

## Abstract

A cross-sectional survey was conducted to assess the level of knowledge, attitude and practices concerning dengue and its vector *Aedes* mosquito among selected rural communities in the Kuala Kangsar district from 16 - 25th June, 2002. It was found that the knowledge of the community was good. Out of the 200 respondents, 82.0% cited that their main source of information on dengue was from television / radio. The respondents' attitude was found to be good and most of them were supportive of *Aedes* control measures. There is a significant association found between knowledge of dengue and attitude towards *Aedes* control ( $p = 0.047$ ). It was also found that good knowledge does not necessarily lead to good practice. This is most likely due to certain practices like water storage for domestic use, which is deeply ingrained in the community. Mass media is an important means of conveying health messages to the public even among the rural population, thus research and development of educational strategies designed to improve behaviour and practice of effective control measures among the villagers are recommended. *Asia Pac J Public Health* 2003; 15(1): 37-43.

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# A Knowledge, Attitude and Practices (KAP) Study on Dengue among Selected Rural Communities in the Kuala Kangsar District

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## Introduction

Dengue fever (DEN) is an acute febrile disease due to a viral infection and presents with severe headache, pain behind the eyes, muscular and joint pain as well as rash<sup>1</sup>. Dengue haemorrhagic fever (DHF) presents with dengue-like symptoms in addition to haemorrhagic manifestations; for example, petechial skin haemorrhage, hepatomegaly and circulatory disturbances<sup>2</sup>.

Dengue is caused by the infection of dengue virus, a flavivirus in the family *Togaviridae*. There are four serotypes of this virus. The virus is transmitted by the *Aedes* mosquito, of which *Aedes aegypti* is the most important vector<sup>2</sup>. *Aedes aegypti* is found in urban areas. Another vector, *Aedes albopictus* predominates in the rural setting<sup>3</sup>.

The first case of dengue in Malaysia was documented in 1902<sup>4</sup>.

The first outbreak of DHF was documented in 1962<sup>5</sup>. Major outbreaks were reported in 1974, 1978, 1982 and 1990 and 1991<sup>3,6</sup>.

In the last decade, cases of dengue have become more severe. The occurrence of severe multi-system involvement is on the rise<sup>7</sup>. In 1995, the Case Fatality Rate of dengue was 7.3% but past rates vary and have reached as high as 10.43% in 1988<sup>7</sup>. Deaths were previously more frequent in children but this pattern has changed and currently 50% of deaths due to dengue occur in those above 15 years of age.

Dengue vaccines have been touted as the most effective control measure of this problem<sup>8</sup>. However, to date, no licensed vaccine is available.

Currently, there is no cure for dengue. Management of DHF is by careful monitoring of several parameters of the patient (blood

pressure, haematocrit, platelet count and level of consciousness), fluid replacement, correction of coagulopathies and prevention and treatment of complications<sup>9-11</sup>.

Therefore, the most important strategy in the prevention and control of dengue lies in the control of its vector, the *Aedes* mosquito. Under the Vector-borne Disease Control Programme in the Sixth Malaysia Plan, four strategies have been developed<sup>12</sup>: (i) Anti-larval measures; (ii) Anti-adult measures; (iii) Health education; and (iv) Enforcement of the Destruction of Disease Bearing Insects Act (DDBIA) 1975.

In 1999, of the 10,146 documented cases of dengue, almost a quarter (22.82%) occurred in rural areas<sup>13</sup>. This distribution of cases by locality varies and has reached as high as 38% in the rural areas in 1988<sup>6</sup>.

In 2001, there were 107 documented cases of dengue in the district of Kuala Kangsar, out of which 38 cases occurred in the rural areas<sup>14</sup>.

The risk of introduction of dengue from urban areas to rural villages especially those within close proximity of townships occurs because *Aedes albopictus* is found in many rural areas and acts as an alternative vector for dengue<sup>3</sup>. With many villagers giving up their traditional way of life such as farming and moving into nearby towns to work, there exists a possibility of a person being infected with the dengue virus bringing it back to the village. The *Aedes albopictus* may bite the person, pick up the virus and subsequently spread it.

As previously discussed, due to the absence of vaccine or a cure, the only effective measure available to prevent and control dengue is by preventing transmission of the disease by the *Aedes* mosquito. Control measures require support, cooperation and participation by the community. Therefore, it is vital to know the level of knowledge, attitude and the practices (KAP) of the community concerning the disease. In 1975, a KAP study on DHF and its control was conducted in an urban Malay village<sup>15</sup>. In 1989, another KAP study on dengue was carried out in three urban areas in the Federal Territory and this study

compared KAP concerning dengue between the Malays, Chinese and Indians<sup>16</sup>.

However, to date, no KAP study on dengue has been conducted on communities in the rural setting. Therefore, it is important to conduct a KAP study concerning dengue on a rural community because almost a quarter of dengue cases occur in the rural setting<sup>13</sup>. Furthermore, the potential for a dengue outbreak among rural communities exists due to the prevalence of *Aedes albopictus*. Nevertheless, many rural folk earn their living in urban areas where the risk of being infected with dengue is higher. They may then bring the virus back to the village and start an outbreak. With rapid urbanisation, villages near townships are slowly witnessing a change into a more sub-urban setting. Thus, the risk of dengue increases as evidenced by an outbreak of dengue in the sub-urban area of Sg. Siput in Kuala Kangsar during the period of survey. In 2001, three cases were also found in one of the rural villages where the survey was conducted<sup>17</sup>.

Since there have been numerous efforts by health authorities to educate the public on dengue and the *Aedes* mosquito via campaigns, the mass media, health visits and forums, it is therefore necessary to assess the level of knowledge, attitude and practice among the rural inhabitants of these villages. Findings from this study would provide useful baseline information, which could improve on the educational programmes, and also the monitoring and evaluation of the dengue prevention and control programmes.

## Materials and Methods

This is a cross-sectional survey of the households in four villages of Kuala Kangsar. The study was carried out between the 16<sup>th</sup>-25<sup>th</sup> June, 2002.

This study encompassed four villages in the Mukim Saiong of Kuala Kangsar district of the state of Perak, namely:

- Kampung Padang Changkat
- Kampung Bendang Panjang
- Kampung Sungai Siput
- Kampung Jias

The study population was 1511, which is the total population of the four villages with the total households numbering up to 343 (average household size of 4.4). Using a sample size calculator, it was estimated that a minimum of 182 households should be sampled in order to gain a 95% confidence level, with a maximum allowable difference of 0.05 in detecting the KAP proportions in the population. A sample of 50 households from each village was selected by simple random sampling method to represent each village, thus a total of 200 households were surveyed for this study.

The data was collected by a face-to-face interview of the head of households using a semi-structured questionnaire on knowledge, attitude and practice of dengue control. Head of households were targeted, as they are the authoritative person in the family who is responsible and capable of taking subsequent preventive and control measures.

The questionnaire was divided into three sections; the first section concerned with knowledge comprised 14 questions, the second part related to practices comprised nine questions and the third part concerned with attitude consisted of 13 questions. The medium of interview was *Bahasa Melayu* since it is the mother tongue of the respondents.

Data was entered and analysed using Statistical Package for Social Sciences (SPSS) version 10.0. Each question was analysed individually. Knowledge, attitude and practice were assessed using a scoring system. Each appropriate answer was given a point and the points for each section of the questionnaire were totalled. Knowledge was assessed as 'good' or 'poor' based on an arbitrary cut-off point. The same principle was applied to the sections on attitude and practice. For knowledge on dengue and *Aedes*, the cut-off point for the level of knowledge considered as 'good' was based on the information available to the public via the mass media and pamphlets.

## Results

The response rate of this study was

100%. All 200 households surveyed responded. The important characteristics of these respondents are given in Table 1.

### Knowledge on dengue

Out of the 200 respondents, only one had never heard of dengue. The main source of information was from the television/radio (82.0%). This was followed by information from their relatives/friends (57.5%). The most under-utilised source of information was pamphlets/posters (34.5%).

When asked about the cause of dengue, 88.5% of the respondents answered mosquitoes. Only 2.5% gave the correct answer, which is the dengue virus. About 86.0% of the respondents were able to give at least one correct answer when asked about the signs and symptoms of dengue fever and the most common answers were fever and rash. However, 13.5% of the respondents were not able to give any answer or gave incorrect answers.

155 (77.5%) respondents knew that dengue is an infectious disease. Out of these respondents, 77.4% knew that dengue was transmitted by mosquitoes. When prompted further, only 91 respondents could name the type of mosquito (*Aedes*).

### Knowledge on Aedes

The majority (95.5%) of the respondents have heard of *Aedes* mosquito when queried. When asked about the timing of the mosquito's biting habits, 107 (53.5%) respondents said 'at dusk', while 84 (42.0%) respondents said 'at dawn'. Only 59 (29.5%) answered both 'at dawn and dusk'. The other answers given include during the daytime, night and anytime.

When inquired, 181 (90.5%) respondents knew water was needed for *Aedes* mosquito to breed. Upon further questioning, 177 (88.5%) respondents knew that stagnant water was required for the mosquito to breed. Two (1.0%) of the respondents incorrectly answered 'running water'.

Most of the respondents (94.0%) had knowledge on ways to prevent *Aedes* breeding. Two most popular

**Table 1. Socio-demographic characteristics of the respondents in Kuala Kangsar, June 2002**

Socio-demographic characteristics	Number (n)	Percentage (%)
1. Age (year)		
< 30	20	10
30 – 49	86	43
> 50	94	47
2. Gender		
Male	96	48
Female	104	52
3. Education attained		
No formal education	40	20
Primary	72	36
Secondary	80	40
Tertiary	8	4
4. Occupation		
Unskilled / semi-skilled	84	42
Skilled	16	8
Professional	2	1
Housewife	54	27
Pensioner	24	12
Unemployed	20	10
5. Monthly income (RM) (US\$1 = RM3.84)		
< 500	42	21
500 – 1000	70	35
> 1000	88	44

N = 200 heads of households, Unskilled / semi-skilled = Labourer, farmer, Skilled = Mechanic, electrician, Professional = Lawyer, doctor

prevention methods named were 'not storing water' (64.0%) and 'environmental cleanliness' (63.5%). Only a quarter of the respondents mentioned about covering the stored water as one method of prevention.

192 (96.0%) of the respondents were aware that having *Aedes* larvae in their residence is an infringement of the law.

### Practice of dengue control

Out of 200 respondents, 120 (60.0%) stored water at home, out of which 93.3% frequently changed the stored water. In addition, 34.2% used abate

to treat stored water and 25.0% covered stored water.

With regards to measures taken to prevent mosquito bites, 95.0% of the respondents appear to know how to prevent themselves from mosquito bites. The two most common measures taken were the use of mosquito coils (74.5%) and insecticides (68.0%). Other methods that were rarely used or unpopular include window netting (4.0%) and the usage of repellents (3.5%).

168 (84.0%) of the respondents reported that the authorities did take measures to prevent mosquito breeding. The most frequent measure

taken was fogging (90.5%). This was followed by house-to-house inspection (60.1%) and campaigns (54.8%).

### Attitude towards dengue

The majority of respondents (96.0%) considered dengue as a serious disease. All 200 respondents believed that they should seek treatment for dengue. 192 out of the 200 respondents felt that prevention is better than cure.

When queried about the effectiveness of various methods of controlling *Aedes*, the respondents were of the opinion that most methods were effective. The method that they felt least effective was the usage of insecticides (78.0%).

A substantial portion of the respondents (57.0%) felt that it was their own responsibility to control *Aedes*, while another 9.5% felt it was solely the government's responsibility. Another one-third of the respondents have the opinion it was a shared responsibility.

It was noted that 90.5% of the respondents would support any activities organised by the health authorities aimed at eradicating *Aedes*. This view was further reinforced by the fact that 91.0% of the respondents agree that it is appropriate to punish those found to harbour the *Aedes* larvae in their residence.

Based on the scoring system described in the methodology, it was found that 68.5% of the respondents had a good knowledge of dengue and *Aedes*, while 91.5% had a good attitude towards dengue control. However, it was noted that only 51.5% of the respondents adopted measures to prevent and control dengue and *Aedes*.

Cross-tabulations were done between knowledge and practice, knowledge and attitude; and attitude and practice. There was no significant association seen between knowledge and practice; and attitude and practice. However, there was a significant association seen between knowledge and attitude ( $p = 0.047$ ).

The association between knowledge, attitude and practices of dengue control, and the socio-

demographic characteristics of the study population is analysed. For knowledge, a larger proportion of the males (70.9%) appeared to have a better knowledge about dengue as compared to females (66.7%). Likewise, those aged below 50 years (70.0%) showed better knowledge compared to those aged above 50 years (67.5%). For the level of education, a pattern was seen where by the higher the education level, the better the knowledge on dengue. For the level of literacy, the knowledge of dengue among those who were literate and semiliterate compared to those who were illiterate showed little difference. However, there was an apparent trend noticed among the different occupations whereby the better paid the occupation the better the knowledge. None of these observations were statistically significant (Table 2).

In terms of attitude, females (92.1%) appeared to have a better attitude towards the prevention of *Aedes* as compared to males (90.7%). For the age group, a similar pattern was seen whereby those aged 50 and above (92.5%) showed a better attitude compared to those below 50 years (90.0%). There was no trend seen for the level of education, all the levels showed good attitude (>90%). For the level of literacy, those who were illiterate showed a better attitude (100.0%) than those who were literate

(90.1%). However, due to the small number of illiterate respondents, this finding was not significant with regard to occupation, a trend was seen whereby among those in the poorer paid occupations, their attitude is better. Similarly for income class, the higher the income the poorer the attitude. However, none of these observations were statistically significant (Table 2).

In terms of the practice of *Aedes* prevention, males (51.2%) and females (51.8%) showed no apparent differences in practising of *Aedes* prevention. Those aged 50 and above (55.8%) had adopted better practices compared to those below 50 (45.0%). With regard to the level of education, a downward trend was observed as those with no education showed better practices than those who received a higher level of education. Regarding literacy level, those who were illiterate had better practices (77.8%) than those who were literate (50.3%). No trend was observed between occupations and practices. Regarding income class, all of them had a similar level of practice. However, none of these observations were statistically significant (Table 2).

Table 3 shows that there was a significant association between the respondents whose houses had been inspected by medical personnel and those who obtained information about dengue from medical personnel.

**Table 2. Association between knowledge, attitude and practices of dengue control and the socio-demographic characteristics of the respondents in Kuala kangsar, June 2002**

Socio-demographic characteristics	p-value		
	Knowledge	Attitude	Practice
Gender	0.520	0.724	0.934
Age	0.709	0.535	0.133
Level of education	0.506	0.841	0.279
Level of literacy	0.904	0.349	0.107
Occupation	0.431	0.599	0.359
Income	0.142	0.430	0.566

Level of significance,  $\alpha=0.05$

From Table 4, it can be seen that there is a significant association between the respondents who learnt about dengue from the television or radio and their knowledge of dengue and *Aedes*.

Table 5 shows the association between the respondents who suggested that by not storing water, *Aedes* could be prevented from breeding and those who actually practised storing water. There was no significant association.

Table 6 shows that there is a significant association between those who suggested cleanliness as a way to prevent *Aedes* breeding and the observed cleanliness of their houses.

## Discussion

The results of this study are discussed bearing in mind certain errors and limitations. Firstly, there might be an error in the interviewer stage. Despite training, different interviewers tend to phrase questions differently, which might influence the response. This is further exacerbated when the respondents do not understand the question forcing the interviewer to explain it and thus inevitably giving clues to the respondents. Secondly, there might be an error in the respondent stage. Due to the hospitality of rural Malays, interviewers were regarded as guests. Thus, respondents may tend to agree with the interviewers when asked attitudinal questions in order to please their 'guests'.

The study reveals that almost all respondents had heard of dengue. Mass media was the main source of information as all but one of the households surveyed had television. This illustrates the importance of the mass media in conveying important health issues to the public. The role of

medical personnel as the source of information was fairly important. This differs from the previous KAP study conducted in the Federal Territory in 1986<sup>16</sup>. There was a significant association between those who received information from the medical personnel and those whose houses had been inspected for larval breeding by health personnel. This shows that

house-to-house inspection is not only a tool for *Aedes* surveillance as it also helps to convey information in an interactive manner. In fact, one of the main purposes of house-to-house inspection as stated under the Vector-borne Disease Control Programme in the Sixth Malaysia Plan is to educate the public on the methods of preventing *Aedes* breeding<sup>18</sup>.

**Table 3. Association between the respondents whose houses had been inspected by medical personnel and those who obtained information about dengue from medical personnel, June 2002**

House-to- house inspection	Medical personnel as source of information about dengue			p-value
	Yes	No	Total	
Yes	60 (60.0%)	40 (40.0%)	100 (100%)	0.009
No	26 (38.8%)	41 (61.2%)	67 (100%)	

Level of significance,  $\alpha=0.05$

**Table 4. Association between the respondents who learnt about dengue from the television or radio and their knowledge of dengue and *Aedes*, June 2002**

TV / radio as source of information about dengue	Knowledge			p-value
	Good	Poor	Total	
Yes	119 (72.6%)	45 (27.4%)	164 (100%)	0.014
No	18 (51.4%)	17 (48.6%)	35 (100%)	

Level of significance,  $\alpha=0.05$

**Table 5. Association between the respondents who suggested not storing water is a way to prevent *Aedes* breeding and those who practised storing water, June 2002**

Not storing water is a way to prevent <i>Aedes</i> breeding	Practiced storing water			p-value
	Good	Poor	Total	
Yes	82 (64.1%)	46 (35.9%)	128(100%)	0.235
No	33 (55%)	27 (45%)	60 (100%)	

Level of significance,  $\alpha=0.05$

**Table 6. Association between those who suggested cleanliness as a way to prevent *Aedes* breeding and the observed cleanliness of their houses, June 2002**

Observed cleanliness of the house	Cleanliness is a way to prevent <i>Aedes</i> breeding			p-value
	Yes	No	Total	
Very poor - fair	43 (55.8%)	34 (44.2%)	77 (100%)	0.004
Good - very good	84 (75.7%)	27 (24.3%)	111 (100%)	

Level of significance,  $\alpha=0.05$

Most respondents attributed the cause of dengue to mosquitoes, while only a handful could name 'virus' as the cause. This is due to the fact that most health education programmes focus on the *Aedes* vector. Although mosquito is not the causative agent itself, this approach is appropriate and important in controlling dengue since vector control is the most effective means of dengue control.

The majority of respondents were aware of at least one sign or symptom of dengue. Many of them were able to recognize it as a febrile illness. This is probably due to the educational message in the mass media stating that the primary symptom of dengue is 'a high fever of sudden onset'. Their ability to recognise the signs and symptoms of dengue is important for them to seek early treatment.

Since more than three quarters of the respondents knew that dengue was infectious but less than half were able to name *Aedes* as the vector, more effort has to be taken to educate the public on the *Aedes* mosquito. Knowledge of the *Aedes* biting habits was quite good with many knowing that the correct biting time was during the day especially in the morning and evenings. This knowledge is important as most methods of preventing mosquito bites such as mosquito coils and bed netting are usually used at night which are ineffective in preventing *Aedes* mosquito bites.

Despite knowing that stagnant water is a breeding site for *Aedes* and the wide availability of piped water, most of the respondents still stored water. It was found that there is no significant association between those who knew that stored water might breed *Aedes* and those who actually stored water. Therefore, this discrepancy between knowledge and practice implies that good knowledge does not necessarily lead to good practice. For instance the practice of storing water is a deeply ingrained habit among the Malay community. On a positive note, all of those who did store water took some form of action to prevent the breeding of *Aedes*. However, there was a significant association between the

respondents who knew that environmental cleanliness controls the breeding of *Aedes* with the actual level of cleanliness in their residences. This shows that with regards to practice, the respondents showed good practice concerning cleanliness but were lacking in the aspect of storing water.

Concerning the prevention of mosquito bites, bed netting was preferred over window netting. The reason mosquito coils and insecticides were by far the preferred choice, could be due to the aggressive advertising over the media.

To the question as to whether the health authorities took any measures to control *Aedes*, a surprising 16.0% of respondents said no. This could be due to lack of awareness, difficulty in reaching all houses due to their scattered locations and the possibility of the respondents not being home at the time of inspection. Inadequate coverage and frequency of house visits due to lack of manpower contributed to this finding<sup>19</sup>. As discussed earlier, our findings indicated that house inspection is an important tool in educating the public on dengue. Therefore, steps should be taken to improve the coverage of house inspections. This can be made possible by increasing manpower and ensuring that residents are at home during the time of inspection.

Concerning the attitude towards dengue control, most of the respondents appeared to have a good attitude. Again, this may be due to the Malay culture of trying to please the interviewers who are regarded as guests by answering yes.

It is comforting to know that most of the respondents believed that the responsibility of *Aedes* control lies within them and they would also support the health authorities in any campaigns or activities aimed at eradicating dengue. This shows that health education has been able to instil responsibility among the rural community. Many also agreed with the legislation concerning dengue control. This shows good general acceptance of the DDBIA 1975 among the rural community. This attitude is good and differs from the overall situation in Perak where compliance to the DDBIA is low<sup>18</sup>. However,

these points should be taken with a pinch of salt, as attitudes are difficult to gauge.

From the KAP study it was found that the overall knowledge on dengue and *Aedes* was fairly good. The attitude towards dengue control was even more promising, however, the practice of dengue control appeared to be lagging behind.

There was no significant association between knowledge and practice. This shows that the level of knowledge of dengue does not necessarily influence the practice of dengue control. As in the 1986 KAP study, it is also thought that most knowledge originating from the mass media is "ineffective in discouraging deeply ingrained habits (like storage of water) and encouraging distasteful habits (like adding chemicals to drinking water)"<sup>15</sup>. Storage of water may be due to the lifestyle in the rural setting, which requires water to be stored for daily usage, for example, bathing, watering plants and drinking water for chickens and other livestock.

For knowledge and attitude, there was a significant association. According to Rosenstock's Health Belief Model 1974, people's health beliefs depend upon their perception of susceptibility to disease<sup>20</sup>. It is a fact that almost all respondents knew that dengue is a serious disease and all of them felt that treatment should be sought immediately. Therefore this knowledge has influenced their attitude towards dengue control. As expected there was no association between attitude and practice.

There was no significant association between the age of the respondents and their knowledge on dengue. In general, formal education contributes more towards knowledge in the older age group. The interplay between these two factors might influence the results.

No association was seen between the level of education and the knowledge on dengue and *Aedes*. Prior to 1993, there was no specific attempt to educate the school children on dengue. It was only in 1993, that 'Program Bebas Denggi' or Dengue-Free Programme was introduced in schools<sup>21</sup>. Therefore the respondents that were surveyed did not obtain their

information from school but from elsewhere.

With regards to the association between literacy level and knowledge, no association was found. This is evident by the fact that mass media is the main source of information regarding dengue and *Aedes* for the respondents, irrespective of the literacy level or the level of education. In fact, a significant association was found between television as a source of information and knowledge of dengue.

No association was found between the attitude and the socio-demographic factors. It is thought that because the respondents all came from the same area, of the same race and religion and shared the same upbringing, various socio-demographic factors did not influence their attitude significantly.

There is no significant association between the practice to control *Aedes* and all socio-demographic factors. This is because the practice among rural community is influenced mainly by tradition and culture. A good example would be the practice of storing water.

### Recommendation

Based on this study, it is recommended that health education programmes should be continued and intensified with emphasis on improving the knowledge of the rural community on the signs and symptoms of dengue, and educating the community on the *Aedes* mosquito especially its role in the spread of the disease as well as the biting times and breeding habits. A change in the approach of the health education programmes is called for based on the findings that good knowledge has not led to a good practice of control measures. Therefore, health personnel should be trained to give appropriate counselling in an effort to change certain deeply ingrained traditional habits like domestic water storage without proper cover. The coverage of house-to-house

inspections should be improved by increasing manpower and enhancing public participation.

### Conclusion

In conclusion, the knowledge and attitude of the respondents concerning dengue control were good. The knowledge and attitude were also significantly associated. However, it was found that good knowledge and attitude does not necessarily lead to good practice. Practice of dengue control was also lacking due to certain deeply ingrained cultural practices.

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