(13.0) 15(16.3) 13(14.1) 5(5.4) 29(31.5) 12(13.0) 6(6.5)	49(19.9) 14(5.7) 22(8.9) 13(5.3) 22(8.9) 56(22.8) 70(28.5)	82.858, 0.000
Residence Rural Urban	36 (69.2) 16(30.8)	48(52.2) 44(47.8)	64(26.0) 182(74.0)	44.390, 0.000
family income per annual less than 500 500–1000 1000–1500 1500–2000 2000 and above	23(44.2) 9(17.3) 8(15.4) 6(11.5) 6(11.5)	23(25.0) 28(30.4) 15(16.3) 4(4.3) 22(23.9)	28(11.4) 26(10.6) 20(8.1) 21(8.5) 151(61.4)	86.580, 0.000
Variables	Number examined (%)	Malaria positive	Malaria negative	χ2, p

Variables	Poor knowledge	Satisfied	Good knowledge	χ2, p
Knowledge level Poor knowledge Satisfied Good knowledge	52(13.3) 92(23.6) 246(63.1)	22(42.3) 8(8.7) 3(1.2)	30(57.7) 84(91.3) 243(98.8)	93.571, 0.000
Attitude level Negative attitude Positive attitude	146(37.4) 244(62.6)	26(17.8) 7(2.9)	120(82.2) 237(97.1)	26.320, 0.000
Practice level Poor practice Good practice	192(49.2) 198(50.8)	31(16.1) 2(1.0)	161(83.9) 196(99.0)	28.831,0.000

Attitude Towards Malaria

From the total respondents, 361(92.5%) agreed to seriousness and threat posed by malaria. The larger proportion 320(82.2%) of the subjects agreed with the statement that malaria is preventable disease. The vast majorities of participants 351 (90%) worried about the presence of mosquitoes. Due to this 382(97.9%) of the study participants agreed to sleep under a mosquito net during the night as a method of preventing oneself from getting malaria. On the other hand, 360(92.3%) of respondents agreed on risk incurred when malaria medicine is not taken properly and completely, however, about 4(1%) and 26(6.4%) of the study participants disagreed and remain neutral to this statement, respectively (Table 5).

The overall attitude was 244(62.6%) of the study participants had positive attitude while 146(37.4%) had negative attitude towards malaria in terms of its seriousness or threat, prevention and control (Table 2).

Table 5
The study participants' response towards attitude questions, Mekaneeyesus hospital, South Gondar, Northwestern Ethiopia, 2018.

Statement	Strongly disagree(1)	Disagree(2)	Undecided (3)	Agree(4)	Strongly agree(5)
	n(%)	n(%)	n(%)	n(%)	n(%)
Blood smear is necessary for malaria diagnosis	7(1.8)	15(3.8)	7(1.8	252(64.6)	109(27.9)
I think the presence of mosquitoes bother you	1(0.3)	17(4.4)	21(5.4)	296(75.9)	55(14.1)
I believe to visit health center/clinic when feel sick	0(0.0)	5(1.3)	3(0.8)	296(75.9)	86(22.1)
Do you think malaria is preventable disease	0(0.0)	6(1.5)	13(3.3)	320(82.2)	51(13.1)
I think malaria is a serious and life-threatening (fatal) disease	1(0.3)	18(4.6)	10(2.6)	255(65.4)	106(27.2)
I believe sleeping under a mosquito net during the night is one way to prevent myself getting malaria	2(0.5)	2(0.5)	4(1.0)	196(50.3)	186(47.7)
I think it is risky when malaria medicine is not taken properly and completely	0(0.0)	4(1.0)	26(6.4)	293(75.1)	67(17.2)

Practice Towards Malaria

Interestingly majority of the study participants 320(82.1%) responded that they always visit health center/clinic when they or their family member gets sick. More than half 216(55.4%) of the study participants reported that they always sleep in an insecticide treated mosquito nets and 170(43.6%) had the habit of checking for holes/repair mosquito nets to prevent the mosquito bite. Nobody (0%) had the practice of constantly draining standing water where anopheles mosquito may breed. Of the total respondents 268(68.7%) reported that they sometimes drain stagnant water or moist areas around their residence. While 248(63.6%) preferred trimming bushes where mosquitoes rest and hide during the daytimes (Table 6).

The study revealed that the majority 325(83.3%) of respondents of had the practice of utilizing bed net while remaining 65 (16.7%) had no the practice of using ITN. Of total number of the study participants who did not use ITN, about1 (0.3%) reported that they lack awareness about the use of ITN. While, majority of them 64(16.7%) reported unavailability in local markets (Fig. 2).

The study participants' overall practice score towards malaria prevention and control was calculated and practice level was determined by comparing one's practice score against the mean practice score. Nearly equal proportion of study participants had good (50.8%) and poor (49.2%) practice toward malaria prevention and control measures (Table 2).

Statistically significant associations were observed between practice level and education status of being uneducated 87(45.3%) with higher distribution and attaining grades 1–8 as compared to the others. The respondent's less than 500 family economic status 57(29.7%) was also significantly associated with practice level ($P < 0.05$) among study participants (Table 7).

Table 6
Participants response to good practice questions related to treatment, prevention and control of malaria, Mekaneeyesus Hospital 2018.

Practice Questions	**Frequency%**		
	Never(0)	Sometimes(1)	Always(2)
How do you describe your habit of visiting health center/clinic when you and any of your family members fall sick?	13(3.3)	57(14.6)	320(82.1)
How often do you sleep in an insecticide treated mosquito net (ITN)?	58(14.9)	116(29.7)	216(55.4)
How do you describe your habit of checking for holes/repair mosquito nets?	40(10.3)	180(46.2)	170(43.6)
All family member sleep under mosquito net	255(65.4)	134(34.4)	1(0.3)
How do you describe your habit of trimming bushes around your home?	139(35.6)	248(63.6)	3(0.8)
How often do you drain stagnant water/moist areas around your home?	122(31.3)	268(68.7)	0(0.0)

Table 7
Multivariate logistic regression analysis of practice level with selected seemingly significant variables, Mekaneeyesus Hospitals, 2018.

Variable	Poor practice (%)	Good practice (%)	Crude OR 95% CI	Adjusted OR 95% CI	P. value
Education status					
Uneducated	87(45.3)	22(11.1)	0.13(0.06, 0.27)	0.10(0.05, 0.21)	0.000*
1–8	30(15.6)	12(6.1)	0.37(0.13, 1.05)	0.23(0.09, 0.58)	0.002*
9–12	24(12.5)	17(8.6)	0.39(0.15, 1.03)	0.42(0.17, 1.06)	0.066
College and above [a]	51(26.6)	147(74.2)	1.00	1.00	
Occupation					
Student	48(25.0)	25(12.6)	0.49(0.15,1.56)	0.44(0.15, 1.25)	0.122
Daily laborer	14(7.3)	16(8.1)	0.94(0.25, 3.55)	0.96(0.27, 3.39)	0.950
Unemployed	29(15.1)	16(8.1)	0.67(0.20, 2.21)	0.57(0.19, 1.70)	0.314
House wife	9(4.7)	11(5.6)	0.87(0.23, 3.30)	1.35(0.37, 4.89)	0.650
Farmer	53(27.6)	18(9.1)	0.51(0.15, 1.72)	0.71(0.22, 2.32)	0.566
Merchant	25(13.0)	49(24.7)	0.73(0.31, 1.75)	0.89(0.39, 2.06)	0.795
Government employee[a]	14(7.3)	63(31.8)	1.41(0.69, 2.87)	1.24(0.63, 2.43)	0.540
			1.00	1.00	
Residence					
Rural	98(51.0)	50(25.3)	1.41(0.69, 2.87)	1.24(0.63, 2.43)	0.540
Urban[a]	94(49.0)	148(74.7)	1.00	1.00	
Family income (in Ethiopian Birr/month)					
less than 500	57(29.7)	17(8.6)	0.23(0.09, 0.57)	0.28(0.11, 0.67)	0.005*
500–1000	45(23.4)	18(9.1)	0.381(0.16, 0.93)	0.44(0.18, 1.05)	0.063
1000–1500	26(13.5)	17(8.6)	0.60(0.23, 1.61)	0.69(0.27, 1.80)	0.452
1500–2000	11(5.7)	20(10.1)	1.36(0.48, 3.86)	1.47(0.54, 4.05)	0.451
2000 and above [a]	53(27.6)	126(63.6)	1.00	1.00	

*Statistically significant at P < 0.05

[a] Reference category

Discussions

In this study malaria infection in individuals having poor knowledge and poor practice were 26.93 and 13.09 times higher, respectively as compared to individuals who are knowledgeable and had good

practice toward malaria. Similar findings were found in the study done by Deressa (2017), but respondent's knowledge about malaria was not statistically significantly associated with malaria risk. However, it is likely to argue that increased level of knowledge on malaria is associated with reduced risk of malaria. People who have a high level of knowledge are in a better position to protect them against malaria. On the other hand level of education status of being uneducated and attaining grades 1–8 was significant predictor of practice level, which is concordant with the findings of the studies in Southern Ethiopia (Fuge et al., 2015).

In the current study that majority 320(82.1%) of respondents had knowledge of malaria transmission and more than three quarter 294(75.4%) of the study subjects implicated anopheles mosquitoes in the transmission of malaria. This observation supports findings of another study conducted in Tanzania, which reported that more than 80% of school children had knowledge on malaria transmission (Sumari et al., 2016). This finding is comparable with the report from the study in Swaziland (Hlongwana et al., 2009), Northwest Tanzania (Mazigo et al., 2010), India (Mahesh et al., 2014), Northern India (Gupta et al., 2016) and Mexico (Rodriguez et al., 2003). This situation is higher compared with that reported by Legesse et al. (2017), which was observed that about three forth (75.1%) of respondents had correct understanding of mode of transmission of malaria,which also corroborate studies in Nigeria in which 74.3% of the study participants has mentioned mosquito bite as mode of malaria transmission (Singh et al., 2014). Contrary to this finding, studies conducted Shashogo District of Ethiopia the knowledge level of respondents about the mode of malaria transmission was very low only 15.6% of the mothers associated mosquitoes with malaria (Fuge et al., 2015) and in Assosa zone, Western Ethiopia less than half (47.5%) of the study participants mentioned mosquito bites as a mode of malaria transmission and thirty percent (30%), of respondents were aware that mosquitoes carry disease causing microorganism (Legesse et al., 2007), which is in agreement with those reported by Aderaw and Gedefaw (2013) in Amhara region, Ethiopia which is 32.3% revealed mosquito bite for transmission of malaria.

The respondent recognition of fever, headache, vomiting and loss of appetite as common symptoms of malaria. This finding were similar with study conducted in Karachi, mentioned that there is fever in malaria 99% and 97% stated that shivering and headache occur in malaria respectively (Bilal et al., 2013). This is also in lined with study conducted in Ethiopia (Legesse et al., 2017; Abate et al., 2013).

Knowledge of mosquito behavior (resting and breeding places and feeding time) is important to take appropriate malaria preventive actions and for the proper use of ITNs. Observations regarding breeding sites of mosquitoes were 265(67.9%), 80(20.5%), 41(10.5%) and 4(1.0%) of the study participants mentioned that stagnant water, tall grass, bushes and running water respectively.The results are consistent with some other studies, which have Knowledge regarding breeding and resting places of mosquitoes in India (Gupta et al., 2016) and in Shashogo District, Southern Ethiopia (Fuge et al., 2015). This is low when compared with the report from the study conducted in Tepi Town, Sheka Zone, Southwestern Ethiopia, most of the community members were aware that the mosquito breeds in stagnant water which is (96.4%) (Haile et al., 2015). This result were higher compared to study reported in

India, 32.7% knew that stagnant water was the most common site of mosquito breeding(Mahesh et al., 2014).

It was also observed that 354(90.8%) participants identified that mosquito bite during night time. This is similar to what was reported in Assosa Zone, Western Ethiopia, mosquitoes' habit of night-time feeding (95%) and 61% were aware that mosquitoes rest at dark places inside the house(Legesse et al., 2007). This result is encouraging when compared to a study conducted by Mahesh et al. (2014), 56.5% knew that the mosquito bite is common during night.

In the present study, 256 (65.6%) and 251(64.4%) of study participants identified correctly that under five children and pregnant women as the most susceptible group of the population to malaria respectively. A high level of awareness was observed in other studies in Ethiopia, most of the community members were aware that under 5 children are more affected (85.1%) followed by pregnant mothers (62.3%) (Haile et al., 2015). These results concur with those reported by Mugao et al. (2014), in Kenya. This is mainly due to the fact that children under five years of age have less developed and weak immunity that makes them more vulnerable to diseases compared to adults and pregnant women have a semi compromised immunity hence high susceptibility to malaria.

With regard to knowledge in intervention measures for indoor prevention and vector control responders that were understood insecticide treated bed net 218(55.9%)as best malaria preventive methods. While only 21.8% of respondents believed that malaria can be prevented using indoor residual spray (IRS) and few of them said fumigation 3(0.8%) can serve as one of the preventive measures. Regarding outdoor vector the presence of stagnant water 265(67.9%) and weeds 334(85.6) should be avoided as means of malaria prevention. It is in lined with report from Myanmar (Oo et al., 2013). It also agreed with the results reported by other studies from Paksong district, Champasack province, Lao PDR, spraying indoor/outdoor anti-mosquito, clear dark corners in the house and the use of bed nets as key malaria Preventive measures (Hlongwana et al., 2009). This is lower when compared with another Ethiopian study, in which 97.55% of respondents agreed on the fact that use of ITN can prevention methods malaria (Tomass et al., 2011).

This study shows that 361(92.5%) agreed to seriousness and threat posed by malaria and 320(82.2%) of the subjects agreed with the statement that malaria is preventable disease, which was comparable with that study conducted in Shewa Robit, Ethiopia, about 90.58% respondents believed that malaria is preventable disease (Abate et al., 2013).

The study revealed that the majority 325(83.3%) of respondents of had the practice of utilizing bed net while remaining 65 (16.7%) had no the practice of using ITN. Of total number of the study participants who did not use ITN, about 0.3% reported that they lack awareness about the use of ITN. While, majority of them 64(16.7%) reported unavailability in local markets. However, nobody reported the expensiveness of ITNs. This result is slightly lower compared to studies in Colombia, most of the study population (> 90%) used an ITN. The perceived benefit of IRS was associated with reduction in mosquitoes and other insects and pests, but only 3% associated it directly with prevention of malaria transmission (Forero et al.,

2014) and Southern Mexico, bed nets were present in 99% households, most of them (76%) were in use all year round and the others during the high mosquito season. However, villagers regarded bed nets as protecting against mosquito bites, and they did not associate them with malaria prevention. Alternative self-protection practices against mosquito bites included using a range of products and methods, from the burning of any material to produce smoke, to the use of mosquito coils (Rodriguez et al., 2003). The difference for this high value compared to our data could be the present study is not a household survey which might have underestimated it. This is in agreement with those reported by Bilal et al. (2013), in Karachi; about 85% were using bed nets; in Swaziland, most people (78%) perceived clinics and vector control practices as central to treating and preventing malaria disease. Indoor residual spraying (IRS) coverage and bed net ownership were 87.2% and 38.8%, respectively (Hlongwana et al., 2009) and in Tanzania, 173 (78%) owned a bed net, and 150 (68%) reported to sleep always under a bed net (Ambrose et al., 2011). These is enraged as compared to results reported by other studies in Ethiopia, 69.9% respondents use beds net from this (65%) were using bed nets still currently, the remaining (35%) reported that they are not lucky to use it now due to lack of access (77%), lack of awareness (8%) and other reason (15%), and 62% drain stagnant water in their surroundings (Haile et al., 2015); Tanzania 68% of the households use ITNs (Sumari et al., 2016) and Nigeria, practices used to prevent mosquito bites, 299 (59.8%) use ITNs, 100 (20.0%) use insecticide sprays, 45 (9.0%) use window/door nets while 32 (6.4%) use repellants (Ezeigbo et al., 2015). Contrarily in other studies the ITNs utilization was poor in the study from Amhara National Regional State, Ethiopia, it was only 26.4% of the study participants that used ITN as malaria prevention and control method (Aderaw and Gedefaw, 2013); (Fuge et al., 2015), only 15.8% of 398 mothers owned at least one ITN. This was due to its unavailability in markets, unsustainable distribution, its being dirty, old, had holes and in some cases lack of awareness on how to install it and its importance to prevent malaria and Myanmar (Oo et al., 2013), among those who did not use ITNs, most common reasons were do not know and do not have ITNs.

Overall knowledge level was 246(63.1%), 92(23.6%) and 52(13.3%) of the study participants had good, satisfactory and poor knowledge about malaria respectively. This is lower when compared with a study from Southern Ethiopia, where 74.3% of respondents had good knowledge while the remaining 25.7% had poor knowledge (Abate et al., 2013). This is encouraging when compared to a study conducted in Champasack Province, Lao PDR, showed that 59.1% of respondents had good knowledge (Thanabouasy et al., 2009). Conversely the results report from other studies from Mumbai, show 39.7% have a low knowledge level and 53.7% obtained an average level and very few have high level of knowledge (Ambadas et al., 2015) .

This study revealed around 244(62.6%) of the study participants had positive attitude while 146(37.4%) had negative attitude towards malaria in terms of its seriousness or threat, prevention and control. This is lower when compared with studies in Karachi, (97%) had good attitude (Bilal et al., 2013) and the study from Amhara National Regional State of Ethiopia, in which 78.1%, 69%, and 47.1% of the study participants were considered as having positive attitude towards malaria prevention, treatment, and good malaria prevention practices, respectively (Aderaw and Gedefaw, 2013).

Result observed in this study nearly equal proportion of study participants had good (50.8%) and poor (49.2%) practice toward malaria prevention and control measures. Similar studies regarding malaria were fairly good in Sri Lanka (Kirkby et al., 2013) and Southern Ethiopia (Fuge et al., 2015). This is lower when compared to studies in Southern Ethiopia, 274 (67.7%) of the study participants had good practice while 131 (32.3%) had poor practice in terms of malaria treatment, prevention and control (Legesse et al., 2017) and the study from Karachi, 59% good practice (Bilal et al., 2013). Conversely, studies from LAO PDR, only 5.7% had good practice (Thanabouasy et al., 2009).

Conclusion And Recommendation

The communities' awareness on means of transmission, its symptoms, cause, when mosquito bites and where it breeds, treatments, ways of prevention and its devastating effects of malaria seems to be good. However, there were still some misconceptions. Individual knowledge, attitude about malaria and prevention practice in this community was relatively good. However, the bed net ownership and utilization of the society is not as high as their knowledge. It is recommended that the local woreda health office, disease prevention and control department as well as community health workers need to strengthen comprehensive public awareness creation on causes, mode of transmission, treatment, prevention and control of malaria. It should focus on improving knowledge and availability of effective malaria control strategies access to early malaria diagnosis prompt treatment before the disease become complicated and participation in the health education in this population. It is recommended to focus on common misconceptions about malaria causes, means of transmission and clinical manifestations through community involvement activities. In these study low sample size population are used. So that other further studies are needed by taking more sample size population.

Declarations

Ethical approval
The study was reviewed and approved by the Ethical Review Board Science College of Bahir Dar University.

Consent for Publication
Not applicable.

Availability of Data and Materials
The datasets used and analyzed during the current study are available (in SPSS code).

Competing interests
The authors declare that they have no competing interests.
Funding
No funding sources.

Authors' Contributions

The Author designed the current study, the overall implementation of data collection, edited, analyzed the data and interpreted the results, and wrote the manuscript. I read and approved the manuscript.

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Figures

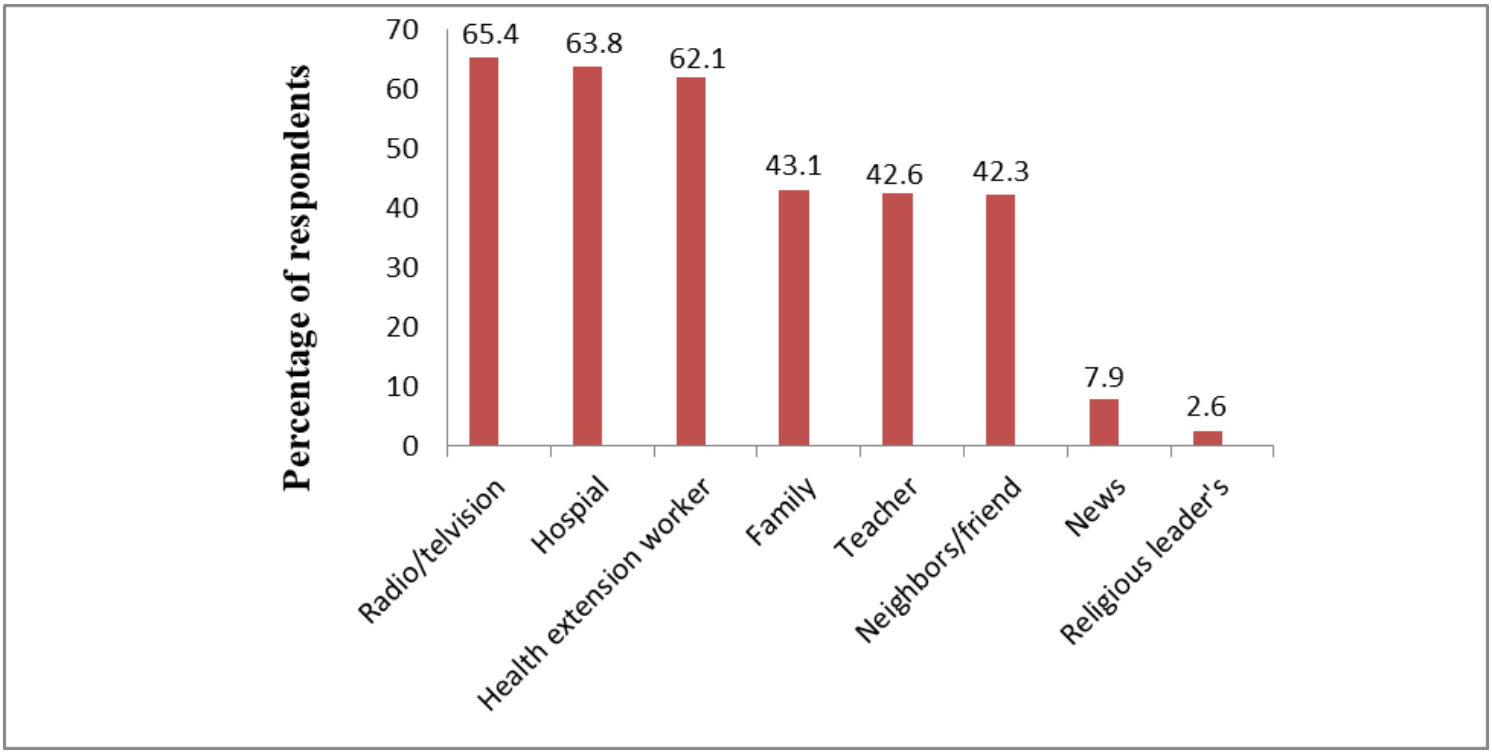

Figure 1

Sources of information about malaria as reported by respondents in Mekaneeyesus hospital, 2018

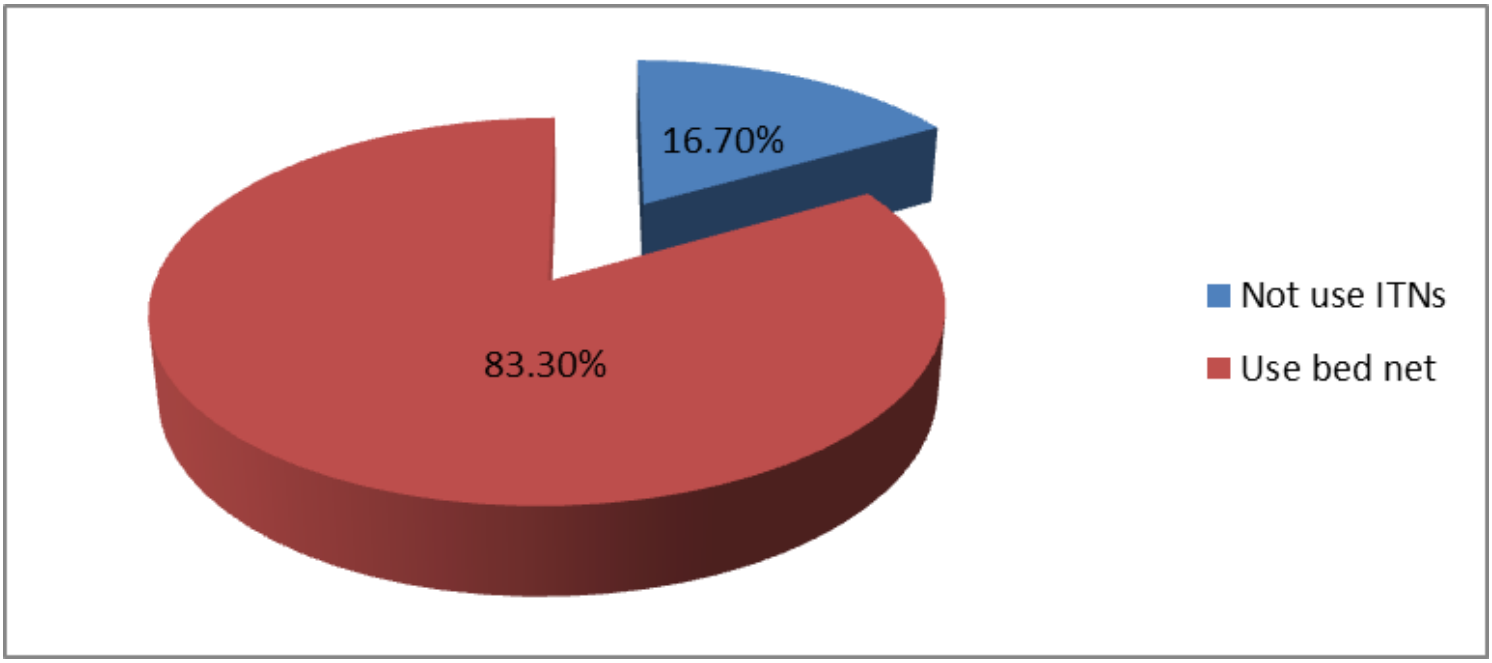

Figure 2

Practice of using ITN among the respondents in Mekaneeyesus Hospital, 2018.