

ORIGINAL ARTICLE

A Household - Based Survey of Knowledge, Attitudes and Practices Towards Dengue Fever Among Local Urban Communities: a Case Study in PPR Batu Muda, Kuala Lumpur

Nurhuda Mohamad Ramli¹, Siti Rohana Mohd Yatim^{1,2}, Nazri Che Dom^{1,2}, Muhammad Afiq Zaki^{1,2}, Samsuri Abdullah³

¹ Centre of Environmental Health and Safety, Faculty of Health Sciences, Universiti Teknologi MARA Selangor, Cawangan Selangor, 42300 Puncak Alam Selangor, Malaysia

² Integrated Mosquito Research Group (I MeRGe), Universiti Teknologi MARA (UiTM), UITM Cawangan Selangor, 42300 Puncak Alam, Selangor, Malaysia

³ Fakulti Teknologi Kejuruteraan Kelautan & Informatik, Universiti Malaysia Terengganu, 21030, Kuala Nerus, Terengganu

ABSTRACT

Introduction: The Consistent outbreak in PPR Batu Muda area has become major curiosity among the researcher despite concerted efforts has been taken by local authority. Therefore, this study was aim to assess the knowledge, attitude, and practice of community, which later might contribute for better approach in tackling the dengue outbreak episode. **Methods:** The PPR Batu Muda was selected in this study due to its consistent outbreak, therefore the residents were assumed to be exposed with various dengue prevention and control efforts, hence make them reliable to answer this questionnaire. 373 residents were participated in this survey. The information collected was subjected to analysis by Statistical Package for Social Science (SPSS) version 26.0. **Results:** The result shows 100% of respondents have a high level of knowledge on dengue fever. Meanwhile sociodemographic factors do not influence the respondents' knowledge level on dengue fever (p-value > 0.05). Sociodemographic factors do not influence the respondents' practice level towards prevention of dengue fever (p-value > 0.05). The attitude of the respondents was also observed with high level of knowledge (p-value <0.05). While the community in this study was observed to be good in their knowledge on dengue fever, poor prevention practices are common among them (p-value > 0.05). **Conclusion:** The public awareness on signs and symptoms of dengue fever, as well as the variables that contribute to the spread and control of the disease's vectors, were substantially observed to be less effective in promoting good practices in preventing dengue fever outbreak.

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Corresponding Author:

Siti Rohana Mohd Yatim, PhD
Email: sitirohana@uitm.edu.my
Tel: +603-32584446

INTRODUCTION

Dengue fever is a vector-borne disease that is one of the major threats to public health in Malaysia. In 2020, Malaysia recorded 88,845 reported dengue cases and 142 deaths as of 19 December 2020, and Selangor reported the highest number of dengue cases (43,941 cases), followed by Johor (11,389 cases) and the Federal Territories Kuala Lumpur and Putrajaya (10,451 cases) (1). A study conducted by Ahbirami et al. (2) showed that rapid development and population density contribute

to the increase in cases of dengue fever. Dengue fever often occurs in urban areas where population density is present. Due to increased demand for housing and land constraints in urban areas, high-rise residential buildings – ranging from flats and apartments to luxury condominiums – have sprung up (3).

There are four distinct serotypes of the dengue virus, namely DEN-1, 2, 3, and 4 (4). Female *Aedes aegypti* and *Aedes albopictus* mosquitoes are the primary and secondary vectors in Malaysia, respectively. Since a virus causes dengue, there is no specific drug or antibiotics to treat it, and the only treatment is to treat the symptoms. Rest and fluid intake for adequate hydration is important (5). Because dengue is endemic and the spread of the virus can have adverse effects, there are

various measures that various countries have taken to reduce the risk of its spread. Falope et al. (6) stated that dengue prevention control could be categorized into three methods: biological control, chemical control, and environmental management. These three methods target the *Aedes* mosquitoes, the vectors of dengue. In the dynamics of transmission, the vector flight range is crucial. Within a 200-meter radius of the house where a dengue case is reported, the Malaysian Ministry of Health (MOH) uses standard approaches to reduce the proliferation of infected vectors and suppress dengue outbreaks by using vector control measures such as insecticide fogging, larviciding, and the elimination of potential larval habitats.

The establishment of the Communication for Behavioural Impact (COMBI) team is one of the Malaysian government's initiatives to target the people – by raising public awareness on the dangers of dengue and the need for prevention in residential areas. COMBI is a program founded by the World Health Organization (WHO) and implemented by the MOH. COMBI is a dynamic approach that uses social mobilization and communication strategies to influence behaviour change among individuals, families, and communities toward healthy behaviour. COMBI was developed based on theories of behaviour change, communication, and marketing. A comprehensive and flexible approach in planning, implementing, and monitoring social mobilization and communication actions can be modified according to the objectives selected (7). COMBI members are appointed from among the residents of a locality. This is the approach of the District Health Office to conduct dengue prevention activities with the residents. Dengue fever can be prevented, but success is highly dependent on community's awareness, attitude, and practice (KAP) (8).

People received dengue information from all sources, including books/newspapers/pamphlets, mass media, the internet, health campaign and people from their vicinity (9). Effective community participation is required to control vectors, but the general public's KAP towards dengue fever are weak (10). Communities living in hotspot areas have been shown to have poor knowledge and attitudes towards dengue, leading them to neglect their role in preventing dengue infection. The attitude of ignoring the cleanliness of their residential environment is the cause of increased dengue cases and recurring cases (11).

Understanding the knowledge, attitude, and practice (KAP) of the general community on dengue prevention is helpful to give information for good strategic planning and engaging the community (12). Therefore, this study aims to broaden the understanding of respondents' knowledge, attitude, and practice towards dengue fever prevention, especially in the multistorey household. The findings from this study is expected to help the District

Health Office to identify more efficient approaches in dengue control efforts to reduce the dengue fever outbreaks.

MATERIALS AND METHODS

Study area and participants

The People Housing Project or *Projek Perumahan Rakyat* (PPR) Batu Muda is located in the district of Kepong, Kuala Lumpur. PPR Batu Muda is comprised of seven blocks, each with 17 stories. It is a PPR with a sizable population of 5712 people. This location was chosen because outbreak of dengue disease occurs annually. The longest epidemic occurred in 2019, when 52 cases were reported during an 85-day period. The PPR is under the jurisdiction of Kepong Health Office. There are 373 respondents involved in this survey. The survey was open to adults aged 18 years or older.

Questionnaire

This is a cross-sectional study. This study used a questionnaire adapted from Nalongsack et al., (13) and Alhoot et al., (14). The questionnaire comprises of four sections. Section A is the sociodemographic part about the respondents' background, such as gender, race, age, occupation, and level of education. Section B contains ten questions about the respondents' knowledge of dengue fever. In this section, the respondent has three answer choices, namely 'not knowing' (1 mark), 'less knowing' (2 marks), and 'very knowledgeable' (3 marks). Section C is related to the attitude of dengue fever prevention by the respondents; they have to choose one of the answers of 'ignore' (1 mark), 'less aware' (2 marks), and 'very curious' (3 marks). Section D contains ten questions related to the respondents' practices on dengue fever prevention. There are also three answer choices, namely 'never' (1 mark), 'sometimes' (2 marks), and 'always' (3 marks).

Ethical approval

Written ethical approval by the UiTM Research Ethics Committee on the study entitled "A Household Based Survey of Knowledge, Attitude and Practices towards Dengue Fever outbreaks among Local Urban Communities in PPR Batu Muda, Kuala Lumpur" has been given with approval code Reference No: REC/07/2021(UG/MR/699).

Data analysis

Data were analysed using Statistical Package for Social Science (SPSS) 26.0 software. The study results are presented in the form of tables containing descriptive statistics to analyse sociodemographic factors. T-test was used to see the relationship between gender factors with knowledge, attitudes, and practices of dengue prevention in the community. ANOVA test was used to see the relationship between sociodemographic factors (race, age, occupation, and education level)

with knowledge of disease prevention, attitudes, and practices. All of these tests used a significant value of $p < 0.05$ with a 95% confidence interval.

RESULT

Table I shows sociodemographic characteristics of respondents. A total of 373 residents of PPR Batu Muda participated in answering the questionnaire. Males dominate as respondents at 89%, while females are 11%. Age-wise, 37.4% of respondents are aged 38 – 42 followed by respondents aged 33 – 37, which is 33.4%. The Malays are the majority of respondents at 85.4%, followed by 10.1% Indians and 4.5% Chinese. For job, 86.7% of respondents work in unskilled fields, and the remaining 3.4% of respondents are housewives. The majority of respondents have a tertiary education level at 94.2%.

Table I Socio-demographic characteristics of respondents

Characteristics	Frequency (n)	Percent (%)
Sex		
Male	332	89.0
Female	41	11.0
Age		
18 - 22	1	0.3
23 - 27	12	3.2
28 - 32	63	16.7
33 - 37	126	33.4
38 - 42	141	37.4
43 - 49	24	6.4
> 50	6	1.6
Mean = 4.31 SD = 1.003		
Race		
Malay	318	84.4
Chinese	17	4.5
Indian	38	10.1
Others	0	0
Occupation		
Unskilled	327	86.7
Skilled	10	2.7
Professional	7	1.9
Housewife	13	3.4
Pensioner	4	1.1
Unemployed	12	3.2
Mean = 1.37 SD = 1.12		
Education Level		
No formal education	0	0
Primary	0	0
Secondary	355	94.2
Tertiary	18	4.8
Mean = 3.05 SD = 0.215		

N=373

Referring to Table II, the average respondent knows the basics about dengue fever. 100% of respondents know about dengue fever. 73.9% of respondents know that dengue fever is a contagious disease. Most respondents (94.6%) are aware of the breeding grounds of Aedes mosquitoes. 100% of respondents know that dengue fever is dangerous. 92.2% of respondents do not know how dengue fever occurs. The peak time of mosquito biting is also less known by 93% of respondents. 94.1% of respondents are well aware of the symptoms of dengue fever. 92.2% of respondents are unaware that dengue fever has no cure. 69.9% respondents also do not know the shape of larvae, and 66.5% of respondents do not know that adult Aedes mosquitoes can spread the dengue virus into their eggs.

Table II Scoring the level of knowledge of respondents on dengue fever

Questions	Not Knowing (n) (%)	Less Know- ing (n) (%)	Very Knowledge- able (n) (%)
Know about dengue fever	0 (0%)	0 (0%)	373 (100%)
Know that dengue fever is infectious diseases	1 (0.3%)	17 (4.6%)	276 (73.9%)
Know Aedes mosquitoes breeding	0 (0%)	20 (5.4%)	353 (94.6%)
Know about danger of dengue fever	0 (0%)	0 (0%)	373 (100%)
Know about dengue fever occur	1 (0.3%)	344 (92.2%)	28 (7.5%)
Know the peak biting period of Aedes Mosquitoes	7 (1.9%)	347 (93.0%)	19 (5.1%)
Know the symptoms of dengue fever	0 (0%)	22 (5.9%)	351 (94.1%)
Dengue fever has no cure	2 (0.5%)	344 (92.2%)	27 (7.2%)
Shape of the larvae	3 (0.8%)	261 (69.9%)	109 (29.2%)
Know adult Aedes mosquito can transmit dengue virus into its eggs	248 (66.5%)	125 (33.5%)	0 (0%)

Table III shows that 95.9% of respondents are less aware that their home area is a dengue epidemic area. The majority of respondents (89.5%) are less aware of the time fogging activities were carried out. A total of 78.3% of respondents were unaware that PPR Batu Muda is having frequent dengue fever outbreak. 97.6% of respondents are less aware of the cleanliness of the environment in PPR Batu Muda. 96.5% of respondents are less aware that officials from the District Health Office came to carry out preventive activities. 66.5% of respondents did not care to open doors or windows during fogging activities. 91.4% of respondents are less aware that they could be compounded if larvae were found in their home area. 80.2% of the respondents are very aware of the need to bring a family member

with symptoms of dengue fever to see a doctor as soon as possible. The majority of respondents (93.2%) are less aware that water storage containers need to be closed. 90% of respondents are less aware that it is their responsibility to ensure no egg or larva exists in their home area.

Table III Level of scoring of respondents' attitudes towards dengue fever prevention

Questions	Ignore (n) (%)	Less Aware (n) (%)	Very Curious (n) (%)
Know the residential area is outbreak	2 (0.5%)	358 (95.9%)	13 (3.5%)
Time of fogging activity	26 (6.9%)	334 (89.5%)	13 (3.5%)
PPR Batu Muda often has outbreaks	49 (13.1%)	292 (78.3%)	32 (8.6%)
Care about the cleanliness of environment PPR Batu Muda	7 (1.9%)	364 (97.6%)	2 (0.5%)
Knowing officers from the Health Office came for control activities	12 (3.2%)	360 (96.5%)	1 (0.3%)
Know the need to open doors / windows during fogging activities	248 (66.5%)	37 (9.9%)	87 (23.3%)
Know the compound will be given if there is breeding of larvae	26 (6.9%)	341 (91.4%)	6 (1.6%)
Need to bring family members who have symptoms of dengue fever to see a doctor	34 (9.1%)	40 (10.7%)	299 (80.2%)
Water container used for water storage needs to be closed	2 (0.5%)	348 (93.2%)	23 (6.1%)
Know that it is the responsibility of the host to ensure that there are no larvae in the house	27 (7.2%)	336 (90.0%)	10 (2.6%)

Table IV summarizes the scoring levels for the respondents' practices on dengue fever prevention. 97.1% of respondents have never checked for larvae outside the house. 82.8% of respondents have never been involved in activities conducted by the Health Office. 90.3% of respondents never store water in open containers. As many as 85.5% of respondents never added larvicide into the water storage. 83.6% of respondents have never brushed the inside of a water container. There are 70.2% of respondents who use mosquito repellent sometimes. 92.8% of respondents never found a container containing larvae. The majority of respondents (94.6%) never opened windows or doors at dawn, and as many as 93.8% of respondents never opened windows and doors at dusk.

Table IV: Level of scoring of respondents' practice on dengue prevention

Questions	Never (n) (%)	Sometimes (n) (%)	Always (n) (%)
Inspect Aedes eggs or larvae in the house	230 (61.7%)	141 (37.8%)	2 (0.5%)
Inspect Aedes eggs or larvae outdoors	362 (97.1%)	11 (2.9%)	0 (0%)
Participate in activities conducted by the Health Office	309 (82.8%)	64 (17.2%)	0 (0%)
Store water in an open container	337 (90.3%)	36 (9.7%)	0 (0%)
Add larvicide into the water storage	319 (85.5%)	54 (14.5%)	0 (0%)
Scrub the inner side of water container	312 (83.6%)	61 (16.4%)	0 (0%)
Using mosquito repellent at home	30 (8.0%)	262 (70.2%)	81 (21.7%)
Find a container containing larvae	346 (92.8%)	26 (6.9%)	1 (0.3%)
Open windows or doors in the early morning after dawn	353 (94.6%)	20 (5.4%)	0 (0%)
Open windows or doors early in the morning before dusk or late evening	350 (93.8%)	22 (5.9%)	1 (0.3%)

The level of knowledge of dengue fever with sociodemographic variables in Table V shows that the respondents have a high level of knowledge where all obtained a score of 16 – 30. There is no significant difference between the level of knowledge of dengue fever and the respondents' sociodemography. The data showed that all p-values for sociodemographic variables are > 0.05 (p-value for gender = 0.53, p-value for race = 0.39, p-value for age = 0.32, p-value for employment = 0.67 and p-value for education level = 0.21).

Additionally, there is a significant difference in views about dengue fever prevention between races, with p-value = 0.02 (p < 0.05). There is a significant difference between the type of occupation of the respondents with the attitude towards the prevention of dengue fever where the value of p-value = 0.02 is which is < 0.05. However, no significant variations in gender (p-value = 0.48), age (p-value = 0.88), or level of education (p-value = 0.76) are observed.

Table V also shows the relationship between respondents' practices towards dengue fever prevention with the respondents' sociodemographic variables. The majority of respondents have poor practice, where most respondents obtained a score of 0 – 15. There was no significant difference between the respondents' practices on dengue prevention with the sociodemography of the respondents. The data showed that all p-values for

sociodemographic variables are > 0.05 (p-value for gender = 0.24, p-value for race = 0.77, p-value for age = 0.28, p-value for employment = 0.20 and p-value for education level = 0.15).

Table V The association between knowledge, Attitudes and Practices of dengue fever and socio-demographic variables

Variables	Good (16-30)	Poor (0-15)	F-stats (df)	p-Value	
Association of knowledge with socio-demographic variables					
Gender	Male	332 (89%)	0.62(368)	0.53	
	Female	41 (11%)			0 (0%)
Race	Malay	315 (84.4%)	0.394 (2:367)	0.39	
	Chinese	20 (5.4%)			0 (0%)
	Indian	38 (10.2%)			0 (0%)
Age	18-22	12 (3.2%)	1.177 (5:364)	0.32	
	23-27	62 (16.6%)			0 (0%)
	28-32	120 (32.2%)			0 (0%)
	33-37	137 (36.7%)			0 (0%)
	38-42	24 (6.4%)			0 (0%)
	43-49	6 (1.6%)			0 (0%)
	>50	12 (3.3%)			0 (0%)
Occupation	Unskilled	334 (89.5%)	0.677 (5:364)	0.67	
	Skilled	10 (2.7%)			0 (0%)
	Professional	6 (1.6%)			0 (0%)
	Housewife	10 (2.7%)			0 (0%)
	Pensioner	4 (1.1%)			0 (0%)
	Unemployed	9 (2.4%)			0 (0%)
	Level of Education	Secondary			352 (94.4%)
Tertiary	21(5.6%)	0 (0%)			
Association of attitudes with socio-demographic variables					
Gender	Male	322 (86.5%)	1.772 (368)	0.48	
	Female	39 (10.5%)			10 (2.7%)
Race	Malay	308 (82.6%)	0.211 (2:367)	0.02*	
	Chinese	19 (5.1%)			7 (1.9%)
	Indian	34 (9.1%)			1 (0.3%)
Age	18-22	12 (3.2%)	1.150 (5:364)	0.88	
	23-27	61 (16.4%)			4 (1.1%)
	28-32	119 (31.9%)			1 (0.3%)
	33-37	131 (35.1%)			1 (1.1%)
	38-42	20 (5.4%)			6 (1.6%)
	43-49	5 (1.3%)			4 (1.1%)
	>50	12 (3.2%)			1 (0.3%)

Table V The association between knowledge, Attitudes and Practices of dengue fever and socio-demographic variables

Variables	Good (16-30)	Poor (0-15)	F-stats (df)	p-Value	
Occupation	Unskilled	331 (88.7%)	4.568 (5:364)	0.02*	
	Skilled	8 (2.1%)			3 (0.8%)
	Professional	5 (1.3%)			2 (0.5%)
	Housewife	9 (2.4%)			1 (0.3%)
	Pensioner	3 (0.8%)			1 (0.3%)
	Unemployed	5 (1.3%)			4 (1.1%)
Level of Education	Secondary	341 (91.4%)	0.082 (1:368)	0.76	
	Tertiary	20 (5.4%)			11 (2.9%)
Association of Practices with socio-demographic variables					
Gender	Male	11 (2.9%)	-0.025 (368)	0.24	
	Female	0 (0%)			304 (81.5%)
Race	Malay	9 (2.4%)	0.133 (2:367)	0.77	
	Chinese	1 (0.3%)			306 (82%)
	Indian	1 (0.3%)			19 (5.1%)
Age	18-22	0 (0%)	2.607 (5:364)	0.28	
	23-27	0 (0%)			37 (9.9%)
	28-32	1 (0.3%)			12 (3.2%)
	33-37	7 (1.9%)			62 (16.6%)
	38-42	1 (0.3%)			119 (31.9%)
	43-49	0 (0%)			23 (6.2%)
	>50	0 (0%)			6 (1.6%)
Occupation	Unskilled	11 (2.9%)	2.566 (5:364)	0.20	
	Skilled	0 (0%)			323 (86.6%)
	Professional	0 (0%)			10 (2.7%)
	Housewife	0 (0%)			6 (1.6%)
	Pensioner	0 (0%)			10 (2.7%)
Level of Education	Secondary	10 (2.7%)	2.063 (1:368)	0.15	
	Tertiary	1 (0.3%)			4 (1.1%)
	Unemployed	0 (0%)			9 (2.4%)

*The relationship is significant at $p < 0.05$

CONTINUE

Table VI shows that p-value = 0.00 which is < 0.05. A good level of knowledge affects the attitude of the respondents. This proves that there is a significant difference between the level of knowledge and attitudes of respondents towards the prevention of dengue fever.

Table VI: The association between knowledge and attitude

Variable	Good Attitude n (%)	Poor Attitude n (%)	X2 (df)	P-value
Good Knowledge	361 (96.8)	12 (3.2%)	0.876 (1)	0.000*
Poor Knowledge	0 (0%)	0 (0%)		
Total	361	12		

*The relationship is significant at p<0.05

There is no significant difference between the level of knowledge and practice of respondents on dengue prevention, as shown in Table VII (p-value = 0.17 which is > 0.05). High levels of knowledge could not influence respondents' practices

Table VII: The association between knowledge and practise

Variable	Good Practise n (%)	Poor Practise n (%)	X2 (df)	P-value
Good Knowledge	11 (2.9%)	362 (97.1%)	2.061 (1:366)	0.17
Poor Knowledge	0 (0%)	0 (0%)		
Total	11	362		

*The relationship is significant at p<0.05

DISCUSSION

Globally, increasing urbanisation has resulted in increasing the risk of infectious diseases, especially vector-borne diseases. Human knowledge and behaviour, as well as dengue vectors, have all been linked to dengue spread (15). The majority of respondents in PPR Batu Muda have a good level of knowledge about dengue fever where 100% of respondents know about the dangers of dengue fever. These outcomes are almost equal with prior study conducted in Perak (16) which showed the highest rate of public knowledge of dengue fever (96.8%). In contrast with that, other studies done in Terengganu (9) and Negeri Sembilan (17) showed fair knowledge on dengue. This scenario could be due to the fact that different areas may have varied levels of knowledge among the residents. The result also showed the association between gender, age, race, occupation, and educational level with knowledge were insignificant with p-value > 0.005 respectively. This finding is parallel to the previous study conducted by Alhoot et al. (9).

On the other hand, our data showed that most respondents are less aware toward dengue fever prevention. Besides that, most respondents also showed less awareness of the importance of cleanliness in preventing dengue outbreak. More than 90% of respondents said they are unaware that water containers must be covered and they are responsible for ensuring that there are no larvae in the house. PPR Batu Muda has suffered dengue outbreaks for quite some time, unfortunately the residents are still unable to cooperate with the health officers for vector control. This is evident when most of the respondent are less aware of the time of fogging activity in their area and 66.5% of respondents ignore opening doors or windows during fogging activities. A study conducted by Sulistyawati S. et al. (18) found that many people in the neighbourhood were unaware of vector control activities conducted by the authority. They were unsure what should they do during the fogging, and they also claimed that they were unaware that windows and doors should be opened during fogging. In addition, they were afraid about the effect of fogging to their health and believed that dengue prevention is inconvenient.

Our results show a significant difference between the respondents' attitude on the prevention of dengue fever with race (p < 0.05). Malay respondents have a good attitude toward dengue prevention and control compared to other races. These results are similar to Leong et al. (17), where ethnicity has a significant association with respondents' attitudes. Malays living in rural areas are known to have a more traditional lifestyle, spending large amounts of time in and around the house; they thus develop positive attitudes towards the elimination of mosquito breeding sites. In contrast Lugova and Wallis (19) reported opposite finding among staff and student university. They found that Chinese, Indian and other ethnicities had significant positive attitudes towards dengue compared to the Malay. The inequality in results could be due to variances in research populations.

There is a significant difference between dengue prevention practices and the type of occupation of the respondents. A study by Al-Dubai et al. (20) also found no association between practice and employment status. However, our study found no significant differences between gender, age, and level of education of respondents with practices on the prevention of dengue fever.

Regarding the respondents' practices on the prevention of dengue fever, the majority of respondents answered 'never'. Only 0.5% of respondents regularly check for larvae in their homes. 97.1% of respondents have never inspected for larvae outside their homes. The community is invited to work together to eradicate Aedes mosquito breeding areas, such as cleaning residential areas by destroying areas that can be breeding grounds for Aedes mosquitoes, such as old tires, empty bottles and cans, drains and so on (21). There was no significant

difference between practices on dengue prevention with the sociodemography of the respondents.

The majority of respondents do not practice activities that can reduce the incidence of dengue fever. This contrasts with the study conducted by Dhimal et al. (22), where the level of good practice is much higher than the level of good knowledge. Respondents did not practice the "Spend 10 minutes to find breeding grounds for *Aedes* mosquitoes" program organized by the Ministry of Health Malaysia.

There is a significant difference between the level of knowledge and attitude. The majority of respondents have a high level of knowledge with attitudes. A high level of knowledge can instil a good attitude. These findings are similar to Hairi et al. (23) in which respondents had good attitudes toward dengue control but contrasts with Alhoot et al. (14) where there was no relationship between knowledge level and attitude. Our study found no significant difference between the level of knowledge and practice.

The majority of respondents have poor practice despite their high level of knowledge, similar to Azfar et al. (24) where there was no significant between knowledge and practice. This demonstrates that dengue knowledge does not necessarily influence dengue control practice. The lack of correlation between dengue preventative knowledge and practice suggests that the government or private sector must help initiate, develop, and implement large-scale education programmes or other services for better dengue management across Malaysia (25).

Ostensibly, this study shows that the high level of knowledge does not affect the attitudes and practices of respondents towards dengue fever prevention. Less cooperation from the community might be due to them uninterested and do not care about the existence of dengue fever in their area. Dengue fever requires all parties to work together in order to control the spread. Therefore, all parties need to change their attitudes in the fight against dengue while supporting the government's efforts against dengue. It was discovered that knowledge or attitude alone does not always equate to successful practice (18). Dengue awareness activities should be carried out in schools and colleges as part of a broader widespread public health campaign especially through social media.

Social media appears to be a promising platform for instilling positive change in the prevention and control of dengue fever. Mobile phone is an example of a good device in spreading information nowadays. Mobile phones are currently utilised to communicate on a regular basis, and they have been successfully used in behavioural change initiatives (26,27).

CONCLUSION

In conclusion, the study show that the respondents have a high level of knowledge and attitude. Even so, the respondents' practice in reducing the incidence of outbreaks are still poor. There are some positive practices regarding dengue prevention among the respondents, but the case statistics of this disease are still at an alarming level. Most of the residents at PPR Batu Muda work and have limited time to monitor the cleanliness of their house area. The individualistic attitude of the community also influences the increasing number of dengue cases because they do not want to share the social responsibility of maintaining the cleanliness of the area. High levels of knowledge are not in line with their practice. The District Health Office needs to increase activities that involve the population. Perhaps stricter enforcement and legal action can change the attitudes and practices of the population towards dengue fever prevention for the better.

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REFERENCES

1. Minister of Health Malaysia. (2020). Kenyataan akhbar Ketua Pengarah Kesihatan Malaysia situasi semasa demam denggi, zika dan chikungunya di Malaysia. In Ministry of Health Malaysia (pp. 1–10). Portal Rasmi Kementerian Kesihatan. 2020. Available from: https://www.moh.gov.my/index.php/database_stores/store_view/17
2. AhbiRami R, Zuharah WF. School-based health education for dengue control in Kelantan, Malaysia: Impact on knowledge, attitude and practice. *PLoS neglected tropical diseases*. 2020 Mar 27;14(3):e0008075.
3. Sarip AG, Lee YF. Exploring the perception of lifestyle housing development in Malaysia. The Asia Pacific Network for Housing Research (APNHR) 2015, 9-12 April 2015, Asia Cultural Complex, Gwangju. 2015 Apr. 09 - 12 April 2015, Asia Cultural Complex, Gwangju, South Korea.
4. Selvarajoo S, Liew JW, Tan W, Lim XY, Refai WF, Zaki RA, Sethi N, Sulaiman WY, Lim YA, Vadivelu J, Vythilingam I. Knowledge, attitude and practice on dengue prevention and dengue seroprevalence in a dengue hotspot in Malaysia: A cross-sectional study. *Scientific reports*. 2020 Jun 12;10(1):1-3.
5. Noisakran S, Perng GC. Alternate hypothesis on the pathogenesis of dengue hemorrhagic fever (DHF)/

- dengue shock syndrome (DSS) in dengue virus infection. *Experimental biology and medicine*. 2008 Apr;233(4):401-8.
6. Falope O, Hanson K, Azizan A. Dengue and mosquito control programs: a comparative analysis. *Journal of Applied Life Sciences International*. 2015:35-48.
 7. Suhaili M, Hosein E, Mokhtar Z, Ali N, Palmer K. Applying Communication-for-Behavioural-Impact (COMBI) in the Prevention and Control of Dengue in Johor Bahru, Johore, Malaysia. *Dengue Bulletin*.2004; 39-43.
 8. Alyousefi TA, Abdul-Ghani R, Mahdy MA, Al-Eryani SM, Al-Mekhlafi AM, Raja YA, Shah SA, Beier JC. A household-based survey of knowledge, attitudes and practices towards dengue fever among local urban communities in Taiz Governorate, Yemen. *BMC infectious diseases*. 2016 Dec;16(1):1-9.
 9. Aung MM, Hassan AB, Kadarman NB, Hussin TM, Barman A, Ismail SB, Hashim SE. Knowledge, attitude, practices related to dengue fever among rural population in Terengganu, Malaysia. *Malaysian Journal of Public Health Medicine*. 2016 Jan 1;16(2):15-23.
 10. Firdous J, Mohamed A, Al Amin M, Ihsan M, Faris'Imadi M, Hakim MK, Afiq M, Muhamad N. Knowledge, attitude and practice regarding dengue infection among Ipoh community, Malaysia. *Journal of Applied Pharmaceutical Science*. 2017 Aug;7(8):99-103.
 11. Páez-Guerra CL, Seda H, García-Rivera EJ, Clark GG. Knowledge and attitudes in Puerto Rico concerning dengue prevention. *Revista Panamericana de Salud Pública*. 2005;17:243-53.
 12. Zamri SN, Rahman NA, Haque M. Knowledge, Attitude, and Practice Regarding Dengue among Students in a Public University in Malaysia. *Bangladesh Journal of Medical Science*. 2020 Jan 16;19(2):245-53.
 13. Nalongsack S, Yoshida Y, Morita S, Sosouphanh K, Sakamoto J. Knowledge, attitude and practice regarding dengue among people in Pakse, Laos. *Nagoya J Med Sci*. 2009 Feb 1;71(1-2):29-37.
 14. Alhoot MA, Baobaid MF, Al-Maleki AR, Abdelqader MA, Paveetran A, Bathmanathan L, Murugan A, Maniam L. Knowledge, attitude, and practice towards dengue fever among patients in Hospital Taiping. *Malaysian Journal of Public Health Medicine*. 2017 Dec 25;17(3):66-75.
 15. Ibrahim NK, Al-Bar A, Kordey M, Al-Fakeeh A. Knowledge, attitudes, and practices relating to Dengue fever among females in Jeddah high schools. *Journal of infection and public health*. 2009 Jan 1;2(1):30-40.
 16. Abdullah M, Azib WN, Harun M, Burhanuddin M. Reliability and construct validity of knowledge, attitude and practice on dengue fever prevention questionnaire. *Am Int J Contemp Res*. 2013;3:69-75.
 17. Leong TK. Knowledge, attitude and practice on dengue among rural communities in Rembau and Bukit Pelanduk, Negeri Sembilan, Malaysia. *International Journal of Tropical Disease & Health*. 2014 May 27:841-8.
 18. Sulistyawati S, Dwi Astuti F, Rahmah Ummiyati S, Tunggul Satoto TB, Lazuardi L, Nilsson M, Rocklov J, Andersson C, Holmner E. Dengue vector control through community empowerment: lessons learned from a community-based study in Yogyakarta, Indonesia. *International journal of environmental research and public health*. 2019 Jan;16(6):1013.
 19. Lugova H, Wallis S. Cross-sectional survey on the dengue knowledge, attitudes and preventive practices among students and staff of a public university in Malaysia. *Journal of community health*. 2017 Apr 1;42(2):413-20.
 20. Al-Dubai SA, 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 Jan 1;44(1):37-49.
 21. Sulaiman NS, Er AC. Pengawalan Dan Pencegahan Denggi Di Malaysia: Satu Tinjauan Terhadap Penglibatan Kerajaan Malaysia (Dengue Control and Prevention in Malaysia: A Review of Government Involvement). e-Bangi. 2018 Jan 27;13(5).
 22. Dhimal M, Aryal KK, Dhimal ML, Gautam I, Singh SP, Bhusal CL, Kuch U. Knowledge, attitude and practice regarding dengue fever among the healthy population of highland and lowland communities in central Nepal. *PloS one*. 2014 Jul 9;9(7):e102028.
 23. Hairi F, Ong CH, Suhaimi A, Tsung TW, bin Anis Ahmad MA, Sundaraj C, Soe MM. A knowledge, attitude and practices (KAP) study on dengue among selected rural communities in the Kuala Kangsar district. *Asia Pacific Journal of Public Health*. 2003 Jan;15(1):37-43.
 24. Azfar ZM, Nazri SM, Rusli AM, Maizurah O, Zahiruddin WM, Azwany YN, Nabilah I, Asma HS, Aziah BD. Knowledge, attitude and practice about leptospirosis prevention among town service workers in northeastern Malaysia: a cross sectional study. *Journal of preventive medicine and hygiene*. 2018 Mar;59(1):E92.
 25. Roslan MA, Ngui R, Vythilingam I, Fatt CK, Soon OP, Keat LC, Muhamed NH, Sulaiman WY. Survey of Dengue Knowledge and Prevention Practices Associated with Sociodemographic Status: A Cross-Sectional Study Among the Community Living in an Urban Area of Selangor, Malaysia. *Journal of the American Mosquito Control Association*. 2020 Jun;36(2):115-9.
 26. Rosli WR, Rahman SA, Parhar JK, Suhaimi MI. Positive impact of educational intervention on knowledge, attitude, and practice towards dengue

among university students in Malaysia. *Journal of Public Health*. 2019 Aug;27(4):461-71.

27. Zhao J, Freeman B, Li M. Can mobile phone apps influence people's health behavior change?

An evidence review. *Journal of medical Internet research*. 2016;18(11):e287.