

# HIGH KNOWLEDGE ON DENGUE BUT LOW PREVENTIVE PRACTICES AMONG RESIDENTS IN A LOW COST FLAT IN AMPANG, SELANGOR

Nur Syakilah Mahyiddin<sup>1\*</sup>, Rosmawati Mohamed<sup>2</sup>, Hamid Jan Jan Mohamed<sup>2</sup> & Norfarhana Ramly<sup>2</sup>

<sup>1</sup>*School of Nursing Science, Faculty of Medicine, Univeristi Sultan ZainalAbidin, Gong Badak Campus, Kuala Terengganu, Terengganu.*

<sup>2</sup>*School of Health Sciences, Health Campus, Universiti Sains Malaysia, Kubang Kerian, Kelantan.*

\*Corresponding Author Email: nur\_syakilah@yahoo.com

## ABSTRACT

Dengue incidence has grown dramatically in recent decades and become a global incidence especially in the urban area. Ministry of Health (MOH) Malaysia reported that the number of dengue cases since January 2014 until June 2014 was 38,411 cases which was higher compared to the number reported in year 2013 (10,910 cases). The objective of the study was to determine the knowledge and preventive practices of dengue among residents in Flat Pandan Indah, Ampang Selangor. A cross sectional study design with convenience sampling method was adopted in this study. A total of 298 respondents living in Flat Pandan Indah were recruited based on the inclusion criteria. A validated questionnaire that measures knowledge and preventive practices of dengue was completed by respondents. More than half of the respondents had scored 61.7% with good knowledge regarding dengue. However, 50.3% of the respondents had a limited extent of dengue practice. Almost all of the respondents (95.6%) reported that television or radio as the main source for information on dengue. The common preventive measures used by the respondents were cleaning the house (n=148, 49.7%), eliminating standing water around the house (n=123, 41.3%) and covering water containers in the home (n=120, 40.3%). There was no correlation between dengue knowledge and preventive practice score (p = 0.109). The study revealed that majority of the respondents had good knowledge regarding dengue but the practices to prevent dengue are poor. Thus, health education program focusing on dengue prevention practices should be done on the community members in the future.

**Keywords :** *Dengue, Dengue knowledge, Dengue preventive practice*

## INTRODUCTION

Dengue fever is a global public health problem. It can cause increase in morbidity and mortality worldwide imposing a significant economic and disease burden in endemic countries (Suaya, Shepard, & Beatty, 2007; Quader, Gandham, & Nandeshwar, A. J. 2013). The average number of the Dengue Fever (DF) /Dengue Hemorrhagic Fever (DHF) cases reported to the World Health Organization (WHO) per year has shown increasing trend. In the 1990's the number of the DF/DHF cases reported was only 908 compared to year 1990's the number of dengue cases

rose up to 519,139 cases (Guha-Sapir & Schimmer 2005). Cambodia, the Lao People's Democratic Republic, Malaysia, Philippines, Singapore and Vietnam are the countries with the greatest dengue burden in the Asia sub-region that show an increase in the reported number of dengue cases (Arima & Matsui, 2011). Malaysia recorded the highest incidence rate of dengue (357.49 per 100,000 population) in the year 2014, compared to the other vector borne diseases such as dengue hemorrhagic fever (3.66, per 100,000 population) malaria (13.03 per 100,000 population) and typhus (0.01 per 100,000 population), (Ministry of

Health Malaysia, 2015). In addition, a study found that Selangor have the highest dengue cases compare to other states in Malaysia where 16, 367 cases dengue and 45 deaths were reported in the weeks 52 in 2010 (Othman & Nurulfaradilla 2012).

Rose Nani (2015) reported five major factors that influence dengue transmission, such as dengue virus, the human as the host, the environment condition (cleanliness), the vectors and its behaviour and the climate change. Malaysia has continued reporting of an increasing number of dengue cases every year since 1980 (Azami *et al.*, 2011). Thus, dengue has been declared as one of the threat to the public health in Malaysia (Er *et al.*, 2010). The current study on knowledge, attitude and practice on dengue among rural communities in Rembau and Bukit Pelanduk, Negeri Sembilan was conducted among household members. The study found that 98% of the respondents had heard about dengue while 58% of the respondents have good knowledge regarding dengue (Leong *et al.*, 2014). However, other study found that score on dengue knowledge was poor (85.7%), the attitude was good (75.2%) and dengue control and prevention practices were moderately poor (50.4%) among an urbanized area in Kampung Datuk Keramat, Kuala Lumpur (Wan Rozita *et al.*, 2006). In addition, residents who owned the house and residents with secondary or tertiary education had better knowledge toward dengue due to the higher scores in knowledge (Wan Rozita *et al.*, 2006).

There is no vaccine or any effective antiviral drugs to treat the disease although intense efforts are underway to develop a vaccine. Therefore, to minimize the impact of dengue outbreaks, some prevention should be taken such as insecticide sprays, biological control, and environmental management and vector control (Chang *et al.*, 2011).

### **Research Objectives**

The objectives of this study were; (1) to determine the dengue knowledge and preventive practices, (2) to determine the level of dengue knowledge and (3) to determine the relationship of knowledge and preventive practices of dengue among residents in Flat Pandan Indah, Ampang Selangor.

### **MATERIALS AND METHODS**

A cross-sectional study design was carried out for

this study. Study location was at Flat Pandan Indah, Ampang, Selangor which is a low cost flat located in suburban area around 10 km from Kuala Lumpur City Centre. Data collection period was from December 2014 to February 2015. A convenience sample of two hundred ninety eight (298) residents aged 18 to 65 years old who were residents of Flat Pandan Indah, Ampang, who were able to read and understand Bahasa Malaysia, with no mental illness and consented to participate, were chosen for this study.

Information on knowledge and preventive practices on dengue was obtained using a validated questionnaire (Yboa and Labrague, 2013). The instrument consists of three sections. Section A consists of socio-demographic data which include age, gender, ethnicity, marital status, level of education, monthly income, history of dengue, using alternative medicine to threat dengue fever, history of the family after that "affected with dengue" and sources of dengue. Section B consisted of knowledge on dengue infections comprising of 26 items with four domains. The first domain is about knowledge of the cause of dengue. Second domain is knowledge about symptoms of dengue, the third domain is about knowledge of transmission of dengue and fourth domain is about knowledge of dengue preventive practices. Regarding knowledge on dengue, it was assessed respectively, 26 dichotomous questions that consist of 'yes' and 'no'. 'Yes' is given one point and 'no' with zero point with a total of 26 marks. There was five levels of knowledge score which are poor knowledge (0-5), fair knowledge (6-10), moderate knowledge (11-15), good knowledge (16-20) and excellent knowledge (21-26). Section C consists of dengue prevention practices which involved 13 questions regarding dengue prevention practices. The dengue practice range were not at all (1.00-1.50), limited extent (1.51-2.50), moderately extent (2.51-3.50), great extent (3.51-4.50) and very great extent (4.51-5.00).

### **Ethical considerations**

The study protocol was reviewed and approved by the Universiti Sains Malaysia Human Research Ethical Committee. The respondents were informed about the purpose of the study and confidentiality was maintained.

### **Data Analysis**

The data were coded and entered into a

computerized data base and analyzed using the Statistical Package of Social Science (SPSS) version 20. Descriptive analysis was used to analyze the socio-demographic data in the form of frequency and percentage (%). While the Pearson correlation was used to find the relationship between respondents' dengue knowledge and preventive practices of dengue.

**RESULTS**

A total of 298 respondents agreed to participate in this study with 132 (44.3%) male and 166 (55.7%) female respondents. Most of the respondents belong to the age group of 18-30 years old (n = 107, 35.9%), Malay ethnic group (n = 231, 77.5%), Muslim (n=231, 77.5%) and married (n = 198, 66.4%). Nearly half of the respondents obtained formal education level until secondary school (n = 142, 47.7 %) (Table 1).

**Table 1 Demographic characteristics of the respondents (n = 298)**

Characteristics	Frequency (N)	Percentage (%)
<b>Age</b>		
18-30	107	35.9
31-40	98	32.9
41-50	52	17.4
51 and 65	41	13.8
<b>Gender</b>		
Male	132	44.3
Female	166	55.7
<b>Ethnic group</b>		
Malay	231	77.5
Chinese	46	15.4
India	19	6.4
Others	2	0.7
<b>Religion</b>		
Islam	231	77.5
Buddha	43	14.4
Hindu	19	6.4
Others	5	1.7
<b>Marital status</b>		
Single	91	30.5
Married	198	66.4
Widow	6	2.0
Widower	3	1.0
<b>Highest level of education</b>		
University/College	126	42.3
Secondary school	142	47.7
Primary school	25	8.4
Others	5	1.7
<b>Monthly Income</b>		
Less than RM1000	57	19.1
RM1000 – RM 3000	150	50.3
RM3000 and above	91	30.5
<b>Suffered from dengue</b>		
Suffered	62	20.8
No suffered	236	79.2
<b>Family history of dengue</b>		
Suffered	75	25.2
No suffered	223	74.8
<b>Use any complementary therapy totreat dengue fever?</b>		
Yes	19	6.4
No	43	14.4

Table 2 shows that all the respondents knew that dengue is caused by a mosquito bite (n =298, 100%). Most of the respondents said that dengue is not likely to feed/bite in the afternoon (n = 271, 90.9%) but majority of the respondents said that mosquitoes are mostly active at 5.30 am to 8.00 am and 5.30 pm to 8.00 pm. On dengue symptoms, most of the respondents agreed that a person with dengue infections may develop typical symptoms like fever, headache, joint pains, muscle pain, rashes and abdominal pain. Only 52.3% or 156 of the respondents knew that pain behind the eyes is a symptom of dengue infections. With regards to dengue transmission, 96.0% respondents believed that Aedes mosquito transmits dengue infection. Some respondents said that dengue infection may be transmitted by blood transmission (n = 125, 41.9%) and only (n = 68, 22.80%), believed that dengue can be transmitted by needle stick injury while 6.7% or 20 respondents claimed that dengue can be transmitted through sexual intercourse. As regard to knowledge on dengue prevention, greater proportion of the respondents cited the use of window screen, bed nets, insecticide sprays, covering of water, removal of standing water, cutting down bushes and pouring chemicals in standing water as a measures to reduce mosquitoes and dengue.

**Table 2 : Frequency and percentage of dengue knowledge**

Statements	Yes	%	No	%
<b>Knowledge of the causes</b>				
Dengue is caused by a mosquito bite	298	100	0.0	0.0
Dengue mosquitoes likely to feed/ bite in the afternoon	27	9.1	271	90.9
Mosquitoes are most active at 5.30 am to 8.00 am and 5.30 pm to 8.00 pm	277	93.0	21	7.0
<b>Knowledge about symptoms of dengue</b>				
Fever is a symptom of dengue	269	90.3	29	9.7
Headache is a symptom of dengue fever	233	78.2	65	21.8
Joints pain are symptoms of dengue fever	257	86.2	41	13.8
Muscle pain is a symptom of dengue fever	227	76.2	71	23.8
Pain behind the eyes is a symptom of dengue fever	156	52.3	142	47.7
Rashes are symptom of dengue fever	219	73.5	79	26.5
Abdominal pain is a symptom of dengue fever	241	80.9	57	19.1
<b>Knowledge of transmission of dengue</b>				
Flies transmit Dengue fever	3	1.0	295	99.0
Ticks transmits Dengue fever	3	1.0	295	99.0
All types of mosquitoes transmit Dengue fever	29	9.7	269	90.3
Aedes mosquito transmits Dengue fever	286	96.0	12	4.0
Person to person contact transmits Dengue fever	39	13.1	259	86.9

Dengue fever can be transmitted by a blood transfusion	125	41.9	173	58.1
Dengue fever can be transmitted by a needle stick	68	22.8	230	77.2
Dengue fever can be transmitted by sexual intercourse	20	6.7	278	93.3
<b>Knowledge of dengue preventive practices</b>				
Mosquitoes breed in standing water	292	98.0	6	2.0
Window screens and bed nets reduce mosquitoes	256	85.9	42	14.1
Insecticide sprays reduce mosquitoes and prevent dengue	280	94.0	18	6.0
covering water container reduce mosquitoes	290	97.3	8	2.7
Removal of standing water can prevent mosquito breeding	296	99.3	2	0.7
Mosquito repellants prevent mosquitoes	253	84.9	45	15.1
Cutting down bushes can reduce mosquitoes and dengue	252	84.6	46	15.4
Pouring chemicals in standing water can kill mosquito larvae.	240	80.5	58	19.5

Table 3 reflects the total scores obtained from the respondents regarding the knowledge. More than half of the respondents 61.7% achieved 16 to 20 score which is interpreted as good knowledge, while 33.6% of the respondents within the range of 11 to 15, moderate knowledge and only 4.0% respondents scored 21 to 26 had excellent knowledge. The mean of knowledge score is 16.56 (SD = 2.47).

**Table 3 : Frequency and percentage of level of dengue knowledge**

Score	Frequency (N)	Percentage (%)
Excellent knowledge	12	4.0
Good knowledge	184	61.7
Moderate knowledge	100	33.6
Fair knowledge	2	0.7
Poor knowledge	0	0

**Table 4 : Mean and standard deviation of knowledge score of dengue**

	Mean	SD
Knowledge score	16.56	2.47

In reference to Table 5, the type of information about dengue, the respondents were allowed to select more than one source for received information about dengue. Majority of the respondents (95.6%) reported that the television or radio as the source and 85% reported that newspaper were the main source of information on dengue. Whereas 52.3% of the

respondents got the information from hospitals, 39.9% from neighbours and 38.5% from brochures. Respondents also reported that they obtained information from school, health workers, health centres and others. Those who have mentioned other sources of information mostly got the information from the internet and Facebook.

**Table 5: Types of information related to dengue**

Types of Information	Frequency	Percentage (%)
TV/ Radio	285	95.6
School	104	34.9
Health Workers	109	36.6
Health Centers	112	37.6
Hospitals	156	52.3
Neighbors	119	39.9
Brochures	115	38.6
Newspaper	253	84.9
Others	52	17.4

Table 6 portrays the self-reported prevention practices towards dengue infection and control. Nearly half of the respondents (n=148, 49.7%) reported of always cleaning the house, eliminating standing water around the house (n=123, 41.3%) and covers water containers in the home (n=120, 40.3%) as preventive practice towards dengue. In addition, respondents also used insecticides spray (n=100, 33.6%), fans (n=115, 38.6%) and mosquito coils (n=120, 40.3%) as dengue preventive practice. Only a little portion of the respondents always used professional pest control (n =17, 5.7%) as means to reduce mosquitoes. Some of the respondents employed control measuring such as always eliminates standing water around the house to reduce mosquitoes (n=123, 41.3%), always covers water container in the home (n=78, 26.2%) and only a quarter of the respondents frequently changed to treat the stored water (n=78, 26.2%).

Half of the respondents (50.3%) have limited extent of dengue prevention practices, 33.6% apply Dengue prevention practices moderately, 13.1% does not apply preventive practice of dengue and only 3% had high score of Dengue prevention practices to great extent (Table 7). The mean practice of dengue is 2.26 (SD = 0.64). (Table 8).

**Table 6 : Frequency and percentage practice of dengue**

Statements	Extents of Practice					Mean
	Always	Usually	Sometimes	Seldom	Never	
Uses insecticide sprays to reduce mosquitoes	100 (33.6%)	87 (29.2%)	72 (24.2%)	20 (6.7%)	19 (6.4%)	2.77
Uses professional pest control to reduce mosquitoes	17 (5.7%)	36 (12.1%)	74 (24.8%)	599 (19.8%)	112 (37.6%)	1.29
Uses windows net to reduce mosquitoes	37 (12.4%)	42 (14.1%)	48 (16.1%)	44 (14.8%)	127 (42.6%)	1.39
Uses fans to reduce mosquitoes	115 (38.6%)	82 (27.5%)	44 (14.8%)	23 (7.7%)	34 (11.4%)	2.74
Uses bed nets to reduce mosquitoes	35 (11.7%)	53 (17.8%)	65 (21.8%)	53 (17.8%)	92 (32.9%)	1.62
Uses mosquitoes coils to reduce mosquitoes	120 (40.3%)	88 (29.5%)	57 (19.1%)	20 (6.7%)	13 (4.4%)	2.95
Cleaning the house	148 (49.7%)	78 (26.2%)	49 (16.4%)	21 (7.0%)	2 (0.7%)	3.17
Eliminates standing water around the house to reduce mosquitoes	123 (41.3%)	76 (25.5%)	56 (18.8%)	38 (12.8%)	5 (1.7%)	2.92
Covers water containers in the home	122 (40.9%)	93 (31.2%)	50 (16.8%)	25 (8.4%)	8 (2.7%)	2.99
Cleans water filled containers and ditches around the house	78 (26.2%)	95 (31.9%)	50 (16.8%)	61 (20.5%)	14 (4.7%)	2.54
Use abate to treat store water	36 (12.1%)	44 (14.8%)	71 (23.8%)	69 (23.2%)	78 (26.2%)	1.63
Frequently change the stored water	78 (26.2%)	86 (28.9%)	59 (19.8%)	57 (19.1%)	18 (6.0%)	2.50
Attend a seminar or campaign on dengue held by committee members in Flat Pandan Indah	3 (1.0%)	20 (6.7%)	60 (20.1%)	62 (20.8%)	153 (51.3%)	0.85

**Table 7 : Frequency and percentage of extent of dengue prevention practice**

Score	Frequency (N)	Percentage (%)
Excellent extent (4.51- 5.00)	0	0
Great extent (3.51 - 4.50)	9	3.0
Moderately extent (2.51 - 3.50)	100	33.6
Limited extent (1.51- 2.50)	150	50.3
Not at all (1.00 - 1.50)	39	13.1

**Table 8: Mean and standard deviation of extent of dengue practice**

	Mean	SD
Practice score	2.26	0.64

Table 9 shows there were no relationship between respondents' dengue knowledge and preventive practices of dengue r-value is 0.093 and p value was 0.109.

**Table 9: Correlation between dengue knowledge and preventive practices of dengue**

Variable	Practice of dengue	
	r	*p value
Dengue knowledge	0.093	0.109

\*Tested using Pearson correlation

## DISCUSSION

### Knowledge on dengue

The study determined the knowledge and preventive practices of dengue among residents in Flat Pandan Indah, Ampang Selangor. The results of this study have demonstrated that respondents were knowledgeable regarding the concepts of dengue. The study revealed that 184 subjects (61.7%) had good knowledge while 100 (33.6%) subjects had moderate knowledge and only two respondents (0.7%) had fair knowledge and 12 respondents (40%) got excellent knowledge. This may indicate that majority of the respondents have a knowledge from medium to good knowledge towards dengue prevention without score of too high or low. When compared with previous studies in Jamaica it was found that 54% of the respondents had good knowledge regarding signs, symptoms and modes of transmission of dengue (Shuaib *et al.*, 2010). While, in Sri Lanka 58% of respondents had satisfactory knowledge on the symptoms, management and transmission of dengue (Gunasekara *et al.*, 2012). However, a very low rate of awareness was found in a recent study in India with only 34.6% of the population had public awareness regarding dengue (Ashok Kumar *et al.*, 2010). This shows that this study population appears to have good knowledge of dengue. This may be due to the intensified dengue awareness campaign effort of the Malaysian government to raise the people knowledge regarding dengue (Naing *et al.*, 2011).

In this study, 100% of respondents agreed that mosquito bites is the factor in causing this disease. This result is higher in previous study conducted in Malaysia where only 72% believed that dengue is spreads or caused by mosquito bites (Al-Dubai *et al.*,

2013). The study done in South India revealed that 60.6% of the respondents knew that mosquito bites can cause dengue (Naik & Nirgude, 2011). This result is similar to other study from different country (Acharya *et al.*, 2005; Degallier *et al.*, 2000; Pérez-Guerra *et al.*, 2005).

This study also found that most of the respondents (92%) have answered correctly regarding the time mosquitoes are active which is from 5.30 am to 8 am and 5.30pm to 8pm. This is higher compared to other study in Mantin Town, Seremban where only half of the respondents had good knowledge on *Aedes* biting time, which was important for an appropriate choice of preventive measures (Naing *et al.*, 2011).

Besides that, 93.0% of respondents agreed that fever is common symptom of dengue and 78.2% of the respondents knew that headache is a symptom of dengue. In additional, majority of the respondents are able to recognize other symptoms of dengue such as joint pain (86.2%), muscle pain (76.2%), abdominal pain (73.5%) and muscle pain (76.2%). This result indicated that most of the respondents were able to recognize fever as the most recognized symptom of dengue. This results was found to be similar with a study in slum areas of metropolitan city of West Bengal that demonstrated approximately 69% of the study respondents recognize fever as the main symptom of dengue (Haldar *et al.*, 2008) and also congruent with a previous study in Laos where most of the respondents (80.9%) could recognize fever as the symptoms of dengue (Nalongsack *et al.*, 2009). However, 47.75% of the respondents rejected pain behind the eyes as a plausible symptom of dengue. This is consistent with the study done in Jamaica which also showed that almost half of the respondents did not know pain behind the eyes as one of the symptoms of dengue (Shuaib *et al.*, 2010). This could be due to the fact that pain behind the eyes is not a commonly described symptom (Heyman, 2008). Ability to recognize the signs and symptoms of dengue was important for people to seek or get early treatment (Nalongsack *et al.*, 2009).

Finding also indicated that television/radio were the most cited source of information on dengue, while 84.9% respondents regarded newspaper as the source of information on dengue. This finding were similar with data gathered from previous studies whereby mass

media was cited to have a major role in disseminating information about dengue (Kittigul *et al.* 2003; Luangdilok 2006). However, in another study, literature on dengue related knowledge, attitude and practice (KAP) among caretakers of elementary school children in Thailand was different. In this study related KAP among migrant Myanmar women caretakers living in Thailand, 88.6% of the caretakers received dengue information from friends, family or neighbours but less often through the Thai television (Kyu, Thu, & Van der Putten, 2005). This is probably due to difference in language.

### **Preventive Practice on Dengue**

In terms of preventive practices of dengue, this study found that most of the respondents have limited extent of dengue (50.3%) and 100 respondents or 33.6% had moderate extent of dengue prevention knowledge. Some of the respondents got low score regarding knowledge of preventive practices of dengue (13.1%) where only nine subjects (3%) practiced dengue preventive measures to a great extent. Thus, from the result of this study it is evident that there is a poor practice of dengue among residents in Flat Pandan Indah. This finding was similar with study in Selangor, Malaysia where it is reported that the level of control of growth of larva of *Aedes* mosquitoes was low (Mohamad, Selamat, & Ismail, 2014). Compare with study in Laos peri-urban where the practice was good (Mayxay, *et al.*, 2011). Furthermore, the high utilization of dengue prevention such as the use of insecticides sprays, use of fans, mosquito coils, cleaning house, elimination of standing water around the house and covering of water container in the home must be maintained to prevent the occurrence of dengue. These findings were consistent with those reported by previous studies in Malaysia, India and Pakistan where most commonly practice preventive measures by the respondents were use of repellents, examining and cleaning mosquito breeding sites both indoor and outdoor, and emptying or covering unused water jars and tanks (Al-Dubai *et al.*, 2013; Snehalatha *et al.*, 2003; Itrat *et al.*, 2008).

Previous study correlating dengue knowledge and practices on dengue prevention have shown mixed result. Some studies theoretically showed good practices of dengue prevention measures related to knowledge (Al-Dubai *et al.*, 2013; Castro *et al.*, 2013;

Donalisio, Alves, & Visockas, 2001) suppose and other studies did show good knowledge does not necessarily correlate with practice of dengue prevention (Smith, 2012; Takahashi *et al.*, 2014; Naik & Nirgude 2011; Ashok Kumar *et al.*, 2010). This study showed that no correlation between knowledge of dengue with dengue prevention practices. Although majority of the respondents has high knowledge of dengue, however there was only little evidence that this knowledge was put into practice. The reason why people are not practicing prevention methods, is not due to lack of knowledge but other factors which are not yet known (Mayxay *et al.*, 2013). In spite of individuals knowing what they should be doing but due to practical reasons, they are unable to apply their knowledge (Naing *et al.*, 2011). Based on the previous studies done by Phuanukoonnon, Mueller, & Bryan (2005) it was identified that there are several barriers to the proper practice of dengue prevention procedures. Control of sustained larval growth may be hindered due to insufficient control agents and incompatibility of control practice with people's beliefs. This reason is

supported by other study. It is found that better knowledge does not necessarily lead to better practices due to change in person's behaviour at different places (Koenraad *et al.*, 2006).

## CONCLUSION

The findings in this study indicated that the overall dengue knowledge score among respondents in Flat Pandan Indah was good. However, the preventive practices of dengue showed limited extent or poor practices among residents in Flat Pandan Indah with 50.3% of respondents score limited extent of use of dengue preventive measures. In terms of practices, there was no correlation between knowledge and preventive practices of dengue. In other words, the better the dengue knowledge among residents is not necessarily was translating into good preventive practices of dengue. Since the dengue cases are increasing in our country this finding can guide or measure the score of knowledge and preventive practices in order to plan health education for prevention of this fatal disease.

## REFERENCES

- Acharya, A., Goswami, K., Srinath, S. & Goswami, A. (2005). Awareness about dengue syndrome and related preventive practices amongst residents of an urban resettlement colony of south Delhi. *Journal of vector borne diseases*. 42(3), pp 122-127.
- Al-Dubai, S. A., Ganasegeran, K., Mohanad Rahman, A., Alshagga, M. A. & Saif-Ali, R. (2013). Factors affecting dengue fever knowledge, attitudes and practices among selected urban, semi-urban and rural communities in Malaysia. *The Southeast Asian Journal of Tropical Medicine and Public Health*, 44(1), pp.37-49.
- Arima, Y. & Matsui, T. (2011). Epidemiologic update of dengue in the Western Pacific Region, 2010. *Western Pacific Surveillance and Response Journal*. 2(2), pp 4-8.
- Ashok Kumar, V., Rajendran, R., Manavalan, R., Tewari, S. C., Arunachalam, N., Ayanar, K., Krishnamoorthi, R. & Tyagi, B.K. (2010). Studies on community knowledge and behavior following a dengue epidemic in Chennai city, Tamil Nadu, India. *Tropical Biomedicine*. 27(2), pp 330-336.
- Castro, M., Sánchez, L., Pérez, D., Sebrango, C., Shkedy, Z. & Van der Stuyft, P (2013). The relationship between economic status, knowledge on dengue, risk perceptions and practices. *PloS one*. 8(12), p.e81875.
- Chang, M. S., Christophel, E. M., Gopinath, D., Abdur, R. M; Malaria, Vectorborne O, Diseases P; World Health Organization Regional Office; Western Pacific (2011). Challenges and future perspective for dengue vector control in the Western Pacific Region. *Western Pacific Surveillance and Response*. 2(2), pp 9-16.

- Degallier, N., De Tarso Ribeiro Vilarinhos, P., De Carvalho, M. S. L., Knox, M. B. & Caetano, JR. A. J (2000). People's knowledge and practice about dengue, its vectors, and control means in Brasilia (DF), Brazil: its relevance with entomological factors. *Journal of the American Mosquito Control Association*. 16(2), pp 114–123.
- Donalisio, M.R., Alves, M.J.C.P. & Visockas, A. (2001). A survey of knowledge and attitudes in a population about dengue transmission-region of Campinas São Paulo, Brasil-1998. *Revista da Sociedade Brasileira de Medicina Tropical*. 34(2), pp.197–201.
- Er, A. C., Rosli, M. H., Asmahani, A., Mohamad Naim M.R. & Harsuzilawati M. (2010). Spatial mapping of dengue incidence: A case study in Hulu Langat District, Selangor, Malaysia. *International Journal of Human and Social Sciences*. 5(6), pp 3410–3414.
- Guha-Sapir, D. & Schimmer, B. (2005). Dengue fever: new paradigms for a changing epidemiology. *Emerging themes in epidemiology*. 2(1), p.1.
- Gunasekara, C., Velathanthiri, V., Weerasekera, M. & Fernando, N. (2012). Knowledge, attitudes and practices regarding dengue fever in a suburban community in Sri Lanka. *Galle Medical Journal*. 17(1), pp 10-17.
- Haldar, A., Gupta, U. D., Majumdar, K. K., Laskar, K., Ghosh, S. & Sen S (2008). Community perception of Dengue in slum areas of metropolitan city of West Bengal. *The Journal of Communicable Diseases*. 40(3), pp 205–210.
- Heyman, D.L. ed., (2008). *Control of Communicable Diseases Manual*. 19th edition, American Public Health Association.
- Itrat, A., Khan, A., Javaid, S., Kamal, M., Khan, H., Javed, S., Kalia, S., Khan, A. H., Sethi, M. I. & Jehan, I. (2008). Knowledge, awareness and practices regarding dengue fever among the adult population of dengue hit cosmopolitan. *PloS one*, 3(7), p.e 2620.
- Kittigul, L., Suankeow, K., Sujirarat, D. & Yoksan, S. (2003). Dengue hemorrhagic fever: knowledge, attitude and practice in Ang Thong Province, Thailand. *Southeast Asian journal of tropical medicine and public health*, 34(2), pp 385–392.
- Koenraadt, C. J., Tuiten, W., Sithiprasasna, R., Kijchalao, U., Jones, J. W. & Scott, T. W. (2006). Dengue knowledge and practices and their impact on *Aedes aegypti* populations in KamphaengPhet, Thailand. *The American journal of tropical medicine and hygiene*, 74(4), pp 692–700.
- Kyu, H. H., Thu, M. & Van der Putten, M. (2005). Myanmar migrant woman caretakers on prevention of dengue fever: a study on knowledge, attitude and practices in Tak province, Thailand. *Hospital*, 27, p.9.
- Leong, T. K. (2014). Knowledge, Attitude and Practice on Dengue among Rural Communities in Rembau and Bukit Pelanduk, Negeri Sembilan, Malaysia. *International Journal of TROPICAL DISEASE & Health*. 4(7), pp 841-848.
- Luangdilok, W., (2006). The performance of caretakers for prevention of dengue fever during care of patients at home. Chulalongkorn University. Bangkok : College of Public Health.
- Mayxay, M., Cui, W., Thammavong, S., Khensakhou, K., Vongxay, V., Inthasoum, L., Sychareun, V. & Armstrong,



- G. (2013). Dengue in peri-urban Pak-Ngum district, Vientiane capital of Laos: a community survey on knowledge, attitudes and practices. *BMC Public Health*. 13(1), p434.
- Ministry of Health Malaysia, 2015.KKM\_HEALTH\_FACTS\_2015.pdf, Available at: [http://vlib.moh.gov.my/cms/content.jsp?id=com.tms.cms.document.Document\\_ef876440-a0188549-82a26f00-e6a36876](http://vlib.moh.gov.my/cms/content.jsp?id=com.tms.cms.document.Document_ef876440-a0188549-82a26f00-e6a36876).
- Mohamad, M., Selamat, M. I. & Ismail, Z. (2014). Factors Associated with Larval Control Practices in a Dengue Outbreak Prone Area. *Journal of environmental and public health*, 2014. Volume 2014, Article ID 459173, 6 pages.
- Mudin, R. N. (2015). *IMJM Vol14No1 Page 05-10. Dengue Incidence and the Prevention and Control. The International Medical Journal of Malaysia*. 14(1), pp 5–10.
- Muhammad Azami, N. A., Salleh, S. A., Neoh, H. M., Syed Zakaria, S. Z. & Jamal, R. (2011). Dengue epidemic in Malaysia: Not a predominantly urban disease anymore. *BMC Research Notes*. 4, pp 216.
- Naik, P.R. & Nirgude, A.S. (2011). G. KP. Knowledge and preventive practices regarding dengue among adult population of rural area of Nalgonda district, South India. *International Journal of Biological and Medical Research [internet]*. 2(3), pp 652–655.
- Naing, C., Ren, W. Y., Man, C. Y., Fern, K. P., Qiqi, C., Ning, C. N., Ee, C.W. (2011). Awareness of dengue and practice of dengue control among the semi-urban community: a cross sectional survey. *Journal of Community Health*. 36(6), pp 1044–1049.
- Nalongsack, S., Yoshida, Y., Morita, S., Sosouphanh, K. & Sakamoto, J. (2009). Knowledge, attitude and practice regarding dengue among people in Pakse, Laos. *Nagoya journal of medical science*. 71(1-2), pp 29–37.
- Othman, J., Omar, N. & Sarjanamuda, P. (2012). Analysis of the Ability to Pay toward Prevention of Dengue Fever in Bandar Baru Bangi. In *PERKEM VII, Volume 2*. pp 823–838.
- Pérez-Guerra, C. L., Seda, H., García-Rivera, E. J. & Clark, G. G. (2005). Knowledge and attitudes in Puerto Rico concerning dengue prevention. *Revista Panamericana de Salud Pública*, 17(4), pp 243–253.
- Phuanukoonnon, S., Mueller, I. & Bryan, J.H., (2005). Effectiveness of dengue control practices in household water containers in Northeast Thailand. *Tropical Medicine & International Health*, 10(8), pp 755–763.
- Quader, A. J., Gandham, P. & Nandeshwar, A. J. (2013). Screening for dengue infection in clinically suspected cases in a rural teaching hospital. *Journal of Microbiology and Biotechnology Research*. 3(2), pp 26–29.
- Shuaib, F., Todd, D., Campbell-Stennett, D., Ehiri, J. & Jolly, P. E. (2010). Knowledge, attitudes and practices regarding dengue infection in Westmoreland, Jamaica. *The West Indian Medical Journal*. 59(2), pp 139–146.
- Smith, V., 2012. A qualitative analysis: using the health belief model to explain dengue fever in two communities in Trinidad and Tobago. *Journal of the Department of Behavioural Sciences*. 2(1), pp 90–101.
- Snehalatha, K. S., Ramaiah, K. D., Vijay Kumar, K. N. & Das, P. K. (2003). The mosquito problem and type and costs of personal protection measures used in rural and urban communities in Pondicherry region, South India. *Actatropica*. 88(1), pp 3–9.

- Suaya, J. A., Shepard, D. S. & Beatty, M. E. (2007). Dengue: burden of disease and costs of illness. In TDR. Report of the Scientific Working Group Meeting on Dengue. pp 35–49.
- Takahashi, R., Wilunda, C., Magutah, K., Thein, T-L, Shibuya, N. & Siripanich, S. (2014). Knowledge, Attitude, and Practices Related to Dengue among Caretakers of Elementary School Children in Chanthaburi Province, Thailand. *International Journal of Tropical Disease & Health*, 2(4), pp 123–135.
- Wan Rozita, W. M., Yap, B. W., Veronica, S., Muhammad, A. K., Lim, A. K. & Sumarni, M. G. (2006). Knowledge, attitude and practice (KAP) survey on dengue fever in an urban Malay residential area in Kuala Lumpur. *Malaysian Journal of Public Health Medicine*. 6(2), pp 62–67.
- Yboa, B.C. & Labrague, L.J. (2013). Dengue Knowledge and Preventive Practices among Rural Residents in Samar Province, Philippines. *American Journal of Public Health Research*. 1(2), pp 47–52.