



نگرش دانشجویان پزشکی نسبت به فعالیت‌های پیشگیری از تب دنگی و پاسخ به هشدار زودهنگام تب دانگ: یک مطالعه مقطعی در مالزی

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چکیده

مقدمه: تب دنگی یک بیماری شایع ناشی از پشه است که از دهه ۱۹۸۰ در مالزی به صورت بومی وجود داشته است. با وجود تلاش‌های قابل توجه دولت، تعداد موارد تب دنگی همچنان در حال افزایش است. بنابراین، درک و نگرش مثبت و همچنین آمادگی مناسب برای جلوگیری از روند صعودی موارد دنگی در مالزی ضروری است. این مطالعه به بررسی دانشجویان پزشکی در مالزی در مورد فعالیت‌های پیشگیری از تب دنگی و واکنش‌های آن‌ها به هشدارهای زودهنگام می‌پردازد.

مواد و روش‌ها: پرسش‌نامه‌های آنلاین به زبان انگلیسی به شرکت‌کنندگان داده شد. آزمون‌های آماری (آزمون t-test و مجذور کای) با استفاده از نرم‌افزار Epi Info نسخه ۷،۲،۲،۶ انجام شد.

نتایج: تقریباً ۱۰۰٪ دانش‌آموزان از تب دنگی اطلاع دارند و ۹۶/۲٪ فکر می‌کنند که تب دنگی می‌تواند باعث مرگ و میر شود. ۷۹/۵ درصد گزارش کردند که دانش کافی در پیشگیری از عفونت دنگی دارند. ۹۹/۴٪ فکر می‌کنند که یک سیستم هشدار اولیه ابزار مفیدی برای جامعه است تا اقدامات پیشگیرانه برای جلوگیری از عفونت احتمالی در زمان کافی انجام دهد. با این حال، تنها ۲۳/۷ درصد از شرکت‌کنندگان، کانون کنونی تب دنگی را در منطقه خود بررسی کردند. در مورد هشدار زودهنگام در مورد دنگی، ۹۵/۶٪ گزارش کردند که به انتقال این اطلاعات به دیگران کمک می‌کنند، ۸۱/۴٪ گزارش دادند که از فعالیت‌های خارج از منزل اجتناب می‌کنند و ۸۲/۷٪ گزارش کردند که ضدعفونی شیمیایی مورد نیاز است.

بحث: اکثر شرکت‌کنندگان در مواجهه با عفونت دنگی و هشدار اولیه دنگی ادراک، نگرش و پاسخ مثبت دارند. ارتباط معنی‌داری بین مرحله مطالعه و ادراک نسبت به عفونت دنگی وجود داشت. مطالعه ما نشان می‌دهد که دانشجویان پزشکی درک مثبتی نسبت به عفونت دنگی، نگرش مثبت نسبت به سیستم هشدار زودهنگام دنگی و پاسخ مناسب به سیستم هشدار زودهنگام دانگ داشتند.

واژه‌های کلیدی: ادراک، نگرش، پاسخ به هشدار زودهنگام تب دانگ، فعالیت‌های پیشگیری از دنگی، مالزی.

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Introduction

Dengue is a type of arboviral infection, which is currently one of the world's most undermined tropical diseases with up trending cases over recent decades. Dengue or commonly known as "Dengue Fever" is caused by dengue virus, which is being spread by a primary vector being *Aedes aegypti* and secondary vector being *Aedes albopictus* (1,2). Dengue transmission is strongly influenced by several factors, such as temperature, tendency of rain, urbanization as well as distribution of the primary vector (*Aedes aegypti*)(3-5). The dengue virus can be categorized genetically into 4 serotypes, ranging from DENV 1-4, with each of them categorized under different genotypes. Infection from each of the serotypes can have a varying degree of clinical manifestations depending on the sequence of infections(6,7).

An infection with a dengue virus can bring about a broad spectrum of illnesses, such as from symptoms that are of flu-like along with fever; to more severe; possible mortality causing forms such as the dengue hemorrhagic fever; better known as the dengue shock syndrome (1). Dengue as an illness itself can be classified into three different phases: acute, critical and convalescent (2). Acute phase is better known as febrile phase, plasma leakage occurs during the critical phase and finally reabsorption of leaked plasma fluid occurs during the convalescent phase (6, 8). Common clinical symptoms observed in a dengue illness are as follows; fever, complaints of rash with frontal headache, retrobulbar pain (eye aches), muscle aches with joint pains; and nausea along with vomiting (5,9,10).

Studies have been conducted; time and time again; on assessing the people's knowledge, awareness, and perception towards dengue. In the year 2006; a study was conducted, Karachi Pakistan; at which 50% of 462 participants in the study had a good knowledge on dengue illness(5). A similar study was conducted again in Pakistan; in the year 2012; whereby 95% of the participants have heard about dengue; but only a mere near 40% were able to make out the symptoms of a dengue illness (1). Coming to Malaysia; a study was conducted in the year 2014, in which the community's perception towards dengue and dengue prevention activities were assessed. 91.5% of 306 participants had good knowledge on the correct cause of dengue, while at least 74% could identify the symptoms of dengue (3). Finally in the year 2017; another study was conducted in the District of Petaling Jaya, Malaysia; to assess the public's perception and attitude to dengue prevention activity and dengue early warning system; in which 97.1% knew what a dengue fever is and 96% were aware that it could lead to death (11).

Ultimately these research studies conducted by different researchers in 2 different countries in a span of 11 years show slight evidence that the public in general is aware of what dengue is along with having a rather good knowledge on its symptoms and that it can cause death; hence our study in the year 2021 is aimed to assess the medical undergraduates' perception and attitude towards dengue prevention activities and response to dengue early warning system in Malaysia.

Dengue has been endemic in our country by several outbreaks in the past decade. The early warning system for dengue fever is complicated because there are several

predictive factors involved. These factors come from humans, insects, and the natural history of the disease. Examples of the factors are age, nationality, education level, economic status, residence, and types of housing (12).

The basic goal of a disease early warning system is to give public health professionals and the public with as much information as possible about the likelihood of a disease outbreak, especially in specific areas where it may occur, so that it can reduce burden and the disease's impact on population (11). As there is presently no vaccine available in Malaysia, other primary preventions such as vector control and surveillance are the only effective dengue preventive methods (13). As a result, dengue early warning might be beneficial in forecasting epidemic-prone dengue infection and in informing the public with as much advance notice as possible about the possibility of a dengue outbreak (12).

Furthermore, In Europe, another network known as the VBORNET network was established to detect any impending outbreak through an early warning system. An early warning system includes the process of recognizing a possible threat and focusing on surveillance and control techniques. This is significant to enhance the possibility of detecting any initial or subsequent illness incursions as soon as feasible (14).

There are multiple uncontrolled factors including the human as the host of dengue virus transmission, environmental factors like cleanliness, *Aedes* mosquitoes as vector and its behavior and the climate change, affect the pathophysiology and transmission of dengue infection. Due to these factors, the prevention and control of infection is very challenging despite close monitoring and continuous control by the Ministry of Health and Municipals (8,15,16).

Dengue is a serious condition, even though in most of the cases the infection is self-limiting, however untreated dengue infection can lead to multiple consequences such as dengue hemorrhagic fever which can be a significant danger to health (3,17). Many believe that fogging activities, and participating in health campaigns provides significant dengue cases reduction (3,17). Therefore, the objectives of our study were to find out the association between perception and attitude towards dengue prevention activities and response to dengue early warning among medical students: by conducting a cross-sectional study in one of the private medical university of Malaysia during 2021.

Methods

This was an epidemiological analytical cross-sectional study design conducted in one of the private medical colleges in Malaysia during July to August 2021. The campus located in two different locations in Malaysia: one in Muar, Johor and the other in Melaka. The medical programme underwent a total of 10 semesters at which semesters 1 to 4 were of pre-clinical years and semesters 5 to 10 are of clinical years. In this study, we included all undergraduate medical students from 10 semesters from which a total of about 1300 students were selected as the study population.

The recruitment utilized the purposive sampling method in which the sample of the study was selected based on the characteristic of the participants and objectives of our study. The participants included in this study were the students from private medical university located in Melaka and Muar campus in Malaysia.

The sample size was calculated using the epi info sample size Calculator; with our population size [N] of an approximate total of 1300 medical students in MUCM. By taking into consideration the study estimates of Dengue awareness in previous study 97.1% and precision error of 3%, the minimum sample size required in this study was 110 (11). When a 20% non-response rate was considered, the required sample size for our study was 138. However, all 156 students (age 18 years and above) who fulfilled the inclusion criteria were included in our study. After data mining, the final sample size was 156 participants including 70 males and 86 females.

The participants were recruited electronically from the private medical university located in Melaka and Muar campus in Malaysia during 2021. The informed consent was obtained from each of the participants prior to enrollment of the study. Those who were aged 18 years and above who provided informed consent prior to enrollment of the study were included in the study. The participants who incompletely filled up questionnaires were excluded from our study.

Standardized and validated questionnaire was designed in the English language and was electronically distributed by forwarding using Google forms among the students in private medical university. First and foremost, participants' consent was obtained before they proceeded to answer the questionnaire. Questionnaire was used to collect the information regarding sociodemographic variables such as age, gender, nationality, race, education level, residence status, current location, types of housing, previous history of dengue infection, number of people living in the house and average household income as independent variables. The dependent variables included in our study were perception and attitude towards dengue infection and response on the dengue early warning system.

The questionnaire was composed of four sections. The first section consisted of the participant's sociodemographic profiles including age (years), gender (Male/Female), race (Malay/Chinese/Indian/Others), nationality (Malaysian student/non-Malaysian student), academic year (pre-clinical from semester 1-4/clinical from semester 5-10, state of origin, residence, type of housing, history of dengue infection as well as among friends and family, and monthly household income (<RM4849/RM4850-RM10959/>RM10960). In addition, the state of origin was categorized into states in accordance with the risk towards dengue, high risk and low risk states. High risk states include Kuala Lumpur, Selangor, Kelantan, Penang and Pahang. Low risk states include Malacca, Johor, Sabah, Sarawak, Terengganu, Negeri Sembilan, Perak, Kedah, and Perlis (18).

Furthermore, for second, third and fourth sections; we adopted the questionnaire from the previous study regarding perception and attitude towards dengue infection and response on the dengue early warning system which consisted of closed-ended questions with 'yes', 'no', 'not

sure', and multiple-choice questions where applicable 9. The second section of our questionnaire comprised of a total of eighteen (18) questions regarding perception towards dengue infection. In this part, participants were asked about their knowledge of dengue infection, prevention, and association of climate factors on dengue. The third section comprised of a total of fourteen (14) questions regarding attitude towards a dengue early warning system. Furthermore, the fourth section comprised of eighteen (18) questions regarding response to and effectiveness of an early warning system. We performed the pilot test among first 30 respondents to validate our questionnaires and we used Cronbach's alpha reliability for the pilot test to access internal consistency of our questionnaire. In our study, the Cronbach's alpha values of second section was 0.667, third section was 0.884 and fourth section was 0.642 respectively. Most researchers described a value of >0.6 as acceptable and sufficient (11). The content validity index (CVI) for the questionnaire was assessed by an expert panel consisting of 6 members with relevant qualifications and experience in the field. Each item was rated on a 4-point scale (scale (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant).

The overall Scale Content Validity Index (S-CVI) for the questionnaire was 0.80, indicating that 80% of the items were rated as quite relevant or highly relevant by the expert panel. An S-CVI of 0.80 suggests that the questionnaire has acceptable content validity, as the majority of the items are considered relevant by the expert panel.

The data was entered into Microsoft Excel version 2302 after data collection and SPSS version 26 was then used to analyze the data. Categorical variables were analyzed using Chi-square test to evaluate the significant associations among dependent and independent variables. Then, binary logistic regression and multiple logistic regression (MLogR) backward logistic regression method were used to analyze the significant factors associated with the perception of dengue infection and attitude and response of dengue early warning system among the undergraduate medical students in private medical university. The quantitative data such as age of the respondents were categorized based on the age category characterized by WHO western pacific criteria. The scoring and cut off point for of perception and attitude towards dengue prevention activities and response to dengue early warning among participants were later categorized into "poor and good" by calculating median scoring in each item. Participants with scoring less than median score were considered as "poor" and those with scoring equal and above the median score were considered as "good". The data were presented as frequency and percentage using descriptive statistics, crude odds ratio (COR) and adjusted odds ratio (AOR) with 95% Confident Interval (CI) and p value of less than 0.05 (P<0.05) were considered as statistically significant.

All the respondents included in this study voluntarily participated and were all provided with informed consents prior to commencement of the survey. The research was conducted following approval from the Research Ethics Committee, Manipal University College Malaysia (MUCM), Malaysia (Ref: MUCM/FOM/Research Ethics Committee- 12/2021.). The participants' information was maintained as confidential and was used solely for the

purpose of this research; hence privacy and anonymity of all participants were maintained throughout the course of this study.

Results

In this study, a total of 156 medical students from one of the private medical universities in Malaysia were recruited with men age of 21.90 ± 2.54 as shown in Table 1. Out of the total of 156, majority of 55.1% were female and the rest 44.9% were male medical students. Among them, majority were Malaysian (90.4%) and the others 15 students were non-Malaysian. Furthermore, out of 156 students, 54.5% were Indian, 26.3% were Chinese, 7.1% were Malay and the rest 12.2% were other races. Moreover, 56.4% of them were living in low-risk zone and 43.6% were in high-risk zone for dengue infection. Among them, 124 had never suffered dengue infection however, 32 of the students claimed that they had been infected with dengue infection before. Among them, 76.3% were living with family members of 0-5 people within the same household. Family household income was divided into B40 group with <RM 4360 per month (22.4%), M40 group with >RM 4360 – RM 9619 per month (43.6%) and T20 group with monthly income of >RM 9619 (53%).

According to table 2, the majority of the medical students (62.8%) had good perception towards dengue prevention activities whereas, 51.3% of the students had good attitude towards dengue prevention activities. Moreover, among 156 medical students, the majority of them had good response to dengue early warning (60.3%).

Table 3 showed the association between sociodemographic characteristics and levels of perception and attitude towards dengue prevention activities and response to dengue early warning among medical students using Simple Logistic Regression (SLogR) among 156 participants. In this study, we can conclude that 21.7% of perception was explained by the independent variables as mentioned in table 3 (SLOGR) (cox and snell $r = 0.217$). Nagelkerke R square of 0.296 indicated that a relationship of 29.6% between perception and the independent variables mentioned in table 3. In this analysis, we found that p-value was more than 0.05 ($P=0.355$). It can be said that there were not statistically significant, and we can conclude that the model does fit well. We found that if the number of people living in the house were more than 5, there were 3.67 times more likely to have good perception towards dengue prevention activities with 95% confident interval (95%CI: 1.25-10.78) and it was significant with p value less than 0.05 ($P=0.018$). The participants with T20 (>RM 9619) household income group had 37% poor perception towards dengue prevention activities compared to those with B40 (<RM 4360) household income group with Crude Odds Ratio (COR) of 0.37 (95%CI: 0.14-0.99) and the association was significant with p less than 0.05 ($P=0.047$).

In this study, we can conclude that 22.4% of attitude was explained by the independent variables as mentioned in table 3. Nagelkerke R square of 0.298 indicated that a relationship of 29.8% between attitude and the independent variables mentioned in table 3. In this analysis, we found that p-value was more than 0.05 ($P=0.510$). It can be said that there were not statistically significant, and we can conclude that the model does fit well. We found that female participants had 1.76 times good attitude on dengue

prevention activities compared to male COR 1.76 (95%CI: 0.76-4.09) and it was significantly associated with p value of 0.019. The clinical year students had also 2.49 times

good attitude on dengue prevention activities compared of pre-clinical year students with COR 2.49 (95%CI: 0.96-6.51) and significant with p beyond 0.05. Those who were living in twin/semi-detached house had 6.98 times good attitude on dengue prevention activities compared to those who lived in apartment and condominium, COR 6.98 (95%CI: 1.01-48.05) and the association was significant with p less than 0.05.

According to response to dengue early warning among medical students, we can conclude that 27.2% of response was explained by the independent variables as mentioned in table 3. Nagelkerke R square of 0.368 indicated that a relationship of 36.8% between response and the independent variables mentioned in table 3. In this analysis, we found that p-value was more than 0.05 ($P=0.913$). It can be said that there were no statistically significant and we can conclude that the model does fit well. We found that Chinese and Indian participants had 11% and 15% poor response to dengue early warning respectively compared to Malay participants, COR: 0.11 (95% CI: 0.01-0.91) and 0.15 (95%CI: 0.02-1.20) respectively and the associations were significant with p values less than 0.05. Moreover, those lived in link house and twin/semi-detached house were 21% and 25% times respectively poor response to dengue early warning compared to those lived in other types of housing with COR 0.21 (95%CI: 0.04-1.08) and 0.25 (95%CI: 0.06-1.09) respectively ($P=0.052$, $P=0.056$). We found that if the number of people living in the house were more than 5, there were 22% likely to have poor response towards dengue early warning with 95% confident interval (95%CI: 0.08-0.63) and it was significant with p value less than 0.05 ($P=0.005$).

According to table 4, we checked the multicollinearity using the VIF (variance-inflation factor) for all independent variables are less than 10 (1.001), therefore there were no multicollinearity problems among the association between sociodemographic characteristics and levels of perception and attitude towards dengue prevention activities and response to dengue early warning among medical students using Multiple Logistic Regression (MlogR). Omnibus tests of model coefficient gave us a Chi-square of 3.592 on 1 df and significant with p value less than 0.05 ($P=0.058$). Cox and snell R^2 (0.023) indicated that 2.3% of the perception was explained by the independent variables stated in the table 4. Nagelkerke R square (0.031) indicated that there were weak effects on perception (3.1%) of total variation of perception can be explained by the independent variables in the current model. In our model, since the p-value was more than 0.05 ($P=0.951$) which was not significant, the data set fit well to the logistic model. Moreover, the sensitivity of 100% indicated that there were fewer number of people in a household (0-5), there were 100% chance of getting good perception. Specificity of 0% meant that there were larger number of people in a household (more than 5), there were 0% chance of getting poor perception on dengue prevention activities among medical students. Overall, our predictions were correct for an overall success rate of 62.8%. We found that if the number of people living in the house were 0-5, there were 22.18 time more likely to have good perception on dengue

prevention activities compared to the household lived by more than 5 people with adjusted odds ratio (AOR) of 2.18 (95%CI: 0.95-5.02).

Regarding the attitude towards dengue prevention activities among medical students, we found that the Omnibus tests of model coefficient gave us a Chi-square of 35.808 on 13 df and significant with p value less than 0.05 (P=0.001). Cox and snell R2 (0.205) indicated that 20.5% of the attitude was explained by the independent variables stated in the table 4 and Nagelkerke R square of 0.274 indicated that there were weak effects on attitude (27.4%) of total variation of attitude can be explained by the independent variables in the current model. In our model, since the p-value was more than 0.05 (P=0.986) which was not significant, the data set fit well to the logistic model. Sensitivity of 66.3% indicated that if the participants were clinical year students and living in twin/Semi-detached house, there was 66.3% chance of getting good attitude. Furthermore, the specificity of 65.8% indicated that the participants were pre-clinical students and living in houses other than twin/semi-detached house, there were 65.8% chance of getting poor attitude. Overall, our predictions were correct for an overall success rate of 66.0%. We also found that those who were clinical year students and living in Twin/Semi-detached house had 6% poor attitude on dengue prevention activities compared to pre-clinical students and living in apartment or condominium the association was significant with p value of 0.035 and AOR: 0.06 (95%CI: 0.01-0.82).

According to the response to dengue early warning among medical students, we checked the Omnibus tests of model coefficient gave us a Chi-square of 51.335 on 20 df and significant with p value less than 0.05 (P=0.001). Cox and snell R2 (0.280) indicated that 28.0% of the response was explained by the independent variables stated in the table 4 and Nagelkerke R square of 0.379 indicated that there were weak effects on response (37.9%) of total variation of response can be explained by the independent variables in the current model. In our model, since the p-value was more than 0.05 (P=0.122) which was not significant, the data set fit well to the logistic model. I got the sensitivity of 90.4% and it indicated that if the participants were races other than Malay, Chinese, Indian, know any person who have been infected with dengue, other race group and living in Individual house/Bungalow, B40 household income and other race group, 0-5 number of people living in a household and living in twin/semi-detached house, there were 66.3% chance of getting good response. Specificity of 59.0% meaning if the participants were Malay, Chinese, Indian, did not know any person who have been infected with dengue, Malay, Chinese, Indian and living in the house other than Individual house/Bungalow, B40, M40 household income and Malay, Chinese, Indian group, more than 5 number of people living in a household and living in the house other than twin/semi-detached house, there were 65.8% chance of getting poor response. Overall, our predictions were correct for an overall success rate of 78.2%. We found that participants with other races had 8.72 times more likely to have good response for dengue early warning compared to Malay; AOR 8.72 (95%CI:1.71-44.49) and significant with P<0.05. Furthermore, those who

know any person who have been infected with dengue, other race groups living in Individual house/Bungalow, B40 household income group by other race group, those who had 0-5 number of people living in a household and living in twin/semi-detached house had significantly poor response to dengue early warning with p values less than 0.05 as shown in table 4.

Table 1. Socio-demographic characteristics of the respondents among undergraduate medical students in private medical university in Malaysia (N=156)

Variables	n (%)
Age (years)	21.90 years (± 2.54)
Gender	
Male	70 (44.9)
Female	86 (55.1)
Nationality	
Malaysian	141 (90.4)
Non-Malaysian	15 (9.6)
Race	
Malay	11 (7.1)
Indian	85 (54.5)
Chinese	41 (26.3)
Others	19 (12.2)
Which of the following phases are you currently in?	
Pre – clinical years	49 (31.4)
Clinical years	107 (68.6)
From which state in Malaysia do you originate from?	
High risk states	68 (43.6)
Low risk states	88 (56.4)
Where are you currently staying?	
At hostel	55 (35.3)
At home	101 (64.7)
What type of house are you currently staying in?	
Individual house / Bungalow	33 (21.2)
Twin / Semi-detached house	28 (17.9)
Terrace house	41 (26.3)
Apartment / Condominium	10 (76.4)
Others (shophouse, link house, hostel)	9 (5.7)
NA	35 (22.4)
Have you had dengue before?	
Yes	32 (20.5)
No	124 (79.5)
Do you know any person who have been infected with dengue?	
Yes	130 (83.3)
No	26 (16.7)
Number of people in your household?	
0-5	119 (76.3)
6-10	36 (23.1)
More than 10	1 (0.6)
What is your average family household income per month?	
B40 (<RM 4360)	35 (22.4)
M40 (RM 4360 – RM 9619)	68 (43.6)
T20 (> RM 9619)	53 (34.0)

Table 2. Levels of perception and attitude towards dengue prevention activities and response to dengue early warning among medical students (n=156)

Variables	n (%)
Perception towards dengue prevention activities	
Poor	58 (37.2)
Good	98 (62.8)
Attitude towards dengue prevention activities	
Poor	76 (48.7)
Good	80 (51.3)
Response to dengue early warning	
Poor	62 (39.7)
Good	94 (60.3)

Table 3. Association between sociodemographic characteristics and levels of perception and attitude towards dengue prevention activities and response to dengue early warning among medical students using SLogR (n=156)

Variables	Perception		Attitude		Response	
	COR (95%CI)	P.V	COR (95%CI)	P.V	COR (95%CI)	P.V
Age (years)						
Young adults (18-36 yrs) ^{ref}	3.08	1.000	385225.8	1.000	77155.50 (0.00-0.00)	1.000
Middle adults (37-59 yrs)	(0.00-0.00)		(0.00-0.00)			
Older adults (≥60 yrs)						
Gender						
Male ^{ref}	1.5	0.308	1.76	0.019	1.03	0.942
Female	(0.67- 0.48)		(0.76-4.09)		(0.42-2.51)	
Nationality						
Malaysian ^{ref}	0.00	0.999	302443.69	0.999	4.83	0.349
Non-Malaysian	(0.00-0.00)		(0.00-0.00)		(0.18-130.07)	
Race						
Malay ^{ref}	0.47	0.775	0.79	0.916	0.11 (0.01-0.91)	0.215
Chinese	(0.03-0.75)	0.611	(0.08-7.57)	0.843	0.15 (0.02-1.20)	0.040
Indian	0.29	0.821	0.64	0.667	0.15 (0.02-1.20)	0.074
Others	(0.02-3.55)	0.589	(0.09-4.81)	0.899	1.45 (0.18-11.44)	0.105
Others	0.38		0.88			
Others	(.03-4.37)		(0.13-6.12)			
Which of the following phases are you currently in?						
Pre-clinical years ^{ref}	1.14	0.755	2.49	0.041	1.19	0.769
Clinical years	(0.46-2.86)		(0.96-6.51)		(0.44-3.24)	
From which state in Malaysia do you originate from?						
High risk states ^{ref}	1.76	0.220	0.88	0.764	1.79	0.213
Low risk states	(0.70-4.39)		(0.37-2.06)		(0.72-4.45)	
What type of house are you currently staying in?						
Apartment/Condominium ^{ref}	0.36		0.21		0.22	
Hostel	(0.06-2.21)		(0.03-1.53)		(0.03-1.72)	
Individual house/ Bungalow	862586.30	0.741	1.85	0.555	0.60	0.400
Link house	(0.00-0.00)	0.272	(0.19-17.6)	0.124	(0.07-5.06)	0.148
Shophouse	0.94	0.999	0.46	0.590	0.21	0.640
Terrace house	(0.23-3.85)	0.935	(0.13-1.66)	0.235	(0.04-1.08)	0.052
Twin/Semi-detached house	890654.46	1.000	314944.87 (0.00-0.00)	1.000	1260006.29 (0.00-0.00)	1.000
NA	(0.00-0.00)	1.000	0.00	1.000	0.00	1.000
NA	661818.70	0.114	0.00 (0.00-0.00)	0.048	(0.00-0.00)	0.056
NA	(0.00-0.00)	0.269	6.98	0.125	0.25	0.146
NA	0.35		(1.01-48.05)		(0.06-1.09)	
NA	(0.09-1.28)		4.68 (0.65-33.61)		4.71(0.58-38.12)	
NA	2.77 (0.46-16.80)					
Have you had dengue before?						
Yes ^{ref}	0.66	0.421	0.89	0.813	0.61	0.369
No	(0.24-1.83)		(0.33-2.38)		(0.22-1.69)	
Do you know any person who have been infected with dengue?						
Yes	0.96	0.943	2.20	0.173	2.85	0.065
No ^{ref}	(0.33-2.79)		(0.70-6.85)		(0.94-8.70)	
Number of people in your household?						
0-5 ^{ref}	3.67 (1.25-10.78)	0.018	0.69	0.434	0.22	0.005
>5			(0.28-1.74)		(0.08-0.63)	
What is your average family household income per month?						
B40 (<RM 4360) ^{ref}	0.42	0.123	0.99	0.956	0.18	0.019
M40 (RM 4360 – RM 9619)	(0.13-1.34)	0.143	(0.32-3.11)	0.990	(0.05-0.65)	0.008
T20 (> RM 9619)	0.37	0.047	1.13	0.801	0.19	0.010
T20 (> RM 9619)	(0.14-0.99)		(0.44-2.86)		(0.05-0.67)	

Table 4. Association between sociodemographic characteristics and levels of perception and attitude towards dengue prevention activities and response to dengue early warning among medical students using MLogR (n=156)

Variables	B	Wald	df	AOR (95%CI)	P.V
Clinical year students * by Living in Twin/Semi-detached house	-2.862	4.445	1	0.06 (0.01-0.82)	0.035
0-5 number of people living in a household	0.778	3.337	1	2.18 (0.95-5.02)	0.068
Race					
Malay ^{ref}	2.166	6.789	1	8.72 (1.71-44.49)	0.009
Others					
Do you know any person who have been infected with dengue?					
No ^{ref}	-1.382	6.736	1	0.25 (0.09-0.71)	0.009
Yes					
Other race group * Living in Individual house/Bungalow	-1.836	5.976	1	0.16 (0.04-0.68)	0.015
B40 household income * Other race group	-0.678	3.566	1	0.51 (0.25-1.03)	0.059
0-5 number of people living in a household * living in twin/semi-detached house	-2.934	5.875	1	0.05 (0.01-0.57)	0.015

Discussion

In our study, we found that most of the students (62.8%) had a good perception on dengue fever and the consequences of it whereas, 51.3% of the students had good attitude towards dengue prevention activities. A similar study was conducted on public's perception and attitude towards dengue prevention activity and response to dengue early warning in Malaysia during 2017, nearly all (99.1%) of the participants had the correct knowledge on the causes of a dengue infection and its clinical symptoms (3, 11). We found that if the number of people living in the house were more than 5, there were 3.67 times more likely to have good perception towards dengue prevention activities with 95% confident interval (95%CI: 1.25-10.78). These findings were consistent with the findings from previous literature which found that residents with lower educational level contributed a higher proportion of residents who were not willing to take part in the public activity ($P < 0.05$) (12).

Nearly half of the participants in our study perceived that they were at medium risk of being infected with dengue fever and the same proportion of participants opted that the dengue situation is not serious in their surrounding areas. These findings were consistent with the findings from previous study done during 2018 shown that there was a significant association between residents' perception on dengue early warning as a useful tool for the community to take preventive actions and their willingness of involving in a public activity for dengue control or removal of mosquitoes breeding sites ($P < 0.001$) (7).

According to our study, most of the participants want early warning even though the dengue situation in their area is available online or in social media. A study found that (84.8%) respondents felt that the community needs public education about dengue early warning via social media platforms (19). In our study, we assessed the association of perception, attitude and response and different phases of study of medical undergraduate students. According to our study, we found out that there is no significant difference between phase of study and their perception towards dengue, however 46.9% of the pre-clinical year students perceived that they have low risk of being infected with dengue, while 61.7% of clinical year students perceived that they have medium risk. A similar study conducted among UPM students in 17th College, Universiti Putra Malaysia showed 42.31% of the participants responded that they have low risk, followed by moderate and high risk with 46.15% and 11.54% respectively (3). A Knowledge, Attitudes, and Practices (KAP) study was conducted among university students in Vietnam in relation to dengue fever, 91% of public school and 87.2% of private school medical students responded that it is possible for a person to suffer from dengue infection more than once (4,20).

Furthermore, in our study, participants with family income of T20 (>RM 9619) household income group had 37% poor perception towards dengue prevention activities compared to those with B40 (<RM 4360) household income group (95%CI: 0.14-0.99) and the association was significant with p less than 0.05 (21). These findings were contrary with the findings from previous literature done in

Malaysia during 2020 (22). They found that participants with income more than RM 5000 had 3.24 times more likely to have good perception towards dengue prevention activities compared to those whose income were less than RM 500 (95%CI: 1.25–8.41) with significant beyond $P < 0.016$ (22). In 2017, a novel qualitative study performed in Peruvian Amazon, about 38.9 % of participants had the fear of contacting the same disease again as well due to the fact they experienced dengue infection in the past. This can be due to poor interest regarding the symptoms of dengue and participation in dengue prevention practices (9, 23, 24). In regard to the student's perception toward global climate, about 91.8% pre-clinical student and 98.1% clinical students were aware of global climate is changing, yet there is only 40.8% and 19.6% of pre-clinical and clinical students respectively agreed that the climate factors may affect the life cycle of mosquitoes but not the dengue cases. Interestingly, A study carried out in India from 2010-2017 by Integrated Disease Surveillance Program (IDSP), Ministry of Health and Family Welfare, Government of India proved that majority of dengue cases (72.47%) occurred during the monsoon period, with median temperature ranged between 21 and 28 °C, which revealed that there is a strong association between the dengue cases and the climate factors (25).

In our study, we found out that 93.9% of the participants believed that these warnings would help them to avoid potential dengue infection. Similarly, a cross-sectional study conducted in the Petaling district, Malaysia showed similar results with 94.4% of the participants agreed early warning is important for them to prevent dengue with 90.5% among the participants of study reviewed it helped them to avoid potential dengue infection (18). However, there was no significant association between the perception of dengue infection and residence of risk zone in our study.

Despite our study having concluded with the desired responses and results expected, there were limitations that occurred throughout the course of the study. First and foremost, the response rate of preclinical year students was lower than clinical year students, this was due to many of the students from the preclinical years not being interested in participating in the study. Our study mainly focused on medical students and the students from different sectors were not included in our study. Therefore, it was recommended that similar studies should be done among students from other sectors such as dental students, engineering students, computer science and foundation students to assess a more accurate result.

Conclusion

Our study revealed perception and attitude towards dengue prevention activities and response to dengue early warning among medical students in Malaysia during 2021. Our findings depicted that the respondents believed that early dengue warning systems were necessary in controlling the dengue outbreak. Mostly they had positive attitudes towards the dengue early warning. Therefore, the government and health authorities should initiate an effort to include information about the dengue warning system in public educational programs in order to increase awareness and knowledge relating to dengue fever and its prevention practice. Moreover, to ensure that dengue does

not remain as one of the major health problems in our country, community engagement and support must continually be stressed in all preventive and control initiatives for dengue fever especially among young children and elderly group.

Furthermore, we recommend the future study to adopt physically distributed questionnaires instead of sending google questionnaire form's link to the students as this allowed the researchers to observe the respondents while they are answering the questionnaire. Moreover, conventional public health education campaigns should be implemented to encourage social mobilization especially among the people with higher income level and those living in high-risk zone to adapt positive attitude and practice related to dengue fever and its preventive measures. Furthermore, future research should be done based on temporal relationship between the exposures of dengue fever and the outcome by using other types of different study design.

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References

1. Bota R, Ahmed M, Jamali MS, Aziz A. Knowledge, attitude and perception regarding dengue fever among university students of interior Sindh. *J Infect Public Health* 2014;7:218-23. doi: 10.1016/j.jiph.2013.11.004
2. Guzman MG, Gubler DJ, Izquierdo A, Martinez E, Halstead SB. Dengue infection. *Nature Reviews Disease Primers* 2016;2:1-25.
3. Abd Rahman A, Zainuddin H, Minhat HS, Juni MH, Mazeli MI. Community perception towards Dengue and Dengue Prevention Program among residences of a rural settlement in jempol, negeri sembilan. *International Journal of Public Health and Clinical Sciences* 2014;1:13-26.
4. Al-Dubai S, Ganasegeran K, Mohanad Rahman A, Alshagga MA, Saif-Ali R. Factors affecting dengue fever knowledge, attitudes and practices among selected urban, semi-urban and rural communities in Malaysia. *Southeast Asian J Trop Med Public Health* 2013;44:37-49.
5. 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:e2620. doi: 10.1371/journal.pone.0002620
6. García G, González N, Pérez AB, Sierra B, Aguirre E, Rizo D, et al. Long-term persistence of clinical symptoms in dengue-infected persons and its association with immunological disorders. *Int J Infect Dis* 2011;15:e38-e43. doi: 10.1016/j.ijid.2010.09.008
7. Hussain-Alkhateeb L, Kroeger A, Oliario P, Rocklöv J, Sewe MO, Tejeda G, et al. Early warning and response system (EWARS) for dengue outbreaks: Recent advancements towards widespread applications in critical settings. *PloS One* 2018;13:e0196811. doi: 10.1371/journal.pone.0196811
8. Wong LP, Shakir SMM, Atefi N, AbuBakar S. Factors affecting dengue prevention practices: nationwide survey of the Malaysian public. *PloS One* 2015;10:e0122890. doi: 10.1371/journal.pone.0122890
9. Tiga-Loza DC, Martínez-Vega RA, Undurraga EA, Tschampel CA, Shepard DS, Ramos-Castañeda J. Persistence of symptoms in dengue patients: a clinical cohort study. *Trans R Soc Trop Med Hyg* 2020;114:355-64. doi: 10.1093/trstmh/traa007
10. Zhang H, Zhou Y, Peng H, Zhang X, Zhou F, Liu Z, et al. Predictive symptoms and signs of severe dengue disease for patients with dengue fever: a meta-analysis. *Biomed Res Int* 2014;2014:359308. doi: 10.1155/2014/359308
11. Zaki R, Roffeei SN, Hii YL, Yahya A, Appannan M, Said MA, et al. Public perception and attitude towards dengue prevention activity and response to dengue early warning in Malaysia. *PloS One* 2019;14:e0212497. doi: 10.1371/journal.pone.0212497
12. Kai LY, Yu CY, Yee KP, Abdullah SN, Hang TQ, Rahimi A, et al. Perceptions, attitudes, and responses to dengue early warning among urban community in Kuala Lumpur. *Malaysian Journal of Public Health Medicine* 2019;19:149-59.
13. Van Benthem B, Khantikul N, Panart K, Kessels P, Somboon P, Oskam L. Knowledge and use of prevention measures related to dengue in northern Thailand. *Trop Med Int Health* 2002;7:993-1000. doi: 10.1046/j.1365-3156.2002.00950.x
14. Racloz V, Ramsey R, Tong S, Hu W. Surveillance of dengue fever virus: a review of epidemiological models and early warning systems. *PLoS Negl Trop Dis* 2012;6:e1648. doi: 10.1371/journal.pntd.0001648
15. Mudin RN. Dengue incidence and the prevention and control program in Malaysia. *IJUM Medical Journal Malaysia* 2015;14. doi: 10.31436/imjm.v14i1.447
16. 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. *J Community Health* 2011;36:1044-9. doi: 10.1007/s10900-011-9407-1
17. Isa A, Loke YK, Smith JR, Papageorgiou A, Hunter PR. Mediation effects of self-efficacy dimensions in the relationship between knowledge of dengue and dengue preventive behaviour with respect to control of dengue outbreaks: a structural equation model of a cross-sectional survey. *PLoS Negl Trop Dis* 2013;7:e2401. doi: 10.1371/journal.pntd.0002401
18. Mohd-Zaki AH, Brett J, Ismail E, L'Azou M. Epidemiology of dengue disease in Malaysia (2000–2012): a systematic literature review. *PLoS Negl Trop Dis* 2014;8:e3159. doi: 10.1371/journal.pntd.0003159
19. Ahmad R, Suzilah I, Wan Najdah WMA, Topek O, Mustafakamal I, Lee HL. Factors determining dengue outbreak in Malaysia. *PloS One* 2018;13:e0193326. doi: 10.1371/journal.pone.0193326
20. Klaythong S, Boontas T, Khumsri N, Saentip S, Wattanasoei S, Saita S, et al. The factors affecting knowledge, attitudes and practices towards dengue infection prevention and control in a rural community of northern thailand. *Southeast Asian Journal of Tropical Medicine and Public Health* 2022;53:274-89.
21. Solomon T, Dung NM, Vaughn DW, Kneen R, Raengsakulrach B, Loan HT, et al. Neurological manifestations of dengue infection. *The Lancet* 2000;355:1053-9. doi: 10.3389/fcimb.2017.00449
22. Selvarajoo S, Liew JWK, Tan W, Lim XY, Refai WF, Zaki RA, et al. Knowledge, attitude and practice on dengue prevention and dengue seroprevalence in a dengue hotspot in Malaysia: A cross-sectional study. *Sci Rep* 2020;10:9534. doi: 10.1038/s41598-020-66212-5

23. Frank AL, Beales ER, De Wildt G, Meza Sanchez G, Jones LL. We need people to collaborate together against this disease: A qualitative exploration of perceptions of dengue fever control in caregivers' of children under 5 years, in the Peruvian Amazon. *PLoS Negl Trop Dis* 2017;11:e0005755. doi: [10.1371/journal.pntd.0005755](https://doi.org/10.1371/journal.pntd.0005755)
24. Hamizah K, Olivia L, Anita A, BB MR. Risk assessment on dengue among UPM students. *International Journal of Public Health and Clinical Sciences* 2016;3:132-40.
25. Kakarla SG, Caminade C, Mutheneni SR, Morse AP, Upadhyayula SM, Kadiri MR, et al. Lag effect of climatic variables on dengue burden in India. *Epidemiol Infect* 2019;147:e170. doi: [10.1017/S0950268819000608](https://doi.org/10.1017/S0950268819000608)





Perception and Attitude Towards Dengue Prevention Activities and Response to Dengue Early Warning Among Medical Students: A Cross-Sectional Study in Malaysia

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Abstract:

Introduction: Dengue is a globally prevalent mosquito-borne disease that has been endemic in Malaysia since the 1980s. Despite significant government efforts, dengue cases continue to rise. To combat this trend, fostering positive perceptions, attitudes, and practices is essential. This study aims to assess the perceptions and attitudes of undergraduate medical students in Malaysia regarding dengue prevention activities and their responses to early warnings.

Methods: Participants were given online questionnaires constructed in English. Statistical tests (Unpaired t-test and chi square test) were done using Epi Info software (version 7.2.2.6).

Results: Almost 100% of the students are aware of dengue fever, and 96.2% believe that it can cause mortality. Additionally, 79.5% reported having sufficient knowledge to prevent dengue infection. Furthermore, 99.4% think that an early warning system is a useful tool for the community to take preventive measures to avoid potential infection in a timely manner. However, only 23.7% of the participants checked the current dengue hotspot in their area. Regarding early warning about dengue, 95.6% reported that they would help convey this information to others, 81.4% reported that they would avoid outdoor activities, and 82.7% reported that chemical fogging is necessary.

Conclusion: Most participants demonstrated a positive perception, attitude, and response regarding dengue infection and early warning systems. The study found a significant association between the participants' phases of study and their perceptions of dengue. Overall, medical students showed a favorable outlook toward dengue infection, a positive attitude toward the early warning system, and an appropriate response to it.

Keywords: Perception, Attitude, Response to dengue early warning, Dengue prevention activities, Malaysia.

Conflict of Interest: No

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