A Study on Knowledge, Attitude and Practice about Malaria Awareness and Bed Net Use

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Abstracts

The purpose of the KAP Study was to determine the community perceptions in terms of malaria cause, prevention and treatment, and also to find out the extent of bed net use and the factors associated with the net use.

The study was carried out in two malaria hyper-endemic districts of Sarpang and Samdrup Jongkhar covering four rural areas and two urban areas with 250 households and 1415 members.

92% of the household members sleep under a mosquito net. 87% of the nets are treated with insecticides. And 35.6% of the respondent had encountered some problem in using the treated nets, primarily as skin irritation. A total of 81 persons (5.7%) were diagnosed and treated for malaria in 2001. On an average 19.6% of the households had at least one member who had malaria in the past 12 months. The gewogs of Chuzagang and Bangtar had one third of their households with at least one member contracting malaria. Farmers and household with more than 6 members had more than two times the risk of having a household with malaria compared with other variables. Also households where they know malaria can be dangerous, if they are sure neighbour had malaria and using preventive measure other than nets then the risk of getting malaria is comparatively high. Probably this indicates that people must be living in high incidence areas except from usage

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other than nets. The results are also significant when tested in a multivariate statistical model.

35.6% of the respondents had encountered some problem in using the treated nets, primarily as skin irritation. This survey points that it should be possible to reduce side effects substantially in Bhutan too. This may be very critical to the program if it means that people will stop using nets because of the side effects.

It is suggested that awareness and prevention should be more differentiated on how to protect, and when to protect at all places.

It should be considered whether delay plays an important role for malaria morbidity and mortality in Bhutan, and if more efficient measures could be implemented to prevent mortality and severe morbidity especially in localities where falciparium incidences are increasing.

Background

Malaria is an age-old problem for the Bhutanese community and the cause many felt was because of intensive heat. Even today, many of our people do not know that the malaria is caused by the infected mosquito bites. To mitigate the malarial deaths a survey was conducted which resulted in the establishment of the National Malaria Eradication Program (NMEP) in 1964. NMEP was later renamed as National Malaria Control Program (NMCP) on realization that malaria cannot be eradicated.

Malaria is a public health problem with the Annual Parasitic Incidence (API) ranging between 66.2 to 19.9 per thousand over the five-year period from 1995 to 1999. What is more alarming is the rising trend of *Plasmodium falciparum* from 1998 onwards. This parasite *falciparium* is the most fatal malarial parasite known so far. Also the latest genetic analysis of the largest survey carried so far on *Plasmodium falciparium* lends weight to the argument that the parasite is

worryingly adaptable to anti-malarial efforts. This is of a major concern, as malarial treatment in the coming years might increasingly become more complex. And the fact that more than half of the country's population is at varying risk of malaria also justifies the National Malaria Program (NMCP) to develop preventive strategy. The preventive strategy is how to inform, educate and communicate (IEC) on the disease awareness. Little is known if this strategy had worked in the past. But there has been substantial reduction of malaria morbidity and mortality since 1995. With the inception of 9th Five Year Plan where Health Department is gearing towards quality assurance and standardization of health services, it is time to reassess, evaluate and also to consolidate the achievements made thus far. This will also help to understand the problems and seek for appropriate and cost effective solutions. This calls for an assessment to be carried out. Therefore this study is not only timely but a necessity in the wake of scarce resources.

Methods

The study was carried out in two malaria hyper-endemic districts of Sarpang and Samdrup Jongkhar covering four rural areas and two urban areas. The district and the blocks were chosen randomly. The rural areas covered 200 households while urban covered 50 households. This is a cross sectional study and the unit of enumeration is household.

The households were selected using the systematic skip interval with replacement. The first household was chosen using the simple random number table. For urban centers where complete household listing was not available, blocks (5-10 households) were formed. Using the same procedure as above blocks and households were then selected for enumeration respectively.

Concurrent to this survey (1st May 2002-20th May 2002), anemia survey was also taking place. Both the survey needed malaria technician. Therefore the need to have malaria

technician as survey enumerators could not be realised. So the lab data (blood sample for malaria test) proposed in the study protocol could not be carried out.

The quantitative data were collected through structured questionnaire interview by the enumerators who were mostly health personnel trained for two days (29th & 30th April 2002). The qualitative data was collected using Focus Group Discussion. In total four FGDs were conducted; two each in urban and rural. The discussion was conducted in local dialect by the team coordinator.

Data entry, data cleaning and data analysis was done using Epi Info 6, SPSS, Statistix and SAS.

Results

The survey covered a total of 250 households with 1415 members. The respondents preferably were the head of the households and the most appropriate substitutes were made where the head of the households were not available. 67% of the respondents were male with significantly higher male prevalence in the two urban centers (82% versus 62%, p=0.01).

The mean age of the respondents were 42.9 years. The head of the households were older in Orong and Bangtar compared to the rest of the gewogs. The average size of the households was 5.7 persons. Almost three quarters of the respondents were farmers. People working in government and business were mainly located in the two urban centers.

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from the date of survey. The gewogs of Chuzagang and Bangtar had the highest prevalence of malaria (see figure 1). About one third of the households in these two gewogs had at least one member contracting malaria during the same year (see figure 2).

Figure 1: Annual prevalence of household members with malaria in 2001.

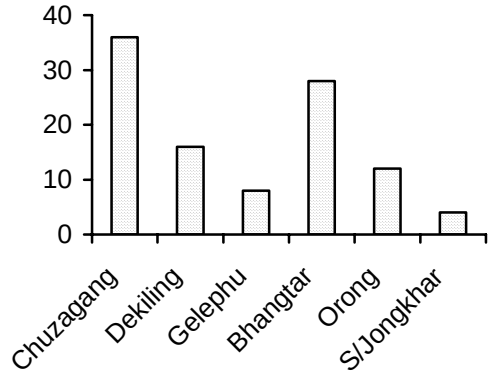
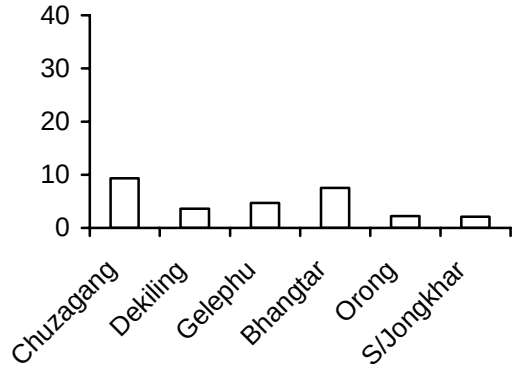


Figure 2**:** Prevalence of households with at least one member who had malaria in 2001



a) Relation between background variables and malaria

The relation between a household where there had been at least one case of malaria in the preceding twelve months and a set of explanatory variables are shown in table 1. The farmers have 1.8 times higher risk of getting malaria compared to other occupation. Odds ratio is equivalent to risk ratio. (OR 2=double risk, 1=equal risk, 0.5=half risk and so on)

Table 1. Variables having significant co-relation with household experiencing at least one malaria case in preceding 12months

Variable	Odds Ratio (OR)	U-CL	L-CL	p-value
Farmer vs. other jobs	2.8	1.2	6.6	0.018
Household > 6 persons	2.2	1.1	4.3	0.015

There are no bi-variate relation between age and gender of the respondents and the prevalence of malaria.

b) Relation between knowledge and causes of malaria

Three quarters of the respondents correctly believed that malaria was caused by mosquito bites. But there was no difference in malaria prevalence compared with those who did not relate malaria to mosquitoes (OR=1.1). Not knowing the cause of malaria at all, were also not associated with malaria prevalence. Most people were aware of the symptoms of malaria, and almost everyone would contact the modern health care facility because they think they can cure the disease.

c) Relation between prevention and malaria

23.6% of the households additionally used other than net to protect themselves from malaria. And they have a lower prevalence of malaria compared with people not using any preventive measures. From table 2 we observe that knowledge about the severity of malaria and if at least one member of a neighbour household had malaria is positively associated with the prevalence of malaria.

Table 2. Household experiencing at least one malaria case in the past 12 months dependent on knowledge attitude and behaviour.

Variable	**OR**	**U-CL**	**L-CL**	**p-value**
Fully agree that you can die from malaria vs. less/not agree	2.4	1.2	5.1	0.01
Sure that at least one neighbour household had malaria last year	4.8	2.3	9.9	<0.001
Using other things than nets: coil, fire, smoke	0.4	0.1	0.9	0.02

Only 168 households were able to tell when they were last informed on how to protect themselves from malaria. 47 of these were informed more than one year prior to the survey. However, there are no association between time of information and prevalence of malaria. Likewise, there is no statistical association between malaria prevalence and if the surveyors found that the household actually applied with the recommendations or not.

d) Bed-net use and malaria

Since more than 90% of the household members were using nets, there are limited possibilities to contrast net usage and malaria. The prevalence of malaria is not related to using bed nets in the household (OR=0.9).

There was no association between malaria prevalence and whether the nets were treated more than two months ago or recently. Many had irritation of the skin, especially in the face and on the hands, but irritation is not related to a higher prevalence of malaria.

The overall picture of the influence of factors on the prevalence of malaria is shown in figure 3 below. The odds ratios are transformed to a risk scale where positive and negative factors have the same scale, and 0 means the factor has no influence on the outcome. Now a preventive influence

is shown to the left of the no effect line, and risk factors with negative influence are shown to the right.

Figure 3

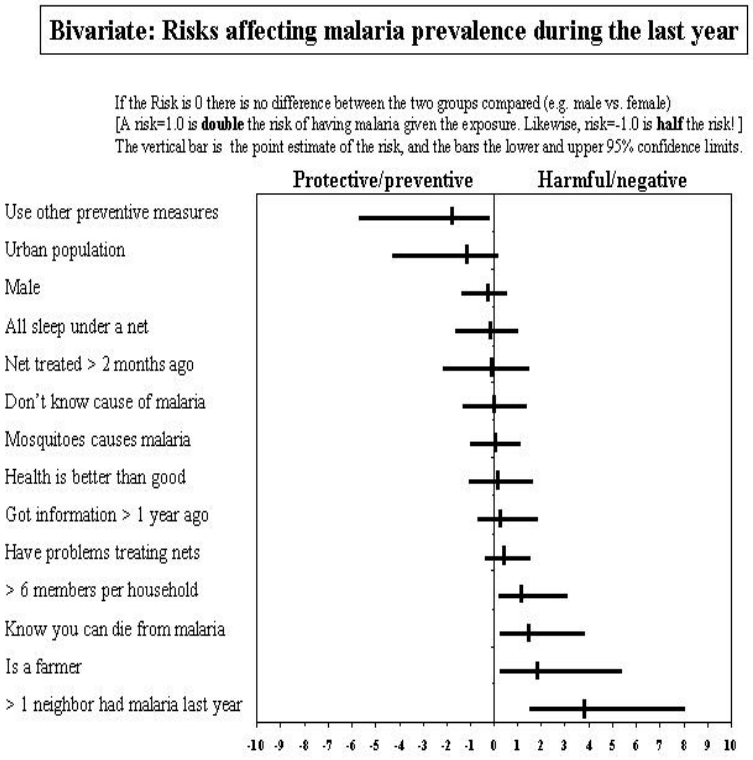
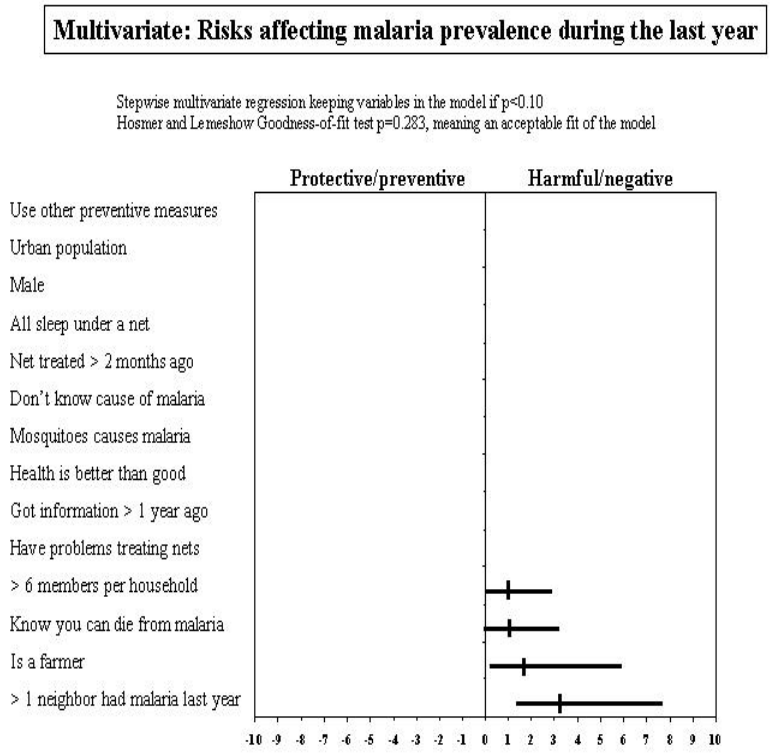


Figure 4



To find out how these factors might influence the 12 months malaria prevalence, a multivariate logistic regression was performed. The full model included all the factors from the figure above. The factors that did not influence the outcome were eliminated from the model (stepwise elimination). The final model is the ones that are statistically significant.

The factors with a $p<0.1$ stays in the model. Only four factors (household with members more than 6, know you can die from malaria, farmer, knows at least one neighbour had malaria last year) stayed in the model (see figure 4). The

parameter estimates and confidence limits are shown in the figure.

In conclusion the most important factor predicting if family members have had malaria was if at least one member in one of the neighbouring households had malaria. Farmers were more often in a risk of getting malaria. Factors like net use, problems with insecticide treatment of nets, gender, age, had no influence on the 12 months malaria prevalence. The majority were using preventive precautions and the few who didn't were not enough to show any effect on the incidence of malaria. One third had problems with treated nets. Is it because people are not applying the insecticide correctly? Or is it because of insecticide itself?? It should be considered to repeat this survey to get information on other preventive measures, and to follow the development of malaria.

Discussion

One third of the respondents got skin irritation using synthetic pyrethroid (deltamethrin) treated nets. Similar side effects have also been reported where pyrethroid (deltamethrin) was used to treat bed sheets and blankets thereby directly coming in contact with the skin. So pyrethroid (deltamethrin) is actually skin irritating in practice. Bioassay results showed that deltramethrin is better to kill anopheles mosquitoes with an effect of 99.7 to 100% while other insecticides showed a lower efficacy from 80-89%. Field trials conducted in Kenya and Ghana using pyrethroid treated nets showed reduction in child mortality by one sixth in Ghana and by one third in Kenya. Therefore we know that pyrethroid are the most effective impregnation protecting from mosquito bites. However a low rate of side effects were found if nets were initially treated with the high dose of deltramethrin, followed by more frequent but lower dosage and the efficiency was found to be same. An explanation to the problem of skin irritation may be that people are not following the optimal treatment requirement with insecticides. This survey points that it should be possible to reduce side effects substantially in Bhutan too. This may be very critical

to the program if it means that people will stop using nets because of the side effects. Therefore there is a need to find out if nets can be treated with pyrethroid in a way where there are fewer side effects.

The net usage is high in Bhutan and non-compliance was not associated with increased malaria prevalence since malaria is also contracted when not covered by a net. Therefore other exposures must also be considered in the preventive strategy design. This survey actually points at the structure of houses as a cause for being exposed to mosquitoes since majority (97%) has had major crevices. Studies in northern Malawi have shown that children living in improved housing were 44% less likely to have respiratory, gastrointestinal or malaria. It is suggested that awareness and prevention should be more differentiated on how to protect, and when to protect at all places.

The problem with the increased incidence of *Plasmodiun falciparium* is that it is much more severe with faster effect and is clearly the most fatal one. This means people should be aware of early treatment especially when severe symptoms appear. A study carried out in the region also points that most falciparium death are encountered where there is delay in clinical diagnosis and pre-hospital phase. People should be made aware on the needs of early treatment especially for places where falciparium incidences are increasing. Therefore it should be considered whether delay plays an important role for malaria morbidity and mortality in Bhutan. And if more efficient measures could be implemented to prevent mortality and severe morbidity especially in localities where falciparium incidences are increasing.

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