ORIGINAL ARTICLE

KNOWLEDGE, ATTITUDE, PRACTICES RELATED TO DENGUE FEVER AMONG RURAL POPULATION IN TERENGGANU, MALAYSIA

Myat Moe Thwe Aung[1], Azmi Bin Hassan[2], Norizhar Bin Kadarman[1], Tengku Mohammad Ariff Bin R. Hussin[1], Arunodaya Barman[1], Salwani Binti Ismail[1] and Syaratul Emma Binti Hashim[1]

[1]Department of Community Medicine,Faculty of Medicine, Universiti Sultan ZainalAbidin, Jalan Sultan Mahmud, 20400, Kuala Terengganu, Terengganu, Malaysia, [2]Insititute of Community Development& Quality of Life, Universiti Sultan ZainalAbidin, 21300 Kuala Nerus , Terengganu, Malaysia

ABSTRACT

Aedes mosquito-borne Dengue morbidity is predominantly high in the tropics and subtropics regions. Dengue is also a public health problem in Malaysia since the first epidemic in 1973. Reducing the vector population and personal protection still plays an important role in dengue prevention and control. With the information of community's dengue knowledge, attitude and practices (KAP), the authorities could construct evidence-based, community- empowered vector control program. Upon the understanding of the value of baseline data, a cross-sectional study was carried out in dengue hotspot areas in Seberang Takir using universal sampling. The study results showed that 54.6% of the population had high level of knowledge, 18.6% had good attitude and 91.7% were performing good practices against Dengue infection. After adjusting confounding variables, age and educational levels of respondents, knowledge as well as attitude were found to be significant associated factors for having good practice against Dengue. The study findings provide the need for further information to undertake a holistic approach which is in need of community participation and cooperation.

Keywords: Dengue fever, dengue knowledge, attitudes, practices, Terengganu

INTRODUCTION

Dengue is an Aedes mosquito-borne disease with an acute febrile onset caused by four dengue virus serotypes (DEN 1-4). The term "dengue" came from Spanish West Indies, and the disease was anciently called "Breakbone Fever"[1]. The first case was documented in a Chinese medical encyclopaedia in 992[2]. Population growth on a massive scale, poorly-planned urbanization, environmental alteration, increased global trade and travelling favour the geographic expansion of both mosquito vectors and Dengue viruses.

Dengue morbidity is predominantly high in the tropics and subtropics such as regions of Southeast Asia, the Americas, Africa and the Caribbean Islands [3]. Globally, there are more than 120 dengue-endemic countries, and at least 50-100 million people are infected annually[4].

In accordance with the World Health Organization (WHO), two-fifth of the world's population is currently at risk of the infection while approximately 70% of them (1.8 billion) populate in the Asia Pacific region[5].

Dengue is also a public health problem of national concern in Malaysia. The first case of dengue was reported in 1901 in Penang. Since then, it has been endemic all over the country and then stretched to the first epidemic proportions in 1973[6]. Year after year, the number of reported cases kept soaring up, and in 2013 (up to 13th November), there were

altogether 29754 dengue cases in Malaysia[7]. Unfortunately, even in this era of advanced technology, there is still lack of effective vaccine and clinical cures for that disease. Thus far, dengue prevention and control is limited to approaches related to reducing its vector population and personal protection.

To accomplish a holistic approach including the elimination of breeding sites, environmental management, use of larvicides and adulticides is in need of community participation and cooperation. Prior to any community engagement, the community's knowledge, attitude and practice (KAP) regarding dengue needs to be assessed. With that information, the Ministry of Health (MOH) may then move to construct effective, evidence-based, community-empowered vector control programmes.

Upon understanding the value of baseline data, multitude of such surveys on dengue was carried out in Malaysia. However, almost all previous ones were conducted in the vicinities of Kuala Lumpur. To date, there existed no document on such KAP study in Terengganu State where the case load escalated from 60 cases in 1991[6] to 358 cases in 2013 until October 5[8].

This current study was executed with the same objectives as the previous studies by Al-Dubai et al., 2013[9], Naing et al., 2011[10] and Wan Rozita et

al., 2006[11]. The objectives of this study were to evaluate the current level of awareness, attitude and practice regarding Dengue (Dengue haemorrhagic fever and Dengue shock syndrome), and to determine the associated factors for preventive practices among residents in Seberang Takir village in Kuala Terengganu, Terengganu.

METHODS

A community-based cross-sectional study was carried out in SeberangTakir composed of 14 small villages with a population of about 30,000. Among these villages, three dengue hotspot areas, Kg Baru, Kg TelukKetapang and Kg TelagaDaing were selected for this study purposively.

Each village is separated into two parts, namely the front part and the back one, by the main road. The front part is the sea side area while the back place is swamped with water. All three places are located continuously and have roughly 3,000 populations residing in 600 houses.

One resident from each house in these areas was interviewed by using the questionnaires constructed from previous studies related to dengue survey. The questionnaires were comprised of 4 main sections with 51 questions all in all: 10 questions in section I for socio-demographic data, 13 questions in section II for source of information and probing the level of knowledge regarding dengue signs and symptoms, transmission, treatment and prevention, 12 questions in section III for attitude towards Dengue disease in the aspect of prevention, and the last 16 questions in section IV for household practices in relation to water storage and mosquito reduction.

With respect to scoring, every single sub-item under one question in section II had 3 answer choices: "yes", "no" or "don't know." 3 scores were given to a correct answer, 1 for wrong and 2 scores for if they answer "don't know". Here were no scores for five-item question for source of information which had just "yes" or "no" answer. Total scores ranged from 129-43 points and knowledge levels were categorized as high level (129-108 scores), moderate level (107-86 scores) and low level (85-43 scores).

Five-level Likert scale was applied in statements of section III: 5 scores was given for "strongly agree" and 1 score for "strongly disagree" in each positive statement whereas the reverse score ratings were given in each negative statement. The scores were summed up and then classified into 3 levels: 60-48 scores (good attitude), 47-36 scores (neutral attitude) and 35-12 scores (poor attitude).

In section III, each statement has 3 answer options: "yes", "no" or "not sure." Yes answer gets 2 scores, no answer or not sure response gets 1 score. Then the total scores were regarded as 32-24 scores (having good practice) and 23-16 scores (having poor practice).

To check the validity and reliability of these questionnaires, the pilot study was conducted among 100 households in Kampung Batin and Kampung TokJembal. Verbal consents were taken from all respondents prior to the interview conducted by trained third year medical students from Universiti Sultan ZainalAbidin. Details about full description of the research, confidentiality and voluntary participation were explained to all interviewees.

Those who failed to answer all questions and those who were not at home during the study period were excluded in this study. There were altogether 575 respondents involved in this study.

Data entry and analysis was done using SPSS version 20. Descriptive statistics was applied such as frequency (%) for categorical data and mean (SD) for numerical data. Multiple linear regression was applied to determine the factors associated with having good practice scores. Variables chosen for multiple linear regression analysis were decided not only based on statistical significance in univariable analysis (p <0.25) but also on principles of parsimony and biological plausibility. Level of significance (α) was set as <0.05 for this study. Final results were presented by using crude and adjusted regression coefficients with 95% Confidence interval (CI), t-statistic and corresponding P-values.

RESULTS

In this survey, 575 respondents aged from 11 to above 40 years old females (58.3%) and males (41.7%) completed the interview questionnaires. The majority (71.8%) lived in these survey areas for more than 10 years and only 14.8% lived there for less than 5 years. Most participants were Malay (90.3%) followed by Indian (6.1%), Chinese (1.2%) and others (2.4%). Among them, 292 people were married, 234 were single, 44 were widowed and 5 were divorced.

The majority (59.3%) of the interviewees were educated at secondary school level, and only 13.9% were graduate and post-graduate persons. Out of those 575 people, 297 (51.7%) were unemployed, students and retired persons. The rest (48.3%) were government or private employers or having their own business. The majority (55.1%) of them were having less than RM 1000 per month income. Until the interview, 534 participants have not had their own dengue history but 229 people had

history of dengue in their relatives and acquaintances.

Based on the findings of the study, people got Dengue information from all sources including books/newspapers/pamphlets, mass media, internet, health campaign and people from their vicinity. There was no one dominant media to convey the Dengue information to this community (Table 1).

With regards to the Dengue symptoms, vast majority (90.4%) recognized fever and also mentioned other typical symptoms like chills and rigor, arthralgia, headache, mucosal bleeding, rashes, nausea and vomiting. However, only less than 28% perceived that pain behind the eyes and abdominal pain are the symptoms of Dengue infection.

Most respondents (98.3%) agreed that Dengue is caused by the bite of mosquitoes. As to transmission, 93.6% cited Aedes was its main vector, and 84.2% knew two peak periods of biting activity: in the morning and late evening. Participants identified Aedes favourite breeding places such as still water (96.9%), discarded tires (93.9%), uncovered water containers (94.1%), flower pots and their base plates (91.5%), exposed food containers (77.9%) and between tree-stems (46.4%). In addition, 91.8% of studied residents already realized that they will get fined if Aedes larvae are found in their house and its surroundings.

Concerning the treatment for Dengue, 407 people (70.8%) wrongly believed that there is a specific therapy, and most participants (91.8%) expressed that if they have any Dengue symptoms, they will seek medical attention. Consuming more water (81.7%), having enough rest (64.3%), taking Panadol (36.2%) or taking traditional medicine and herbs (15.3%) were reported to be remedies for Dengue Fever.

Regarding the participants' attitude towards Dengue infection, its prevention and control, 94.4% of interviewees agreed that Dengue fever is a serious illness and 77.7% accepted that everybody has a chance to be contracted with dengue virus. More than 60% realized that children are the most vulnerable group to be engaged with the disease and even old dengue cases can still get recurrent infection in their life-time. Furthermore, 69.0% had positive attitude that dengue illness can be recovered completely.

Regarding attitude towards prevention and control, 77.9% perceived that combating the vector mosquitoes is the only means of controlling and preventing dengue infection. Yet, some respondents (55.4%) grasped the idea that fogging is enough to prevent mosquitoes as well as 71.6% had an opinion that elimination of larval breeding sources is complicated and a waste of time. Besides, nearly half of the people disagreed to restrict and check the potential breeding grounds at least once a year. Even though most subjects (80.3%) held the attitude that they themselves are one of the most vital persons in preventing dengue fever, 67.2% perceived that eliminating the vector breeding places is solely the responsibility of the public health staff and health volunteers.

Related to the practice of controlling Aedes population, most respondents took personal and environmental control measures against Dengue such as having cover for water storage containers or well in their house (76.6%), covering-up after using them (77.0%), regularly examining the water containers if the respondents do not use for more than 5 days (69.9%), using abate in water storage containers (38.8%), destroying the larvae found in water containers (93.6%) or flower pots at home (81.7%), draining the stagnant water inside flower pots (93.7%) or water-holding containers (89.7%), checking the potential breeding places around the house and its vicinity (86.4%), using bed-net while sleeping (11.8%), installing mosquito screens on windows (14.8%), checking the roof gutters during the rainy season (41.2%), sharing the mosquito control responsibilities (95.1%), participating of family members in an Aedes prevention community campaign (46.8%) and "Gotong-royong" events (Communal activities) (86.1%), allowing the authorities to conduct Dengue preventive measures in their home.

According to the scoring system stated in the methodology, it was found that 54.6 % of the sample population had high level of knowledge, 18.6% held good attitude and 91.7% were performing good practices against Dengue infection (Table 2).

Table1 Socio-demographic profiles of respondents and source of information about Dengue (n= 575)

Characteristics	Frequency (%)
Gender	
Male	240 (41.7)
Female	335 (58.3)
Age Group	
11-20 years old	108 (18.8)
21-30 years old	141 (24.5)
31-40 years old	110 (19.1)
>40 years old	216 (37.6)
Race	
Malay	519 (90.3)
Non-Malay	56 (9.7)
Chinese	7 (1.2)
Indian	35 (6.1)
Others	14 (2.4)
Marital Status	
Single	234 (40.7)
Married	292 (50.8)
Divorced and Widowed	49 (8.5)
Education Level	
Illiterate	33 (5.7)
Primary School	121 (21.0)
Secondary School	341 (59.3)
Graduate/Post-graduate	80 (13.9)
Occupational Status	
Unemployed, students and retired	297 (51.7)
Employed	278 (48.3)
Government Officer	51 (8.9)
Private Worker	42 (7.3)
Own Job	161 (28.0)
Labour	24 (4.2)
Monthly Income	
Less than RM1000	371 (55.1)
RM1000 – RM3000	208 (36.2)
More than RM3000	48 (8.3)
Duration of staying in the survey areas	
Less than 5 years	85 (14.8)
5–10 years	76 (13.2)
More than 10 years	413 (71.8)
Dengue History (Own)	
No	534 (92.9)
Yes	41(7.1)
Dengue History (Relatives and Acquaintances)	
No	346 (60.2)
Yes	229 (39.8)
Source of information about Dengue	
Book/ Newspaper/ Pamphlet	469 (81.6)
Mass Media	518 (90.1)
Internet	333 (57.9)
Health campaign	521(90.6)
Neighbouring people	422 (73.4)

Table 2: Knowledge, attitude and preventive practice level on Dengue among respondents (n= 575)

Variables	Frequency (%)
Knowledge level of respondents regarding Dengue infection	
High Level (108-129 scores)	314 (54.6)
Moderate Level (86-107 scores)	258 (44.9)
Low Level (43-85 scores)	3 (0.5)
Attitude of respondents towards Dengue infection	
Good Attitude (48-60 scores)	107 (18.6)
Neutral Attitude (36-47 scores)	453 (78.8)
Poor Attitude (12-35 scores)	15 (2.6)
Practice of respondents on Dengue infection	
Good Practice (24-32 scores)	527 (91.7)
Poor Practice (16-23 scores)	48 (8.3)

After adjusting the confounding variables, the significant association was found between preventive practice regarding dengue and socio-demographic characteristics comprising age of respondents and educational levels. Moreover, there was also significant association between practice scores and knowledge and attitude scores (Table 3).

DISCUSSIONS

In the absence of cure and vaccines, the mainstay of the control of dengue is still the preventive efforts – both in the secondary prevention (prompt diagnosis and early clinical care) and the primary prevention of reducing vector abundance, eliminating breeding areas, breaking the female mosquito intra-salivary cycle (the feeding of female Aedes on blood) which includes personal protective coverings.

Community empowerment and engagements are the sole strong factor in ensuring all environments – domiciles, workplaces, schools and playgrounds are free from any potential habitations of the Aedes mosquitoes[12].

In this sense, studies of knowledge, attitude and practices with regards to this sinister disease is never irrelevant or out-of-date. KAP study is the primary tool of situational analysis of the population's literacy to dengue and its manifestation.

Terengganu (69 cases per 100,000 population in the year 2012) has been the 5th Malaysian state with most incidence with dengue after Selangor (175), WP (104), Johor, Kelantan (72) and Perlis (70)[13]. The national average incidence in 2012 was 76 per 100,000 populations. We expect the preponderance of knowledge about dengue be more in Kuala Terengganu, to coincide with the preponderance of the cases[13].

Fortunately, most (90.4%) of the respondents in this study knew that fever is the main symptoms of dengue, quite similar to most findings of other studies such as in Mantin, Malaysia (86.9%), Sri Lanka (98%), Delhi (84%) and Karachi (81.5%) by Naing et al, (2011)[10]; Gunasekara et al (2012)[14]; Chinnakalli et al (2012)[15]; and Itrat et al (2008)[16] respectively. Some studies showed a lower percentage of knowledge of fever being the symptoms, such as in KamphaengPhet, Thailand (59%) and Jamaica (49.5%), in reports from Shuaib F et al (2010) [3] and Koenraadt et al (2006) [17]. Could we say that the diseases has been so widespread that majority of the afflicted population are aware of fever being the main symptom of dengue infection in the later years. Albeit, it is interesting to note that the knowledge about dengue has improved with time. Even in Malaysia, a similar study in Kuala Lumpur in 1986 reported the most commonly mentioned symptoms of dengue as fever was given by only 68% of respondents [18]. This is despite the start of endemicity occurring in Kuala Lumpur since 1982[19].

Other typical symptoms noted by respondents are chills, rigors, arthralgia, headache, mucosal bleeding, rashes, nausea and vomiting. A much lower proportion of respondents (28%) did relate that "pain behind the eyes" and abdominal pain *as* symptoms of dengue infection. Of course, by fact fever has been reported clinically as the most frequent symptom of dengue. Analyses of clinical records had proven that fever was present in up to 99.7% of dengue cases – such as in the capital of a neighbouring state, Kota Bharu[20].

Table 3: The association between total scores of knowledge, total scores of attitude, socio-demographic characteristics, and total scores of practice regarding Dengue (n =575)

Variables	SLRᵃ		MLRᵇ		
	Crude bᶜ (95% CI)	P Value	Adjusted bᵈ (95% CI)	t-stat	P Value
Gender					
Male	1.00				
Female	0.29 (-0.13, 0.70)	0.175			
Age Group					
11-20 years old	1.00		1.00		
21-30 years old	0.43 (-0.05, 0.90)	0.076	1.24 (0.63, 1.85)	3.97	<0.001
31-40 years old	0.43 (-0.08, 0.95)	0.101	1.12 (0.47, 1.77)	3.37	0.001
>40 years old	0.23 (-0.19, 0.65)	0.283	1.02 (0.46, 1.59)	3.55	<0.001
Race					
Malay	1.00				
Non-Malay	-0.16 (-0.85, 0.53)	0.646			
Marital Status					
Single	1.00				
Married	0.72 (0.32, 1.13)	0.001			
Divorced and Widowed	0.04 (-0.70, 0.77)	0.923			
Education Level					
Illiterate	1.00		1.00		
Primary School	-0.63(-1.13,-0.13)	0.014			
Secondary School	0.46 (0.05 , 0.88)	0.029	0.51 (0.11, 0.91)	2.48	0.014
Graduate/Post-graduate	0.24 (-0.35, 0.83)	0.422			
Occupational Status					
Unemployed, students and retired	1.00				
Employed	0.59 (0.18 , 0.99)	0.005			
Monthly Income					
Less than RM1000	1.00				
RM1000 – RM3000	0.10 (-0.32, 0.53)	0.630			
More than RM3000	0.04 (- 0.70 , 0.78)	0.924			
Duration of staying in the survey areas					
Less than 5 years	1.00				
5–10 years	0.21 (-0.40, 0.81)	0.505			
More than 10 years	-0.11 (-0.56, 0.35)	0.647			
Dengue History (Own)					
No	1.00				
Yes	0.35 (-0.44, 1.15)	0.386			
Dengue History (Relatives)					
No	1.00				
Yes	-0.19 (-0.60, 0.23)	0.386			
Total knowledge scores	0.06 (0.03, 0.08)	<0.001	0.04 (0.01, 0.07)	2.93	0.004
Total attitude scores	0.11 (0.06, 0.15)	<0.001	0.06 (0.01, 0.11)	2.53	0.012

ᵃSimple linear regression, ᵇMultiple linear regression
ᶜCrude regression coefficient, ᵈAdjusted regression coefficient, R^2= 8.9%
The model reasonably fitted well. Model assumptions were met. There were no interaction and multicollinearity problems.

Knowledge of transmission of disease from mosquito bites is also well known to these capital-city dwelling respondents (98.3%); as has been reported by studies in other towns such as Delhi (86.3%), Karachi (86.9%), Manila (92.9%), in studies by Chinnakalli et al (2012)[15], Itrat A et al (2008)[16], and Yboa et al (2013) respectively[21].

They (93.6% of them) could even cite Aedes as the vector, with such percentage higher than those reported by Naing et al (52.1%) in Mantin, Malaysia in 2011[10] or by Wan Rozita (73.0%) in Kuala Lumpur in 2006[11].

A smaller percentage of the respondents (84.2%) knew two peak periods of biting activity: in the morning and late evening, in contrary to the studies by Yboa (2013)[21] in the Philippines (who reported a mere 69.8% knew so) and by Rozita (2006) in Kuala Lumpur (who showed a low 42% knew so)[11].

Having knowledge of transmission should be a critical queue point to break the cycle of the disease. This can be seen later of the relations between this knowledge and the practice of cleaning the environment to combat dengue.

Participants in this study could identify Aedes' favourite breeding places such as still water (96.9%), discarded tires (93.9%), uncovered water containers (94.1%), flower pots and their base plates (91.5%), exposed food containers (77.9%) and between tree-stems (46.4%). Studied by Begonia reported only 61.6% knew of the stagnant water been a good breeding place. Thus the next move for this population is to translate their correct knowledge into deeds of cleaning the environment of the breeding places. In addition, 91.8% of the studied residents realized that they would be fined if Aedes larvae are found in their premises (Table 2). This deterrence of negative behaviour can be an important aspect of control, heralding also the success of the implementation of the law such as the Malaysian Law, DDBIA 1975[22].

Most participants (91.8%) had the cue that if they have any of the dengue symptoms, they will seek medical attention. This positive health seeking behaviour is reported in many studies. In Pakse, Laos (Nalongsack et al, 2009) [23], 96.5% of the respondents would see a doctor. In Sri Lanka, 97.7% would do so[14].

Many of the respondents (407 people, 70.8%) thought that there is a specific treatment for dengue. Some respondents advocate consuming more water (81.7%), having enough rest (64.3%), taking acetaminophens (36.2%) or taking traditional medicine and herbs (15.3%) to be remedies for dengue fever (Table 2). In contrast, in Pakse, Laos only 3.4 % of the respondents (N=230) seek traditional or own medication as treatment of dengue. In a focus group (qualitative) study in Klang valley showed most of the 84 participants knew of the unavailability of medication for dengue, although interestingly many related their experience of natural remedies imposing some healing effect[24].

On discussing participants' attitude towards dengue, 94.4% of the respondents agreed that dengue is a serious illness. This is also elicited from most respondents of and Al-Dubai et al's study (76%)[9] and Nalongsack et al's study (70.9%) [23]. Study by Naing et al (2011) showed to the contrary – that only 36.7% of the respondents knew that dengue could produce bleeding complications[10].

In our study, 63.6% had the notion that children are the most vulnerable group. The Klang valley focus group study revealed that some participants decided that children are more at risk than elder adults (Wong and Sazaly, 2013) [24].

Regarding attitude towards prevention and control, more than half of respondents (57.9%) thought that dengue fever cannot be prevented whereas 77.9% perceived that combating the vector mosquitoes is the only mean of controlling and preventing dengue infection. Surprisingly, of the opposite view, among Al-Dubai's respondents in the dengue study in Malaysia (2013), 32.7% of them declared that they believed elimination of larvae breeding is a waste of time [9]. Again, surprisingly, 71.6% of our study respondents opined the same that elimination of larval bleeding sources is complicated and could be a waste of time. Some 55.4% of the respondents agreed with the idea that fogging is enough to prevent mosquitoes. We might want to think that the feeling could have come along with the despair that the cases are still uprising in spite of the continuous sprays of water containers and their care to remove water from open receptacles. But, nearly half of the people agreed that they do not restrict potential breeding grounds in their vicinity. This practice was held, despite most subjects (80.3%) held the attitude that they themselves are one of the vital persons in preventing dengue fever. Some 67.2% perceived that eliminating the vector breeding places is solely the responsibility of the public health staff and health volunteers.

In this study most respondents claimed that they have taken measures against dengue by caring for their water containers. They *agreedto have* covered water storage containers or wells in their houses (76.6%), covering-up after using (77.0%),

examining of water containers if not used (69.9%), using abate in water storage containers (38.8%), destroying larvae found (93.6%), draining stagnant water in flower pots (93.7%) or water containers (89.7%), checking the potential breeding places around the house and its vicinity (86.4%). We saw these behaviours reported in many other studies. Al-Dubai reported 85.3% of his respondents covered water jars and 80.3% inspected refrigerator trays. Gunasekara reported that 53% of their Sri Lankan respondents remove stagnated water and 42.7 % buried tyres, and left-away water containers and utensils [14]. Studied in Laos by Nalongsack, on the contrary found that only 20% covered their water containers and 89.8% people did not change water stored in open containers[23].

Some studies looked most into practices and control using personal protective measures such as the use of mosquito nets, coils, insecticides spray and repellents. In our study, we had focussed more on the environmental control for the favour of the importance of reducing breeding spaces of the vectors.

It was seen that 54.6 % of the sample population had high level of knowledge, 18.6% held good attitude and 91.7% were performing good practices against dengue. After adjusting for confoundings, this study found significant association between preventive practices regarding dengue and socio-demographic characteristics comprising age of respondents and educational levels. This is quite similar to the study by Naing in Mantin, Malaysia (2011) there was significant associations between knowledge scores and age and education level[10]. He also showed in his final model that a higher level of knowledge corresponds with favourable practices of dengue prevention and control. We found the same – that there was significant association between practice scores and the knowledge and attitude determinants. This is not always seen in other studies such as that done by Koenraadt and others in KamphaengPhaet, Thailand [17]. He revealed otherwise – that their binary logistic regression did not show any relations between any knowledge determinants to container protection practices. In the same study the contrary was true – that the group with the knowledge of at least one preventive measure had more unprotected containers.

The findings and conclusions in our study must be interpreted while considering some limitations we had. The conclusions are made based on a cross sectional survey based on a one-point in time capture of information. This is again coupled with the interview method of data collection that left to apossibility of participants providing socially desirable responses especially of the practice domains. It was not possible to directly observe objectively the practices in homes of the respondents at this time. Albeit, taking that the majority of the respondents are mature adults, who are literate members of the community, we are quite confident that we had a valid sample of the information gathered to safely analyse and conclude on the knowledge, attitude and practices and continue with the associations between these parameters.

CONCLUSION

As a conclusion, we found that the overall knowledge scores among these endemic dengue areas in Malaysia are sound and good. The attitude and thence practices of the community to combat the dengue uprising are commendable and are positively associated with the availability of knowledge shown.
This study reveals important information on knowledge, attitude and practice of the population, which should be highly regarded in the control of Dengue by the authorities.

RECOMMENDATIONS

We invariably need the public to understand the issue well and to ganger their cooperation to work together to look after the environment they are in, to eliminate the breeding sites of the Aedes and thus diminishing the number of the dengue vectors to result in the reduction of the disease. The gap between the knowledge, attitude and practices should be bridged by authorities in their continual effort to combat dengue.

More studies should be done to analyse further the associations between the domains and determinants of each of the knowledge, attitude and practices; as well to the actual practices and objective findings in the households. To add further, all findings pertaining to dengue should place on a GIS and the spatial analyses deliberated to show the geographical bearings and hotspots – both in terms of cases, personal and family characteristics and the environmental conditions to disable the breeding cycles of the dreaded dengue vector, the Aedes mosquitoes.

As recommended by WHO, the authorities should also strengthen efforts in producing comprehensive communication guidelines on the prevention, surveillance, treatment and control of dengue epidemic, including the "Dos and Don'ts" for consumption of the public. This is also pivotal in dismissing information generated by extra sources, which may not be always correct[25].

REFERENCES

1   Halstead SB. Dengue haemorrhagic fever-- a public health problem and a field for research. Bulletin of the World Health Organization. 1980; 58:1-21.

2   Gubler DJ. Dengue/dengue haemorrhagic fever: history and current status. Novartis Foundation Symposium. 2006:3-16.

3   Shuaib F, Todd D, Campbell-Stennett D, Ehiri J, Jolly PE. Knowledge, attitudes and practices regarding dengue infection in Westmoreland, Jamaica. The West Indian medical journal. 2010; 59:134-46.

4   Ng LC. Challenges in Dengue surveillance and control. Western Pacific Surveillance and Response Journal. 2011; 2:1-3.

5   (WHO) WHO. Dengue. World Health Organization Western Pacific Region 2013; Available from: http://www.wpro.who.int/topics/dengue/en/.

6   Poovaneswari S. Dengue situation in Malaysia. The Malaria journal of pathology. 1993; 15:3-7.

7   (WHO) WHO. Dengue Situation Updates. 2013 [updated 13.11.2013; cited 2013]; Available from: http://www.wpro.who.int/emerging_diseases/DengueSituationUpdates/en/ or http://www.wpro.who.int/emerging_diseases/Dengue.Biweekly.13Nov2013rev.pdf.

8   (MOH) MoHM. SITUASI SEMASA DEMAM DENGGI DI MALAYSIA [Bagi Minggu 40/2013 (29 September hingga 5 Oktober 2013)] 2013: Available from: http://www.google.com.my/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=0CCgQFjAA&url=http%3A%2F%2Fwww2.moh.gov.my%2Fattachments%2F9001&ei=O0alUpLhCc2lrQeem4H4DA&usg=AFQjCNHp7BiqDNKnuR-BxQ1FfE2gqSL5fA&bvm=bv.57752919,d.bmk.

9   Al-Dubai SA, Ganasegeran K, Alwan MR, Alshagga MA, Saif-Ali R. Factors affecting Dengue Fever Knowledge, Attitudes and Practices among selected urban, semi-urban and rural communities in Malaysia. The Southeast Asia journal of tropical medicine and public health. 2013; 44:37-49.

10   Naing C, Ren WY, Man CY, Fern KP, Qiqi C, Ning CN, et al. Awareness of dengue and practice of dengue control among the semi-urban community: a cross sectional survey. Journal of Community Health. 2011; 36:1044-9.

11   Wan Rozita WM, Yap BW, Veronica S, Muhammad AK, Lim KH, Sumarni MG. KAP survey on Dengue Fever in an urban Malay residential area in KL. Malaysian Journal of Public Health Medicine 2006; 6:62-7.

12   (WHO) WHO. Management of Dengue Epidemic. Report of a Technical Meeting1996.

13   N MR. Dengue update from Malaysia. Ministry of Health, Malaysia2013; Available from: http://www.denguevaccines.org/sites/default/files/files/Mudin_Malaysia.pdf.

14   Gunasekara TDCP, Velathanthiri VGNS, Weerasekara MM, Fernando SSN, Peelawattage M, Guruge D, et al. Knowledge, attitudes and practices regarding dengue fever in a suburban community in Sri Lanka. Galle Medical Journal. 2012; 17.

15   Chinnakali P, Gurnani N, Upadhyay RP, Parmar K, Suri TM, Yadav K. High Level of Awareness but Poor Practices Regarding Dengue Fever Control: A Cross-sectional Study from North India. North American Journal of Medical Sciences. 2012; 4:278-82.

16   Itrat A, Khan A, Javaid S, Kamal M, Khan H, Javed S, et al. Knowledge, Awareness and Practices Regarding Dengue Fever among the Adult Population of Dengue Hit Cosmopolitan. PLoS One. 2008; 3.

17   Koenraadt CJ, Tuiten W, Sithiprasasna R, Kijchalao U, Jones JW, Scott TW. Dengue knowledge and practices and their impact on Aedes aegypti populations in Kamphaeng Phet, Thailand. Am J Trop Med Hyg. 2006; 74:692-700.

18   Ayyamani UD, Ying GC, San OG. A knowledge attitude and practice (KAP) study on dengue/dengue haemorrhagic fever and the Aedes mosquitoes. Med J Malaysia 1986; 41:108-15.

19   Jamaiah I, Rohela M, Nissapatorn V, Maizatulhikma MM, Norazlinda R, Syaheerah H, et al. Prevalence of dengue

fever and dengue hemorrhagic fever in Hospital Tengku Ampuan Rahimah, Klang, Selangor, Malaysia. The Southeast Asian journal of tropical medicine and public health. 2005; 36:196-201.

20   Hussin N, Jaafar J, Naing NN, Mat HA, Muhamad AH, Mamat MN. A review of dengue fever incidence in Kota Bharu, Kelantan, Malaysia during the years 1998-2003. Southeast Asian J Trop Med Public Health 2005; 36:1179-86.

21   Yboa BC, Labrague LJ. Dengue Knowledge and Preventive Practices among Rural Residents in Samar Province, Philippines. American Journal of Public Health Research. 2013; 1:47-52.

22   Government M. Destruction of disease bearing insects Act 1975. 2006.

23   Nalongsack S, Yoshida Y, Morita S, Sosouphanh K, Sakamoto J. Knowledge, attitude and practice regarding dengue among people in Pakse, Laos. Nagoya journal of medical science. 2009; 71:29-37.

24   Wong LP, AbuBakar S. Health beliefs and practices related to dengue fever: a focus group study. PLoS Negl Trop Dis 2013; 7.

25   (WHO) WHO. Global Strategy For Dengue Prevention And Control 2012-20202012: Available from: http://apps.who.int/iris/bitstream/10665/75303/1/9789241504034_eng.pdf.