UNIVERSITI PUTRA MALAYSIA

KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) ON DENGUE FEVER AMONG 17th COLLEGE RESIDENTS OF UNIVERSITI PUTRA MALAYSIA (UPM)

WAN NUR MARISAH BINTI ABDULLAH

ACKNOWLEDGEMENTS

First of all, I am really grateful to the God for the good health and wellbeing that were requisite to complete this thesis. I want to express my deep thanks to Associate Professor Dr. Juliana Jalaludin, Head of Department of Environmental and Occupational Health, for giving me an opportunity as a student to conduct a research.

I am also extremely thankful and indebted to Dr. Vivien How, senior lecturer, in the Department of Environmental and Occupational Health for sharing her expertise, supervised, and genuinely giving the guidance and motivation towards me. Special thanks to the administrative staff of 17th college and *Pusat Kesihatan Universiti* (PKU) Universiti Putra Malaysia for providing information regarding my research project.

I would like to take this moment to express gratitude to my parents for their wonderful encouragement and cheering me up. Not to forget, I also thank to my final year project team mates and my course mates for the great support. Lastly, I am grateful and really appreciate all the respondents and everyone who directly or indirectly involved in this project.

ABSTRACT

KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) ON DENGUE FEVER AMONG 17th COLLEGE RESIDENTS OF UNIVERSITI PUTRA MALAYSIA (UPM)

WAN NUR MARISAH BINTI ABDULLAH

Introduction: Dengue fever (DF) is a serious infectious disease that burden the worldwide and grown dramatically around the world in recent decades. 17th college was reported as the hotspot area for dengue compared to other colleges in Universiti Putra Malaysia. Even though fogging and the dengue fever awareness campaign had been conducted in order to reduce the trend, this infectious disease keeps happening and increasing. **Objectives:** To determine the knowledge, attitude and practice (KAP) on dengue fever among 17th college residents of Universiti Putra Malaysia (UPM). **Methodology:** A cross-sectional study had been conducted that involve 163 respondents from 17th college residents. The respondents selected were undergraduate students from two different faculty, Faculty Medicine and Health Sciences and Faculty of Veterinary Medicine of UPM. A self-administered questionnaire were distributed to the respondents and the questionnaire consists of four sections, such as socio demographic characteristic, knowledge of dengue fever, attitude toward dengue fever and practice regarding dengue fever prevention. **Results:** Low level of knowledge (7.4%) and high level of attitude (60.1%) and practices (78.5%) regarding dengue fever prevention were identified. Unfortunately, study shows no significant association (p>0.05) between knowledge, attitude and practices on dengue prevention. **Conclusion:** The results suggested that the current practices of health education awareness alone is insufficient to change the KAP of 17th residents on dengue fever prevention, instead, a systematic and comprehensive, long-term participatory approach to dengue fever prevention and control strategies shall be implemented in collaboration with the 17th college administrative office, university and students club to ensure sustainable learning and development.

Keywords: Knowledge, Attitude, Practice, Dengue Fever

ABSTRAK

PENGETAHUAN, SIKAP DAN AMALAN (KAP) MENGENAI DEMAM DENGGI DI KALANGAN PENGHUNI KOLEJ 17 UNIVERSITI PUTRA MALAYSIA (UPM)

WAN NUR MARISAH BINTI ABDULLAH

Pengenalan: Demam denggi (DF) adalah penyakit berjangkit yang membawa beban serius di seluruh dunia dan meningkat secara mendadak di seluruh dunia dalam beberapa dekad kebelakangan ini. Kolej 17 telah dilaporkan sebagai kawasan titik panas (*hotspot*) denggi berbanding kolej lain di Universiti Putra Malaysia. Walaupun penyemburan asap (*fogging*) dan kempen kesedaran demam denggi telah dijalankan untuk mengurangkan trend, penyakit berjangkit ini terus berlaku dan semakin meningkat. **Objektif:** Untuk menentukan tahap pengetahuan, sikap dan amalan (KAP) terhadap demam denggi dalam kalangan penghuni kolej 17, Universiti Putra Malaysia (UPM). **Metodologi:** Satu kajian keratan rentas telah dijalankan yang melibatkan 163 responden yang terdiri daripada penghuni kolej 17. Responden yang dipilih adalah pelajar ijazah pertama dari dua fakulti yang berbeza, Fakulti Perubatan dan Sains Kesihatan dan Fakulti Perubatan Veterinar UPM. Satu set soal selidik telah diedarkan kepada responden dan soal selidik ini terdiri daripada empat bahagian, ciri-ciri sosio demografi, pengetahuan tentang demam denggi, sikap terhadap demam denggi dan amalan mengenai pencegahan demam denggi. **Keputusan:** Tahap pengetahuan adalah rendah (7.4%) dan tahap sikap (60.1%) dan amalan (78.5%) adalah bagus mengenai pencegahan demam denggi telah dikenal pasti. Malangnya, kajian tidak menunjukkan hubungan yang bererti ($p > 0.05$) antara pengetahuan, sikap dan amalan pencegahan denggi. **Kesimpulan:** Keputusan mencadangkan bahawa amalan semasa kesedaran pendidikan kesihatan sahaja tidak mencukupi untuk mengubah KAP penduduk kolej 17 terhadap pencegahan demam denggi, sebaliknya, pendekatan yang sistematik dan komprehensif serta pendekatan penyertaan jangka panjang untuk pencegahan dan strategi kawalan demam denggi seharusnya dilaksanakan dengan kerjasama pejabat pentadbiran, universiti dan kelab pelajar dari kolej 17 untuk memastikan pembelajaran dan pembangunan yang mampan.

Kata kunci: Pengetahuan, Sikap, Amalan, Demam Denggi

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

KAP	Knowledge, Attitude and Practice
PKU	Pusat Kesihatan Universiti
UPM	Universiti Putra Malaysia
MOH	Ministry of Health

CHAPTER 1

INTRODUCTION

1.1 Introduction

Dengue fever is a serious infectious disease that burden the worldwide and grown dramatically around the world in recent decades. According to the World Health Organization (2016), approximately 390 million dengue infection per year were reported and at least 96 million of these dengue cases shows the severity of the disease was estimated. According to World Health Organization. (n.d.), once human infected by *Aedes* mosquito, he or she will become a carrier and may transmit the virus to uninfected mosquito through the bite of female *Aedes* mosquito. The period the infected person need to develop the fever is 2-7 day. The infected person will have long lasting immunity after recovery time, but sequential infection will increase the risk of severe dengue. The person should suspect he or she infected by dengue fever when a high fever (40°C/ 104°F) with other symptoms, such as severe headache, pain behind the eyes, nausea, vomiting, swollen glands, muscle and joint pain and rash appeared. The complication of dengue fever may cause fatal where the person will get dengue haemorrhagic fever and the rare cases will cause dengue shock syndrome.

The first reported outbreak for dengue in Malaysia is in 1901 at Penang (Skae, 1902), then dengue has become endemic in Malaysia by year 1960's (Rudnick et al., 1965). The current situation in Malaysia obtained from iDengue website showed the

increasing trend of dengue cases from year 2011 to 2015. iDengue website is an official government website that aim to give the current update for dengue to community. This website also showed that the incident rate for dengue cases in 69.8 per 100,000 population in year 2011 and continuously increase up to 396.4 per 100,000 population in year 2015. By looking to this statistics, we can see how dengue had become burden to our country.

In year 2017, there are 140 hotspot area in Malaysia for dengue and 68% of the hotspot area are coming from Selangor (iDengue, 2017). This study was interested to be conducted in Selangor and the target population is the teenagers. According to website kpkesihatan (2016), the teenagers from age group 20 – 24 was recorded as the highest age group infected with dengue in year 2015. Thus, this population was selected as the study population as they will become a generation that lead the country and help to sustain the quality of life in the future. Basically, 17th college of UPM, Selangor was selected due to the suitability of study population and location who are targeted to teenagers in hotspot area. In addition, 17th college is one of the hotspot area in Universiti Putra Malaysia (UPM).

The study by Dom et al. (2012) indicated the factors that increase the population number of *Aedes* mosquito were inadequate urban infrastructure, poor solid waste disposal and including the incremental of domestic or international travel. This study also mentioned that the area that experienced dengue fever outbreak before will have higher possibility to become a dengue fever outbreak again. Meanwhile, the climate change also one of the possible reasons that might spread the dengue virus transmission in Malaysia (Mia et al., 2013).

Although the previous study had stated that dengue burden cannot be encounter in any ways (Skae, 1902; Rudnick, 1965; Sharma et al., 2008). Thus, we need to try the best to avoid the bite of *Aedes* mosquitoes and give all effort to eliminate and destroy the breeding site of *Aedes* mosquitoes as it was cheaper cost than having dengue vaccine injection. Then, to avoid the death risk, the infected person should have appropriate medical care, early detection for those who was suspected and proper management of dengue disease (World Health Organization, 2016).

Knowledge, attitude and practice (KAP) study is useful to evaluate the effectiveness of the existing program that has been conducted (Kaliyaperumal, 2004) and this KAP study interested to be conduct as it would help the researcher to find the reference value of KAP college residents. This baseline data (reference value) will be the guidance to help the college management in the future. KAP study among the college residents will help to identify which part is the most influential in giving the awareness to them and as well as to develop the most efficient strategy in fighting dengue.

1.2 Problem statement

Basically, 17th college is the residential college for students from medical, health and veterinary background. The location for this college is quite far from other colleges in UPM, but still in Petaling district. According to the Director General of Ministry of Health, he had mentioned in the website (kpkesihatan, 2016), the Petaling district was recorded as the highest dengue cases in year 2015. The dengue cases statistic (refer to Figure 1.1) in year 2015 from Pusat Kesihatan Universiti, UPM (2016) showed 56

cases are from 17th college. This statistic show an increasing 19 dengue cases from previous year which were 37 cases in year 2014.

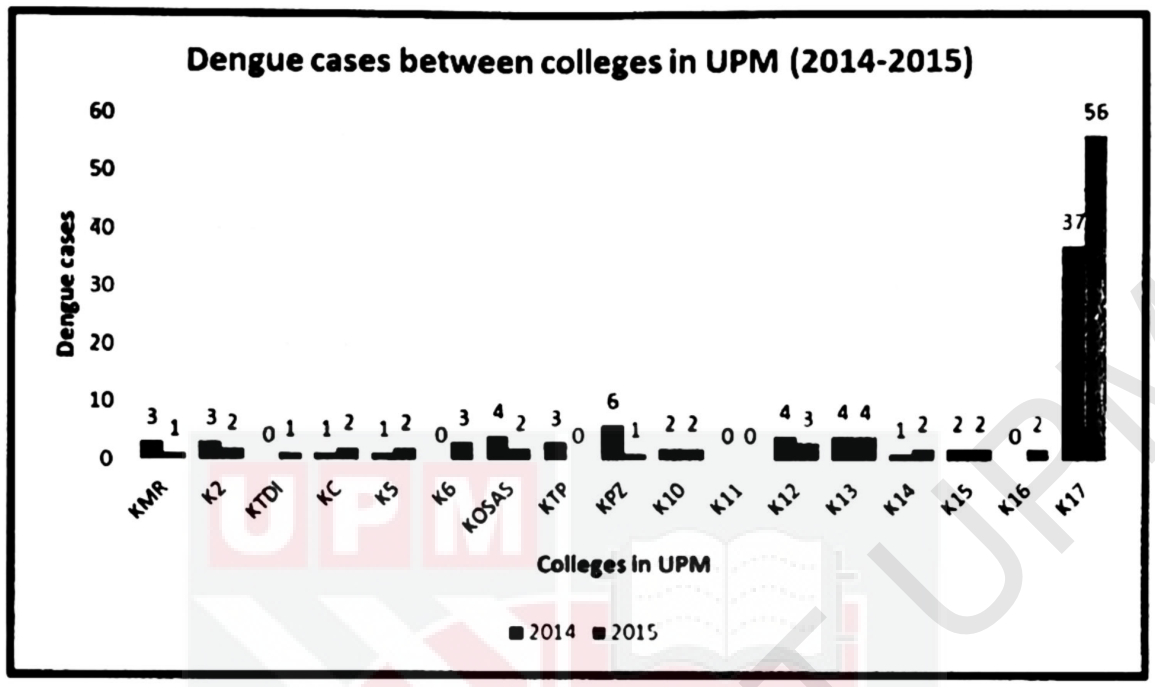

Figure 1.1: Dengue cases at 17th College
(Source from Pusat Kesihatan Universiti (PKU) UPM (2016))

The college management reported had conducted yearly programme related to dengue prevention such as dengue awareness talk, cleanliness program and the fogging. However, the issue here, are the programme conducted just to fill the programme timeline for college or the objective to reduce the dengue cases.

This study was determined the KAP level for 17th college residents. Knowledge on dengue was tested to this residents to see whether the information they received are sufficient especially from college programme. This study also intended to identify whether the knowledge alone can change and improve the college resident's attitude and practices regarding dengue prevention. Despite the majority of the residents was coming from health background, the statistics still show the 17th college as the highest dengue cases compared to other living residents in UPM.

Apart from that, to make thing worse is the construction activity that still being progress in the vicinity of 17th college that was expected to be completed by the year 2018. According to Nazri et al. (2009) in Selangor where it was stated that they found people who lived in urban area especially near the construction sites are more prone to get infected with the dengue diseases. Furthermore, World Health Organisation (2016) reported that the travel distance that female *Aedes aegypti (A. aegypti)* was 400 metre where it was in the range distance between the 17th college and that construction activity.

Generally, there are several factor that indicate the rising number of dengue reported cases in Selangor state (Rahman, 2012). Human activities has been highlighted as the primary driving force for the observed rising trend, for example, population growths in crowded living environment, increased outdoor activities, urbanisation increased construction activities, and sanitisation are often associated with increased frequencies of dengue transmission in the community. In addition, there a study found that the area that experienced dengue fever outbreak before will have higher possibility to become a dengue fever outbreak again (Dom et al., 2012).

Although there were some other contributing factor to dengue cases such as urbanisation, climate change and poor sanitation, this research was interested to study the human factors which is the KAP for college students. This are the factors that can be tackle especially by the college management to cultivate better prevention programmes in the future.

1.3 Study Justification

Universiti Putra Malaysia (UPM) is located in Petaling District, one of the highly concerned dengue hotspot zones as suggested by Ministry of Health Malaysia (MOH). The statistic from *Pusat Kesihatan Universiti* (PKU) of Universiti Putra Malaysia (UPM) showed that from the past 2 years (2014-2015), College 17 was the most "hotspot" residential college in UPM which have the highest number of students reported with confirmed cases with dengue. The trend of dengue cases at 17th college of Universiti Putra Malaysia showed in year 2014 was increased from 37 cases to 56 cases in year the 2015. Although, college staff and representative take action to fight the burden of dengue, the trends keep increased. Meanwhile, the other colleges recorded a less number of dengue cases than 17th college and there was a wide gap between other college dengue cases in comparison with 17th college.

According to Rehman et al. (2015), this previous study was found the *Aedes albopictus* (*A. albopictus*)prefer to lay the eggs in both container, but the *A. aegypti* would rather lay their eggs in the artificial container such as flower vases, water storage jars, unused toilets bowls and chocked roof gutters which commonly found in or over the houses. These potential breeding sites of *Aedes* mosquitoes was commonly found in 17th college and it was known as one of the hotspot area for dengue. In order to increase awareness on dengue prevention, the management of 17th college was organized programme on dengue each year. Based on the record obtained from the college administration, the programme was conducted every year. However, is the knowledge obtained sufficient to prevent dengue among the resident? In this study I would like to study whether the knowledge given was sufficient for the resident to

develop positive attitude and good practices toward dengue prevention. The previous study indicate that the knowledge, attitude and practice (KAP) study will tell us what they know, how their perception and how they behave (Kaliyaperumal, 2004).

Knowledge, Attitude and Practices (KAP) survey in this study was used quantitative method that provides access to quantitative and qualitative information related to understanding the rising number of dengue fever among the study population. The assessment of these three components was to understand the capacity of the study population to acquire, retained and used information related to dengue (knowledge), to assess the inclinations of the study population to react and interpret hazardous situations which may lead to increase of mosquito breeding (attitude); and to evaluate the application of rules and knowledge that leads to vector-borne diseases preventive measure (practices). In addition, the good practice is an art that is linked to the progress of knowledge and technology, and is executed in an ethical manner (Kaliyaperumal, 2004). This study could help to have a better understanding and evaluate the key of effective control measure practices by the study population (World Health Organization, 2008).

Moreover, 17th college was located next to the construction site which was considered as one of the mosquito favourite breeding sites. Based on the map of 17th college, it was located in the vicinity of the construction site of *Hospital Pengajar* UPM (which was expected to be completed by the year 2018). Actually, the average distance of female *A. aegypti* can travel was 400 metres (World Health Organization, 2016). However, the distance between 17th college and construction site is 300 metres which make the resident should become more careful by wearing the long sleeves

while doing outdoor activity. Figure 1.2 visually explained the reason why this study targeted the resident of college 17 who was the age of 20-24 years old and it was considered as the susceptible group to dengue infection as suggested by the article published in the website of kpkesihatan (2016).

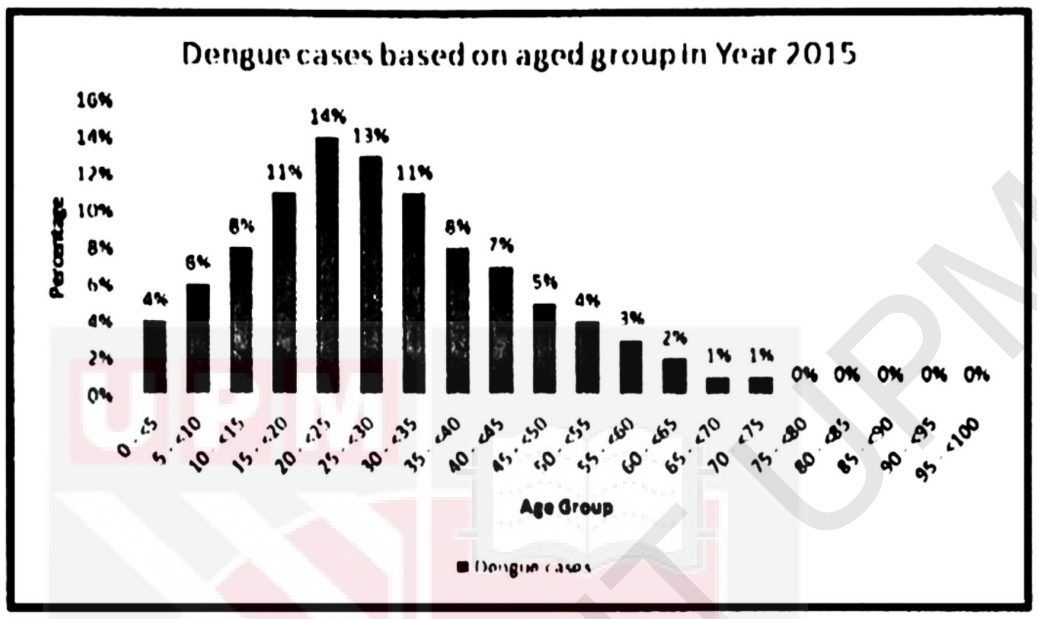

Figure 1.2: Dengue cases with different age group
(Source from kpkesihatan (2016))

After the college management begin develop the awareness among residents regarding dengue prevention, there was necessary to evaluate the knowledge, attitude and practice of college residents related dengue. The college management can shape appropriately how the program elements based on the need for community, it will enable a more efficient process of awareness creation. In addition, the findings of this research will be used wisely by researcher to suggest some recommendations as it could help the college management to reduce the dengue case. The recommended strategies could enhance the use of preventive measures among college residents and as well as too save the budget too.

According to the previous study by Parks and Lloyd (2004), this study briefly describe the significance of social mobilization and effective communication while focusing on the implementing programs in controlling the problematic issues such as dengue. The media campaign was suggested as it one of the effective ways to attract

the community nowadays especially the teenagers. However, the findings of this research will help to describe the best ways to combat dengue despite it was emerging diseases in Malaysia.

1.4 Conceptual framework

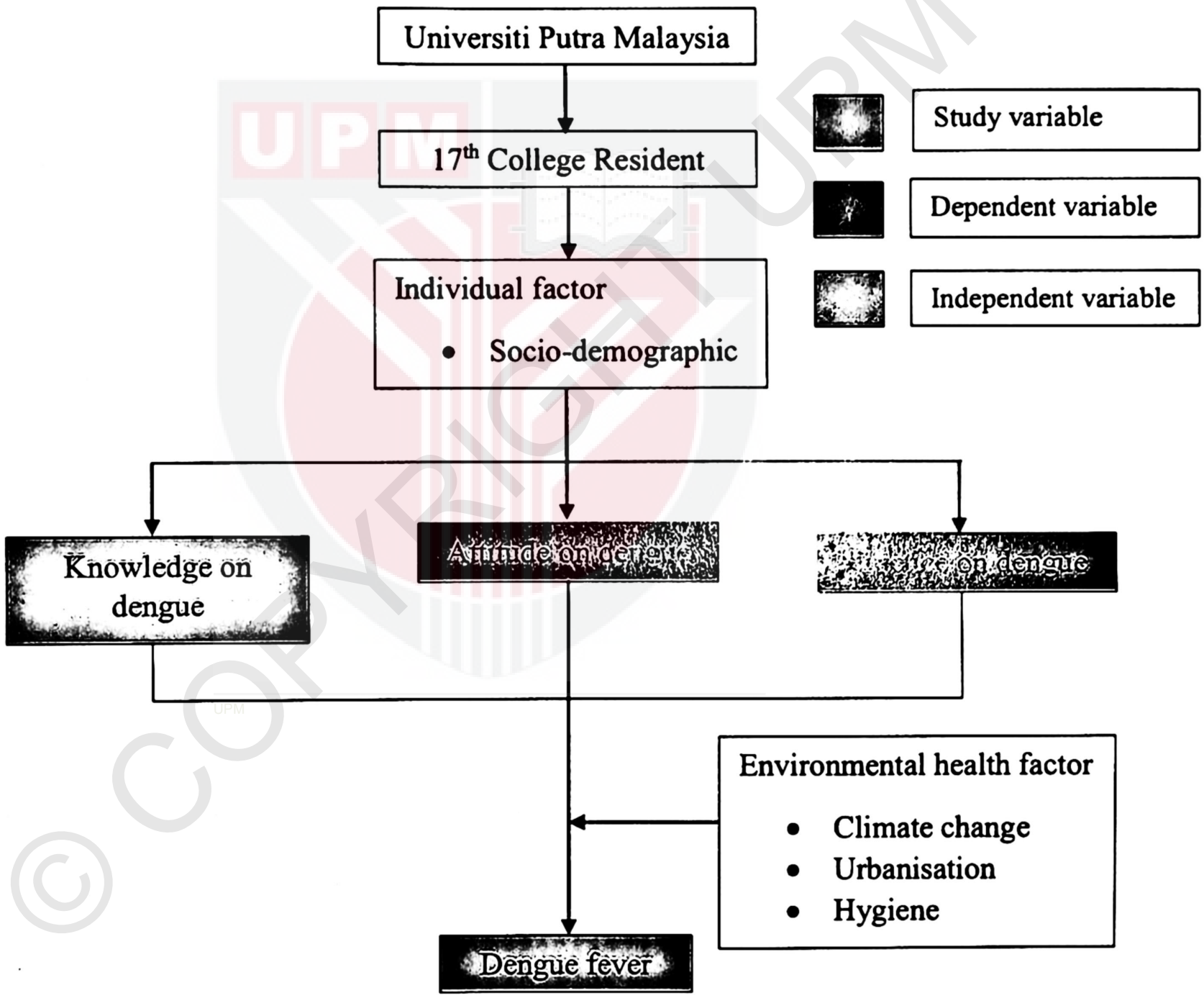

Figure 1.3: Conceptual framework of knowledge, attitude and practice on dengue fever among 17th college residents of UPM

Figure 1.3 show the conceptual framework of this research. According to PKU UPM (2016), 17th college is the most hotspot area for dengue cases compared to other living residents in UPM. The individual factor such as socio demographic characteristics of the resident were assessed to describe the background of the residents as it can be contribute to the study variable, dengue fever. The level of knowledge on dengue fever was assessed by focusing on knowledge on transmission, diagnosis, treatment and preventive measures. Next, the attitude level was assessed to evaluate their belief on fogging, elimination of potential breeding sites and personal hygiene. Lastly, the level of practices of the residents through preventive measures used was assessed to determine the response of residents towards dengue prevention. Meanwhile, the environmental health factors such as climate change, urbanisation, and personal hygiene, act as mediating variable that contribute in dengue cases.

1.5 Research objectives

1.5.1 General objective

The general objective is to determine the knowledge, attitude and practice (KAP) on dengue fever among 17th college residents of Universiti Putra Malaysia (UPM).

1.5.2 Specific objectives

The specific objectives are:

i. To determine the socio-demographic information of 17th college residents.

ii. To assess the knowledge, attitude and practice level related dengue fever among 17th college residents.

iii. To compare the mean of dengue awareness between knowledge, attitude and practice (KAP) level among 17th college residents of UPM.

iv. To compare the mean of type of dengue histories between knowledge, attitude and practice (KAP) level among 17th college residents of UPM.

v. To determine the association between knowledge and attitude on dengue among 17th college residents of UPM.

vi. To determine the association between knowledge and practices on dengue among 17th college residents of UPM.

vii. To determine the association between attitude and practices on dengue among 17th college residents of UPM.

1.6 Study hypothesis

The alternative hypothesis are:

H_1: There is a significant difference between dengue awareness and KAP level among 17th college residents of UPM.

H_2: There is a significant difference between type of dengue histories and KAP level among 17th college residents of UPM.

H_3: There is a significant association between knowledge and attitude on dengue among 17th college residents of UPM.

H_4: There is a significant association between knowledge and practices on dengue among 17th college residents of UPM.

Hs: There is a significant association between attitude and practices on dengue among 17th college residents of UPM.

1.7 Definition of terms

1.7.1 Conceptual definition

i. Dengue fever

Dengue fever is mosquito-borne infection caused by the dengue serotypes such as DEN-1, DEN-2, DEN-3 and DEN-4. Dengue fever is febrile illness with symptoms appearing after 3-14 days after the infective bite. The common symptoms of dengue fever are severe headache, rash, and muscle and joint pain (World Health Organization, 2016).

ii. Knowledge

The knowledge can be defined the understanding of some related topics (Kaliyaperumal, 2004).

iii. Attitude

The attitude can be defined as the perception of someone toward the related topics (Kaliyaperumal, 2004).

iv. Practice

The practice can be defined as the actions taken based on the knowledge and attitude (Kaliyaperumal, 2004).

v. College resident

The college resident can be defined as the societies who occupy in a college as students

vi. Dengue awareness

The dengue awareness can be defined as the alertness of someone towards dengue information given.

vii. Dengue histories

The dengue histories can be defined as the experienced of someone related diseases such as dengue.

1.7.2 Operational definition

i. Dengue fever

The dengue fever cases that happen in college 17 which involve their residents who have dengue fever like febrile illness with common symptoms such as severe headache, muscle and joint pain, and rash.

ii. Knowledge

The knowledge of the 17th college residents of UPM which gained and learnt from classes or somewhere that related to dengue fever. The knowledge assessed regarding the cause, transmission, clinical manifestation and prevention of dengue fever.

iii. Attitude

The attitude define as the feeling and belief showed of the residents of 17th college, UPM, with regard to dengue fever and its prevention.

iv. Practice

The practice define as any action[illegible] by the residents of 17th college, UPM, in order to prevent from dengue fe[illegible]

v. College resident

The college resident define as the residen[illegible] college, UPM, who involved in this study based on the inclusive criteria.

vi. Dengue awareness

Dengue awareness can be defined as the awareness of the residents about the issues that happen in their college. In this study, this term were asked whether the residents know the fact that 17th college is the hotspot area in UPM.

vii. Dengue histories

Dengue histories can be defined as the history of the college resident towards dengue fever. This histories can be divided into three group such as confirmed cases, suspected cases and no past history.

CHAPTER 2

LITERATURE REVIEW

2.1 Dengue Fever

The disease is due to the infection of the dengue virus serotypes (DEN-1, DEN-2, DEN-3, and DEN-4) which come from the *Flaviviridae* family members (Vazquez-Prokopec et al., 2010). The two species of *Aedes* mosquito that contribute dengue fever were *Aedes aegpyti* (*A. aegypti*) as primary dengue vector and *Aedes albopictus* (*A. albopictus*) as secondary dengue vector, despite that, only female *Aedes* mosquito is transmitting the dengue virus to the human through the bite (World Health Organization, 2016). The statement of dengue viruses was transmitted in urban cycle that involved human and *A. aegypti* mosquitoes was highlighted in study by Guzman and Kouri (2002).

A. aegypti is commonly breeds in artificial containers and urban while *A. Albopictus* largely spread to North America and Europe due to international trade use in tyres (that may deposited with rainwater that probably consist of egg) and other goods. The fact is, *A. aegypti* is a daytime feeder where actively bite at the peak time like early morning and evening before dusk (World Health Organization, 2013). According to Gu et al. (2016) indicated that there is need to develop early warning signs and time to time precautions toward dengue fever control and it was based on the spread of different pattern of dengue and the risk factors were identified.

2.2 Dengue Fever in living Residential College

The *A. aegypti* mosquitoes mostly found in the tropical and subtropical regions of the world and can easily recognised like black and white stripes all over the body. Usually, the *A. aegypti* and *A. albopictus* were found in the vicinity of residential colonies. Both of them prefer different type of containers to survive such as artificial and natural container. The *A. albopictus* prefer to lay the eggs in both container, but the *A. aegypti* would rather lay their eggs in the artificial container such as flower vases, water storage jars, unused toilets bowls and chocked roof gutters which commonly found in or over the houses (Rehman et al., 2015). One of the reasons why indoor mosquitoes grow better is due to the large water storage container that provide favourable larval habitat with greater availability of food such as human blood meals (Saifur et al., 2012).

In addition, dengue fever posed as particular important in tropical developing world where it influence the human-mosquito interactions. This interaction included unscreened housing, crowded residential areas with large numbers of household or occupants breeding sites (such as containers and tires). To make thing worst where an absence of waste management, sewer, and water systems produce favourable conditions for mosquito breeding in this environment (Spiegel et al., 2005).

According to Dhang et al. (2005) showed that the one of the urban residential area in Selangor had high (73-79%) ovitrap with only *A. aegypti*. This study also reported that *A. aegypti* can be resembled as the leading dengue vector in the urban residential area. In addition, the *Aedes* mosquitoes was associated with residential

areas that may come from concrete drainage outside of the houses. Based on kpkesihatan (2016), in 2015, the age ranged from 20-24 years old (14%) is the most susceptible to get infected by dengue fever. This followed by the age ranged between 25-29 years old (13%). Generally, the majority background of this age ranged are students from any university or college. The statement by Director General of MOH also had been supported by the previous study (Mia et al., 2013) where the most vulnerable age group can be infected by dengue fever were children and young adults.

The residents play the most important role in reducing dengue fever cases, such as, based on article published by The Star online (Thestaronline, 2017) had stated that, one campaign '15 Minutes Per Saturday' had launched by Klang Municipal Council's (MPK) health department and it was successfully reported just in a few weeks.

2.3 Dengue Fever and Risk Factor

2.3.1 Dengue Fever and Urbanisation

According to Martin et al. (2010) that has been conducted in Americas highlighted several factors that increase the burden of dengue disease. The factors were involved the population growth, unplanned urbanization with poor sanitary conditions, deterioration of the public health infrastructure, and a decreased access to health care.

According to the article published by the Reuters (2009), the main drivers of dengue fever are actively urbanisation, air travel expansion and insufficient mosquito control. Duane Gubler, director of Asia Pacific Institute of Tropical Medicine and

Infectious Diseases at the University of Hawaii also highlighted that change of climate have little contribution factor toward dengue fever.

In addition, Professor Annelies Wilder-Smith, who studies infectious diseases at the Lee Kong Chian School of Medicine in Nanyang Technological University had mentioned that urbanisation is develop a new habitat for *Aedes* mosquito to breed. The more road and building will sharply increase the temperature and may cause climate change, where it become one of favourable factor to increase the *Aedes* mosquito population growth (TheStraitTimes, 2016).

Surprisingly, due to rapid urbanisation and globalisation which associated with the rapid development of urban population without proper infrastructure for living will resulted in increase of dengue fever (Kwon and Crizaldo, 2014). The previous study emphasize that the poor urbanisation management provide the standard housing with lack of water supply and the system of managing the waste (Guzman & Kouri, 2002). The failure of health systems and mosquito-control activities exacerbate the condition of epidemiology (Pinheiro & Corber, 1997; Guzman et al., 1999; Guzman et al., 2001).

2.3.2 Dengue Fever and Climate Change

Generally, the tropical country like Malaysia have the warm temperatures, high humidity, and copious rainfall. The average temperature is around 27 °C, and mean cumulative rainfall is about 2500 mm a year. The warm and wet weather coupled with high humidity make the *Aedes* mosquito with conducive condition to further develop, viral replication, and transmission of dengue year round (Hii, 2009; Barrera, 2011;

Campbell, 2015). The humidity was considered as the potential predictor of dengue fever (Qi et al., 2013). The previous study in Guangzhou showed a month of the peak of temperature and humidity conditions will lead to dengue incidence in year 2001 to 2006 (Lu et al., 2009). Noted that, heavy rainfall created the stagnant water that make the perfect breeding site of *Aedes* mosquitoes (Chen et al., 2010; Naish et al., 2014). In addition, the frequency of mosquito's activity was affected by rainfall and the exposure can be reduce by avoiding human from the outdoor activities during rainy days (Gharbi et al., 2011).

The contribution of the climate change toward dengue is worrisome. This could influence in the variation of geographic range of vector, accelerate the reproductive and biting rates, and shorten the pathogen incubation period (Rahman, 2012). The useful control measures need to be consider. In view of this, De Souza et al. (2012) found that climate change can cause the migration of infectious diseases into newer regions and this can lead to safety hazards for local communities.

Based on the Cheong et al. (2013), they had found the increased minimum temperature was positively related significantly with the relative risk of dengue with the percentage change of 11.92%. The effect was delayed by 51 days. On top of that, the rainfall had a positively strong effect on dengue cases at cumulative percentage change of 21.45% and the effect delayed by 26-28 days. The study was conducted at Selangor, Kuala Lumpur and Putrajaya which assessed the non-linear temporal effects. Furthermore, the previous studies by Lambrechts et al. (2011) and Eastin et al. (2014), found the sensitivity of *Aedes* vector and dengue transmission toward extreme temperature such as minimum and maximum temperature.

2.3.3 Dengue Fever and Personal Hygiene

Malaysia had severe demand on groundwater where it is resulted in inadequate water supply (Manap et al., 2013). The practice of residents who lived in poor water supply system have tendency to store drinking water in artificial container that provides most favourable breeding habitats for the vector mosquitoes (Gage et al., 2008).

Other study in Pakistan also supported the hygiene practices should be well implemented where it had mentioned the congested cities, insufficient sanitation and lack of safe drinking water supply was the major contributing factor of dengue outbreak (Jahan, 2009). A study Martin et al. (2010) study was indicated that the increase of disease burden is due to the several factors and the researcher also mentioned poor sanitary conditioned as one of the contributing factors.

The number of global human influence which help as driving force of dengue was resulted in ineffective efforts on mosquito control. The global human factors such as enhancement of inadequate municipal services and the increase used of non-biodegradable products (bottles, plastic, cans, tires, etc.) (Gubler, 1989; Gubler, 1997; Gubler, 1998a; WHO, 2001).

2.3.4 Dengue Fever and Epidemiological Factor

2.3.4.1 Age factor

According to Shah et al. (2012), the most age group that experienced dengue was 21-30 year aged group (34%), followed by 31-40-year age group (20%), and 51-year and above age group (6%). However, another study that had been conducted in Malaysia showed age group between 31-40 years old have better practices toward dengue prevention compared to the younger or older age (Al-Dubai et al., 2013).

In Malaysia, a study was conducted by Naing et al. (2011) showed the older age have poor knowledge compared to the younger age group. This previous study was supported by Dowling et al. (2013) and Hairi et al. (2003) where the younger respondents had greater knowledge than older respondents. However, Hairi et al. (2003) findings showed attitude (92.5%) and practices (55.8%) of the older age (aged above 50 years) were better than the younger (aged below 50 years) respondents. Dowling et al. (2013) discussed the reason why younger respondents have greater knowledge than older respondents due to the different experiences toward mosquitoes and education messages.

2.3.4.2 Gender factor

A study in Americas indicated that the women was frequently infected with dengue compared to men (Martin et al., 2010). The past study by Hairi et al. (2003) showed in terms of knowledge of dengue fever, males (70.9%) have higher knowledge than

females (66.7%) while in terms of attitude, females (92.1%) have better attitude than males (90.7%) in dengue prevention. However, there were no different for males and females in practice regarding dengue prevention.

Meanwhile, another study at Maldives by Ahmed (2007) discussed that females had higher preventive practices than males. In addition, past study by Al-Dubai et al. (2013) claimed that females had higher score in knowledge and practice than males. Despite that, the study showed the attitude score for females and males was the same

.

2.3.4.3 Education factor

First year medical students in Lahore showed they had high knowledge on dengue fever (Humayun et al., 2013). Students with science background had high knowledge toward dengue fever (Ibrahim et al., 2009). Past study also showed there was a significant association between course of study and knowledge in University of Gujerat (Ujala et al., 2013).

Al-Dubai et al. (2003) claimed that tertiary educated group in Malaysia have better knowledge, attitude and practices toward dengue prevention compared to high school people.

females (66.7%) while in terms of attitude, females (92.1%) have better attitude than males (90.7%) in dengue prevention. However, there were no different for males and females in practice regarding dengue prevention.

Meanwhile, another study at Maldives by Ahmed (2007) discussed that females had higher preventive practices than males. In addition, past study by Al-Dubai et al. (2013) claimed that females had higher score in knowledge and practice than males. Despite that, the study showed the attitude score for females and males was the same

.

2.3.4.3 Education factor

First year medical students in Lahore showed they had high knowledge on dengue fever (Humayun et al., 2013). Students with science background had high knowledge toward dengue fever (Ibrahim et al., 2009). Past study also showed there was a significant association between course of study and knowledge in University of Gujerat (Ujala et al., 2013).

Al-Dubai et al. (2003) claimed that tertiary educated group in Malaysia have better knowledge, attitude and practices toward dengue prevention compared to high school people.

2.3.4.3 Ethnicity

The past study showed that there is a significant association between ethnicity and dengue awareness (Al-Dubai et al., 2003; Wan Rozita et al., 2006). A past study by Shah et al. (2012) that had been conducted at Sepang district, Selangor showed the most dengue cases involved Malay (61.7%), followed by Indian (13.6%), Chinese (12.4%), and others (11.2%).

Despite that, another study by Azami et al. (2011) claimed that the most ethnic who had positive dengue IgG was Malay (91.8%), followed by Indians and others (91.5%) and Chinese (91.4%).

2.4 Knowledge, Attitude and Practice of Dengue Fever

The study conducted in Punjab found that the knowledge had significant impact on attitude and practice toward dengue prevention (Dowling et al., 2013). The previous study by Phuanukoonnon et al. (2005) also mentioned the high knowledge of urban community contributed to have proper observation and application of preventive measures.

According to study conducted in Philippines, the top 5 correct answers were reported by respondents: empty stagnant water from old tires, trash cans, and flower pots can be breeding places for mosquitoes (96%); Dengue Fever is a severe, flu-like illness that affects infants, young children and adults (94%); dengue viruses are transmitted to humans through bites of infective female *A. aegpyti* (90%); dengue

patients have chills, headache, pain upon moving the eyes, and low backache (83%); and the only method of controlling dengue infection is to combat the vector mosquitoes (79%) (Kwon and Crizaldo, 2014). In addition there were most favourite 5 practices of the respondents in Philippine towards dengue prevention such as immediately covering water jars after use (92%), examining mosquito larvae in water containers in the toilet (88%), disposing refuse into the garbage (81%), using mosquito net/mosquito coils in the house (77%), and checking and cleaning roof gutters during rainy season (69%). However, this study showed the urban poor community in Philippines had moderate level of knowledge (56.3%) on dengue, while majority of them were reported having negative attitude (95.8%) on dengue and fair practice level (50%) also was reported.

Naing et al. (2011) study that has been conducted in Malaysia reported that majority of the respondents have knowledge on the common symptoms of dengue such as high fever (86.9%), rash (74. 1%) and muscular/joint pain (71.8%). However, only one third of them (36.7%) know about the bleeding complications cause by dengue. From this study, half of the female respondent have at least secondary level education. Based on the study from Wan Rozita et al. (2006) state that 73% of urban Malay residential area in Kuala Lumpur were aware that dengue was transmitted by the bite of *Aedes* mosquito. The most respondent (78.2%) were able to recognise correctly at least one clinical sign or symptom of dengue fever. Bota et al. (2014) study found that the university students in Sindh was lacking in knowledge regarding attributes of dengue infection, such as the cause of dengue fever and its symptoms, the appearance of the *Aedes* mosquito and its bite time, whether dusk or dawn, and the breeding places of the *Aedes* mosquito.

Previous studies by Hairi et al., (2003) and Leong (2014) found in their findings that majority of the respondents had good attitude towards dengue fever. According to study by Dhimal et al., (2014), their findings showed (51%) strongly agreed and (40%) agreed that dengue is a serious illness. Thus, (91%) of respondents effectively appreciated the nature of the disease. The university students also reported 77.6% reported that dengue can be prevented, and 55.5% said it can be treated fully (Bota et al., 2014). The previous study have found similar findings (Hairi et al. 2003; Nalongsack et al, 2009; Shuaib et al, 2010). From findings carried out by Swaddiwudhipong et al., (1992), (90.4%) respondents considered themselves as the first one responsible for the control of *Aedes* mosquito followed by (4.8%) hospital personnel, municipal officers (2.6%) and others (2.2%).

According to the Mohamad et al. (2014), the study in dengue outbreak prone area in Selangor was conducted. The residents practice in prevention of dengue fever showed most (75%) of them never use bed net and almost (40%) of them never use mosquito coils. However, about 15% of them never use mosquito aerosol. 36% of them never use larvicide (abate sand) in water filled container in their home in order to control the dengue fever. In addition, by referring to the study by Al-Dubai et al. (2013) showed the knowledge is associated significantly with the practice. The knowledgeable participant has higher mean practice in comparison with the non-knowledgeable participants. Moreover, Flynn (2012) study on university students found that all the participant had practice vector control disease at home and the most favourite method was ensuring no stagnant water.

In Malaysia, a KAP study has been carried out in an apartment living residential area that has been identified as dengue outbreak prone area, Selangor. This study suggested to prevent from mosquito breeding, the community need to sustain certain behaviour due to their findings. Despite the respondents had good level of knowledge and attitude toward dengue, the personal larval control practice reported as low (33.2%). However, there were some findings that prove this findings, for those who had positive attitude and frequent attended to health campaigns significantly associated with the good practice control of larval.

Meanwhile, the previous study conducted in urbanized residential area, Kuala Lumpur showed majority of the residents had poor knowledge and practice toward dengue prevention. However, they had positive attitude on dengue. The inconsistent findings were showed in another previous study by Hairi et al. (2003). The study was carried out among rural communities area where the respondents had good level of knowledge and attitude of dengue, but resulted in poor practice towards prevention of dengue.

A study was conducted at Male', Maldives among households which determined the knowledge, attitude and practices level of the respondents concerning on dengue fever prevention. The majority of respondents had low level (46%) of knowledge on dengue, positive attitude (42.5%) towards dengue and fair practice level (48.1%) was reported. The previous study by Rehman et al. (2015) that has been conducted in Faisalabad and Lahore city among age group ranged between 17 to 70 years old. The findings showed the majority of the respondents had low level of knowledge (56.22%) and positive attitude toward dengue (46%). Unfortunately, the

poor practice level (47.11%) concerning on dengue prevention was reported among them. In addition, the dengue outbreak area such as Pakse, Laos was selected as a study location for KAP study on dengue. Most of the respondents was from primary education level and in between age group of 15 to 65 years old. These population showed they had moderate level of knowledge on dengue, but resulted in positive attitude of dengue.

2.5 The Current Preventive Measures for Dengue Fever

Past study showed the utilization of insecticide-treated stuff such as window curtains and jar covers that will help in reduce the densities of dengue vector (Naing et al., 2011). A previous study (Ujala et al., 2013) at University of Gujerat found that the most preventive measures used by university students was mosquito aerosol (90.5%), followed by window and door net protection (70.9%) and clean water container covered (71.4%).

A booklet published by ASEAN and World Health Organization (2012) had mentioned several health promotion and community mobilization activities were conducted to increase the awareness of dengue fever, such as national mass media campaign, Mobile Dengue Interactive Exhibit and Adversiting Services involvement, national convention on Communication for Behavioural Impact (COMBI), and assigned a celebrities as a part of health ambassadors for successful promotion on anti-dengue campaign in "Duta Sihat 1 Malaysia".

The latest campaign named "15 Minutes per Saturday" launched by Klang Municipal Council's (MPK) health department only provided some materials to the residential area in Klang, such as stickers (need to paste outside of their house as a reminder), flyers (to develop awareness on dengue fever among them) and five mobile rubbish bins (TheStarOnline, 2017).

A new platform was developed to spread the latest information about dengue cases to the public people. They can easily access to the iDengue websites and the information that had been provided is updated official informations (iDengue, 2016).

CHAPTER 3

METHODOLOGY

3.1 Study design

The cross-sectional study was conducted from January 2017 to March 2017. The cross-sectional surveys by using modified questionnaire were distributed to the respondents in order to evaluate the KAP on dengue fever among residents in 17th college of UPM.

3.2 Study location

The study was carried out at the 17th college, Universiti Putra Malaysia at Serdang, Selangor. This college has four blocks of hostels for students that can accommodate 2000 students with several facilities such as student centre, courts, study room, cafe, and mosque. In addition, the distance between 17th college and construction site (Hospital Pengajar UPM) was around 300 metre.

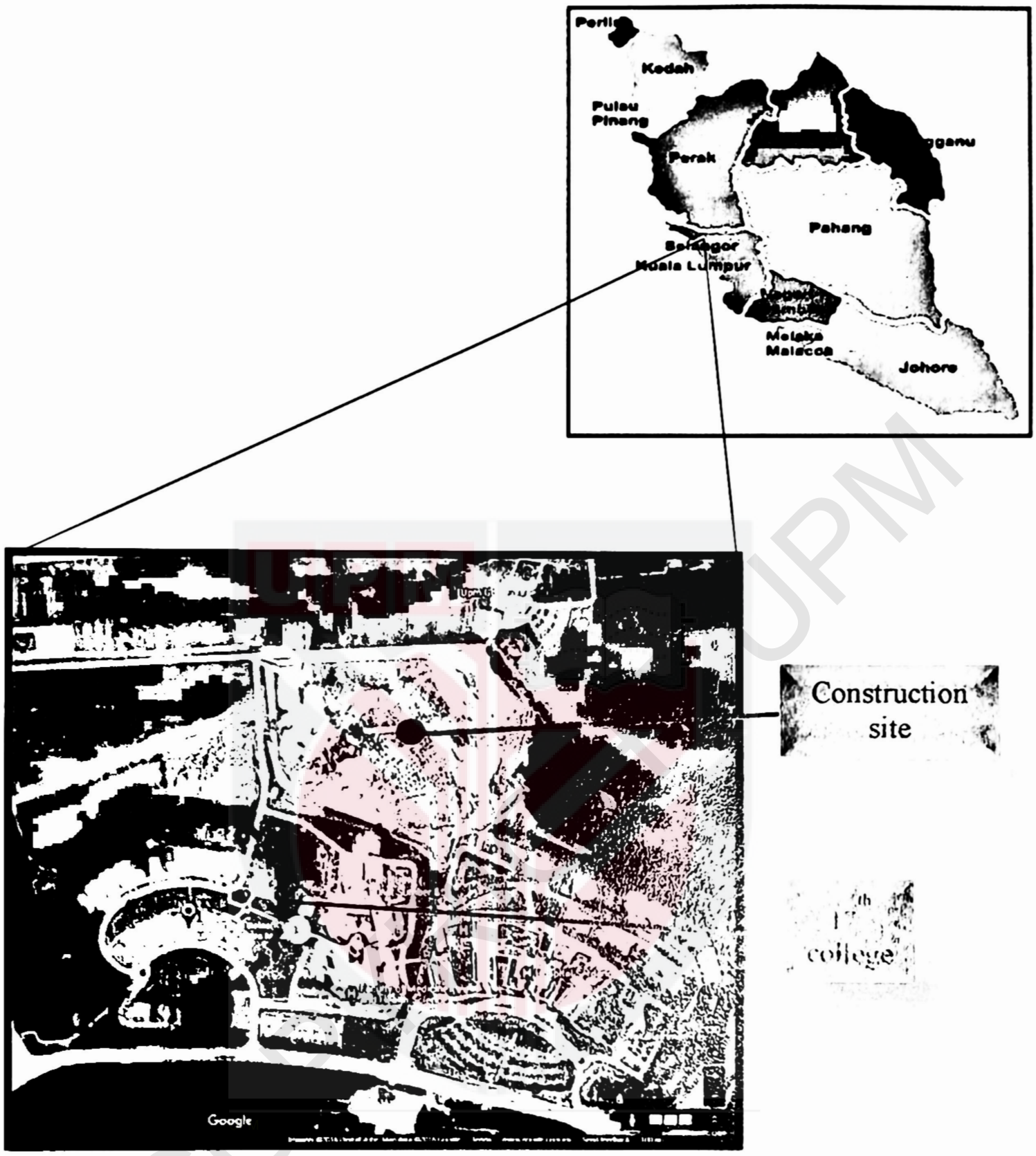

Figure 3.1: The map of study location (Source from Google Map)

3.3 Study sampling

3.3. 1 Study population

The population that involved in this study was residents from 17th college. Mostly, the residents of this college were undergraduate students from two different faculty, Faculty Medicine and Health Sciences & Faculty of Veterinary Medicine of UPM. The

minority of the residents came from graduated or post graduate students who still studying and researching at both faculty. To date, the total population of the living residential in 17th college was 1,698 persons. After consider the inclusive criteria, the total resident had become 1,198.

3.3.2 Sampling population

The study sample (respondent) were randomly (refer to **3.6 Sampling method**) selected from the residents of 17th college who fulfil the inclusive criteria, such that,

i. Stay in 17th college for more than 1 year

ii. Age range: 20-29 years old

3.4 Sampling unit

The residents in the 17th college of UPM.

3.5 Sampling frame

The list name of the residents by blocks which meet the inclusion criteria were obtained from the office of 17th college.

3.6 Sampling method

The 17th college was selected as the study location due to the highest prevalence of dengue fever cases reported as compared to other living residence in UPM. In this context, the stratified random sampling was used in order to divide the 17th college's block into different stratum, such that, Block A, B, C and D. Subjects from each stratum were randomly selected based on systematic random sampling. Thus, 10 pieces of paper were put in a bowl and then, mixed up. The k^{th} element was picked randomly from a bowl, then k^{th} element chose was 2. Therefore, every 2 of the participants will be selected from the sampling frame from each stratum.

The type of sampling used in this study can be refer in **Figure 3.2** as following:

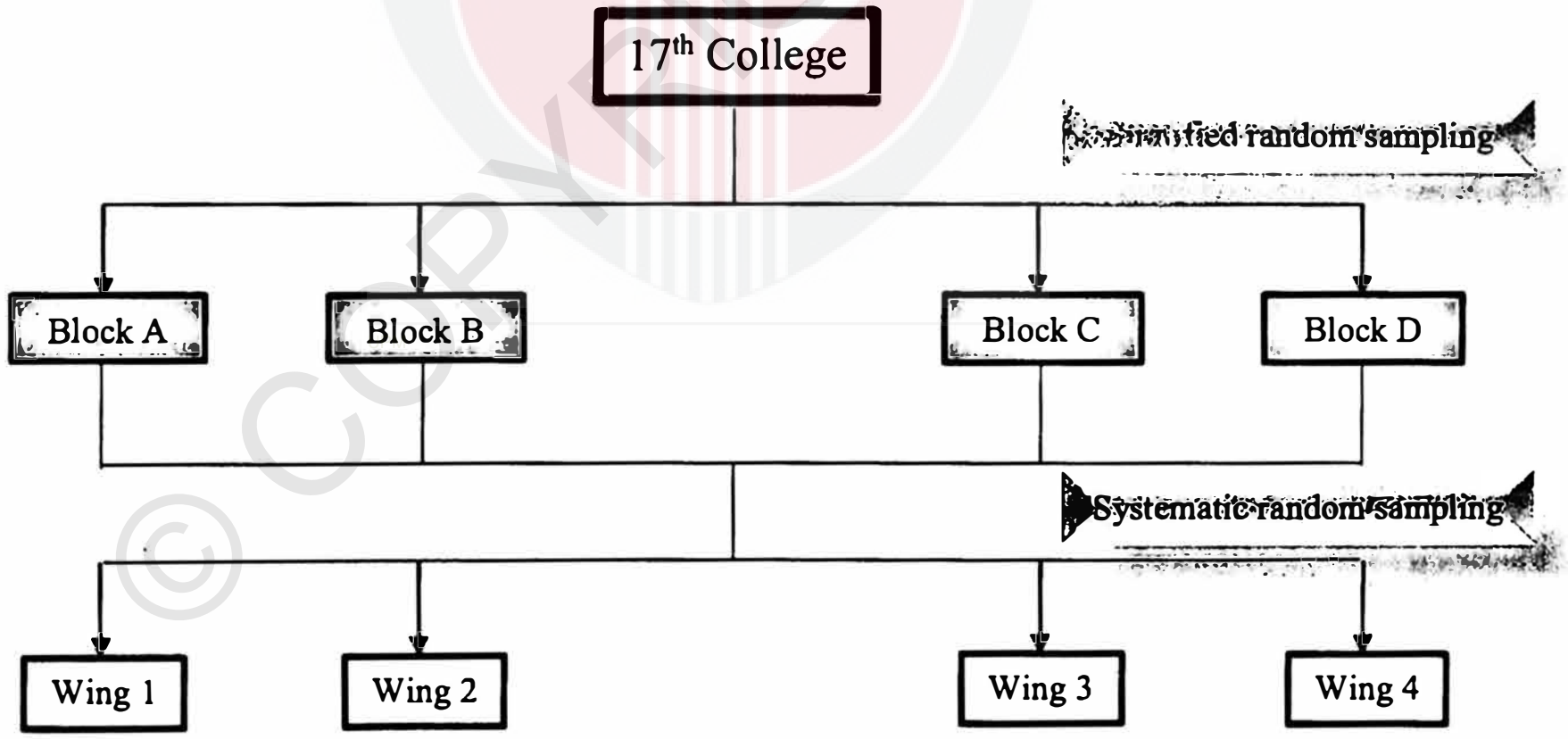

Figure 3.2: Research flow of study

3.7 Sample size

For sample size, two proportion sampling will be used. The formula of sample size calculation used by referring Lemeshow et al. (1990) and Lipsey (1990).

$$n_1 = \frac{\{(Z_{1-\alpha/2}\sqrt{2\bar{P}(1-\bar{P})} + Z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\}^2}{(P_1-P_2)^2}$$

$$n_2 = n_1 \times 2$$

$$n_3 = n_2 \div 0.8$$

$$n_4 = n_3 \div 0.9$$

Here,

$Z_{1-\alpha/2}$ = the critical value of the Normal distribution at $\alpha/2$ (e.g. for a confidence level of 95%, α is 0.05 and the critical value is 1.96)

$Z_{1-\beta}$ = the critical value of the Normal distribution at β (e.g. for a power of 80%, β is 0.2 and the critical value is 0.84)

$\bar{P}$ = $(P_1 + P_2/2)$

P_1 = estimated proportion (larger)

P_2 = estimated proportion (smaller)

n_1 = the sample size estimation

n_2 = the adjustment group

n_3 = the adjustment of estimated response rate

n_4 = the adjustment of eligibility

By using **Knowledge and Practice** proportion (referred to Ramdzan, 2016):

P_1 = the proportion of good practice among good knowledge which is 0.6357

P_2 = the proportion of good practice among poor knowledge which is 0.6327

$$n_1 = \frac{\{(1.96\sqrt{2((0.6357+0.6327)^2/2)(1-(\frac{(0.6357+0.6327)^2}{2}))} + 0.84\sqrt{(0.6357)(1-0.6357)+(0.6327)(1-0.6327)}\}^2}{(0.6357-0.6327)^2}$$

$= 401111.11$

$n_2 = 802222.22$

$n_3 = 1002777.78$

$n_4 = 1114197.53$

By using **Attitude and Practice** proportion (referred to Ramdzan, 2016):

P_1 = the proportion of good practice among good attitude which is 0.8302

P_2 = the proportion of good practice among poor attitude which is 0.5978

$$n_1 = \frac{\{(1.96\sqrt{2((0.8302+0.5978)^2/2)(1-(\frac{(0.8302+0.5978)^2}{2}))} + 0.84\sqrt{(0.8302)(1-0.8302)+(0.5978)(1-0.5978)}\}^2}{(0.8302-0.5978)^2}$$

$= 58.66$

$n_2 = 117.33$

$n_3 = 146.66$

$n_4 = 162.95$

Thus,

The sample size was calculated for third and fourth objectives in this study according to **proportion from the previous study Ramdzan (2016)**. Thus, a minimum of **163 respondents** were recruited in this study to fulfil the number of sample size calculation.

3.8 Study instrument

The standardized questionnaire by Al-Dubai et al. (2013) and Ramdzan (2016) was modified according to the 17th college population setting. The questionnaire consist of four section. The first section was socio-demographic characteristics of the subjects. Second section was about the knowledge of respondent regarding dengue fever. The third section was attitude towards dengue fever and the last section was the practice of the respondents towards preventive action. Generally, the questions were focused on the sign and symptoms, dengue fever transmission and the preventive measures. Ahmed (2007) was referred as to modify the soring measures as suitable to the developed questionnaire.

The questionnaires were divided into 4 categories which were:

3.8.1 Section A (Socio- demographic characteristic)

In this part, there were 11 questions asked include the age, gender, ethnicity, marital status, dengue history, dengue awareness and the source of information on dengue fever.

3.8.2 Section B (Knowledge of Dengue Fever)

There were 15 questions asked to obtain the level of subject's knowledge on dengue. The questions are about signs and symptom, transmission, treatment and prevention. There are three choices of answer which are yes, no and do not know. "1" score was given for a correct answer and "0" score for a wrong answer. The cut-off point to

categorize the knowledge on dengue fever infection is based on the study by Ahmed (2007).The point was range of 0-15 points and categorized into:

High level (80% - 100%) : 12-15 scores

Medium level (60% - 79%) : 9-11 scores

Low level (less than 59%) : 0-8 scores

3.8.3 Section C (Attitudes toward Dengue Fever)

There were 10 statements which can be classified into both positive and negative statements This part include about the attitudes of the students toward dengue fever and was assessed by using Likert's scale. The following show how the rating scale was obtained and measured:

Positive statement	
Choice	Scores
Strongly agree	5
Agree	4
Neither agree nor disagree	3
Disagree	2
Strongly disagree	1

Negative statement	
Choice	Scores
Strongly agree	1
Agree	2
Neither agree nor disagree	3
Disagree	4
Strongly disagree	5

10-50 points of scores indicated as the rating scale, then, the individual answers was summed up into total scores and the mean was calculated. The cut-off point to categorize the attitude toward dengue fever was based on the study by Ahmed (2007). The scores were categorized into 3 levels as follows:

Positive attitude (71% - 100%) : 36-50 scores

Neutral attitude (60% - 70%) : 30-35 scores

Negative attitude (less than 59%) : 10-29 scores

3.8.4 Section D (Practice regarding Dengue Fever Prevention)

In this section, only 8 questions were asked regarding on dengue fever prevention practices among residents in 17th college. The scores of the respondents were varied from 0 to 8 points and were classified into 3 levels. The scores assessed by giving 1 score for "yes" answer and 0 score for "no" answer. The cut-off point to categorize the practice of dengue fever prevention was based on the study by Ahmed (2007).

Good level (80% - 100%) : 7-8 scores

Fair level (60% - 79%) : 5-6 scores

Poor level (less than 59%) : 0-4 scores

3.9 Quality control

3.9.1 Validity

Validity is the test which measures the desired performance and appropriate inferences can be drawn from the results (New Horizons for Learning, 2007). The questionnaires as the study instrument used in this study was adapted from past study such that, Al-Dubai et al. (2013) and Ramdzan (2016) studies. The content validity was performed

by researcher's supervisor to evaluate whether test items assess defined the content of the study.

3.9.2 Reliability

The test-retest reliability was conducted in order to examine the degree of the results are consistent over time. The internal consistency was examined by using internal consistency reliability test, which is Cronbach's alpha. Thus, the pre-test was conducted by giving the questionnaires to the 10% (17 respondents) of total respondent in order to determine the Cronbach's alpha. The closed area such as tutorial room was selected as the place to conduct pre-test. In order to measure the reliability of the study instrument, the test is needed to be done for the same respondent in two separate occasions. The first time test was referred as **T1** and the second time test was referred as **T2**. The T1 and T2 was performed on the same day to avoid any bias. The gap between T1 and T2 is about 30 minutes and entertaining video was played during that duration to retain them before the next test, T2. The Cronbach's alpha result showed in Table 3.1 as below:

Table 3.1: The Cronbach's alpha results

	Knowledge of Dengue Fever	Attitude toward Dengue Fever	Practice regarding Dengue Fever Prevention
Cronbach's alpha	0.703	0.815	0.750

Cronbach's alpha was the most common measure of internal consistency ("reliability"). It was used for multiple Likert questions in a survey/questionnaire that form a scale and I wish to determine if the scale is reliable. The following guidelines were used:

- $\alpha \geq 0.9$: excellent reliability
- $0.9 > \alpha \geq 0.8$: good reliability
- $0.8 > \alpha \geq 0.7$: acceptable reliability
- $0.7 > \alpha \geq 0.6$: questionable reliability
- $0.6 > \alpha \geq 0.5$: poor reliability
- $0.5 > \alpha$: unacceptable reliability

3.10 Data collection

A set of self-administered questionnaire was distributed to the respondents. Initially, a proper introduction of the research, such as objectives and procedure was given. Those whom agreed to be a respondent asked to sign a consent form to confirm their willingness to participate in this research. The researcher requested the help of college representatives to distribute the questionnaires for completing the data collection process. By the way, the researcher explained the question in questionnaire to the college representative to ensure everyone clearly understand answered the questions.

3.11 Ethical consideration

1) Ethical approval was obtained by the Ethic Committee of Universiti Putra Malaysia before this study was conducted.

2) The objectives of the study were explained to the responsible person from 17th college before permission was granted.
3) Full verbal explanation of the study was given to the residents before inclusion as participants.
4) Respondents were given right to refuse to take part in the study. Privacy and confidentiality were maintained throughout the study.

3.12 Data analysis

Statistical Analysis Package for Social Science (SPSS) version 22.0 for Windows was used to analyses the raw data and run the statistical test.

Table 3.2: The data analysis of this study

OBJECTIVES	HYPOTHESIS	STATISTICAL ANALYSIS
To determine the socio-demographic information of 17th college residents.	-	Descriptive analysis
To assess the knowledge, attitude and practice level related dengue fever among 17th college residents.	-	Descriptive analysis
To compare the mean of dengue awareness between knowledge, attitude and practice (KAP) level among	There is a significant difference between dengue awareness and KAP level among 17th college residents of UPM.	Independent sample t-test

17th college residents of UPM.		
To compare the mean of type of dengue histories between knowledge, attitude and practice (KAP) level among 17th college residents of UPM.	There is a significant difference between type of dengue histories and KAP level among 17th college residents of UPM.	One-way ANOVA
To determine the significant association between knowledge and attitude on dengue among 17th college residents of UPM.	There is a significant association between knowledge and attitude on dengue among 17th college residents of UPM.	Chi-square test
To determine the significant association between knowledge and practices on dengue among 17th college residents of UPM.	There is a significant association between knowledge and practices on dengue among 17th college residents of UPM.	Chi-square test
To determine the significant association between attitude and practices on dengue among 17th college residents of UPM.	There is a significant association between knowledge and attitude on dengue among 17th college residents of UPM.	Chi-square test

CHAPTER 4

RESULT

This chapter summarized the findings of this study. A total of 163 residents of 17th college who fulfilled the inclusive criteria were participate in this study. The respondents comprised of students who pursue undergraduate study from the Faculty of Medicine and Health Sciences and Faculty of Veterinary Medicine. The response rate from the participants was 100 %. 163 copy of questionnaires were distributed in order to complete the KAP study among the residents of 17th college which comprised of seven courses and the response rate from the participants was 100 %. The selected participants need to complete the questionnaire and send back to the researcher to analyse it.

4.1 The socio-demographic characteristics of 17th college

This section shows the distribution of socio-demographic characteristics to describe the background information of the respondents. Table 4.1 revealed the general information of the respondents such as age, gender, ethnicity, religion, marital status, education level, year of study, dengue fever history and dengue fever awareness and how the respondents heard about dengue fever. Findings of this study showed that the study respondents comprises of 74.2% female and 25.8% of male residents at 17th college.

Most of the respondents (73%) at the age of 20-22 years old while the rest are ages at the range of 23-26 years old. The ethnicity of the respondents shows that Malay (77.9%) was dominant as compared to other ethnic such as Chinese (15.3%), Indian (4.3%) and others (2.5%). Thus, mostly the religion of the respondents was Islam (80.4%), followed by Buddha (14.1%), Hindu (3.7%) and others (2.5%). In this study, out of 163 selected respondents, 93 (57.1%) respondents were from third year of study or stay in 17th college, followed by 42 (52.8%) fourth year respondents and 28(17.2%) in second year of study.

The dengue history of the respondents were examined to understand their past-experience on dengue fever cases. Findings of this study showed that, most of the respondents (72.4%) have no part history of getting dengue fever, however, 18.4% and 9.2% of them reported to experience confirmed cases and suspected cases during their stay in 17th college. This section also to examine the awareness of the respondents on the dengue fever related awareness talk/brochures/information sharing, as well as, their realization of 17th college are susceptible to vector-borne diseases like dengue fever due to its location situated. Findings showed that, at least 92.6% and 97.5% of respondents are aware and heard of risk of the dengue fever during their reside in the 17th college. In addition, most of them claimed that they learned and exposed to the relevant knowledge from internet (82.2%), followed by education lecture (79.8%) and television (74.8%). The least source of information was learning from book reading (39.3%).

Table 4.1: Socio-demographic characteristics of the respondent (N=163)

Socio-demographic characteristics	Frequency (n)	Percentage (%)
Age (years)		
20-22	**119**	**73.0**
23-26	44	27.0
Gender		
Male	42	25.8
Female	**121**	**74.2**
Ethnicity		
Malay	**127**	**77.9**
Chinese	25	15.3
Indian	7	4.3
Others	4	2.5
Religion		
Islam	**131**	**80.4**
Buddha	23	14.1
Hindu	6	3.7
Others	3	1.8
Year of Study (Undergraduate)		
Second	28	17.2
Third	**93**	**57.1**
Fourth	42	25.8
Dengue fever history		
Confirmed	30	18.4

Suspected	15	9.2
No past history	**118**	**72.4**
Dengue fever awareness		
Yes	**151**	**92.6**
No	12	7.4
Heard about dengue fever		
Yes	**159**	**97.5**
No	4	2.5
Sources of information		
Television	122	74.8
Book	64	39.3
Public media	97	59.5
Radio	69	42.3
Internet	**134**	**82.2**
Poster/pamphlets	109	66.9
Newspaper	98	60.1
Friend/family	109	66.9
Education lecture	130	79.8

Table 4.2 shows the type of preventive measures that had been used by the 17th college residents. The most favourable preventive measures used was mosquito repellent (35.6%), followed by mosquito aerosol (32.5%) and electronic coil (25.2%). The least preventive measures used was Abate (3.7%).

Table 4.2: The type of preventive measure used by 17th college residents (N=163)

	Type of preventive measure	Frequency (n)	Percentage (%)
1.	Mosquito net	12	7.4
2.	**Mosquito repellent**	**58**	**35.6**
3.	Mosquito aerosol	53	32.5
4.	Mosquito coil	11	6.7
5.	Electronic coil	41	25.2
6.	Abate	6	3.7

4.2 The knowledge on Dengue Fever

Table 4.3 shows the participants responses regarding knowledge on dengue fever. Most of the respondents correctly answered questions related to the feature of dengue fever, such as the life cycle and the types of vector-caused dengue fever. Findings also shows that, most of the respondents agreed that the type of containers is one of the factor that that determine the potential breeding sites of *Aedes* mosquito, but mostly the respondents do not know *Aedes* mosquito likely to breed in clean water. Besides, 92% of respondents claimed that dengue fever will only affect the children and elderly and the 74.2% of respondents were answered *Aedes* mosquito only bite early in the morning.

When examine the knowledge on the mechanism of dengue transmission, 41.1% claimed that people who infected with dengue virus are asymptomatic or have only mild symptoms such as an uncomplicated fever (eg. hot/cold fever), 23.9% indicated that dengue can be transmitted by direct blood contact (eg. blood donation)

and 65.6% of them agreed that the transmission cycle can be derive from man to mosquito or from mosquito to man. Nevertheless, 89% of respondents correctly answered the question about the high risk group to infected with dengue fever was the group who live in the vicinity of the construction site.

Knowledge on the vector-control was also tested among the respondents, where 55.2% of them saying that *Aedes* mosquito eggs can withstand very dry conditions and survive for months, only 39.3% of them claimed that Abate is widely used to kill adult mosquitoes, 75.5% highlighted that there is a vaccine for dengue and 71.2% suggested that Panadol can be used to treat dengue.

Overall, out of 15 questions, only 8 questions were answered correctly by the respondents.

Table 4.3: The Knowledge of Dengue Fever among residents of 17th College (N=163)

	Knowledge	Choice of answer	Frequency (%)
1.	Dengue virus is transmitted by both female mosquitoes mainly of the species *Aedes aegypti* and *AAedes anopheles*.	Yes	45(27.6)
		No	**118(72.4)**
2.	Life cycle of the *Aedes* mosquito is 2 weeks.	Yes	34(20.9)
		No	**129(79.1)**
3.	Types of containers is one of the factors that determine the potential breeding sites of *Aedes* mosquito.	**Yes**	**97(59.5)**
		No	66(40.5)

4.	Dengue fever will only affects children and elderly.	**Yes**	**150(92.0)**
		No	13(8.0)
5.	*Aedes* mosquito likely to breed in dirty water.	**Yes**	**133(81.6)**
		No	30(18.4)
6.	People infected with dengue virus are asymptomatic or have only mild symptoms such as an uncomplicated fever (eg. hot/cold fever).	Yes	67(41.1)
		No	**96(58.9)**
7.	Dengue can be transmitted by direct blood contact (eg. blood donation)	Yes	39(23.9)
		No	**124(76.1)**
8.	Transmission cycle can be derive from man to mosquito or from mosquito to man.	**Yes**	**107(65.6)**
		No	56(34.4)
9.	Mosquitoes that transmitting dengue infection only bite early in the morning.	**Yes**	**121(74.2)**
		No	42(25.8)
10.	The *Aedes* mosquito eggs can withstand very dry conditions and survive for months.	**Yes**	**90(55.2)**
		No	73(44.8)
11.	ABATE is widely used to kill adult mosquitoes	Yes	64(39.3)
		No	**99(60.7)**
12.	There is a vaccine for dengue.	**Yes**	**123(75.5)**
		No	40(24.5)
13.	Paracetamol (Panadol) can be used to treat dengue.	**Yes**	**116(71.2)**
		No	47(28.8)
14.	The mosquito species, *Aedes aegypti*, is a daytime feeder.	Yes	46(28.2)
		No	**117(71.8)**

15.	Residents who live in the vicinity of construction site are at high risk of infecting dengue virus.	**Yes**	**145(89.0)**
		No	18(11.0)

The total score of knowledge level on dengue fever were quantify to indicate the overall knowledge level of one's on dengue fever. Table 4.4 summarised that only 7.4% of the study respondents scored high level of knowledge regarding dengue fever, the rest either have medium score (41.1%) or low score (51.5%) on knowledge levels on dengue fever transmission mechanism, life-cycle, control and prevent.

Table 4.4: The Total Score of Knowledge on Dengue Fever among 17th College residents (N=163)

Level of Knowledge (Total score=15)	Frequency (n)	Percentage (%)
High (12-15 scores)	12	7.4
Medium (9-11 scores)	67	41.1
Low (0-8 scores)	**84**	**51.5**
TOTAL		**100**

4.3 Attitude toward dengue fever prevention

The attitude on dengue fever prevention was summarized as in Table 4.5. Most of the respondent suggested that fogging by the local government is not essential enough for the prevention of dengue, and believe that wearing the black cloth will cause mosquito more attracted to bite me. At the same time, most respondents agreed that elimination of larvae breeding is necessary control and shall not considered as the time-consuming

measures. At least 56.4% of respondents strongly disagree that a person who previously had dengue would not get infected again, with 57.7% of respondent strongly disagree with the statement 'immediate treatment is not necessary for dengue fever as there is no cure for it'.

Although 44.8% of respondents believe that people who live near the construction site are more susceptible to dengue fever infection, but, only 39.3% of respondents strongly disagree with the elimination of stagnant water appears at construction site only the responsibility of construction worker. In addition, most of the respondents have neither agree nor disagree answered whether they will get infected by dengue if they remove all the stagnant water. For the attitude of personal precaution steps against dengue fever, most of the respondents claimed that they shall take more preventive measure to prevent mosquito breeding during rainy season, and personal hygiene has related to the prevention measures of dengue fever.

Table 4.5: The Attitude toward Dengue Fever among residents of 17th College (N=163)

	Attitude	Choice of answer	Frequency (%)
1.	Fogging by the local government is not essential enough for the prevention of dengue.	Strongly agree	29(17.8)
		Agree	**59(36.2)**
		Neither agree nor disagree	25(15.3)
		Disagree	28(17.2)
		Strongly disagree	22(13.5)

2.	I believe when I wear a black cloth will cause mosquito more attracted to bite me.	Strongly agree	45(27.6)
		Agree	**66(40.5)**
		Neither agree nor disagree	29(17.8)
		Disagree	16(9.8)
		Strongly disagree	7(4.3)
3.	Elimination of larvae breeding is a complete waste of time.	Strongly agree	4(2.5)
		Agree	9(5.5)
		Neither agree nor disagree	12(7.4)
		Disagree	48(29.4)
		Strongly disagree	**90(55.2)**
4.	A person who previously had dengue would not get infected again.	Strongly agree	3(1.8)
		Agree	5(3.1)
		Neither agree nor disagree	12(7.4)
		Disagree	51(31.3)
		Strongly disagree	**92(56.4)**
5.	Immediate treatment is not necessary for dengue fever as there is no cure for it.	Strongly agree	8(4.9)
		Agree	7(4.3)
		Neither agree nor disagree	17(10.4)
		Disagree	37(22.7)
		Strongly disagree	**94(57.7)**

6.	I will not get infected by dengue if I removed all the stagnant water.	Strongly agree	12(7.4)
		Agree	37(22.7)
		Neither agree nor disagree	**45(27.6)**
		Disagree	43(26.4)
		Strongly disagree	26(16.0)
.	Elimination of stagnant water appears at construction site only the responsibility of construction worker.	Strongly agree	9(5.5)
		Agree	12(7.4)
		Neither agree nor disagree	25(15.3)
		Disagree	53(32.5)
		Strongly disagree	**64(39.3)**
8.	During rainy season, I believe that I should be taking more preventive measure to prevent mosquito breeding.	Strongly agree	66(40.5)
		Agree	**75(46.0)**
		Neither agree nor disagree	12(7.4)
		Disagree	7(4.3)
		Strongly disagree	3(1.8)
9.	I believe people who live near the construction site are more susceptible to dengue fever infection	Strongly agree	54(33.1)
		Agree	**73(44.8)**
		Neither agree nor disagree	25(15.3)
		Disagree	8(4.9)
		Strongly disagree	3(1.8)

10.	Personal hygiene has related to the prevention measures of dengue fever.	Strongly agree	49(30.1)
		Agree	**63(38.7)**
		Neither agree nor disagree	36(22.1)
		Disagree	9(5.5)
		Strongly disagree	6(3.7)

Respondents were regarded as having an appropriate attitude towards dengue if they scored 71% and above of the questions. Table 4.6 shows that the 17th college residents have positive attitude (78.5%) regarding dengue fever prevention. However, 19.6% of respondents shows neutral attitude and only 1.8% of respondent shows negative attitude.

Table 4.6: The Total Score of Attitude toward Dengue Fever among 17th College residents (N=163)

Attitude (Total score=50)	Frequency (n)	Percentage (%)
Positive (36-50 scores)	**128**	**78.5**
Neutral (30-35 scores)	32	19.6
Negative (10-29 scores)	3	1.8
TOTAL		**100**

4.4 Practice regarding dengue fever prevention

This section is to examine the practices measures taken by the respondents to mitigate and prevent the risk of getting dengue fever. Table 4.7 shows more than half (62-96.3%) of the respondents answered 'yes' for all the questions in this practice part which concerning on the dengue fever prevention. This practices measure include cover the water container after using them (89%), wear cloth with long sleeves during outdoor activity to prevent mosquito bite (85.3%), check frequently for area that has stagnant water during rainy season (77.9%), discard thing in the garbage or dispose them (96.3%), participate in any activities related to dengue awareness programs at my college (76.7%), supporting fogging activity by let my window/door stay open (79.1%), report to college management if developed any symptoms of dengue fever (73.1%) and implemented preventive measures while staying in 17th college (62.0%).

Table 4.7: The Practice regarding Dengue Fever among residents of 17th College (N=163)

	Practice	Choice of answer	Frequency (%)
1.	I will cover water container after using them immediately in my household.	**Yes**	**145(89.0)**
		No	18(11.0)
2.	I will wear cloth with long sleeves during outdoor activity to prevent mosquito bite.	**Yes**	**139(85.3)**
		No	24(14.7)
3.	I will check frequently for area that has stagnant water during rainy season.	**Yes**	**127(77.9)**
		No	36(22.1)

4.	I will discard thing in the garbage or dispose them.	**Yes**	**157(96.3)**
		No	6(3.7)
5.	I will participate in any activities related to dengue awareness programs at my college.	**Yes**	**125(76.7)**
		No	38(23.3)
6.	I will supporting fogging activity by let my window/door stay open.	**Yes**	**129(79.1)**
		No	34(20.9)
7.	I will report to college management if I have any symptoms of dengue fever.	**Yes**	**120(73.6)**
		No	43(26.4)
8.	I am using preventive measures during staying in 17th college to prevent from dengue fever infection.	**Yes**	**101(62.0)**
		No	62(38.0)

The total score of practices are calculated to quantify the practices levels among respondents. Table 4.8 shows 60.1% of respondents have a good practice level regarding dengue fever prevention and mitigation, however, only 25.8% and 14.1% of the respondents showed they have fair and poor practice level, respectively.

Table 4.8: The Total Score of Practice regarding Dengue Fever among 17th College residents (N=163)

Level of Practice (Total score=8)	Frequency (n)	Percentage (%)
Good (7-8 scores)	**98**	**60.1**
Fair (5-6 scores)	42	25.8
Poor (0-4 scores)	23	14.1
TOTAL		**100**

4.5 The comparison of mean dengue awareness between knowledge, attitude and practice (KAP) level

This section is to examine whether the awareness will influence one's attitude and practices over dengue fever control and prevention. The independent t-test was used in order to compare dengue awareness among 17th college respondents with the KAP level. Table 4.9 showed the mean score of knowledge, attitude and practice for who were aware 17th college is the hotspot area for dengue fever is higher than who does not aware. Findings of this study reported that there is a significant difference (p<0.05) for knowledge score among respondent who aware or does not aware on hotspot area for dengue fever. However, the awareness in one's do not seem to affect the attitude and practices towards dengue risk control and prevention as both group of respondents showed no significant different (p>0.05) on attitude and practices level.

Table 4.9: The comparison of mean dengue awareness between knowledge, attitude and practice (KAP) level among 17th college residents.

Variable	Mean (SD)		Mean	T-statistics	p-value*
	Aware	Not aware	difference (95%CI)	(df)	
Knowledge	8.54 (2.131)	7.25 (1.865)	1.293 (0.041, 2.545)	2.039 (161)	*0.043
Attitude	39.33 (5.008)	37.08 (4.699)	2.248 (-0.706, 5.202)	1.503 (161)	0.135
Practice	6.40 (1.613)	6.33 (1.723)	0.071 (-0.889, 1.031)	0.145 (161)	0.885

N=163, Independent sample t-test *significant at p<0.05

4.6 The comparison of mean dengue history between knowledge, attitude and practice (KAP) level

This section is to compare the KAP level among respondents who has the background history of confirmed and suspected dengue cases, as well as one who has no past history. As show in Table 4.10, one-way ANOVA was used to compare the KAP levels among these three groups of respondents.

This table showed there is no significant difference (p>0.05) between KAP level with confirmed case, suspected case and no past history of dengue fever. Nevertheless, respondents who ever experienced confirmed dengue cases indicated relatively higher mean score for knowledge (9.10±1.69) and practice level (6.53±1.53), as compared to those who reported to have suspected dengue cases or no past history with dengue fever. At the same time, respondents with no past history and suspected cases of dengue fever showed relatively similar knowledge and practices levels on dengue fever prevention and control.

Table 4.10: The comparison of mean dengue histories between knowledge, attitude and practice (KAP) level among 17th college residents.

Variable	Mean (SD)			F-statistics (df)	p-value*
	Confirmed	Suspected	No past history		
Knowledge	9.10 (1.689)	7.53 (2.100)	8.40 (2.204)	2.873 (2, 160)	0.059
Attitude	40.20 (4.582)	40.33 (5.094)	38.75 (5.077)	1.455 (2, 160)	0.237
Practice	6.53 (1.525)	6.20 (1.474)	6.39 (1.664)	0.217 (2, 160)	0.805

N=163, One-way ANOVA *significant at $p<0.05$

4.7 The association between Knowledge and Attitude level

Table 4.11 is to determine the association between knowledge and attitude on dengue among 17th college residents of UPM. The result showed there is no significant association ($p>0.05$) between knowledge level and attitude level. The findings of this study showed that, one's knowledge are not influenced by the attitude they practiced to prevent the risk of getting dengue fever, such that, who have low level of knowledge (38.0%) on dengue fever tend to have a positive attitude as compared to people who have high level of knowledge (6.1%), and 34..4% of respondents who showed medium knowledge on dengue fever can actually has positive attitude on dengue risk prevention.

Table 4.11: The Association of Knowledge on the Attitude toward Dengue Fever among 17th College residents

Knowledge	Attitude, n (%)			X^2	p-value
	Positive	Neutral	Negative		
High level	10(6.1)	2(1.2)	0(0.0)		
Medium level	56(34.4)	10(6.1)	1(0.6)	2.446	0.654
Low level	62(38.0)	20(12.3)	2(1.2)		
TOTAL	128(78.5)	32(19.6)	3(1.8)		

N=163, Chi-square test *significant at $p<0.05$

4.8 The association between Knowledge and Practice level

Table 4.12 is to determine the association between knowledge and practices on dengue among the 17th college residents of UPM. The result showed there is no significant association ($p>0.05$) between knowledge level and practice level. The findings of this study demonstrated that, one's knowledge are not influenced by the practices they implemented to mitigate and control the risk arisen from the dengue fever. Such that, 31.3% of respondents who reported to have low-level of knowledge are demonstrating good level of practices, 25.2% of respondents who showed medium level of knowledge are showing good level of practices on dengue risk control and mitigation.

Table 4.12: The Association of Knowledge on the Practice regarding Dengue Fever among 17th College residents (N=163)

Knowledge	Practice, n (%)			X^2	p-value
	Good level	Fair level	Poor level		
High level	6(3.7)	4(2.5)	2(1.2)		
Medium level	41(25.2)	18(11.0)	8(4.9)	1.035	0.904
Low level	51(31.3)	20(12.3)	13(8.0)		
TOTAL	98(60.2)	42(25.8)	23(14.1)		

N=163, Chi-square test *significant at $p<0.05$

4.9 The association between Attitude and Practice level

Table 4.13 is to determine the association between attitude and practice on dengue among 17th college's residents. The result showed there is no significant association ($p>0.05$) between attitude level and practice level. Nevertheless, findings showed that respondents who claimed to have positive attitude on preventive measures against dengue might not necessarily demonstrated the good practices to manage the risk of dengue fever, such that only 47.9% of respondents reported to have positive attitude and good level of practices, 18.4% of them has positive attitude but with fair level of practices ,and 12.3% of them has positive attitude but relatively poor level of practices to mitigate and control the risk of dengue fever.

Table 4.13: The Association of Attitude on the Practice regarding Dengue Fever among 17th College residents (N=163)

Attitude	Practice, n (%)			X^2	p-value
	Good level	Fair level	Poor level		
-e attitude	78(47.9)	30(18.4)	20(12.3)		
	18(11.0)	12(7.4)	2(1.2)	5.262	0.261
Negative attitude	2(1.2)	0(0.0)	1(0.6)		
TOTAL	98(60.1)	42(25.8)	23(14.1)		

N=163, Chi-square test *significant at $p<0.05$

CHAPTER 5

DISCUSSIONS

5.1 The socio-demographic characteristics of 17th college

The result of this study showed the female respondents participation was higher than male respondents. This is due to the 17th college had more female residents (3 blocks) than male residents (1 block). The age of respondents in a range between 20 until 26 years old and all the respondents single and have a same level of education (degree). Actually, the majority of the 17th college residents came from degree students and there were least students who had early married while studying. Usually, the married students will stay outside and give the opportunity to the other single residents who want to live in 17th college. This study also showed Islamic residents was the majority of residents who lived in 17th college, followed by Chinese, Indian and other religions.

The dengue history showed most of the respondent do not have past history of dengue fever while lived in 17th college. However, about 30 respondents who had confirmed dengue fever while lived in this college. Despite of most of the total respondents showed they aware with the fact of 17th college is the hotspot for dengue fever, there were some of them who had experienced dengue fever.

The finding of this study shows that, most of the respondents heard about dengue fever before. To date, most of the students engaged with the social media for

several times a day and will benefits them to have a better access to the health information (O'Keeffe et al., 2011). The present study observed the main source of information regarding dengue fever was Internet (134 respondents) and followed by education or lecture (130 respondents) and television (122 respondents). Despite other studies (Ahmed, 2007; Al-Dubai et al., 2013) indicated that television is the main source of acquiring information related to dengue fever, present study showed that Internet is the main source used among the 17th college residents. The present study observed the internet is an effective communication tools that could be used to spread the information about health promotion and promote better awareness in regards to the dengue fever and their preventions.

Table 4.2 showed the most preventive measures that have been used by the residents while staying in 17th college were mosquito repellent (35.6%) and mosquito aerosol (32.5%) while the least preventive measures used was Abate (3.7%). This probably due to the programs or any outdoor activities that student mostly participated need to at least have mosquito repellent and mosquito aerosol while joining since it were easy to carry and use it.

5.2 Knowledge, Attitude and Practice level on Dengue Fever

5.2.1 Knowledge on Dengue Fever

It was surprisingly that although most of the respondents heard about dengue fever, but they do not know *Aedes* mosquito likely to breed in clean water. In line with study by Naing (2011), the respondents also have confusion that *Aedes* cannot reproduce in

dirty water. Moreover, they claimed only certain groups of people getting infected such as the child and elderly. The present study is inconsistent with previous study (Al-Dubai et al., 2013) which reported majority of them knew dengue fever will affects all age of groups. This may be due to the lack of information by the respondents they got on how to identify the *Aedes* mosquito in terms of their habitat.

On the other hand, findings of this study shows that more than half (74.2%) of the reported *Aedes* mosquito bites only in the morning. This finding is inconsistent with the previous study (Al-Dubai et al., 2013; Degallier et al., 2000; Itrat et al., 2008) which indicated that majority knew the fact that *Aedes* mosquitoes may bite either in sunrise or sunset.

Past study showed that about half of the respondents showed they know that dengue can be transmitted through direct blood contact (Al-Dubai et al., 2013). In the present study, only one third from total respondents aware the fact dengue can be transmitted by direct blood contact (eg. blood donation). This probably due to the most of information they got, just stated that the virus of dengue fever only can be infected through the bite of female *Aedes* mosquito. Actually, dengue virus can be transmitted through direct blood contact, however it is uncommon cases (Scitable, 2014).

About half of the respondents could correctly answered that the *Aedes* mosquito eggs can withstand very dry conditions and survive for months and Abate is widely used to kill adult mosquito. Anyhow, most of them incorrectly stated that there is vaccine for dengue fever and incorrectly respond that Panadol can be used to treat the dengue fever. The respondents reacted to the question on vaccine probably due to

the news on new vaccine was developed for dengue fever has been spread in the global but it was still under evaluation in clinical trials in order to help to reduce the number of dengue cases in the worldwide.

Nevertheless, the respondents were observed could correctly answered question about the residents who live in the vicinity of construction site are at high risk of infecting dengue virus due to the 17th college is in the vicinity of the developing construction of Hospital Pengajar UPM. They may be more aware to their surrounding issues to protect themselves from getting infected with dengue as they may know that construction sites is one of the highest contribution to dengue fever cases in Selangor.

5.2.2 Attitude toward dengue fever prevention

Oweini and Houri (2006) argue that, despite attitude is necessity for positive action, attitude is not essential enough to contribute in implementation of prevention by individual. The present study observed that the respondents believed the fogging by local government is not enough in dengue fever prevention and black cloth will cause attract mosquitoes to bite. One of the possible reason is the respondents may be experienced the situation above and feel that were the true fact about dengue fever. The respondents believed mosquito will bite people who wear black cloth as he may experience it before. The respondents probably feel fogging is not enough due to the increasing the trend of dengue cases in respondent's area. In addition, they need a better solutions from local governments to help them to overcome this dengue problems. The present study is similar with those found in previous studies (Al-Dubai et al., 2013; Acharya et al., 2005).

The situation is alarming when only 57.7% of respondents strongly disagree for immediate treatment is a must for dengue fever cases. These attitude of respondents in present study is worrisome because the respondents do not aware the complication of dengue fever may cause fatal. The finding in the present study was consistent with previous study by Nalongsack et al. (2009) which reported majority of them showed positive attitude, seek for treatment as soon as possible when he or she realize the dengue manifestation.

Almost half of respondents agree susceptible people to get infected by dengue fever come from people who live in the vicinity of construction site. However, only 39.3% strongly disagree the elimination of stagnant water appears at construction site only the responsibility of construction worker. The probably reason is they did not know the *Aedes* mosquitoes may fly in the average distance of 400 metres (WHO, 2016). Most of the respondents have neutral answer on statement '*I will not get infected by dengue if I removed all the stagnant water*'. This answer was defined they did not know the impact of removing all the stagnant water. At the same time, most of the information delivered to the society did not stated the result of having good practices regarding dengue prevention could be one of the reason why they have neutral attitude on that statement. The previous study showed most of the problem of dengue control in many countries is due to the lack of personal responsibility (Thailand (Phuanukoonnon, Brough, Bryan, 2006), Malaysia (Hairi et al. ,2003) and Puerto Rico (Pérez-Guerra et al. , 2009) and this was also the case in Pakse City of Laos (Nalongsack et al., 2009) where the respondents believed most of the responsible person to control dengue cases is government caused the respondents in the present study did not know how to respond with that statement.

5.2.3 Practice regarding dengue fever prevention

The respondents in the present study showed good level of practice in preventing dengue fever cases and avoidance of mosquito or vector bite. The present study is consistent with previous study by Dhimal et al. (2015) reported majority of the respondents showed good level of practice where the majority of respondents in this study discarded thing in the garbage or dispose them, immediately covered water container after used it and wear long sleeves during outdoor activity in order to avoid mosquito bite. The study by Mayxay et al. (2013) inconsistent with this study where only 50.7% will immediately covered their water container after used it. However, only 62% of respondents in the present study showed them using preventive measures while staying in the college. As the students, the respondents may be unable to obtain or buy preventive measures due to financial constraint.

5.3 The comparison status of dengue awareness and dengue history between knowledge, attitude and practice (KAP) level

5.3.1 Dengue awareness

Dengue awareness is defined as a person who is aware or unaware that the 17th college is the hotspot area for dengue fever cases. The present study shows that there is significant difference for knowledge score between people who are aware or unaware while there is no significant difference for both attitude and practice score. This finding highlighted that the attitude and the practices level of the respondent will not be

influenced by merely having knowledge of preventing dengue fever. Although attitude and practice are changeable, we need to have better planning to curb this problem as well. The findings also reported that the respondent who is aware had higher score in terms of knowledge, attitude and practice level compared to unaware respondent. This summarized that people need to become more alert with the surrounding issues in order to increase their awareness level in taking their action to eliminate *Aedes* mosquitoes breeding areas and controlling the dengue fever. Furthermore, this finding also can be used as reference to the college management to spread the current status of dengue fever cases that happened in 17th college.

5.3.2 Dengue history

The present study showed the respondents who had encountered dengue fever as confirmed case have high knowledge, attitude and practices level in preventing dengue fever compared to respondents with suspected case and no past history. The present study similar with previous study by Wan Rozita et al. (2006) and Ayyamani et al. (1986) where the study participant have higher knowledge, attitude and practices level among people had confirmed case of dengue fever. Thus, in order to have better comprehension factor of understanding the disease, the best alternative is by having the personal experience. This study is consistent with the fact that personal experience is the best teacher to guide us in controlling the dengue fever.

5.4 The association between Knowledge, Attitude and Practice level on dengue fever

Past study (Kwon and Crizaldo, 2014) showed that there is no significant association between knowledge and attitude and practice where it consistent with the present study. This may be due to the insufficient knowledge and awareness concerning on the prevention of dengue fever. Moreover, the high level of attitude and practices among the study population showed that, despite the resident had low level of knowledge, it does not influence their attitude and practices level regarding dengue prevention. Fortunately, they are applying the right attitude and practices into their daily life based on their culture life. As the finding showed that the present study was reported the respondent have low knowledge of dengue fever and positive attitude and good practices scores while staying in college.

There are studies (Ahmed, 2007; Mayxay, 2013) showed that knowledge is not associated with attitude, which is consistent to my study. However, the previous study by Mayxay et al. (2013) and Naing (2011) showed that the knowledge of respondents associated with practices. This study was supported by other previous study (Pai, Hong and Hsu, 2006; Espinoza et al., 2002), where the education and cleanliness program contributed in generating better practices in reducing dengue outbreak. Generally, most of the resident who participate in this study are educated students who pursuing their degree at medical and/or alliance health sciences background, this inevitability showed that, knowledge attainment among the study population is adequate during their daily reading in social media or otherwise embedded in their respective class learning module.

The present study showed that the attitude not associated with practices on prevention of dengue fever. However, the past study (Mayxay et al., 2013) finding found that positive attitude did not resulted in good practices. Despite that, the past study by Espinoza, Moises and Coll (2002) is inconsistent with present study where the attitude was significant associated with practices. In conclusion, the past study had clearly stated, even though, a right attitude alone is not enough to lead people to have a good practices and make the person itself to take a prompt action against dengue infection.

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Generally, this study indicated that the level of knowledge among 17th college residents was low. Surprisingly, the attitude and practices level regarding dengue fever prevention were good. On the other hand, this study also shows that there is no significant association between knowledge and attitude, knowledge and practice, and attitude and practice. However, the comparison of dengue awareness and their KAP level indicated that there is significant difference between dengue awareness and knowledge score. Yet, still there is no significant difference between dengue awareness and attitude and practices score. In addition, the comparison of dengue history and KAP level was analysed and showed that there is no significant difference between this two variables.

This study suggests that, the state of healthy condition among the community is largely shape by the circumstances in which people grow, live, work and age as well as the systems put in place to deal with health needs ultimately leading to inequities in health. Thus, the attainment of the highest possible standard of health depends on a comprehensive, holistic approach which goes beyond the traditional curative care, involving communities, health providers and other stakeholders. This study clearly shown that a comprehensive and interactive knowledge transfer life cycle should be

implemented in order to instil knowledge, inculcate behavioural changes, as well as enhance the belief and attitude in one's daily practices.

6.2 Recommendations

In order to foster a comprehensive health education program and strengthening a sustainable learning environment for the residents of 17th college, a partnership and network development among residents, college management and the local health authority provide continuous support.

The knowledge, attitude and practices is a good indicator in planning an intervention program in order to have a better quality of life and freely live without experiencing any burden diseases. Considering the current practices of health education program to combat against dengue fever at 17th college, it is recommended to view the following suggestions, such that:

Table 6.1: The example of recommendations action plan table to ensure a sustainable knowledge transfer to reduce Dengue Fever

Action plan	Strategies
Social media	Sharing the updated info on social-media (Facebook, instagram, twitter, etc.) on dengue prevention and control would help to enhance student's interest in learning the knowledge and understand the trend of dengue incidence among the 17th college residents.

	1) Alternatively, provide simple information that will pop up on the screen when students enter 17th college website or social media network. 2) Alternatively, self-reporting on signs and symptoms, living environment conditions can be reported and shared with the college's administrative officer to highlight the potential mosquito-borne breeding site 3) Use social media to share the updated dengue fever incidence happen at the 17th college so that the residents are aware of the trend of diseases for better preventive and control measures.
Periodical 'Environmental Health' inspection and surveillance	1) Introduce team, such as college staff with the help from Ministry of Health inspecting for house to house and block inspection every two months. In addition, to ensure the alertness of the residents on dengue disease, the 'red flag' system should be install. The red flag should be put on the place that have been found of *aedes* larvae. This can help residents or the inspection team to know where the potential breeding site. 2) The residents itself need to self-inspect their living area whether there are any potential breeding site and train themselves to do simple practice to avoid mosquitoes breeding sites such as immediately cover the water container.

Cleanliness program (*gotong-royong*)	1) A program called 'Fight Saturday' is suggested as the college management should provide three things to the residents, such as, pamphlet, sticker, and plastic for every Saturday. This program can be conducted especially during dengue outbreak as it will help to achieve reduced target. The pamphlet about dengue will educate them while increasing their awareness and knowledge level. However, the sticker provided should be stick on the door for each room to help in reminding them to stay focus on the goal of reducing the dengue cases by eliminate the potential breeding site for *Aedes* mosquitoes. Lastly, the discarded thing should be put into the plastic provided and gather it. Then, the person in charge need to collect all the things gathered immediately to avoid from creating the favourable place for breeding site of *Aedes* mosquitoes. 2) Planted the plants that are proven to repel mosquitoes, such as garlic, lavender, lemon grass and catnip and many more, is one of the way to educate the residents about 'do it yourself' or known as DIY mosquito repellent. The type of this plants can be referred to Healthline website by Yasin and Watson (2017). Thus, this plant can be planted at the college surrounding. The main intention is to indirectly give knowledge to the residents by placing information card at each plants. This

	information card will contain information, such as 'how to DIY' the mosquito repellent. This strategy will help them to obtain the knowledge in interesting way and at the same time, they will know how to protect themselves by using this plant. In addition, they can save budget too by do it themselves.
Add the dengue pamphlet and abate in *'Pakej Kolej'*	In addition, the staff college should provide dengue pamphlet and abate for every new semester. These two thing should be included in *'Pakej Kolej'* in order to increase the awareness and knowledge of college residents. Instead of give something that are not valuable for them, it is better we give something like 'dengue pamphlet' and 'abate' that help them to achieve sustainable environmental health as due to the fact that dengue fever is emerging issues.
'Dengue board' system	Based on Table 4.9, the mean score for knowledge, attitude and practice for people who aware with the fact that 17th college is the hotspot area for dengue is higher than people who unaware. Thus, we need to ensure the college residents stay aware with the current status or incident of dengue cases. It is recommended the 'dengue board' should be placed at the 17th college office and courts area. The content of 'dengue board' should include the total number of residents, latest dengue cases and the maps of the potential breeding site (based on the flag system).

REFERENCES

Abdullah, N. H. (2016). Kenyataan Akhbar KPK 11 Jan 2016: Situasi Semasa Demam Denggi Di Malaysia Bagi Minggu 1/2016 (3 Januari hingga 9 Januari 2016). Retrieved October 01, 2016, from https://kpkesihatan.com/2016/01/11/kenyataan-akhbar-kpk-11-jan-2016-situasi-semasa-demam-denggi-di-malaysia-bagi-minggu-12016-3-januari-hingga-9-januari-2016/

Acharya, A., Goswami, K., Srinath, S., & Goswami, A. (2005). Awareness about dengue syndrome and related preventive practices amongst residents of an urban resettlement colony of south Delhi. *J Vector Borne Dis*, 42: 122-7.

Ahmed, N. (2007). Knowledge , Attitude and Practice of dengue fever prevention among the people in Male ', Maldives. A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Public Health Program in Health Systems Development College of Public Health Sciences Copyright of Chulalongkorn University.

Al-Dubai, S. A. R., Ganasegeran, K., Alwan, M. R., Alshagga, M. A. & Saif-Ali, R. (2013). Factors affecting dengue fever knowledge, attitudes and practices among selected urban, semi-urban and rural communities in Malaysia. *Southeast Asian Journal of Trop Med Public Health*, 44(1).

ASEAN & World Health Organization. (2012). *Action Against Dengue: ASEAN Den gue Day: One year on* [Brochure]. Author. Retrieved May 10, 2017, from http://www.wpro.who.int/emerging_diseases/meetings/docs/[illegible]booklet.pdf

Ayyamani, U. D., Ying, G. C., & San, O. G. (1986). A knowledge, attitude and practice (KAP) study on dengue/dengue haemorrhagic fever and the aedes mosquitoes. *Med Journal Malaysia*. 41(2): 108-15.

Azami, N. A., Salleh, S., Neoh, H., Zakaria, S. S., & Jamal, R. (2011). Dengue epide mic in Malaysia: Not a predominantly urban disease anymore. *BMC Research N otes,4*(1), 216. doi:10.1186/1756-0500-4-216

Barrera, R., Amador, M., & Mackay, A. J. (2011). Population Dynamics of Aedes aegypti and Dengue as Influenced by Weather and Human Behavior in San Juan, Puerto Rico. *PLoS Negl Trop Dis PLoS Neglected Tropical Diseases*, 5(12). doi:10.1371/journal.pntd.0001378

Bota, R., Ahmed, M., Jamali, M. S., & Aziz, A. (2014). Knowledge, attitude and perception regarding dengue fever among university students of interior Sindh. *Journal of Infection and Public Health,7*(3), 218-223. doi:10.1016/j.jiph.2013.11.004

Campbell, K. M., Haldeman, K., Lehnig, C., Munayco, C. V., Halsey, E. S., Laguna-Torres, V. A., Yagui, M., Morrison, A. C., Lin, C-D. & Scott, T. W. (2015). Weather regulates location, timing, and intensity of dengue virus transmission between humans and mosquitoes. *PLoS Negl Trop Dis*, 9:1–26.

Chan, M. & Johansson, M. A. (2012). The Incubation Periods of Dengue Viruses. *PLoS ONE*, 7(11). doi:10.1371/journal.pone.0050972

Chen, S. C., Liao, C. M., Chio, C. P., Chou, H. H., You, S. H. & Cheng, Y. H. (2010). Lagged temperature effect with mosquito transmission potential explains dengue variability in southern Taiwan: Insights from a statistical analysis. *Sci. Total Environ.*, 408, 4069–4075.

Cheong, Y. L., Burkart, K., Leitao, P. J. & Lakes, T. (2013). Assessing the weather effects on dengue disease in Malaysia. *International Journal of Environmental Research and Public Health*, 10(12): 6319-6334.

De Souza, D.K., Owusu, P.N. & Wilson, M.D. (2012). Impact of Climate Change on the Geographic Scope of Diseases. *InTech, Morn Hill*, 245-264.

Degallier, N., Vilarinhos, P. T., Carvalho, M. S., Knox, M. S., & Caetano, J. J. (2000). People's knowledge and practice about dengue, its vectors and control means in Brasilia (DF), Brazil: its relevance with entomological factors. *Journal of American Mosquito Control Association*, 16: 114-23.

Dengue Transmission. (2014). Retrieved May 07, 2017, from https://www.nature.com/scitable/topicpage/dengue-transmission-22399758

Dhang, C. C., Benjamin, S., Saranum, M.M., Fook, C. Y., Lim, L. H., Ahmad, N. W. & Sofian-Azirun, M. (2005). Dengue vector surveillance in urban residential and settlement areas in Selangor, Malaysia. *Tropical Biomedicine,* 22(1): 39–43.

Dhimal, M., Aryal, K. K., Dhimal, M. L., Gautam, I., Singh, S. P., Bhusal, C. L., & Kuch, U. (2014). Knowledge, Attitude and Practice Regarding Dengue Fever among the Healthy Population of Highland and Lowland Communities in Central Nepal. *PLos ONE,* 9(7): 1-15.

Dhimal, M., Gautam, I., Joshi, H. D., O'Hara, R. B., Ahrens, B., & Kuch, U. (2015). Risk Factors for the Presence of Chikungunya and Dengue Vectors (Aedes aegypti and Aedes albopictus), Their Altitudinal Distribution and Climatic Determinants of Their Abundance in Central Nepal. *PLOS Neglected Tropical Diseases*, 9(3). doi:10.1371/journal.pntd.0003545

Dickerson, C. Z. (2007). *The effects of temperature and humidity on the eggs of Aedes aegypti (L.) and Aedes albopictus (Skuse) in Texas* (Unpublished doctoral dissertation).

Dom, N. C., Latif, Z. A., Ahmad, A. H., Ismail, R., & Pradhan, B. (2012). Manifestation of GIS Tools for Spatial Pattern Distribution Analysis of Dengue

Fever Epidemic in the City of Subang Jaya, Malaysia. *Journal of Environment Asia*, 5(2), 82-92. doi: 10.14456/ea.2012.22

Dowling, Z., Armbruster, P., Ladeau, S. L., Decotiis, M., Mottley, J., & Leisnham, P. T. (2013). Linking Mosquito Infestation to Resident Socioeconomic Status, Knowledge, and Source Reduction Practices in Suburban Washington, DC. *EcoHealth, 10*(1), 36-47. doi:10.1007/s10393-013-0818-6

Eastin, M. D., Delmelle, E., Casas, I., Wexler, J. & Self, C. (2014). Intra-and interseasonal autoregressive prediction of dengue outbreaks using local weather and regional climate for a tropical environment in Colombia. *Am. J. Trop. Med. Hyg.*, 91, 598–610.

Espinoza-Gomez, F., Hernandez-Suarez, C. M., & Coll-Cardenas, R. (2002). Educational campaign vs malathion spraying for the control of Aedes *aegypti* in Colima, Mexico. *J Epidemiol Community Health*, 56:148–153.

Flynn, A. (2012). A Study Exploring the Knowledge, Attitudes and Practices of Young People Regarding Dengue Fever and the Extent of Community Involvement in Vector Control of the Disease in Trinidad and Tobago. *West Indian Med J,* 61(6), 615.

Gage, K. L., Burkot, T. R., Eisen, R. J. & Hayes, E. B. (2008). Climate and vector borne diseases. Am. *J. Prev. Med.* 35:436-450.

Gharbi, M., Quenel, P., Gustave, J., Cassadou, S., Ruche, G. L., Girdary, L. & Marrama, L. (2011). Time series analysis of dengue incidence in Guadeloupe, French West Indies: Forecasting models using climate variables as predictors. *BMC Infect. Dis.*, 11, 166.

Gu, H., Leung, R. K-K., Jing, Q., Zhang, W., Yang, Z., Lu, J., Hao, Y. & Zhang, D. (2016). Meteorological Factors for Dengue Fever Control and Prevention in South China. *Int. J. Environ. Res. Public Health*, 13, 867. doi: 10.3390/ijerph13090867

Gubler, D. (1997). Dengue and dengue hemorrhagic fever: its history and resurgence as a global public health problem. In: Dengue and Dengue Hemorrhagic Fever, Gubler D, Kuno G (editors), Wallingford, UK: CAB International, 1–21.

Gubler, D. (1998a). Dengue and dengue hemorrhagic fever. *Clinical Microbiology Reviews,* 11, 480–496.

Gubler, D. J. (1989). Aedes aegypti and Aedes aegypti-borne disease control in the 1990s: top down or bottom up. *American Journal of Tropical Medicine and Hygiene,* 40, 571–578.

Guzman, M. G & Kouri, G. (2002). Dengue: an update. *Lancet Infectious Diseases*, 2, 33–42.

Guzmán, M. G., & Kouri, G. (2002). Dengue: an update. *The Lancet Infectious Diseases, 2*(1), 33-42. doi:10.1016/s1473-3099(01)00171-2

Guzman, M. G., Kouri, G. & Bravo, J. (1999). La emergencia de la fiebre hemorragica del dengue en las Americas: re-emergencia del dengue. *Rev Cub Med Trop*, 51, 5–13.

Guzman, M. G., Kouri, G. & Pelegrino, J. L. (2001). Enfermedades virales emergentes. *Rev Cub Med Trop*, 53, 5–15.

Hairi, F., Ong, C.-H., Suhaimi, A., Tsung, T.-W., Anis Ahmad, M., Sundaraj, C., & Soe, M. M. (2003). A Knowledge, Attitude and Practices (KAP) Study on Dengue among Selected Rural Communities in the Kuala Kangsar District. *Asia Pacific Journal Public Health,* 15(1): 37-43.

Handel, A. S., Ayala, E. B., Borbor-Cordova, M. J., Fessler, A. G., Finkelstein, J. L., Espinoza, R. X., . . . Stewart-Ibarra, A. M. (2016). Knowledge, attitudes, and practices regarding dengue infection among public sector healthcare providers in Machala, Ecuador. *Trop Dis Travel Med Vaccines Tropical Diseases, Travel Medicine and Vaccines*, 2(1). doi:10.1186/s40794-016-0024-y

Health, P. B. (2016, January 10). Kenyataan Akhbar KPK 11 Jan 2016: Situasi Semasa Demam Denggi Di Malaysia Bagi Minggu 1/2016 (3 Januari hingga 9 Januari 2016). Retrieved May 09, 2017, from https://kpkesihatan.com/2016/01/11/kenyataan-akhbar-kpk-11-jan-2016-situasi-semasa-demam-denggi-di-malaysia-bagi-minggu-1/2016-3-januari-hingga-9-januari-2016/

Hii, Y. L., Zaki, R. A., Aghamohammadi, N., & Rocklöv, J. (2016). Research on Climate and Dengue in Malaysia: A Systematic Review. Current Environmental Health Reports Curr Envir Health Rpt, 3(1), 81-90. doi:10.1007/s40572-016-0078-z

Horta, M. A., Bruniera, R., Ker, F., Catita, C. & Ferreira, A. P. Temporal relationship between environmental factors and the occurrence of dengue fever. *Int. J. Environ. Health Res.*, 24, 471–481.

Humayun, M., Hasan, R., & Rubina, B. (2013). Knowledge, Attitude & Perception of Dengue among First Year Medical Students. *Pakistan Journal of Medical and H ealth Sciences*, 258-263.

Ibrahim, N. R., Al-Bar, A., Mohamed Kordey, & Al-Fakeeh, A. (2009). Knowledge, Attitudes and Practices relating to dengue fever among females in Jeddah High S chools. *Journal of Infection and Public Health*, 30-40.

iDengue untuk komuniti. (n.d.). Retrieved October 03, 2016, from http://idengue.remotesensing.gov.my/idengue/index.php

Itrat, A., Khan, A., Javaid, S., Kamal, M., Khan, H., Javed, S. & Jehan, I. (2008). Knowledge, Awareness and Practices Regarding Dengue Fever among the Adult

Population of Dengue Hit Cosmopolitan. *PLoS ONE*, 3(7). doi:10.1371/journal.pone.0002620

Jahan (2009). Dengue Fever (DF) in Pakistan. *Asia Pacific Family Medicine,* 10:1-4.

James, N. V. (2015). Urban and rural inequality in knowledge, attitude and practice on haze in Klang Valley. Degree of Bachelor Sciece (Environmental and Occupational Health).

Kaliyaperumal, K. (2004). Guideline for Conducting a Knowledge, Attitude and Practice (KAP) Study. *Journal of Community Ophthalmology,* 4(1).

Kwon, D-H. & Crizaldo, R. L. (2014). A Knowledge, Attitudes, and Practices (KAP) Study on Dengue Fever among the Rowenas Community in the Philippines. *Journal of Mediator,* 10(1).

Lambrechts, L., Paaijmans, K. P., Fansiri, T., Carrington, L. B., Kramer, L. D., Thomas, M. B. & Scott, T. W. (2011). Impact of daily temperature fluctuations on dengue virus transmission by Aedes aegypti. *Proc. Natl. Acad. Sci. USA*, 108, 7460–7465.

Leong, T. K. (2014). Knowledge, Attitude and Practice on Dengue among Rural Communities in Rembau and Bukit Pelanduk, Negeri Sembilan, Malaysia. *International Journal of Tropical Disease & Health*, 4(7): 841-848.

Lu, L., Lin, H., Tian, L., Yang, W., Sun, J. & Liu, Q. (2009). Time series analysis of dengue fever and weather in Guangzhou, China. *BMC Public Health*, 9, 395.

Malaysia - Malaysian Meteorological Department. (n.d.). Retrieved May 25, 2017, from http://www.met.gov.my/web/metmalaysia/climate/generalinformation/malaysia

Malaysia, K. K. (n.d.). Laman Utama | iDengue. Retrieved September 1, 2017, from http://idengue.remotesensing.gov.my/idengue/index.php

Malaysia, K. K. (n.d.). Portal Rasmi Kementerian Kesihatan Malaysia - Kadar Insiden & Kematian Akibat Penyakit Berjangkit. Retrieved October 03, 2017, from http://www.moh.gov.my/index.php/pages/view/324

Malaysia, M. O. H. (2012). Health Facts 2012. Health Informatics Centre, Planning and Development Division, MOH/S/RAN/31.12(TR).

Manap, M. A., Sulaiman, W. N., Ramli, M. F., Pradhan, B., & Surip, N. (2011). A knowledge-driven GIS modeling technique for groundwater potential mapping at the Upper Langat Basin, Malaysia. *Arabian Journal of Geosciences,6*(5), 1621-1637. doi:10.1007/s12517-011-0469-2

Martín, J. L., Solórzano, J. O., Guzmán, M. G., Brathwaite, O., Bouckenooghe, A., Zambrano, B., & Dayan, G. H. (2010). The Epidemiology of Dengue in the Americas Over the Last Three Decades: A Worrisome Reality. *The American*

Journal of Tropical Medicine and Hygiene,82(1), 128-135. doi:10.4269/ajtmh.2010.09-0346

Mayxay, M., Cui, W., Thammavong, S., Khensakhou, K., Vongxay, V., Inthasoum, L. & Armstrong, G. (2013). Dengue in peri-urban Pak-Ngum district, Vientiane capital of Laos: a community survey on knowledge, attitudes and practices. *BMC Public Health*, 13(1). doi:10.1186/1471-2458-13-434

Mia, M. S., Begum, R. A., Er, A., Raja Datuk Zaharaton Raja Zainal Abidin, & Pereira, J. J. (2013). Trends of dengue infections in Malaysia, 2000-2010. *Asian Pacific Journal of Tropical Medicine, 6*(6), 462-466. doi:10.1016/s1995-7645(13)60075-9

Mohamad, M., Selamat, M. I., & Ismail, Z. (2014). Factors Associated with Larval Control Practices in a Dengue Outbreak Prone Area. *Journal of Environmental and Public Health*, 1-6. doi:10.1155/2014/459173

Morin, C. W., Comrie, A. C., & Ernst, K. (2013). Climate and Dengue Transmission: Evidence and Implications. *Environmental Health Perspectives*. doi:10.1289/ehp.1306556

Naing, C., Ren, W. Y., Man, C. Y., Fern, K. P., Qiqi, C., Ning, C. N. & Ee, C. W. S. (2011). Awareness of Dengue and Practice of Dengue Control among the Semi-Urban Community: A Cross Sectional Survey. *Journal of Community Health*, 36: 1044-1049.

Naish, S., Dale, P., Mackenzie, J. S., McBride, J., Mengersen, K. & Tong, S. (2014). Climate change and dengue: A critical and systematic review of quantitative modelling approaches. *BMC Infect. Dis.*, 14, 167.

Nalongsack, S., Yoshida, Y., Morita, S., Sosouphanh, K., & Sakamoto, J. (2009). Knowledge, Attitude and Practice Regarding Dengue among People in Pakse, Laos. *Nagoya Journal of Medicine and Sciences*, 29-37.

Nazri, C. D., Zulkiflee, A. L., Abu, H. A., Rodziah, I., & Biswajeet, P. (2012). Manifestation of GIS Tools for Spatial Pattern Distribution Analysis of Dengue Fever Epidemic in the City of Subang Jaya, Malaysia. *Journal of Environment Asia,* 5(2): 82-92.

New Horizons for Learning. (2007). Assessment Terminology: A Glossary of Useful. Retrieved February 28, 2008, from http://www.k12.hi.us/~atr/evaluation/glossary.htm

O'keeffe, G. S., & Clarke-Pearson, K. (2011). The Impact of Social Media on Children, Adolescents, and Families. *Pediatrics,* 127(4), 800-804. doi:10.1542/peds.2011-0054

Oweini, A., & Houri, A. (2006). Factors Affecting Environmental Knowledge and Attitudes among Lebanese College Students. Applied Environmental Education & Communication, 5(2), 95-105. doi:10.1080/15330150600648945

Pai, H. H., Hong, Y. J., & Hsu, E. L. (2006). Impact of a short-term community-based cleanliness campaign on the sources of dengue vectors: an entomological and human behavior study. *J Environ Health*, 68:35–39.

Pérez-Guerra, C. L., Zielinski-Gutierrez, E., Vargas-Torres, D., & Clark, G. G. (2009). Community beliefs and practices about dengue in Puerto Rico. Revista Panamericana de Salud Pública, 25(3), 218-226. doi:10.1590/s1020-49892009000300005

Perumal, E. (2017, April 25). Reducing dengue cases - Community. Retrieved May 08, 2017, from http://www.thestar.com.my/metro/community/2017/04/26/reducing-dengue-cases/

Phuanukoonnon, S., Brough, M., & Bryan, J. H. (2006). Folk knowledge about dengue mosquitoes and contributions of health belief model in dengue control promotion in Northeast Thailand. *Acta Tropica*, 99(1), 6-14. doi:10.1016/j.actatropica.2006.05.012

Pinheiro, F. P. & Corber, S. J. (1997). Global situation of dengue and dengue haemorrhagic fever and its emergence in the Americas. *World Health Statist Quart*, 50, 161–168.

Qi, X., Wang, Y., Li, Y., Meng, Y., Chen, Q., Ma, J. & Gao, G. F. (2015). The Effects of Socioeconomic and Environmental Factors on the Incidence of Dengue Fever in the Pearl River Delta, China, 2013. *PLoS Negl. Trop. Dis.*, 9. doi: e0004159.

Rahman, H. A. (2012). Climate Change and Dengue Fever Diseases: Any Association? *International Scientific Journal*, 2: 1-5.

Ramdzan, S. N. F. M. (2016). Knowledge, attitude and practice regarding dengue fever among undergraduate students in Faculty of Medicine and Health Sciences, Universiti Putra Malaysia. Degree of Bachelor of Nursing, Universiti Putra Malaysia.

Rehman A. U., Mahmood, M. A., Kazmi, S. F., Munir, F. & Ghani, U. (2015). Dengue Fever; Impact of Knowledge on Preventive Practice. *Journal of Ann. Pak. Inst. Med. Sci.,* 11(4): 195-201.

Rudnick, A., Tan, E. E., Lucas, J. K., & Omar, M. (1965). Mosquitoborne haemorrhagic fever in Malaya. *Br Med J*, 1: 1269-72.

Saifur, R. G., Dieng, H., Hassan, A. A., Salmah, M. R., Satho, T., Miake, F., & Hamdan, A. (2012). Changing Domesticity of Aedes aegypti in Northern Peninsular Malaysia: Reproductive Consequences and Potential Epidemiological Implications. *PLoS ONE, 7*(2). doi:10.1371/journal.pone.0030919

Shah, S. A., Sani, J. A. M., Hassan, M. R., Safian, N., Aizuddin, A. N. & Hod, R. (2012). Relationships between Aedes indices and dengue outbreaks in Selangor, Malaysia. *Dengue Bulletin*, 36.

Sharma, K., Angel, B., Singh, H., Purohit, A. & Joshi, V. (2008). Entomological studies for surveillance and prevention of dengue in arid and semi-arid districts of Rajasthan, India. *Journal of Vector Borne Disease*, 45: 124-32.

Shuaib, F., Todd, D., Campbell Stennett, D., Ehiri, J., & Jolly, P. E. (2010). Knowledge, attitudes and practices regarding dengue infection in Westmoreland, Jamaica. *West Indian Medical Journal,* 59(2): 139-146.

Skae, F. M. T. (1902). Dengue fever in Penang. *Br Med J*, 2: 1581-2.

Spiegel, J., Bennett, S., Hattersley, L., Hayden, M. H., Kittayapong, P., Nalim, S., . . . Gubler, D. (2005). Barriers and Bridges to Prevention and Control of Dengue: The Need for a Social–Ecological Approach. *EcoHealth,2*(4), 273-290. doi:10.1007/s10393-005-8388-x

Swaddiwudhipong, W., Lerdlukanavonge, P., Khumklam, P., Koonchote, S., Nguntra, P., & Chaovakiratipong, C. (1992). A Survey of Knowledge, Attitude and Practice of the Prevention of Dengue Hemorrhagic Fever in an Urban Community of Thailand. *Southest Asian Journal of Tropical Medical and Public Health,* 23(2): 207-211.

Taksande, A. & Lakhkar, B. (2012). Knowledge, attitude and practice (KAP) of dengue fever in the rural area of central India. *Journal of Shiraz E Medical,* 13(4).

Tan, A. (2016, January 19). More people, urbanisation 'behind rise in dengue cases' Retrieved May 08, 2017, from http://www.straitstimes.com/singapore/health/more-people-urbanisation-behind-rise-in-dengue-cases

The definition of attitude (2016). Retrieved November 01, 2016, from http://www.dictionary.com/browse/attitude

Ujala, N., Umar, F., Muhammad Zahid, L., Razi Haider, Tahir, M., & Rahila, N. (201 3). Knowledge, awareness and practices about dengue fever among university stu dents. *Pakistan Journal of Medical and Health Sciences*, 1097-1100.

Universiti Putra Malaysia, P. K. (2016, November 10). STATISTIK KES DENGGI K OLEJ DAN FAKULTI UPM TAHUN 2014 HINGGA JUN 2016 [E-mail to the a uthor].

Urban sprawl, bad sanitation spread dengue fever. (2009, September 01). Retrieved May 08, 2017, from http://www.reuters.com/article/us-philippines-dengue-idUSTRE58011M20090901

Vazquez-Prokopec, G. M., Chaves, L. F., Ritchie, S. A., Davis, J., & Kitron, U. (2010). Unforeseen costs of cutting mosquito surveillance budgets. *Journal of PLoS Neglected Tropical Diseases*, 4(10).

Wan Rozita, W. M., Yap, B. W., Veronica, S., Muhammad, A. K., Lim, K. H. & Sumarni, M. G. (2006). Knowledge, attitude and practice (KAP) survey on dengue fever in an urban Malay residential area in Kuala Lumpur. *Malaysian Journal of Public Health Medicine,* 6(2): 62-67.

WHO collaborates with the Association of Southeast Asian Nations to highlight the need for sustained dengue prevention and control. (2013, June 12). Retrieved May 08, 2017, from http://www.who.int/denguecontrol/news/Dengue_day_asean_2013/en/

Will, P. & Lloyd, L. (2004). Planning Social Mobilization and Communication for Dengue Fever Prevention and Control: A Step by Step Guide. Geneva: WHO.

World Health Organisation (2013). Country Cooperation Strategy Report. Retrieved December 01, 2016, from http://www.who.int/countryfocus

World Health Organization (2008). Country Cooperation Strategy at a glance. Retrieved 2 October 2016. http://www.who.int/countries/mys/eng

World Health Organization (2016). Dengue and severe dengue. Retrieved 9 October 2016. http://www.who.int/mediacentre/factsheets/fs117/en/

World Health Organization. (n.d.). Retrieved May 08, 2017, from http://www.who.int/denguecontrol/human/en/

Xu, H. Y., Fu, X., Lee, L. K. H., Ma, S., Goh, K. T., Wong, J., Habibullah, M. S., Lee, G. K. K., Lim, T. K. & Tambyah, P. A. (2014). Statistical modeling reveals the effect of absolute humidity on dengue in Singapore. *PLoS Negl. Trop. Dis.*, 8, e2805.

Yasin, K., & Watson, K. (2017). 10 Natural Ingredients That Repel Mosquitos. Retrieved May 23, 2017, from http://www.healthline.com/health/kinds-of-natural-mosquito-repellant#lavender3

APPENDICES

APPENDIX A

QUESTIONNAIRE

DEPARTMENT OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH

FACULTY OF MEDICINE AND HEALTH SCIENCES

UNIVERSITI PUTRA MALAYSIA

KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) ON DENGUE FEVER AMONG 17th COLLEGE RESIDENTS OF UNIVERSITI PUTRA MALAYSIA (UPM)

The instruction to participant:

1. Please read the instruction clearly.
2. The questions consist of four sections (Section A, B, C and D).
3. You are required to answer all the questions.

JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM

FORM B1: RESPONDENT'S INFORMATION SHEET AND CONSENT

Please read the following information carefully and do not hesitate to discuss with the researcher should you need further clarification.

1. STUDY TITLE :

Knowledge, attitude and practice (KAP) on dengue fever among 17th college residents of Universiti Putra Malaysia (UPM).

2. INTRODUCTION:

In Malaysia, dengue disease is a significant public health problem and the reported dengue cases have been increasing in recent years. The possible reasons for the increasing dengue cases were rapid urbanization, living in the vicinity of construction sites, improper waste management, acute shortage of water resulting in increases of water storage containers. In addition, suitable breeding containers for dengue mosquitoes were often found in parks, empty land, industrial buildings, construction sites, and blocked cement drains and septic tanks.

The increasing prevalance rate of dengue fever at 17th college is worrying due to several factors as stated above. Therefore, this study aims to examine the knowledge, attitude and practice of 17th college residents on dengue fever. At the same time, determine the association between the knowledge, attitude and practices of dengue fever among the 17th college residents.

3. WHAT WILL YOU HAVE TO DO?

Once you understand the study background, you should sign up the consent form as enclosing below in **Section 9 (Consent Form)** to indicate your interest in participating in this study voluntarily. Should you agree to participate in this study, a validated questionnaire will be passed to you by the researcher. You are advised to complete the questionnaire and submit it back to the researcher upon completion.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

The respondents who not fulfill the inclusive criteria as stated below are not eligible to participate in this study,

Inclusive Criteria

i. Student residents whose academic intake for session 2016/2017
ii. Stay in 17th college for more than 1 year
iii. Age range: 20-29 years old

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

Respondents will understand their knowledge, attitude and practice status to the communicable diseases, i.e. dengue fever, at the same time, help to increae their awareness in term of knowledge, atttitude and practices to reduce their vulnerability towards the hazards expose and increase their resiliency in managing the potential environmental and/or individual risks factors of dengue fever.

(b) TO THE INVESTIGATOR?

The finding of this study will provide evidence-based data relating to the knowledge, attitude and practice of dengue fever among the 17th college residents. This result would help to understand the knowledge gaps exists, at the same time, assist the administrative authorities of 17th college in suggesting the preparedness and mitigative meausures to control and minimize the prevalence of dengue fever among the residents.

6. WHAT ARE THE POSSIBLE RISKS?

There are no possible risks known for joining this study.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

All the information and identity that are provided by the respondents will remain confidential and will solely used for research purposes only

8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

Should you have further enquiry, kindly contact the researcher or the project leader below for clarification.

Wan Nur Marisah binti Abdullah
(Researcher)
BSc. (Environmental & Occupational Health)
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
019-9105654
marisahabdullah94@gmail.com

Dr. Vivien How
(Project Leader)
Department of Environmental and Occupational Health
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
Tel: 03-89472396/ faks: 03-89472395
vivien@upm.edu.my

*Please initial here if you have read and understood the contents of this page*_____

9. CONSENT

I ..... Identity Card No. .....

address.....

....hereby voluntarily agree to take part in the research stated above *(clinical /drug trial/video recording/ focus group/interview-based/ questionnaire-based).

I have been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent's Information Sheet). I understand that I have the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to my identity will remain private and confidential.

I* wish / do not wish to know the results related to my participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable)

* delete where necessary

Signature ..... Signature .....

(Respondent) (Witness)

Date :..... Name :.....

I/C No. :.....

I confirm that I have explained to the respondent the nature and purpose of the above-mentioned research.

Date ..... Signature .....

(Researcher)

SECTION A: Socio-Demographic Characteristics

Direction: Please read each statement carefully and tick (√) your answer.

1. Age : _____years

2. Gender : ☐ Male ☐ Female

3. Ethnicity : ☐ Malay ☐ Chinese
   ☐ Indian ☐ Others (please specify):_____

4. Religion : ☐ Islam ☐ Buddha
   ☐ Hindu ☐ Others (please specify):_____

5. Marital status : ☐ Single
   ☐ Married
   ☐ Others

6. Current education level : ☐ Degree
   ☐ Master
   ☐ P. H. D.

7. How long have you been staying in 17th college? _____years

8. Have you ever suspected (not necessarily confirmed case) from dengue fever during your stay in the college?
   ☐ Yes ☐ No

   If **YES**, please proceed to answer question 9.
   If **NO**, please proceed to answer question 10.

9. If you are suspected from dengue fever, is it the dengue fever is confirmed?
   ☐ Yes ☐ No

10. Are you aware that 17th college is the hotspot for dengue fever?
    ☐ Yes ☐ No

11. Have you ever received any information about dengue?
    ☐ Yes ☐ No

    If **YES**, please proceed to answer question 12.

    If **NO**, please proceed to SECTION B.

12. Select the sources from which you got the information. You may tick (√) more than one answer.

☐ Television	☐ Book	☐ Public media
☐ Radio	☐ Internet	☐ Poster/pamphlets
☐ Newspaper	☐ Friend/family	☐ Education lecture

SECTION B: Knowledge on Dengue Fever

Direction: Please read each statement carefully and tick (√) for your answer.

NO.	STATEMENT	YES	NO	DO NOT KNOW
1.	Dengue virus is transmitted by both female mosquitoes mainly of the species *Aedes aegypti* and *Aedes anopheles*.			
2.	Life cycle of the *Aedes* mosquito is 2 weeks.			
3.	Types of containers is one of the factors that determine the potential breeding sites of *Aedes* mosquito.			
4.	Dengue fever will only affects children and elderly.			
5.	*Aedes* mosquito likely to breed in dirty water.			
6.	People infected with dengue virus are asymptomatic or have only mild symptoms such as an uncomplicated fever (eg. hot/cold fever).			
7.	Dengue can be transmitted by direct blood contact (eg. blood donation)			
8.	Transmission cycle can be derive from man to mosquito or from mosquito to man.			
9.	Mosquitoes that transmitting dengue infection only bite early in the morning.			
10.	The *Aedes* mosquito eggs can withstand very dry conditions and survive for months.			
11.	ABATE is widely used to kill adult mosquitoes			

12.	There is a vaccine for dengue.			
13.	Paracetamol (Panadol) can be used to treat dengue.			
14.	The mosquito species, *Aedes aegypti*, is a daytime feeder.			
15.	Residents who live in the vicinity of construction site are at high risk of infecting dengue virus.			

SECTION C: Attitude towards Dengue Fever

Direction: Please read each statement carefully and tick (√) for your answer.

1	2	3	4	5
Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree

NO.	STATEMENT	1	2	3	4	5
1.	Fogging by the local government is not essential enough for the prevention of dengue.					
2.	I believe when I wear a black cloth will cause mosquito more attracted to bite me.					
3.	Elimination of larvae breeding is a complete waste of time.					
4.	A person who previously had dengue would not get infected again.					
5.	Immediate treatment is not necessary for dengue fever as there is no cure for it.					
6.	I will not get infected by dengue if I removed all the stagnant water.					
7.	Elimination of stagnant water appears at construction site only the responsibility of construction worker.					
8.	During rainy season, I believe that I should be taking more preventive measure to prevent mosquito breeding.					
9.	I believe people who live near the construction site are more susceptible to dengue fever infection					
10.	Personal hygiene has related to the prevention measures of dengue fever.					

SECTION D: Practice regarding Dengue Fever Prevention

Direction: Please read each statement carefully and tick (√) your answer.

NO.	STATEMENT	YES	NO	DO NOT KNOW
1.	I will cover water container after using them immediately in my household.			
2.	I will wear cloth with long sleeves during outdoor activity to prevent mosquito bite.			
3.	I will check frequently for area that has stagnant water during rainy season.			
4.	I will discard thing in the garbage or dispose them.			
5.	I will participate in any activities related to dengue awareness programs at my college.			
6.	I will supporting fogging activity by let my window/door stay open.			
7.	I will report to college management if I have any symptoms of dengue fever.			
8.	I am using preventive measures during staying in 17th college to prevent from dengue fever infection. If **YES**, please proceed to answer question 9.			

9. Select the preventive measures for dengue fever infection that you used while studying in 17th college. You may tick (√) more than one answer.

- ☐ Mosquito net
- ☐ Mosquito repellent
- ☐ Mosquito aerosol
- ☐ Mosquito coil
- ☐ Electronic coil
- ☐ Others (_____)

APPENDIX B

ETHIC APPROVAL LETTER

ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS (JKEUPM)
UNIVERSITI PUTRA MALAYSIA

Research title	:	**Knowledge, Attitude and Practice(KAP) on Dengue Fever Among 17th College Residents of Universiti Putra Malaysia (UPM)**
Study Site	:	**UPM**
JKEUPM Ref No.	:	**FPSK(EXP16-OSH)U010**
Researcher	:	**Wan Nur Marisah bt Abdullah**
Supervisor	:	**Dr. Vivien How**

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 1 dated 18/10/2016
2. Respondent Information Sheet & Consent (English) Version 2 dated 29/11/2016
3. Proposal (English), Version 4 dated 15/3/2017
4. Questionnaire (English), Version 1 dated 18/10/2016
5. Curriculum Vitae of:
   a. . Dr. Vivien How

The University Research Ethics Committee, Universiti Putra Malaysia (JKEUPM) operates in accordance to the ICH-GCP Guidelines.

Decision by JKEUPM:

[X] Approved

[ ] **Permission MUST BE OBTAINED from the respective hospitals/ institutions before conducting the research**

[ ] Disapproved

Please note that the approval is valid until 28 March 2018

Researchers should comply with the following:

I. Complete a Study Final Report upon study completion (Form D).

II. Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.

APPENDIX C

17th COLLEGE APPROVAL LETTER