

## **ASSESSMENT OF KNOWLEDGE, ATTITUDES AND PRACTICE TOWARD DENGUE FEVER AMONG UNIVERSITY STUDENTS IN MALAYSIA**

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### **ABSTRACT**

**Introduction:** Dengue fever is an acute febrile illness with a significant public health concern in tropical and subtropical countries. Population knowledge and practice play an essential role in the transmission and prevention of the disease. This study aims to evaluate the level of knowledge, attitudes, and practice regarding dengue fever among Malaysian university students. **Methods:** A cross-sectional descriptive study was conducted in twenty-five randomly selected universities across Malaysia. A total of 1520 respondents were approached by simple random sampling method. A previously validated and published questionnaire was used with little modification. The associations between the level of knowledge, Attitudes, and practice with different risk factors were calculated statistically and the significant association was considered with a p-value <0.05. **Results:** The data were analysed and showed that most of the students (56.3%, 46.2%, and 43.3%) has a moderate level of knowledge, attitude, and practice respectively toward dengue infection among the respondents. The result shows a significant association between the level of practice and knowledge (p-value <0.001) as well as between the level of practice and attitudes (p-value <0.001). **Conclusion:** The significant association between the practice and knowledge along with attitudes indicates the more knowledge and attitudes lead to better practice. This study highlighted the important role of university students in dengue prevention-based programs. They should be exposed more to improve and transfer their knowledge and attitude to other community population to reduce the incidence of dengue not only in Malaysia but globally.

**Keywords:** Dengue Fever, Malaysia, Knowledge, Attitude, Practice.

## Introduction

Dengue fever (DF) is a disease that is not foreign anymore towards society worldwide nowadays. It is one of the most critical mosquitoes borne illnesses in the world. However, not everyone knows or cares about this disease. DF is a significant cause of morbidity and mortality (Cheah et al., 2014). Clinical manifestations for DF include three phases, which are the febrile phase, critical phase and recovery phase (Kalayanarooj, 2011). Briefly, for febrile phase, it includes dehydration, high fever that may cause neurological disturbances, and febrile seizures in young children. Critical phase includes shock from plasma leakage, severe hemorrhage, and organ impairment. Recovery phase includes hypervolemia that is only if intravenous fluid therapy has been excessive (Kalayanarooj, 2011).

In Malaysia, dengue cases were first reported in 1901 in Penang. Since then, the disease became endemic throughout the country. The first case of dengue hemorrhagic fever (DHF) was reported in 1962 in Malaysia. After this, a major outbreak of DHF occurred in 1973 when almost the whole nation was involved (Poovaneswari, 1993). The Destruction of Disease Bearing Insects Act (DDBIA, 1975) was introduced in 1975 (Lam, 1994).

Recently, it has been estimated that 390 million dengue-infected people yearly, of which 67-136 million show clinically severe infections (World Health Organization, 2020). Currently, over half of the world's population live in areas potentially at risk for dengue transmission, making dengue one of the most crucial arbovirus disease transmitted to the human in terms of morbidity and mortality. Dengue is endemic in more than 128 countries (Brady et al., 2012) in whereby five out of the six WHO regions were involved compared to only nine countries in 1970 (World Health Organization, 2011b). Approximately, 75% of the global dengue infection burden is in the WHO South-East Asia and Western Pacific regions (World Health Organization, 2011a). The dengue cases in Malaysia increases day by day. This increase gives us a big question mark why there is an increase in the number although the government had conducted many of the preventive measures. According to WHO, many factors lead to the rise in dengue cases nowadays, for example, it can be due to environmental factors that provide places for *Aedes* mosquito to breed such as the exposed polystyrene and plastic containers and the used tires. The unlimited movement of patients who have been infected with the dengue virus would easily spread the virus to another person. Society's habit of litter and not well-managed garbage leads to the rise in dengue cases. Lastly, the lack of awareness of the community to implement preventive measures, such as cleaning their surroundings and carry out the activities like "search and destroy" the breeding grounds for mosquitoes every week. It is essential to increase the health promotion activities to strengthen and improve the awareness and practices of dengue control among the Malaysian society. It can form the basis for preventive practices as part of the strategy to control the dengue in the country, thus eliminating them to achieve a zero-dengue country in the future. Preventive strategies are the only means of controlling the disease (Baur, 2013; Low et al., 2006). This study aims to determine the level of knowledge, attitudes, and practice (KAP) regarding DF among Malaysian university students. Furthermore, this study will highlight the role of university students' as citizens in the collaboration the society together with the government to reduce the dengue transmission cycle. So, in the future, we can focus on those factors to increase awareness among the society.

## Methods

An observational cross-sectional survey was conducted at selected universities in Malaysia. Students at the selected universities were recruited for this survey. The questionnaires were answered by convenience selection of the sample. Simple random sampling was used to select twenty-five universities in the different states of Malaysia to conduct this study. The sample size was calculated by statistical Epi Info™ version 7.1.3 program (Centre for Disease Control, Atlanta, USA) using 95% confidence level and 2.5 confidence interval with a total population of 1,174,579 local students in both public and private higher education institutions. Accordingly, the sample size calculated was 1518 subjects. The inclusion of this study includes all the students at the selected universities. International students and students aged below 18 years were excluded from this study.

A previously validated and published questionnaire was used for this study with little modification (Shuaib et al., 2010). It is a quantitatively designed research whereby a survey was deliberated. The questionnaire has been written in Bilingual (Bahasa Melayu and English) before being used to avoid any difficulty for the students to understand. It is contained a total of 72 questions. The questionnaire comprises four sections, in which Part A, composed of ten questions on personal and demographical information. Part B composed of 25 questions on the knowledge about DF. The response option would be 'yes' or 'no'. Each correct answer was given one point, while no point for the incorrect answer. Part C composed of 15 questions on the attitudes towards DF prevention. The questions were comprised of awareness and responsibility as public in the prevention of DF. The response options for this question will be 'agree' or 'disagree'. A positive attitude will be given one point, and a negative attitude will be given no point. Part D composed of 20 questions on the practice regarding DF prevention. The questions were designed to assess the steps taken in the prevention of DF. Response option included 'yes' or 'no'. If the answer was 'yes', one point is given and no points for the answer 'no'. Amendments have been made to the questionnaires to suit the researchers' interests excluding the options 'semirural', for the ease of data calculation.

### *Ethics and consent*

The nature of the study was explained briefly to the students and written informed consent was obtained from all the participants. This study was approved by the Ethics Committee of Management and Science University (MSU). The study methodology was reviewed and recommended for ethical approval by the Institute for Health Behavioural Research (IHBR) (NMRR ID NMRR-15-1627-27280 S2 R0).

### *Data collection*

Data collection began after the Research Committee granted the study approval at Management and Science University (MSU). A cover letter was attached to the questionnaires to ensure the confidentiality of the participants' information. Patients were given a briefing before distributing the questionnaires. Permission was taken directly from the students after agreed to participate and to fill the consent form. Data were collected by answering a self-administered questionnaire. The questionnaire comprises of

close-ended questions. The session ended within half an hour. The study data was stored on the researcher's personal computer.

#### *Data analysis*

Data were verified and analyzed using the IBM Statistical Package for the Social Sciences (SPSS) version 20.0 software for Windows (IBM Corp., Armonk, NY, USA). Descriptive analysis was used to compute the socio-demographic data (gender, age, residential area, race, monthly family income, relationship status, education level) in which the frequency and percentage of each variable were calculated. The descriptive analysis was also used to find out the prevalence of knowledge, awareness, and practice. For the analysis of the independent variables, the frequency and percentage of the categories were obtained. Inferential analysis was used to analyze the association between the independent and the dependent variables. The Chi-squared test and ANOVA were used to determine the association between KAP with socio-demographic information of the respondents whichever appropriate. The level of KAP was categorized following scoring the right answers. Then, the total score was calculated and converted to a percentage. Finally, The sum score of each outcome was assessed based on Bloom's cut off point (Bloom, 1956). Based on the sum scores, level of knowledge was classified into low level knowledge (less than 60%), moderate level knowledge (60-80%), and high-level knowledge (80-100%).

#### **Results**

This study was conducted among 1520 respondents with a response rate of 80%, to measure the level of knowledge, attitudes, and practice about DF. Results showed that most of the participants were have a moderate level of knowledge, 56.3%, whereas 24.1% of the study population have a low level of knowledge. For attitudes, 46.2% of the study population showed moderate attitudes than 30.3% with low attitudes. Again 43.3% of the study population showed moderate practice toward Df compared with 25.1% of those with low practice, as shown in Table 1.

**Table 1: The Level of knowledge, attitudes, and practice about DF among the respondents**

<b>KAP level</b>	<b>Knowledge N (%)</b>	<b>Attitude N (%)</b>	<b>Practice N (%)</b>
<b>Low</b>	367(24.1)	460(30.3)	382(25.1)
<b>Moderate</b>	855(56.3)	702(46.2)	658(43.3)
<b>High</b>	298(19.6)	298(19.6)	480(31.6)

As shown in Table 2, the level of knowledge was significantly associated with gender, females showed a better level of knowledge. The race also showed significant association with knowledge, as the race Malay had the highest level of knowledge. The age showed significant association knowledge, those aged 20-29 years majority under the moderate level of knowledge, while those more than 30 years majority had a higher level of knowledge.

Married had a significantly higher level of knowledge as compared to non-married. Monthly family income and living area whether rural or urban did not show significant association with knowledge. Educational level showed a significant association with the level of knowledge with p-value <0.001.

**Table 2: The association between the level of knowledge and different demographical data**

Variables	Low	Moderate	High	X <sup>2</sup>	P-Value
	N (%)	N (%)	N (%)		
<b>GENDER</b>					
Male	138(28.3)	263(53.9)	87(17.8)	6.95	0.03
Female	229(22.2)	592(57.4)	211(20.4)		
<b>Race</b>					
Malay	309(26.6)	686(59)	167(14.4)	97.05	<0.001
Chinese	25(21.4)	58(49.6)	34(29.1)		
Indian	22(15.0)	70(47.6)	55(37.4)		
Others	11(11.7)	41(43.6)	42(44.7)		
<b>Age Group (Years)</b>					
<20	44(26.2)	75(44.6)	49(29.2)	85.40	<0.001
20-24	271(24.7)	665(60.7)	159(14.5)		
25-29	47(24.6)	86(45.0)	58(30.4)		
>30	5(7.6)	29(43.9)	32(48.5)		
<b>Marital Status</b>					
Single	350(24.4)	817(57.0)	268(18.6)	16.77	0.002
Married	17(20.0)	38(44.7)	30(35.3)		
<b>Monthly Family Income</b>					
<3000RM	188(24.6)	435(56.9)	141(18.5)	1.30	0.52
>3000RM	179(23.7)	420(55.6)	157(20.8)		
<b>Living Area</b>					
Rural	178(26.0)	384(56.1)	122(17.8)	3.80	0.14
Urban	189(22.6)	471(56.3)	176(21.1)		
<b>Education Level</b>					
SPM	62(34.1)	115(63.2)	5(2.7)	50.94	<0.001
DIPLOMA	83(22.5)	188(50.9)	98(26.6)		
DEGREE	211(23.3)	518(57.2)	177(19.5)		
MASTER	11(17.5)	34(54.0)	18(28.5)		

\*Level of significant at P value <0.05

Table 3 shows the association with attitude level; males show a higher level of attitudes, p-value <0.001. The race showed a significant association with the level of attitudes with a p-value <0.001. The highest level of attitude was among those aged >30 years, and they showed a significant association. Married showed a significantly higher level of attitude. Those with higher income showed more level of attitude but was not significant. Whether living in rural or urban also does not show a significant association. Master level of education showed a higher level of knowledge.

**Table 3: The association between the attitude level and different demographical data**

Variables	Level of Attitude			X <sup>2</sup>	P-Value
	Low N (%)	Moderate N (%)	High N (%)		
<b>GENDER</b>					
Male	118(24.2)	257(52.7)	113(23.3)	15.37	<0.001
Female	342(33.1)	445(43.1)	245(23.7)		
<b>Race</b>					
Malay	400(34.4)	538(46.3)	224(19.3)	82.72	<0.001
Chinese	27(23.1)	60(51.3)	30(25.6)		
Indian	16(10.9)	63(42.9)	68(46.3)		
Others	17(18.1)	41(43.6)	36(38.3)		
<b>Age Group (Years)</b>					
<20	43(25.6)	73(43.5)	52(31.0)	57.74	<0.001
20-24	378(34.5)	498(45.5)	219(20.0)		
25-29	32(16.8)	100(52.4)	59(30.9)		
>30	7(10.6)	31(47.0)	28(42.4)		
<b>Marital Status</b>					
Single	442(30.8)	667(46.5)	324(22.6)	14.35	0.006
Married	17(20.0)	35(41.2)	33(38.8)		
<b>Monthly Family Income</b>					
<3000RM	248(32.5)	348(45.5)	168(22.0)	4.17	0.124
>3000RM	212(28.0)	354(46.8)	190(25.1)		
<b>Living Area</b>					
Rural	221(32.3)	300(43.9)	163(23.8)	3.21	0.200
Urban	239(28.6)	402(48.1)	195(23.3)		
<b>Education Level</b>					
SPM	69(37.9)	91(50.0)	22(12.1)	36.95	<0.001
Diploma	83(22.5)	189(51.2)	97(26.3)		
Degree	295(32.6)	397(43.8)	214(23.6)		
Master	13(20.6)	25(39.7)	25(39.7)		

\*Level of significant at P value <0.05

Table 4 shows no significant association between level of practice and gender, race, age group, marital status, monthly income, and living area. Simultaneously, the relationship with the educational level was significant with p-value <0.001; those master level of education had a higher level of practice. The state where they live and the university, they study at showed significant association with practice toward DF.

**Table 4: The association of level of practice towards DF with different demographical data**

Variables	Level of Practice			X <sup>2</sup>	P-Value
	Low N (%)	Moderate N (%)	High N (%)		
<b>GENDER</b>					
Male	124(25.4)	208(42.6)	156(32.0)	0.13	0.937
Female	258(25.0)	450(43.6)	324(31.4)		
<b>Race</b>					
Malay	289(24.9)	504(43.3)	369(31.8)	2.64	0.851
Chinese	32(27.4)	52(44.4)	33(28.2)		
Indian	33(22.4)	66(44.9)	48(32.7)		
Others	28(29.8)	36(38.3)	30(31.9)		
<b>Age Group (Years)</b>					
<20	40(23.8)	75(44.6)	53(31.5)	12.34	0.137
20-24	280(25.6)	481(43.9)	334(30.5)		
25-29	44(23.0)	85(44.5)	63(32.5)		
>30	18(27.3)	17(25.8)	31(46.9)		
<b>Marital Status</b>					
Single	364(25.4)	624(43.5)	445(31.1)	5.09	0.278
Married	17(20.0)	33(38.8)	35(41.2)		
<b>Monthly Family Income</b>					
<3000RM	181(23.7)	334(43.7)	249(32.6)	1.83	0.400
>3000RM	201(26.6)	324(42.9)	231(30.6)		
<b>Living Area</b>					
Rural	162(23.7)	299(43.7)	223(32.6)	1.50	0.472
Urban	220(26.3)	359(42.9)	257(30.7)		
<b>Education Level</b>					
SPM	67(36.8)	80(44.0)	35(19.2)	25.64	<0.001
DIPLOMA	77(20.9)	165(44.7)	127(34.4)		
DEGREE	226(24.9)	388(42.8)	292(32.2)		
MASTER	12(19.0)	25(39.7)	26(41.3)		

\*Level of significant at P value <0.05

Table 5 shows the association between the level of practice towards DF and the level of knowledge and attitudes.

**Table 5: The association of level of practice towards DF with knowledge and attitudes**

Variables	N	Mean	SD	95% Confidence Interval for Mean	
				Lower Bound	Upper Bound
<b>Practice</b>					
Low	367	12.96	3.340	12.62	13.31
Moderate	855	13.70	3.608	13.46	13.94
High	298	14.59	3.616	14.17	15.00
Total	1520	13.70	3.585	13.52	13.88
<b>Attitudes</b>					
Low	382	9.51	1.985	9.31	9.71
Moderate	658	9.62	2.032	9.47	9.78
High	480	10.25	2.353	10.04	10.46
Total	1520	9.79	2.149	9.68	9.90

## Discussion

Since the 21<sup>st</sup> century, DF becomes the most crucial vector-borne disease toward human health that tends to morbidity and mortality, especially for those living in tropical and sub-tropical countries (Wong et al., 2015). Malaysian Ministry of Health reported an incidence rate of 397.71 for dengue in 2019 (Ministry of Health Malaysia, 2020). Yearly the incidence rate has been increased over the population and over the government target for DF incidence, which is less than 50. There is no apparent reason to justify this increase. It could be due to climate changes, hot and humid weather; alternatively, the unplanned urbanization and community population behaviours make the environment very suitable for mosquitos breeding and growth. Malaysia Health Technology Assessment Section (MaHTAS) published in 2015 that the dengue incidence rate is higher in the age group of 15 and above. Most of the dengue cases reported were from urban areas (70% - 80%). Many factors such as high-density population, and rapid development favour dengue transmission could be involved (Ministry of Health Malaysia & Academy of Medicine Malaysia, 2015). With this sharp surge of dengue cases in Malaysia, it is a must for the respondents to possess the right information, attitudes, and practice. Therefore, this cross-sectional study was run to determine the knowledge, attitudes, and practice regarding DF, especially among Malaysian university students.

Our result shows that respondents were moderately knowledgeable in various aspects which are more or less corresponding with previous studies conducted in Malaysia (Al-Zurfi et al., 2015; Alhoot et al., 2017; Hairi et al., 2003; Leong, 2014; Wong et al., 2015), Laos (Mayxay et al., 2013; Nalongsak et al., 2009), Nepal (Dhimal et al., 2014), Pakistan (Itrat et al., 2008), Philippines (Yboa & Labrague, 2013), Sri Lanka (Gunasekara et al., 2015), Jamaica (Shuaib et al., 2010) and Saudi Arabia (Ibrahim et al., 2009). In contrast, another study, that has been done in urban, semi-urban and rural communities in Malaysia demonstrated a higher rate of knowledge (89.7%) towards DF (Al-Dubai et al., 2013). This variation could be attributed to that different regions could have a different experience and the diverse



target population. Interestingly, another study in the Perak state in Malaysia showed the highest rate (96.8%) of the public having a good knowledge of DF (Abdullah et al., 2013). This level of good knowledge was referred to the intensive education and awareness campaigns carried out by the government and various institutions to control the spread of the disease effectively. This can be shown clearly when we look at the significant association between practice and knowledge level ( $p$ -value  $< 0.001$ ). The finding from this study is supporting the data obtained in 2015 by Wong et al. where the student from the tertiary education level possessed a high level of knowledge related to dengue transmission (Wong et al., 2015). The results show a good Knowledge of preventing mosquitoes breeding by removing standing water, reducing the mosquitoes by cutting down bushes and killing mosquito larvae by pouring chemicals in standing water. This result similar to previous results showing blocked drains is the most suitable place for the mosquito breeding (Rozita et al., 2006) and stagnant water is top mosquito breeding sites (Al-Dubai et al., 2013; Alhoot et al., 2016; Leong, 2014).

When the students' attitudes are analysed, this study finds that university students have moderate positive attitudes, which should be reflected in their practice in preventing dengue. However, it is not reflected based on the data obtained. For example, there should be a significant association between the degrees of susceptibility for those previously affected or knew someone with their practice, since being infected with dengue virus for the second time will be much-severed reaction than the first one. Thus, this study found that there was no significant association between those two. There should be a concern with their perception of susceptibility based on Wong et al. findings (Wong et al., 2015) Some of the respondents state substantial body system decrease the chance of being infected. The most common practices used by respondents to prevent the dengue were the covering of water containers, cleaning water containers, and ditches around their homes. This finding was constant with previous results (Abdullah et al., 2013; Al-Dubai et al., 2013; Alhoot et al., 2017; Leong, 2014).

This study shows a significant association between the knowledge and the education level in which the Master or higher education level has a higher level of knowledge than respondents with other educational levels. Al-Dubai et al. (2013) found a significant association between attitudes and both levels of education and employment status. It is like other study done by Leong et al. (2014) where education level and ethnicity have a significant association with respondents. Rozita et al. (2006) also found higher education level has positive attitudes towards DF.

Finally, the result shows a significant association between knowledge and practice, unlike the earlier studies (Abdullah et al., 2013; Al-Dubai et al., 2013; Alhoot et al., 2017; Leong, 2014). It indicates that people with good knowledge tend to act and be involved in preventing their surroundings from breeding mosquitoes and spread DF.

## Conclusion

This study highlighted university students' vital role in dengue prevention-based programs such as dengue campaigns, talks, school health programs, community collaboration activities. Generally, they have a moderate knowledge of and attitude toward DF. They should be exposed more to improve and transfer this knowledge to other community members. Furthermore, it is essential to pollinate the seed of the right attitude and practice regarding dengue and its impact on the public. These programs should be started first at school levels to educate children at an early age. Even though these activities established for some time ago, overall results could be achieved by the cooperation of individuals, community, government, and mass media. Finally, everyone should play a role in eradicating dengue outbreak not only in Malaysia but worldwide.

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## Conflicts of Interest:

The authors declare no conflicts of interest.

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