

Factors Affecting Dengue Fever among the Population in Bandar Maharani, Muar, Johor, Malaysia

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Abstract

Background: Dengue is a mosquito-borne viral disease. The trend of dengue incidence in Malaysia has continued to increase since 2001 until 2014. Despite the close monitoring and continuous efforts from the Ministry of Health and Municipals to conduct the prevention and control activities, the number of dengue cases continued to increase due to multiple uncontrolled factors.

Aim: Our objective is to assess the factors affecting dengue fever among the population in Bandar Maharani, Muar, Johor, Malaysia.

Methodology: A descriptive, cross-sectional study design based on simple random sampling, resident aged between 18 to 60 years old was randomly chosen. Data was collected using assisted self-administered questionnaire that covered 4 parts i.e. socio-demographic data, knowledge about dengue infection, attitudes towards dengue fever and practices of dengue prevention. Data was analyzed using PASW statistics student version 18.

Results: It was found that knowledge among the respondent was only moderate. The respondents' attitude was neutral and the practice was good. The most common source of information on dengue was from the television (72.1%). There was significant association between knowledge and practice ($p = 0.000$) and also between attitude and practice ($p = 0.000$). Attitude was associated with ethnicity ($p = 0.002$) and education level ($p = 0.031$).

Conclusion: The study has highlighted that despite having satisfactory level of practice on dengue prevention, the knowledge and attitude can be further strengthened. Information, education and communication materials can be provided at areas that are more accessible. This would help to increase knowledge and mold positive attitude among the Muarian to eliminate dengue fever.

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

Introduction

Dengue is a mosquito-borne disease caused by any one of four closely related dengue viruses (DEN-1, -2, -3, and -4). The mosquito-borne infection especially dengue, had become a global health problem in Asia, the Americas and the Western Pacific. The infection has turn into endemic with repeated epidemic outbreaks in many parts of the tropics and subtropical regions of the world (World Health Organization, 2014).

Dengue virus, a flavivirus in the family of Togaviridae is transmitted to humans by the bite of infected Aedes. Aedes aegypti mosquito serves as a main vector for the transmission of the virus. It is found in urban area while Aedes albopictus predominates in the rural setting (Pang T et al, 1983; Lam SK, 1993).

Today about 2.5 billion people or 40% of the world population are living in areas with high risk of dengue transmission. Dengue is endemic in at least 100 countries in Asia, the Pacific, the Americas, Africa, and the Caribbean. The World Health Organization (WHO) estimates that 50 to 100 million infections occurs yearly, including 500,000 DHF cases and 22,000 deaths, mostly among children (Centers for Disease Control and Prevention, 2015).

Since the first reported case of dengue fever in Malaysia in 1902, dengue has remained a serious public health problem in this country (Li Ping Wong et al, 2014). A series of outbreak reported in 1973 with 54 deaths out of 1,487 cases, 1974 with 104 deaths out of 2,200 cases and 1982 with 35 deaths out of 3,006 cases reported. Since year 2002, the number of dengue cases and incidence rate continue to increase with the highest ever reported in 2014 (Rose NaniMudin, 2015). Dengue is rated the most important communicable disease in Malaysia, superseding tuberculosis, malaria and HIV/AIDS (Shepard DS et al, 2013).

Malaysia started to implement the National Strategic Plan for Dengue (2009-2013) targeting to reduce the cases of dengue by half in a duration of 5 years. The strengthening on dengue prevention and control is carried throughout 7 strategies: (i) surveillance system, (ii) integrated vector management, (iii) dengue case management, (iv) communication and social mobilization, (v) dengue outbreak response, (vi) dengue research and (vii) dengue strategic plan (Ministry of Health, 2010). However, gaps still exist where even with high knowledge, attitude, practice within the community; dengue fever still remains to be a problem and is currently on the increasing fashion (Anita AbdRahman et al, 2014).

For development of a suitable health education strategy, it is necessary to understand the level of perception and knowledge of the community regarding dengue fever, the attitude and practices the people follow to prevent from dengue fever (K. Ravi Kumar et al, 2005).

Aim of this Study

General objective

To assess the factors affecting dengue fever among the population in Bandar Maharani, Muar, Johor, Malaysia.

Specific objectives

1. To determine the knowledge, attitude, and practice of dengue fever among Muarian.
2. To determine the association between socio-demographic characteristics with knowledge, attitude and practice of dengue fever among Muarian.
3. To determine the association between knowledge and practice of dengue fever among Muarian.
4. To determine the association between attitude and practice of dengue fever among Muarian.
5. To determine the sources of information.

Methodology

Study design

This was a descriptive, cross-sectional study of perception, knowledge, attitudes and practices concerning dengue among communities of Bandar Maharani, Johor, Malaysia.

Study population

The population in this study was residents of Bandar Maharani who were aged between 18-60 and were living there for at least one year.

Study area

Bandar Maharani was selected as the study area due to the high population density and availability of adequate data.

Study period

From 2nd to 4th week of November, 2015.

Sample size

A computed sample size of 383 respondents was required to fulfill the objective of the study at a 95% confidence level assuming 5% of confidence interval.

Sampling method

Bandar Maharani was chosen among the 11 districts of Johor by simple random sampling. Bandar Maharani has a total number of 127,905 populations. A total of 10 residential areas in Bandar Maharani were selected randomly by random sampling software. In every residential area, odd number was chosen. Each members of the selected household was interviewed.

Ethical considerations

Approval of the study was obtained from the Medical Research Ethics Committee (MREC) of Asia Metropolitan University, Selangor, Malaysia. Informed the participants about the purpose and design of the study and assured that participation was voluntary and confidential. Written consent was obtained from those who agreed to participate.

Research instrument and Measurement

Data was collected by using a validated questionnaire which was developed from literature for the use in this study (Nahida Ahmed, 2007). The questions were directed towards gaining information regarding the community's knowledge, attitude and practice on dengue fever. The questionnaire was translated from English to Bahasa Malaysia and Mandarin without altering the original meaning which was verified by Bahasa Malaysia and Mandarin teachers.

The questionnaire consisted of 4 parts:

The first part consisted of information regarding demographic data such as age, gender, educational level, marital status, ethnicity and employment status.

The second part included questions on knowledge about dengue infection. This was assessed by 14 questions and the response option included 'yes' or 'no'. A correct answer was given 1 score and 0 score for the wrong answer. The score varies from 0-14 points and classified into 3 levels as follows:

High level (80-100%)	12-14 scores
Moderate level (60-79%)	9-11 scores
Low levels (less than 59%)	0-8 scores

The third part assessed the attitudes towards dengue fever and it included 12 questions, assessing by using Likert's Scale. There were 12 statements which includes both positive and negative. The rating scale measured as follows:

Positive Statement		Negative Statement	
Choice	Score	Choice	Score
Strongly agree	5	Strongly agree	1
Agree	4	Agree	2
Neither agree nor disagree	3	Neither agree nor disagree	3
Disagree	2	Disagree	4
Strongly disagree	1	Strongly disagree	5

The score varies from 12 to 60 and all individual answers were summed up for total scores and calculated for means. The scores were classified into 3 levels:

Positive Attitude 47-60 scores
Neutral Attitude 41-46 scores
Negative Attitude 12-40 scores

The fourth part addressed practices of dengue prevention which was assessed by 13 questions and the response options included 'yes', 'no' and 'do not have'. The variables gave zero for 'no' and value one for 'yes'. (Based on Bloom's cut off point, 60-80%)

Good level 9-13 scores
Fair level 5-8 scores
Poor level 0-4 scores

Data analysis procedures

The collected information was entered in Excel sheet and interpreted by using PASW Statistics Student Version 18. Summed up the questions on knowledge, attitudes, and practices and obtained the total score of each part. Data analysis including descriptive statistics (frequency, percentage, mean and standard deviation) was used to summarize and describe the data. Chi-square was used for analytical statistic to describe the relationship between two variables.

Frequency distribution in term of

- Socio-demographic characteristics
- Level of knowledge
- Attitude towards dengue fever
- Practice regarding dengue fever prevention

Association between:

- Socio-demographic characteristics with knowledge, attitude and practice
- Knowledge and practice
- Attitude and practice

Results

Demographic information

A total of 383 populations of Bandar Maharani, Muar participated in the study. Table 1 shows the socio-demographic characteristics of respondents. The mean age of the study participants was 30.64 years, with a standard deviation of 10.19. The age ranged from 18 to 60 years old. There were more female (60.8%) than males (39.2%) in this study. More than half of the respondents (64.8%) were married. Most of the study participants had a secondary school education (77.3%) while 13.6% were undergraduates. Of the total respondents, 73.4% were employed. The majority (42.0%) had a monthly income of RM 900 to RM 1500. Most of the participants were Malay (64.5%) with Chinese and Indians at 31.6% and 2.1% respectively. The remaining consisted of other ethnic minorities (1.8%).

Table 1. Socio-demographic characteristics of respondents (N=383)

Characteristic	n (%)	Characteristic	n (%)
Gender		Employment Status	
Male	150 (39.2)	Employed	281 (73.4)
Female	233 (60.8)	Unemployed	102 (26.2)
Age Groups (years)		Income	
18-30	260 (67.9)	None	108 (28.2)
31-43	65 (17)	RM 900-RM1500	161 (42)

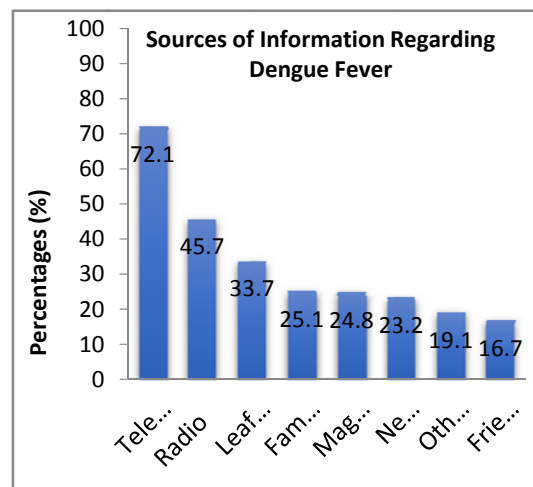
44-56	40 (10.4)	RM 1500- RM3000	76 (19.8)
>56	18 (4.7)	Above RM3000	38 (9.9)
Marital Status		Ethnicity	
Single	248 (64.8)	Malay	247 (64.5)
Married	123 (32.1)	Chinese	121 (31.6)
Divorced	6 (1.6)	Indian	8 (2.1)
Widow	6 (1.6)	Others	7 (1.8)
Educational Level			
Primary	16 (4.2)		
Secondary	296 (77.3)		
Graduate	52 (13.6)		
Post-graduate	19 (5.0)		

Source of information regarding dengue fever

The respondents were allowed to select more than one source of information about dengue fever. The main source of information given by the participants was television (72.1%) followed by radio (45.7%) and leaflets (33.7%). The most under-utilized source of information was from friends (16.7%).

Table 2. Sources of information regarding dengue fever and the percentage of respondents.

Sources	n	%
Television	276	72.1
Radio	175	45.7
Leaflets	129	33.7
Family	96	25.1
Magazines	95	24.8
Newspaper	89	23.2
Others	73	19.1
Friends	64	16.7



Graph 1. Sources of information regarding dengue fever and the percentage of respondents.

Knowledge about dengue infection

In the survey questionnaire, there were 14 questions related to knowledge of dengue fever. One point was given to each correct response. The mean total knowledge score for the overall sample was 4.73 with a standard deviation of 1.76,

out of possible 14 points. The response for the 14 knowledge part of the questionnaire was summarized in Table 4. Only one respondent was able to answer all the questions correctly.

The range of knowledge score was 0-14 as shown in Table 3. It showed that 62.9% of the participants had moderate level of knowledge, 21.2% had low knowledge and 15.9% had high knowledge. Approximately all of the participants (97.4%) were aware that empty stagnant water from old tires, trash cans, and flower pots can be breeding places for mosquitoes. Three hundred and fifty one of the respondents (91.6%) knew that the principal mosquito vector for dengue fever is *Aedes aegypti*. More than half of the participants (85.1%) knew that the symptoms of dengue are chills, headache, pain upon moving the eyes and low backache. However, more than half of the participants (64.5%) wrongly answered that dengue mosquito lays eggs in dirty sewage water. Only 24.5% of the participants knew that mosquito transmitting infection bites only during day time.

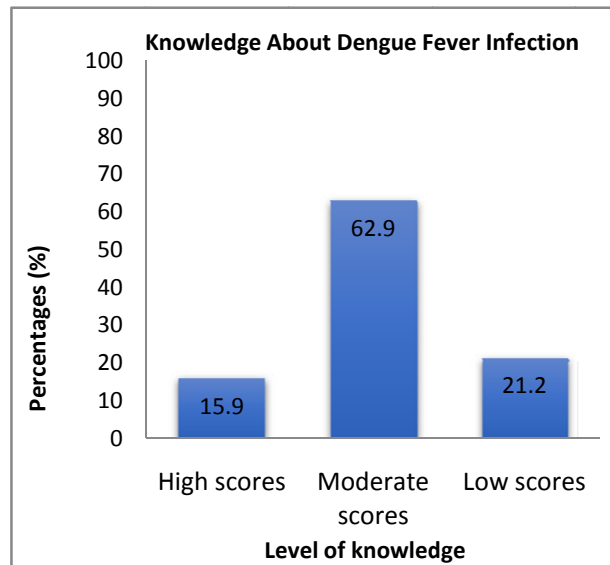
Table 3. Knowledge about dengue infection; number and percentage of respondent based on the option given.

Questions	Number of respondents (%)	
	Yes	No
1. The principal mosquito vector for dengue fever is <i>Aedes aegypti</i> .	351 (91.6)	32 (8.4)
2. Dengue fever is a severe, flu-like illness that affects infants, young children and adults.	300 (78.3)	83 (21.7)
3. Dengue patients have chills, headache, pain upon moving the eyes, and low backache.	326 (85.1)	57 (14.9)
4. Rainy season is the only epidemic season for dengue infection.	241 (62.9)	142 (37.1)
5. Mosquitoes transmitting dengue infection bites only during day time.	94 (24.5)	289 (75.5)
6. The mosquito that transmits dengue infection lays its eggs in dirty sewage water.	247 (64.5)	136 (35.5)
7. Empty stagnant water from old tires, trash cans, and flower pots can be breeding places for mosquitoes.	373(97.4)	10 (2.6)
8. Dengue viruses are transmitted to human through bites of infective female <i>Aedes</i> mosquitoes.	286 (74.4)	97 (25.3)
9. Only method of controlling dengue infection is to combat the vector mosquitoes.	323 (84.3)	60 (15.7)
10. There is no specific treatment for dengue infection and the drug of choice is paracetamol.	162 (42.3)	221 (57.7)
11. Abate sand can be beneficial in killing the mosquito larvae.	315 (82.2)	68 (17.8)
12. Abate sand, if put in the standing water, can help prevent the mosquito breeding for 3 months.	281 (73.4)	102 (26.6)
13. Stored water containers/ tanks for drinking water without being covered should be cleaned every 7 days.	307 (80.2)	76 (19.8)
14. I am afraid of getting dengue fever if one of my family members has dengue fever.	320 (83.6)	63 (16.4)

Table 4. Knowledge about dengue infection; number and percentage of the respondents based on the score.

Level		Number of respondents (%)
High (80-100%)	12-14 scores	61 (15.9)
Moderate (60-79%)	9-11 scores	241 (62.9)
Low (less than 59%)	0-8 scores	81 (21.2)

Minimum = 4
Maximum = 14
Mean = 4.73
Standard deviation = 1.76



Graph 2. Number and percentage of the respondent's knowledge about dengue fever infection based on the scores.

Attitude towards dengue fever

The participants answered a total of 12 questions related to the attitude towards dengue fever, which had a total score of 60. The distribution of attitudes toward dengue fever is shown in Table 6. There were 44.1% of participants who had “neutral attitude”, 37.9% had “negative attitude” while 18.0% had positive attitude. The mean larval breeding sources is a waste of time and very complicated while more than half of the participants (56.4%) disagreed that person who once got dengue infection cannot be infected again. Fifty-four percent of participants disagreed that strong and healthy person will not get dengue infection. When asked about the possibility to recover completely from dengue infection, 48.0% of the respondents agreed and 1.3% of the respondents were strongly disagreed that the only method of controlling or preventing dengue and dengue hemorrhagic fever is to combat the vector mosquitoes.

Table 5. Attitude towards dengue infections, number of respondents based on the options given.

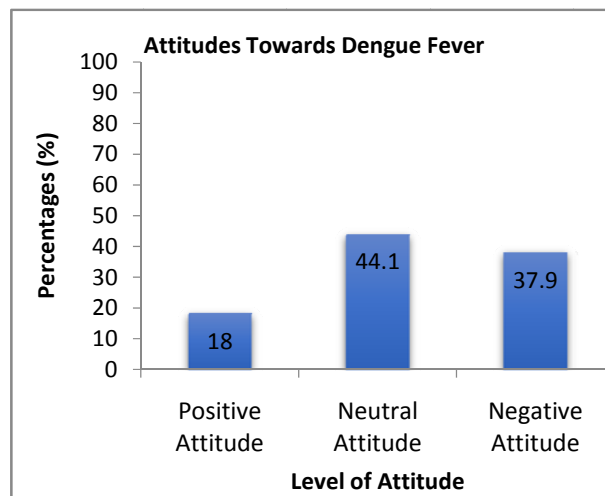
Questions	Number of respondents (%)				
	Strongly Agree	Agree	Neither agree nor Disagree	Disagree	Strongly Disagree
1. Dengue fever is a disease that cannot be prevented.	37 (9.7)	103 (26.9)	37 (9.7)	142 (37.1)	64 (16.7)
2. Eliminating the	99 (25.8)	93 (24.3)	34 (8.9)	105	52 (13.6)

breeding places is the responsibility of the public health staff and health volunteer.				(27.4)	
3. Only method of controlling or preventing dengue and dengue hemorrhagic fever is to combat the vector mosquitoes.	123 (32.1)	172 (44.9)	48 (12.5)	35 (9.1)	5 (1.3)
4. Only smogging is enough to prevent mosquito and no need for other ways.	23 (6.0)	60 (15.7)	58 (15.1)	190 (49.6)	52 (13.6)
5. Everybody has a chance to be infected with dengue virus.	76 (19.8)	192 (50.1)	41 (10.7)	52 (13.6)	22 (5.7)
6. Person who once got dengue infection cannot get dengue infection again.	19 (5.0)	30 (7.8)	52 (13.6)	216 (56.4)	66 (17.2)
7. It is possible to recover completely from dengue infection.	55 (14.4)	184 (48.0)	57 (14.9)	74 (19.3)	13 (3.4)
8. Elimination of larval breeding sources is a waste of time and very complicated.	8 (2.1)	35 (9.1)	43 (11.2)	153 (39.9)	144 (37.6)
9. Restricting and checking the availability of potential breeding habits should be conducted every 1-2 times/year.	33 (8.6)	110 (28.7)	63 (16.4)	126 (32.9)	51 (13.3)
10. Strong and healthy person will not get dengue infection.	17 (4.4)	39 (10.2)	39 (10.2)	207 (54.0)	81 (21.1)
11. Sleeping in mosquito net can prevent dengue infection.	41 (10.7)	154 (40.2)	65 (17.0)	98 (25.6)	25 (6.5)
12. You are one of the important people in preventing dengue fever.	124 (32.4)	173 (45.2)	62 (16.2)	14 (3.7)	10 (2.6)

Table 6. Attitude towards dengue fever; number and percentages of respondents based on the scores.

Level		Number of respondents (%)
Positive Attitude	47-60 scores	69 (18.0)
Neutral Attitude	41-46 scores	169 (44.1)
Negative Attitude	12-40 scores	145 (37.9)

Minimum = 27
Maximum = 56
Mean = 41.93
SD = 4.99



Graph 3. Number and percentages of respondent's attitude towards dengue fever based on the scores.

Practice regarding dengue infection

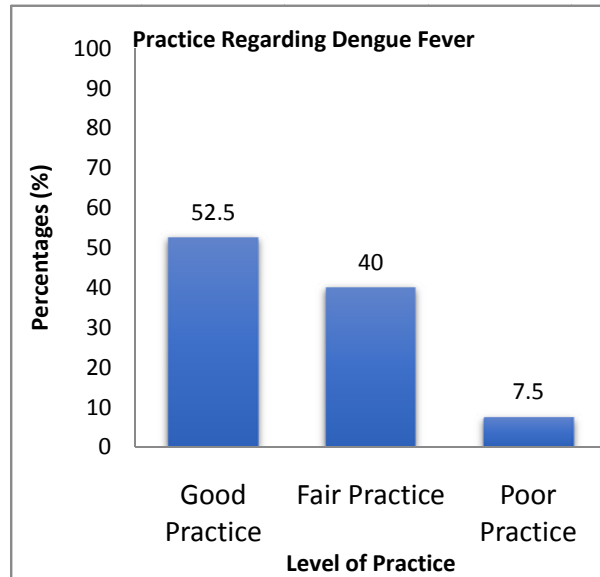
Participants answered a total of 13 questions. Each correct response was given one mark with a total score of 13. The total scores are added up and distributed to three levels which are poor practice, fair practice and good practice. The mean practice score was 8.46 out of possible 13 points with a standard deviation of 2.65. The distribution of practice regarding dengue infection was presented in Table 8. Majority of the respondents, 52.3% had "good practice", 40% had "fair practice" and only 7.5% had "poor practice". Table 7 shows respondents' practices regarding dengue infection. Majority of the respondents (86.2%) had a cover for their water tanks and 88.5% of them removed the mosquito larvae if it is found in the water tank. Three hundred and thirty four respondents (87.2%) disposed any discarded thing that can hold water around their house. About 86.7% of the respondents covered the water jar immediately after used. Approximately, only 39.4% of the respondents checked and cleaned the roof gutters in the raining season.

Table 7. Practice regarding dengue infection; number and percentages of respondents based on the options given.

Questions	Number of respondents (%)		
	Yes	No	Don't have
1. Do you cover water jars after using immediately?	332 (86.7)	39 (10.2)	12 (3.1)
2. Do you have a cover in your water tanks?	330 (86.2)	31 (8.1)	22 (5.7)
3. If there is a mosquito larvae in your water tank, do you ever do anything to get rid of it?	339 (88.5)	21 (5.5)	23 (6.0)
4. Do you ever examine the mosquito larvae in the flower pots?	248 (64.8)	76 (19.8)	58 (15.1)
5. Do you change the water of the indoor plants every week?	228 (59.5)	80 (20.9)	75 (19.6)
6. Do you ever drain off the water in the plates of the flower pot?	230 (60.1)	83 (21.7)	69 (18.0)
7. Do you examine any discarded thing that can hold water around your house?	296 (77.3)	60 (15.7)	26 (6.8)
8. If yes, do you ever put them in the garbage or dispose them?	334 (87.2)	28 (7.3)	21 (5.5)
9. Do you use mosquito net/ mosquito coils in your house?	208 (54.3)	114 (29.8)	61 (15.9)
10. Do you participate when your community has been sprayed fog?	126 (32.9)	219 (57.2)	38 (9.9)
11. Do you participate in any campaigns of dengue infection in your community?	131 (34.2)	208 (54.3)	44 (11.5)
12. Do you ever examine the mosquito larvae in water containers in the toilet?	295 (77.0)	68 (17.8)	20 (5.2)
13. Do you check and clean your roof gutters in the rainy season?	151 (39.4)	185 (48.3)	47 (12.3)

Table 8. Practice regarding dengue infection; number and percentages of respondents based on the scores.

Level	Number of respondents (%)	
Good	9-13 scores	201 (52.5)
Fair	5-8 scores	153 (40.0)
Poor	0-4 scores	29 (7.5)



Graph 4. Number and percentages of respondents practice regarding dengue infection based on the scores.

Association between knowledge, attitude and practice about dengue infection and socio-demographic variables

Chi-square test was used to determine the association between socio-demographic variables and knowledge of dengue infection in Bandar Maharani, Muar population. The following tables (Table 9 to 13) provide the details of these tests.

As shown in Table 9 there was no association between socio-demographic and level of knowledge.

Table 9. Association between socio-demographic variables and knowledge about dengue fever infection.

Socio-demographic variables		Knowledge			Total n (%)
		High n (%)	Moderate n (%)	Low n (%)	
Age	18-30	38 (14.6)	169 (65.0)	53 (20.4)	260 (100)
	31-43	13 (20.3)	38 (58.5)	14 (21.5)	65 (100)
	44-56	7 (17.5)	24 (60.0)	9 (22.5)	40 (100)
	>56	3 (16.7)	10 (55.6)	5 (27.8)	18 (100)
Gender	Male	38 (25.3)	76 (50.7)	36 (24.0)	150 (100)
	Female	23 (9.9)	165 (70.8)	45 (19.3)	233 (100)
Marital Status	Single	37 (14.9)	157 (63.3)	54 (21.8)	248 (100)
	Married	21 (17.1)	77 (62.6)	25 (20.3)	123 (100)
	Divorced	2 (33.3)	3 (50.0)	1 (16.7)	6 (100)
	Widowed	1 (16.7)	4 (66.7)	1 (16.7)	6 (100)
Education Level	Primary	2 (12.5)	8 (50.0)	6 (37.5)	16 (100)
	Secondary	45 (15.2)	185 (62.5)	66 (22.3)	296 (100)
	Graduate	12 (23.1)	34 (65.4)	6 (11.5)	52 (100)

	ate				
	Post-graduate	2 (10.5)	14 (73.7)	3 (15.8)	19 (100)
Employment Status	Employed	38 (13.5)	193 (68.7)	50 (17.8)	281 (100)
	Unemployed	23 (22.5)	48 (47.1)	31 (30.4)	102 (100)
Income	None	23 (21.3)	55 (50.9)	30 (27.8)	108 (100)
	RM900-1500	16 (9.9)	116 (72.0)	29 (18.0)	161 (100)
	RM1500-3000	13 (17.1)	47 (61.8)	16 (21.1)	76 (100)
	>RM3000	9 (23.7)	23 (60.5)	6 (15.8)	38 (100)
Ethnicity	Malay	45 (18.2)	150 (60.7)	52 (21.1)	247 (100)
	Indian	1 (12.5)	6 (75.0)	1 (12.5)	8 (100)
	Chinese	15 (12.4)	83 (68.6)	23 (19.0)	121 (100)
	Others	0 (0)	2 (28.6)	5 (71.4)	7 (100)
Total		61 (15.9)	241 (62.9)	81 (21.1)	383 (100)

As shown in Table 11, a significant association was found between attitude scores and ethnicity ($p = 0.002$). Education level also had association with level of attitude among the respondents in this study ($p = 0.031$).

Table 10. Association between socio-demographic variables and attitudes towards dengue fever infection.

Socio-demographic variables		Practice			Total n (%)
		Positive n (%)	Neutral n (%)	Negative n (%)	
Age	18-30	137 (52.7)	109 (41.9)	14 (5.4)	260 (100)
	31-43	36 (55.4)	20 (30.8)	9 (13.8)	65 (100)
	44-56	19 (47.5)	16 (40.0)	5 (12.5)	40 (100)
	>56	9 (50.0)	8 (44.4)	1 (5.6)	18 (100)
Educational Level	Primary	2 (12.5)	6 (37.5)	8 (50.0)	16 (100)
	Secondary	50 (16.9)	128 (43.2)	118 (39.9)	296 (100)
	Graduate	14 (26.9)	23 (44.2)	15 (28.8)	52 (100)
	Post-graduate	3 (15.8)	12 (63.2)	4 (21.1)	19 (100)
Employment Status	Employed	43 (15.3)	132 (47.0)	106 (37.7)	281 (100)
	Unemployed	26 (25.5)	37 (36.3)	39 (38.2)	102 (100)
Income	None	27 (25.0)	41 (38.0)	40 (37.0)	108 (100)
	RM900-1500	20 (12.4)	77 (47.8)	64 (39.8)	161 (100)
	RM1500-3000	13 (17.1)	35 (46.1)	28 (36.8)	76 (100)
	>RM3000	9 (23.7)	16 (42.1)	13 (34.2)	38 (100)
Ethnicity	Malay	53 (21.5)	112 (45.3)	82 (33.2)	247 (100)
	Indian	1 (12.5)	2 (25.0)	5 (62.5)	8 (100)

	Chinese	15 (12.4)	54 (44.6)	52 (43.0)	121 (100)
	Others	0 (0)	1 (14.3)	6 (85.7)	7 (100)
Total		69 (18.0)	169 (44.1)	145 (37.9)	383 (100)

With regards to practices, there was a significant association between education level and practice scores ($p = 0.020$) as shown in Table 11.

Table 11. Association between socio-demographic variables and practices towards dengue fever infection.

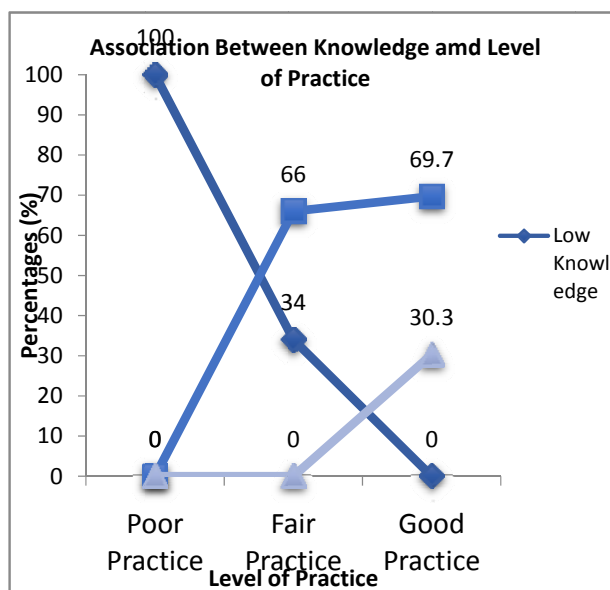
Socio-demographic variables		Attitude			Total n (%)
		Positive n (%)	Neutral n (%)	Negative n (%)	
Age	18-30	45 (17.3)	119 (45.8)	96 (36.9)	260 (100)
	31-43	13 (20.0)	29 (44.6)	23 (35.4)	65 (100)
	44-56	8 (20.0)	14 (35.0)	18 (45.0)	40 (100)
	>56	3 (16.7)	7 (38.9)	8 (44.4)	18 (100)
Gender	Male	38 (25.3)	54 (36.0)	58 (38.7)	150 (100)
	Female	31 (13.3)	115 (49.4)	87 (37.3)	233 (100)
Marital Status	Single	44 (17.7)	110 (44.4)	94 (37.9)	248 (100)
	Married	22 (17.9)	54 (44.7)	46 (37.4)	123 (100)
	Divorced	2 (13.3)	1 (16.9)	3 (50.0)	6 (100)
	Widowed	1 (16.7)	3 (50.0)	2 (33.3)	6 (100)
Gender	Male	79 (52.7)	63 (42.0)	8 (5.3)	150 (100)
	Female	122 (52.4)	90 (38.6)	21 (9.0)	233 (100)
Marital Status	Single	129 (52.0)	105 (42.3)	14 (5.6)	248 (100)
	Married	65 (52.8)	45 (36.6)	13 (10.6)	123 (100)
	Divorced	3 (50.0)	2 (33.3)	1 (16.7)	6 (100)
	Widowed	4 (66.7)	1 (16.7)	1 (16.7)	6 (100)
Education Level	Primary	6 (37.5)	9 (56.3)	1 (6.3)	16 (100)
	Secondary	146 (49.3)	127 (42.9)	23 (7.8)	296 (100)
	Graduate	36 (69.2)	13 (25.0)	3 (5.8)	52 (100)
	Post-graduate	13 (68.4)	4 (21.1)	2 (10.5)	19 (100)
Employment Status	Employed	155 (55.2)	98 (34.9)	28 (10.0)	281 (100)
	Unemployed	46 (45.1)	55 (53.9)	1 (1.0)	102 (100)
Income	None	50 (46.3)	57 (52.8)	1 (0.9)	108 (100)
	RM900-1500	84 (52.2)	60 (37.3)	17 (10.6)	161 (100)
	RM1500-3000	43 (56.6)	25 (32.9)	8 (10.5)	76 (100)
	>RM3000	24 (63.2)	11 (28.9)	3 (7.9)	38 (100)
Ethnicity	Malay	130 (52.6)	104 (42.1)	13 (5.3)	247 (100)
	Indian	2 (25.0)	6 (75.0)	0 (0)	8 (100)
	Chinese	69 (57.0)	36 (29.8)	16 (13.2)	121 (100)
	Others	0 (0)	7 (100.0)	0 (0)	7 (100)
Total		201 (52.5)	153 (39.9)	29 (7.6)	383 (100)

As shown in Table 12, knowledge had highly statistically significant association with level of practice behaviors regarding dengue infection ($p = 0.00$).

Table 12. Association between knowledge and level of practice against dengue fever prevention.

Level	Knowledge			
	Low No. (%)	Moderate No. (%)	High No. (%)	Total No. (%)
Poor practice	29 (100)	0 (0)	0 (0)	29 (100)
Fair practice	52 (34.0)	101 (66.0)	0 (0)	153 (100)
Good practice	0 (0)	140 (69.7)	61 (30.3)	201 (100)
Total	81 (21.1)	241 (62.9)	61 (15.9)	383 (100)

p = 0.000



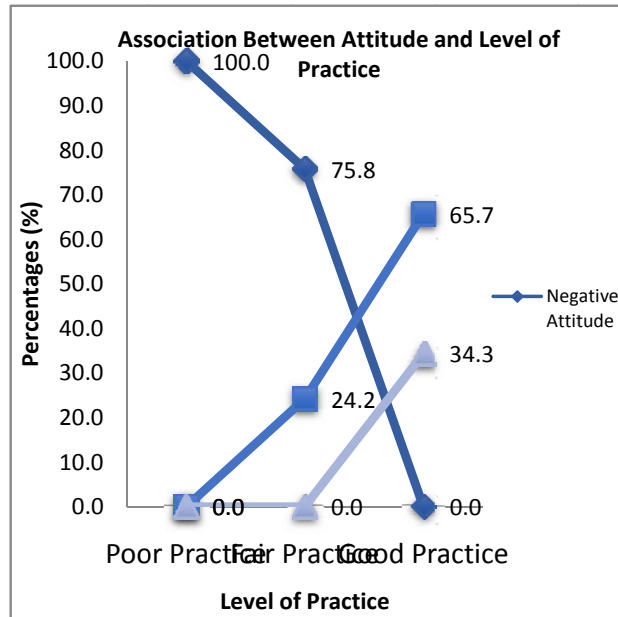
Graph 5. Association between knowledge and level of practice against dengue fever prevention.

Attitude had significant association between the levels of practice behaviors regarding dengue infection ($p = 0.00$). Attitude had significant association between the levels of practice behaviors regarding dengue infection ($p = 0.00$).

Table 13. Association between attitude and level of practice behaviors against dengue fever prevention.

Level	Attitude			
	Negative No. (%)	Neutral No. (%)	Positive No. (%)	Total No. (%)
Poor practice	29 (100)	0 (0)	0 (0)	29 (100)
Fair practice	116 (75.8)	37 (24.2)	0 (0)	153 (100)
Good practice	0 (0)	132 (65.7)	69 (34.3)	201 (100)
Total	145 (37.9)	169 (44.1)	69 (18.0)	383 (100)

p = 0.000



Graph 6. Association between attitude and level of practice behaviors against dengue fever prevention.

Discussion

Socio-demographic characteristics of respondents

The results of this study showed that education level were significant associated with level of attitudes and practices. Graduates from tertiary education and post-graduate had good practices towards dengue infection. This might be because they were aware the importance of practicing dengue prevention. In addition, the graduates and post-graduates had neutral attitudes towards dengue fever infection.

In this study, television was the most common sources of information regarding dengue fever (72.1%), so the importance of practising dengue prevention should be emphasized through television. This is similar to previous studies whereby television was the most popular source of information about dengue fever (Sultana Habibullah *et al*, 2013). However, another study in Lao PDR reported that friends and relatives (43.9%) were the main source of information regarding dengue fever.

Knowledge about dengue fever

The mean knowledge score was found to be 91 from a possible 14 points with a standard deviation of 1.76. More than half of the respondents (62.9%) had moderate scores and only 15.9% of them had high knowledge regarding dengue fever. This might be due to the education information for the public was insufficient and not readily available.

Areas of high level of knowledge:

Almost all of the respondents (97.4%) answered correctly on the question that empty stagnant water from old tires, trash cans, and flower pots can be mosquito breeding sites. Similarly, a study also found that 93% of the respondents knew that stagnant water is the main source for mosquito breeding (AbdoRadman *et al.*, 2013).

Regarding the principal mosquito vector for dengue fever, 91.6% of the respondents were aware that was *Aedes aegypti*. This was consistent with the study conducted by Anita AbdRahman *et al* (2014) which recorded majority of them (91.5%) knew that dengue fever was caused by *Aedes* mosquito.

Areas of knowledge deficit:

According to World Health Organization (WHO), *Aedes* mosquitoes usually bite

during the day. However, refer to Table 3, only 24.5% of the respondents answered correctly that mosquitoes transmitting dengue infection bites only during day time. This finding was consistent with the findings of previous study which indicate 44% of rural and only 9.5% of urban population knew the day biting habit of dengue mosquito (Shoba *et al.*, 2014). This is important to the public on the timing of the use of protective measures from mosquito bites. Hence, it was recommended that dengue prevention educational programs should added focus on this important topic.

On top of this, less than half of the respondents (37.1%) were aware that dengue infection can occur in all season, not only during the rainy season.

Among the research population, knowledge had significant association with the practice of dengue prevention. Previous studies have found similar associations between knowledge and practices (Benthem *et al.*, 2002; Itrat *et al.*, 2008; Ibrahim *et al.*, 2009).

Attitude Towards Dengue Fever

The mean survey score for attitude about dengue fever prevention was found to be 41.93 from a possible 60 scores with a standard deviation of 4.99. Based on Likert scale, majority of the respondents had neutral attitude.

53.8% of the respondents disagreed that dengue fever was a disease that cannot be prevented and more than half of the respondents (77.6%) agreed that they were the important people in preventing dengue fever. This was similar to a study conducted by Binsaeed A.A *et al* (2015) that 93.2% of the respondents believed that dengue fever can be prevented and controlled and 78.5% of them recognized themselves have an important role to play in dengue fever prevention.

However, there is a deficit in the respondents' attitude towards dengue fever. Although 77.0% of the respondents agreed that the only method of controlling and preventing dengue and dengue hemorrhagic fever is to combat the vector mosquitoes, about 11.2% of them believed the elimination of larval breeding sources is a waste of time and very complicated. This findings was consistent with previous study by Acharya *et al.*(2005).

This present study found a significant association between attitudes and both level of education and ethnicity. Tan Kok Leong *et al.* (2014) found similar findings. Malay ethnicity and with graduate education level showed positive attitude.

There was a significant association with attitudes and practice of dengue fever prevention in this study. However, this was contrast with a study of Hairi *et al.*(2003) found out there was no significant association seen between attitudes and preventive practice on dengue.

Conclusion

It was evident from this study that television was the most important sources of information on dengue fever among the population. Although knowledge regarding the breeding and preventive methods was essential but alone it was not enough to achieve mosquito control unless it was translated into practice.

The level of knowledge regarding dengue fever was still insufficient among the population of Bandar Maharani, Muar, but their level of practice was good.

Ethnicity and education level were significantly associated with level of attitude and practice. Regarding the knowledge and attitude toward dengue fever were positively associated with the practice prevention.

Recommendation

1. Government authorities should strengthen the educational campaign regarding dengue through social media to increase awareness and knowledge regarding dengue and preventive measures to reduce the incidence of dengue fever.

2. Information, education and communications (IECs) materials maybe provided in areas like schools and health centres making it more accessible for the residents to obtain.
3. Health personnel should be trained to give appropriate counselling in an effort to change certain deeply ingrained traditional behaviours like domestic water storage without proper cover.
4. Emphasis should be placed on the limitations, such as seeking early treatment as soon as dengue signs and symptoms are noticed.
5. The unique traditional community collaborative activity (*gotong-royong*) frequently practiced in rural villages should be promoted in urban communities as well.

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