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Original Research Article

Influencing factors among rural households on their awareness level about mosquito borne diseases-a descriptive cross-sectional study from endemic area in Kerala

Thiyagarajan P.*, Piramanayagam N.

Department of Community Medicine, Karuna Medical College, Vilayodi, Chittur, Kerala, India

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***Correspondence:**
Dr. P. Thiyagarajan Palanichamy,
E-mail: drptrajan@gmail.com

ABSTRACT

Background: The global burden of vector borne diseases (VBDs) is 17% of all infectious diseases. Health systems in many tropical and subtropical countries are overwhelmed by outbreaks of dengue, malaria, chikungunya with highest burden among poorest populations. India carries 85% of the global malaria burden. WHO-Global vector control response identified behavioural change need and initiated education to improve public awareness. Malaria, filariasis, chikungunya, JE, dengue is currently endemic in rural Kerala. Main objective of this study was to assess the awareness level in general about the mosquito borne diseases (MBDs) among households from rural field practice areas and to find out its association between influencing factors.
Methods: A descriptive cross-sectional study conducted by household survey in 2019 in Perumatty panchayat of rural Kerala. Participants were interviewed separately. The mixed pattern questionnaire consisted of dichotomized and multiple answer questions with scoring and interpretations to assess the awareness level in general. The final outcome was categorized as good, partial and poor awareness and analysed for frequencies and associations.
Results: More participants were in 31-45 years age group (39.5%) with mean age 43.5±13.6. Only 7% good, 70% partial and 20% poor awareness levels were found. 32.9% participants had completed secondary school. 43.9% belong to middle class family. 75% participants were aware on 'mosquito bite' as mode of transmission. 14.3% aware on all major symptoms. Education, family history, SEC and Knowledge source had significant influence between awareness categories.
Conclusions: Low awareness level on MBDs among the rural population needs proper health education interventions**.**

Keywords: Rural households, Influencing factors, Awareness, Mosquito borne diseases

INTRODUCTION

The global burden of VBDs is 17% of all infectious diseases and accounting for more than 700,000 deaths annually.[1] Since 2014, health systems in many tropical and subtropical countries are overwhelmed by major outbreaks of dengue, malaria, chikungunya, yellow fever and zika and the burden is disproportionately highest among the poorest populations.[1]According to the world malaria report 2019, among 31endemic countries India carries 85% of the global malaria burden. Since, the rate of decline in malaria cases remained static from 2014 to 2018 and trends in IRS protection against MBDs declined from 5% in 2010 to 2% in 2018 globally, WHO has initiated its work with partners to provide education and improve public awareness.[2] The "global vector control response (GVCR) 2017-2030" has identified behavioural change as the crucial element in reducing the burden of vector-borne diseases.[2] Since BCC and actual community involvement is completely depends on awareness and attitude towards MBDs, assessing the level of awareness among population place crucial role in implementing the

strategies**.** Malaria, filariasis, chikungunya, JE, dengue is currently endemic in Kerala. Kodumbu, Koduvayur, Nanniyode, Nalleppilly, Vannamada like villages/towns among the field practice areas are 'the hotspots of dengue fever' in Palakkad district of Kerala. The common cause of dengue fever in these areas were identified such as 'water storage practices' in Koduvayur and Nanniyode and 'scrap collection centres and tyre storage' in Nalleppilly.[3] Hence this study aimed to assess the awareness level in general about the MBDs among households from rural field practice areas.

METHODS

Study setting

This descriptive cross-sectional study was carried out in Perumatty panchayat in Chittur Taluka of Palakkad district in Kerala in the period of Feb. 2019 to May 2019. Perumatty panchayat unit in Chittur Taluk of Palakkad district in Kerala constitutes total population of 8150 (males 3976; females 4174) in 1967 households.[4] Malaria is holo-endemic in these areas of Palakkad district with most transmission and disease occurring during June to October months.[3]

Sample size calculation

The literature review showed 15% to 27% of rural households have adequate knowledge on prevention of vector borne diseases[3]. Taking these prevalence into account we decided to go for household survey. For this we have taken the average of above-mentioned prevalence i.e., 21% and used in the formula

$$N=(Z_{(1-\alpha)})^2 (pq)/L^2$$

for sample size calculation. With the set 95% CI, 5% level of precision the sample size arrived was 254 households. Taking into account of the average family size 3.7 in Kerala, as per 2011 census,[5,6] the final total sample size was expected would be around 940 individual study participants which will cover well the design effect value of criteria 1.5.

Sampling technique

The population of our study area Perumatty panchayat are mostly agrarian community dwelling in scattered pattern with as many as 36 clusters of households around the river banks and farms. Our operational definition for 'village' was set as clustering of minimum 10 households and merging of few very much scattered household clusters done. After merger there were 31 villages identified. The households in each defined village were numbered and included in the sampling frame. If a compound contains more than 1 household or polygamous family each was included separately in the list for household selection with the help of the Sarpanch, the head of the Panchayat raaj. 254 households were selected from all the defined villages by applying simple random sampling technique with probability proportion to the size of the village (Figure 1).

Inclusion criteria

Inclusion criteria included only those households that had existed in that area for more than 6 months were included and only those individuals having normal cognitive and communication abilities were included.

Exclusion criteria

Those households not residing more than 6 months and those critically ill or bedridden people not able to communicate normally were excluded.

Data collection method

The study was started after ethical clearance from the IEC. After obtaining informed consent from each participant were interviewed separately by the trained investigators. The pre-designed, semi-structured, pre-tested questionnaire constituted basic socio-demographic characters and 2 non-scoring questions and a set of 10 scoring questions to assess the awareness on MBDs. Many reasons (e.g.: refusal, conflict with leader, locked for prolonged period) prevented our team from visiting a household that was selected during the sampling procedure. In this case, the investigators visited the next random household according to the sampling procedure that was used without replacing these household. If a participant is not available during the first visit, they were contacted through their mobile phone contact and interviewed. To classify the socio-economic status of the participants modified BG Prasad's scale version 2017 was used with per capita income criteria.

Scoring and interpretation

Among the scoring questions, the dichotomized items (1, 6, 9, 10) had only two scores i.e., 1 and 0 as maximum and minimum respectively. The others (2, 3, 4, 5, 7, 8) had scores 0, 0.75, 0.50, 0.25 and 1 based on the weightage given to the answering options. For example, in qn. 2 about the symptoms of MBDs the expected answers as MCQs are fever with chills/rigors, rash/petechiae, joint pain/body pain, malaise/generalized tiredness. The participants saying all the symptoms they score 1, participants saying fever and rash they score. 0.75, the participants saying joint pain body pain score. 5, those who say only tiredness or malaise or loss of appetite score only 0.25 and finally if participants say don't know/or vague symptoms not related to the above weighted answers score 0. Similarly, the weighted options to secure full score for qn. 3 minimum five breeding places around the house, for qn. 4 all integrated vector control measures, for qn. 5 all the personal protective measures and for qn. 8 creating awareness through media, town planning infrastructure facility development and

providing ITNs in endemic areas were all expected as answers of full score. At the end, all the scores were computed to a score out of maximum 10. The participant scored 7.1 to 10 were considered of having 'good' level of awareness, those who score 4.1 to 7.0 were considered of having 'partial' awareness and those who score ≤4 was categorized to 'poor' awareness group.

Statistical analysis

The collected data were entered in the Excel worksheet and mean scores calculated. Frequency distributions were analysed for basic characteristics of the study participants and Chi square test with Fischer's exact was used to test the presence and significance of association between the awareness levels and basic characteristics of the study participants using SPSS vs 21 (IBM, Illinois) software.

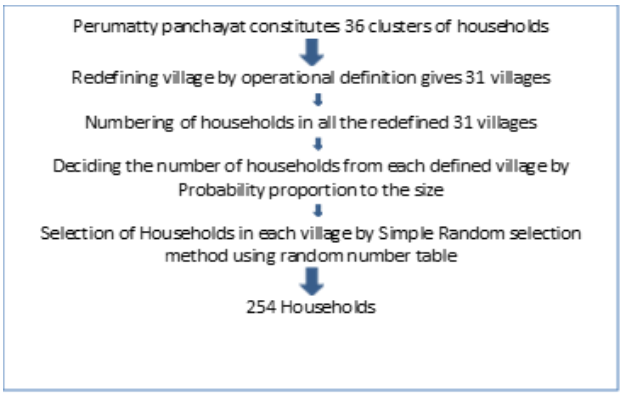

Figure 1: Schematic representing selection of households.

RESULTS

Out of 254 households aimed in the sample we could complete 251 households with 810 participants in our study. The overall non-response rate was 14% among study participants. There were 479 males (59.1%) and 331 females (40.9%). More participants were in 31-45 years age group (320 i.e., 39.5%) with mean age 43.5±13.6 (For males 43.3±13.3; for females 43.8±14.0). More number of participants have completed secondary school (267 i.e., 32.9%) followed by degree or professional level education (226 i.e., 27.9%). Majority of the participants (356 i.e., 43.9%) belong to middle class family. Table 1 shows the basic characteristics of study participants.

Table 2 highlights the frequency of participants' scores to awareness assessment questions with the mean score. Among all, around 75% (613) of participants were aware about mosquito bite as mode of transmission. Majority (78%) participants could not answer all the major symptoms of MBDs and main breeding sites in and around the house. About 43% (345) and 77% (621) of participants secured partial score on awareness about prevention measures against mosquito breeding and mosquito biting respectively. More than 80% (658) participants were aware that MBDs can be fatal at times and around 70% (563) knew complete treatment available only at the facilities practicing modern medicine. Forty eight percent participants expressed awareness on government measures to prevent/control MBDs and free of cost availability of ITNs in endemic areas. Around 34% participants (272) were aware on vaccine against some MBDs.

After final scores made the awareness about MBDs was good among 7% (56) participants only. In the remaining 754 participants 591 (70%) had partial awareness and 163 (20%) had poor awareness (Figure 2). Majority of the participants admitted that the source of knowledge for their awareness on MBDs as social media (59%) (Figure 3). On the question of their preferred source of knowledge to keep up or to improve majority participants opted for media sources (71.7%) (Figure 4). Around 20% (159) participants admitted of family history of suffering from MBDs (Figure 5).

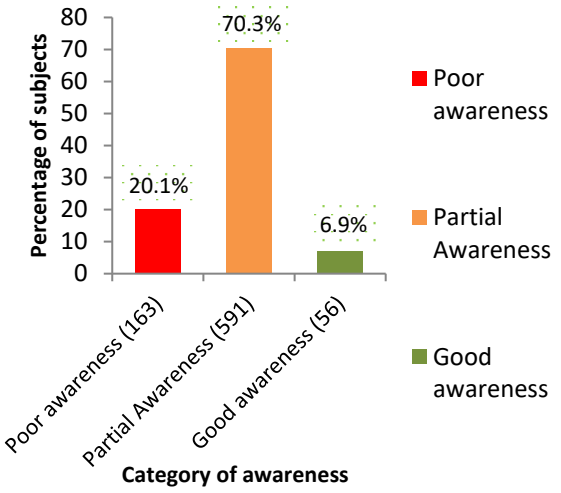

Figure 2: Awareness level about MBDs among the study participants (n=180).

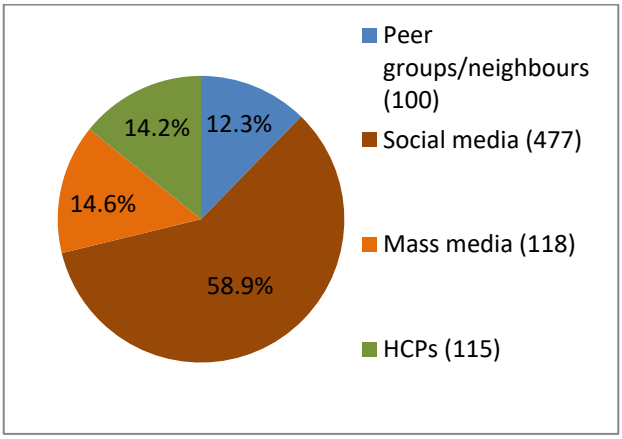

Figure 3: Frequency related to the source of knowledge on existing awareness level about MBDs among study participants (n=180).

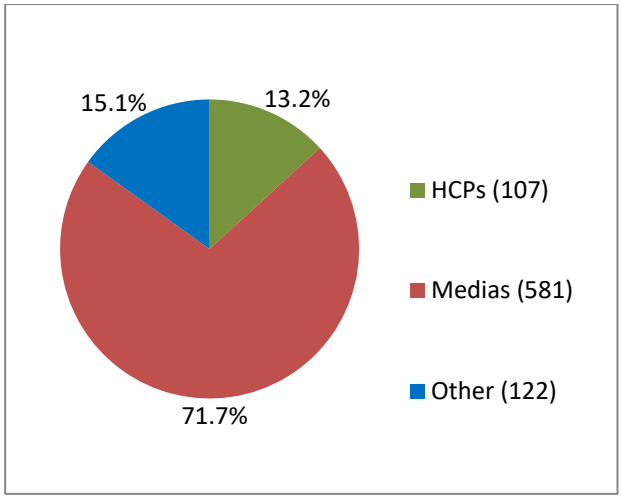

Figure 4: Frequency related to the preferred source of knowledge to keep up or to improve the awareness level about MBDs (n=180).

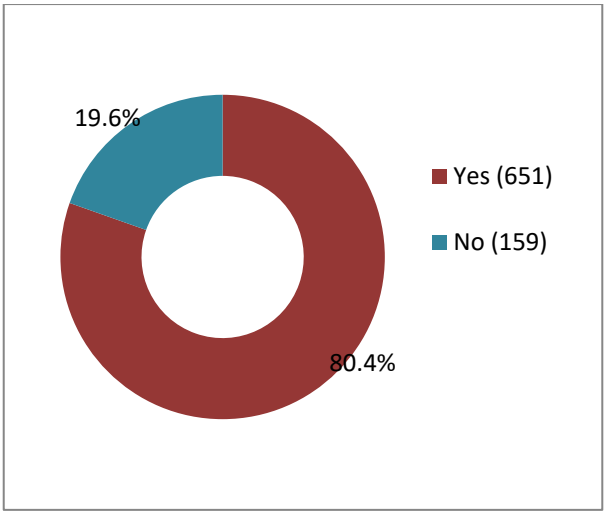

Figure 5: Frequency related to the history of MBDs among family members (n=180).

Table 1: Sex wise frequency distribution of study participants according to their basic characteristics (n=810) (males-479; females-331).

Characteristics	Sub-category	Males (%†)	Females (%†)	Total
Age group (year)	≤30	89 (10.9)	65 (8.0)	154 (19.0)
	31-45	200 (24.7)	120 (14.8)	320 (39.5)
	46-60	150 (18.5)	112 (13.8)	262 (32.3)
	>60	40 (4.9)	34 (4.2)	74 (9.1)
Education level	Illiterate	07 (0.9)	07 (0.9)	14 (1.8)
	Primary	86 (10.6)	76 (9.4)	162 (20.0)
	Secondary	158 (19.5)	109 (13.4)	267 (32.9)
	HS/technical certificate	81 (10.0)	60 (7.4)	141 (17.4)
	Degree/professional	147 (18.1)	79 (9.8)	226 (27.9)
Economic status of family	Lower	65 (8.0)	99 (12.2)	164 (20.2)
	Middle	216 (26.6)	140 (17.3)	356 (43.9)
	Upper	198 (24.4)	92 (11.4)	290 (35.8)

HS-Higher secondary; †Percentage in total

Table 2: Distribution of study participants by their scores to awareness assessment questions.

Questions	Frequency of component score for answers (%)					Mean score
	0	1	0.75	0.50	0.25	
How malaria, dengue like diseases occur in man?	197 (24.3)	613 (75.7)	NA	NA	NA	NA
Do you know what are the common symptoms of mosquito borne diseases?	635 (78.4)	116 (14.3)	-	38 (4.7)	21 (2.6)	0.17
Do you know what are the sites around the house mosquitos breed?	635 (78.4)	114 (14.1)	-	36 (4.4)	25 (3.1)	0.17
Do you know what are the common measures to prevent mosquito breeding?	190 (23.5)	37 (4.6)	46 (5.7)	345 (42.6)	192 (23.7)	0.36
Do you know what are the common measures to prevent mosquito biting?	136 (16.8)	40 (4.9)	-	621 (76.7)	13 (1.6)	0.44
Do you know that the mosquito borne diseases are fatal if not treated properly?	152 (18.8)	658 (81.2)	NA	NA	NA	NA
Do you know where complete treatment available for mosquito borne diseases?	241 (29.7)	563 (69.5)	-	06 (0.7)	-	0.77
Do you know the measures taken by the government to prevent/control MBDs?	390 (48.1)	392 (48.4)	07 (0.9)	21 (2.6)	-	0.50

Continued.

Questions	Frequency of component score for answers (%)					Mean score
	0	1	0.75	0.50	0.25	
Do you know insecticide treated nets available in free of cost from government?	549 (67.8)	261 (32.2)	NA	NA	NA	NA
Do you know some of the mosquito borne diseases have vaccine against them?	538 (66.4)	272 (33.6)	NA	NA	NA	NA

NA- not applicable

Table 3: Characters of study population and its statistical association on awareness level.

Character		Awareness category			χ^2 value	P value
		Poor (%)	Partial (%)	Good (%)		
Age (year)	≤30	16 (10.4)	105 (68.2)	33 (21.4)	6.790	0.341
	31-45	23 (7.2)	240 (75.0)	57 (17.8)		
	46-60	14 (5.3)	190 (72.5)	58 (22.1)		
	>60	03 (4.1)	56 (75.7)	15 (20.3)		
Sex	Male	86 (18.0)	364 (76.0)	29 (6.1)	5.467	0.065
	Female	77 (23.3)	227 (68.6)	27 (8.2)		
Education	Illiterate	00 (0.0)	10 (71.4)	4 (28.6)	40.129	0.000
	Primary	7 (4.3)	102 (63.0)	53 (32.7)		
	Secondary	12 (4.5)	203 (76.0)	52 (19.5)		
	HS/tech.	11 (7.8)	99 (70.2)	31 (22.0)		
	Deg/prof.	26 (11.5)	177 (78.3)	23 (10.2)		
SEC	Lower	4 (2.4)	117 (71.3)	43 (26.2)	19.639	0.001
	Middle	27 (7.6)	247 (69.4)	82 (23.0)		
	Upper	38 (13.)	227 (78.3)	25 (8.6)		
H/o MBDs in family	No	31 (19.5)	110 (69.2)	18 (11.3)	5.984	0.050
	Yes	132 (20.3)	481 (73.9)	38 (5.8)		
Source of existing knowledge	Peers/neighbour	15 (15.0)	70 (70.0)	15 (15.0)	28.195	0.000
	Social media	91 (19.1)	369 (77.4)	17 (3.6)		
	Mass media	28 (23.7)	78 (66.1)	12 (10.2)		
	HCP	29 (25.2)	74 (64.3)	12 (10.4)		
Preferred source of knowledge	HCP	15 (14.0)	76 (71.0)	15 (14.0)	22.010	0.000
	Media	115 (19.8)	439 (75.6)	27 (4.6)		
	Others	32 (26.2)	76 (62.3)	14 (11.5)		

HS-Higher Secondary; tech-Techical course; Deg-Degree; prof-Professional; SEC- socio-economic class; HCP-Health care personnel. P value ≤0.05 is statistically significant.

Education level (χ^2 value-40.129; p value-0.000), socio-economic class (SEC) (χ^2 value-19.639; p value-0.001), history of persons suffering by MBDs (χ^2 value-5.984; p value-0.050), source of knowledge for existing awareness level (χ^2 value-28.195; p value-0.000) and preferred source of knowledge (χ^2 value-22.010; p value-0.000) all were having statistically significant association with the level of awareness about MBDs among the study participants (Table 3).

DISCUSSION

In this cross-sectional study, the good level of awareness, in general, about MBDs was found only among 7% (56) participants compared to the 70% of partial awareness. Since many studies in this subject have discussed their results on the individual components of knowledge and practices of VBD prevention assessment, the awareness levels in general, including almost all the components, found out by our study among endemic rural population is unique and the final outcome is not comparable.

Our finding of around 75% of participants were aware that the 'mosquito bite' as mode of transmission for malaria, dengue like diseases is similar to the finding by Bellad et al that 67% of their participants were aware that mosquitoes transmit diseases in their study in a rural setting.[7] Our finding related to this aspect is in way between the findings by Snehalatha et al where only 27% of the rural respondents are aware that mosquitoes transmit diseases and were able to name at least one mosquito-borne disease in a rural urban comparison study and the findings by Nanjesh Kumar and Sahoo et al where 89.5 and 97.9% awareness respectively among their study populations about transmission of malaria by mosquito in 2017.[8-10] There are also reports by Moore et al stating 37.5% of men linking mosquitoes with malaria in a border malaria setting and Mainali et al stating majority of residents living near a mosquito breeding natural habitat were aware of mosquito-borne diseases and its risk in their local area.[11,12] Sreedevi et al have reported from their rural field practice a pre-intervention level of only 32% awareness on diseases spread by

mosquitoes had improved to 93% post health education intervention.[13]

In our study majority (78%) participants could not answer the all-major symptoms of MBDs and main breeding sites around the house. This is considerably lower, as a finding from an endemic area, when compared to 100% awareness regarding major signs and symptoms of malaria reported by Sahoo et al.[10] Our findings can also be compared with findings from similar setting by Bellad et al where fever, headache, and body ache were known as major symptoms of mosquito-borne diseases to only 20.27% and 27.5% did not know any of them.[7] But in an another study in similar setting Nanjesh Kumar et al study reports that fever and rigor were known as most common symptoms to 84.5% of their study population.[9] Securing only partial score on awareness about prevention measures against mosquito breeding and mosquito biting by 43% and 77% participants respectively in our study is well supported by the study finding of Mainali et al where they also found only 50% of residents reported using personal protective measures to reduce mosquito bites and because of 60% of respondents believed that mosquito control was "a job for the council and the state government", rather than for individual householders only one in six residents undertook physical or chemical mosquito control around their home.[12] Nanjesh Kumar et al also have reported 65% of their study participants used mosquito coil as a protective measure and 48.5% said that the health authorities had not conducted active surveillance.[9] In another study by Anand et al reports that nearly one-fifth (20%) of the participants reported incorrect breeding sites for mosquitoes and even though the knowledge was 93% with 90% families using at least one of the PPMs the correctly and adequately methods of using PPMs were merely 1.1% and 5.6% respectively.[14]

Our findings of 80% participants were aware that MBDs can be fatal at times is supported by the finding reported by Sahoo et al stating 95.6% of the population had awareness that malaria is fatal if untreated but also think that dengue is more fatal.[10] The finding in our study of around 70% participants knowing the availability of complete treatment only at the facilities practicing modern medicine reflects the view of these rural participants about the seriousness of MBDs. In relation to endemic setting our finding of around 52% participants being not aware on government measures to prevent/control MBDs and free of cost availability of ITNs is a notable one. A fair thirty-four percentage knowing about vaccine against MBDs (E.g.: Dengvax) is a finding in our study that indirectly reflects the influence of educational attainment level beyond secondary school on the awareness about MBDs.

The findings in our study such as 73.5% (58.9% TV, radio like mass medias and 14.6% social media) participants stating media as the source of knowledge comparing to only 14.2% from health care personals are contrasting the findings by Bellad et al where the major sources of information for their participants had been first health personnel and hospitals (35.27%) followed by relatives/friends (25.55%) and last the media (9.44%).[7] Also, majority participants in our study (71.7%) have opted for media sources only as their preferred source of knowledge to keep up or to improve their current awareness level on MBDs compare to only 13.2% from health care personals. These finding highlights the influence and the need of media sources in in disseminating the public health messages about MBDs. The finding, in our study, of 20% participants having family history of suffering from any of the MBDs from this dengue prevalent rural setting is well supported by the report by Sahoo et al where they had been 15.92% households had family members suffered from dengue with majority (91.38%) had history malaria and 2.34% sufferings from chikungunya.

In our study we could find better awareness with increase in education level (χ^2 value- 40.129; p value-0.000), increase in SEC (χ^2 value-19.639; p value-0.001), history of suffering by MBDs (χ^2 value-5.984; p value-0.050), source of knowledge (χ^2 value-28.195; p value-0.000) and preferred source of knowledge (χ^2 value-22.010; p value-0.000) with statistically significant association with the level of awareness on MBDs among the study participants. These findings are supported by the findings of the study by Sahoo et al where they have also found age, sex, caste, education and social class were having significant association with satisfactory level of awareness in their study. A study by Moore et al among non-Han-Chinese groups in rural China has reported that the use of bed nets, synthetic repellents and mosquito coils was significantly more frequent among those with higher income, more years of education and permanent housing.[11] In this regard Mulla et al have already reported from their study in 2001 that the most preferred products used by the poor is mosquito coils and for most of the residents the proportion of their income spent on mosquito control activities was proportionally greater compared to the average cost of organized mosquito control in the developed countries.[15]

Limitations

Ours is a descriptive cross-sectional study. Whereas we need to do a longitudinal study in the future covering the pre-monsoon, monsoon and post-monsoon months in these endemic settings to evaluate the attitude and practice on control and prevention of MBDs with risk analysis for better interpretations.

CONCLUSION

From our study it is concluded hereby that the awareness level, in general, on mosquito borne diseases among the rural endemic area population is mostly partial and the level of education, class of economy, suffering happened and the sources of knowledge have influencing effect on the prevailing knowledge.

Recommendations

We strongly recommend increasing the health education and attitude developing activities, through both governmental and non-governmental agencies with participatory rural appraisal on awareness and integrated vector control measures among the rural population with periodic evaluation and reinforcement of the same at least once in a year.

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