



UNIVERSITI PUTRA MALAYSIA

***KNOWLEDGE, ATTITUDE AND PRACTICE ON LEPTOSPIROSIS
DISEASE AMONG FINAL YEAR STUDENTS OF SELECTED
PROGRAMMES IN UNIVERSITI PUTRA MALAYSIA***

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DISEASE AMONG FINAL YEAR STUDENTS OF SELECTED
PROGRAMMES IN UNIVERSITI PUTRA MALAYSIA (UPM).**



BY

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**This thesis submitted in fulfilment of the requirement for the degree of Bachelor
Science (Environmental and Occupational Health) from the Faculty of Medicine
and Health Sciences, Universiti Putra Malaysia**

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ABSTRACT

KNOWLEDGE, ATTITUDE AND PRACTICE ON LEPTOSPIROSIS DISEASE AMONG FINAL YEAR STUDENTS OF SELECTED PROGRAMMES IN UNIVERSITI PUTRA MALAYSIA (UPM)

SITI MARYAM BINTI ABU BAKAR

Introduction: Leptospirosis is an infectious and zoonotic disease caused by pathogenic bacteria called leptospire. This disease can be directly or indirectly transmitted through the exposure to the urine or excretion of infected animals, and also water or soil that being contaminated with secretion of the infected animals. The first case and outbreak in Malaysia happened in Mulu Caves, Sarawak in 1984. Since that, the cases of Leptospirosis in Malaysia showed a rising trend with 69% increase from 1418 cases in 2009 to 7806 cases in 2014 with 92 deaths. **Objective:** Thus, the study was done in order to determine the knowledge, attitude and practice among final year students of selected programmes in UPM. **Methodology:** A cross sectional study was conducted in UPM among final year students of Environmental and Occupational Health (ENVOCH), Nursing and Veterinary Medicine. All final year students of these three programmes were involved in this study. Questionnaire was used as the study instrumentation. Statistical analysis used in this study were descriptive analysis, Chi-square test, Kruskal-Wallis test and Mann-Whitney test. **Results and Discussion:** From the results obtained, majority of the students had moderate level of knowledge which was ENVOCH (41, 71.9%), Nursing (14, 63.6%) and Veterinary Medicine (46, 76.7%). Besides, most of the students from ENVOCH, Nursing and Veterinary Medicine had moderate attitude towards Leptospirosis which was 42 (73.7%), 18 (81.8%) and 40 (66.7%) respectively. Plus, majority of them also showed moderate practice level which was 41 (71.9%), 17 (77.3%) and 44 (73.3%) respectively. There was a significant association between race and knowledge, also gender and attitude with $p < 0.05$, ($p = 0.008$) and ($p = 0.001$) respectively. There was also an association between attitude and practice ($p < 0.05$). Meanwhile, there was a significant difference on the knowledge between students of ENVOCH with Veterinary Medicine and Nursing with Veterinary Medicine ($p < 0.05$). **Conclusion:** Most of the final year students of ENVOCH, Nursing and Veterinary Medicine had moderate level of knowledge, attitude and practice towards Leptospirosis disease. Thus, improvement in education and training must be done to face this issue.

Keywords: Knowledge, Attitude, Practice, Leptospirosis, Final year students, UPM

ABSTRAK

PENGETAHUAN, SIKAP DAN AMALAN TERHADAP PENYAKIT LEPTOSPIROSIS DALAM KALANGAN PELAJAR TAHUN AKHIR PROGRAM TERPILIH DI UNIVERSITI PUTRA MALAYSIA (UPM)

SITI MARYAM BINTI ABU BAKAR

Pengenalan: Leptospirosis adalah penyakit berjangkit dan zoonotik yang disebabkan oleh bakteria patogenik iaitu leptospire. Penyakit ini boleh merebak secara langsung atau tidak langsung melalui pendedahan kepada air kencing atau perkumuhan haiwan yang dijangkiti, dan juga air atau tanah yang tercemar dengan rembesan haiwan dijangkiti. Di Malaysia, kes pertama telah dicatatkan pada tahun 1984 yang berlaku di Gua Mulu, Sarawak. Sejak itu, kes Leptospirosis di Malaysia semakin meningkat dengan peningkatan 69%, iaitu dari 1418 kes pada tahun 2009 kepada 7806 kes pada tahun 2014 dengan 92 kematian. **Objektif:** Kajian ini dilakukan untuk menentukan tahap pengetahuan, sikap dan amalan dalam kalangan pelajar tahun akhir program yang terpilih di UPM. **Metodologi:** Kajian keratan rentas telah dijalankan di UPM dalam kalangan pelajar tahun akhir Kesihatan Persekitaran dan Pekerjaan (ENVOCH), Kejururawatan dan Perubatan Veterinar. Semua pelajar tahun akhir daripada tiga program telah terlibat dalam kajian ini. Soal selidik telah digunakan sebagai peralatan kajian. Analisis yang digunakan adalah analisis deskriptif, ujian 'Chi-square', ujian 'Kruskal-Wallis' dan ujian Mann-Whitney. **Hasil Kajian:** Dari keputusan yang diperolehi, majoriti pelajar mempunyai tahap pengetahuan yang sederhana iaitu ENVOCH (41, 71.9%), Kejururawatan (14, 63.6%) dan Perubatan Veterinar (46, 76.7%). Selain itu, kebanyakan pelajar dari ENVOCH, Kejururawatan dan Perubatan Veterinar mempunyai sikap yang sederhana terhadap Leptospirosis iaitu 42 (73.7%), 18 (81.8%) dan 40 (66.7%) masing-masing. Majoriti daripada mereka juga menunjukkan tahap amalan yang sederhana iaitu 41 (71.9%), 17 (77.3%) dan 44 (73.3%) masing-masing. Terdapat hubungan yang signifikan di antara bangsa dan pengetahuan, juga jantina dan sikap dengan ($p < 0.05$), ($p = 0.008$) dan ($p = 0.001$) bagi setiap hubungan. Terdapat juga kaitan antara sikap dan amalan ($p < 0.05$). Sementara itu, terdapat perbezaan yang besar tentang pengetahuan di antara pelajar ENVOCH dan Perubatan Veterinar dan Kejururawatan dengan Perubatan Veterinar ($p < 0.05$). **Kesimpulan:** Kebanyakan pelajar tahun akhir ENVOCH, Kejururawatan dan Perubatan Veterinar mempunyai tahap sederhana dalam pengetahuan, sikap dan amalan terhadap penyakit Leptospirosis. Oleh itu, peningkatan dalam pendidikan dan latihan perlu dilakukan untuk menghadapi dan mengatasi isu ini.

Kata kunci: Pengetahuan, Sikap, Amalan, Leptospirosis, Pelajar Tahun Akhir, UPM

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LIST OF ABBREVIATIONS

ENVOCH	Environmental and Occupational Health
KAP	Knowledge, Attitude and Practice
MOH	Ministry of Health
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organization



CHAPTER 1

INTRODUCTION

1.1 Background

Leptospirosis is an infectious disease caused by pathogenic bacteria called leptospire, which are transmitted directly or indirectly from animal to human (WHO, 2003). It is a globally zoonotic disease caused by infection of *Leptospira interrogans* that may affect both human and animals resulting in morbidity and mortality (Antony, 1996).

Leptospire are spirochaetes in the order Spirochaetales, Leptospiraceae family and include two genera which are *Leptospira* and *Leptonema* (Adler & Pena Moctezuma, 2010). Based on serological classification, genus *Leptospira* was divided into two species: *Leptospira interrogans*, which consist of all the pathogenic strains and *Leptospira biflexa*, the environmental saprophytic strains (Cerqueira and Picardeau, 2009). *Leptospira* are obligate aerobes with an optimum temperature for growth ranging from 28°C to 30°C (Johnson et al., 1969). Besides, the *Leptospira* survive and stay viable for several weeks in stagnant water (MOH, 2015). Based on the morphology from Ministry of Health Malaysia (MOH, 2015), the *Leptospira* (Figure 1.1) appear tightly coiled thin

flexible Spirochetes 5-15 microns long. The one end of the *Leptospira* appears bent that forms a hook and it is actively motile.

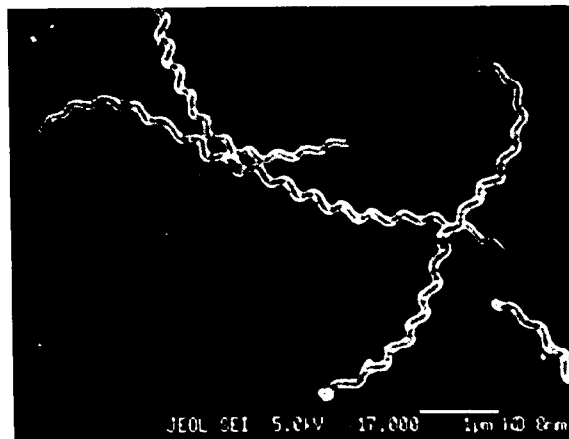


Figure 1.1 : *Leptospira* (MOH, 2015)

In 1917, rats was discovered to be the source of human infection, and subsequently some previous studies have showed that other wild mammals can also act as potential carriers, including flying foxes (Monahan et al., 2009). MOH (2015) stated that rats, mice, wild rodents, dogs, swine and cattle are the principle sources of Leptospirosis infection. These animals excrete *Leptospira* in active infection and also at asymptomatic stage. Monahan et al. (2009) mentioned that the main sources of Leptospirosis infection are urine of infected or carrier animals, contaminated surface water, soil and mud. The transmission can happen when people have direct contact with the contaminated urine of infected animals or indirectly through the exposure to water or soil that contaminated with urine or secretion of infected animals (Bharti et al., 2003).

Worldwide, the Leptospirosis incidence is reported at around 0.1 to 100 per 100,000 population (Firdaus et al., 2017). Meanwhile, epidemics happen with incidence of more than 100 per 100,000 population particularly in rainy season

and flooding (WHO, 2003). According to Costa et al. (2015) , there were around 1.03 million cases and 58,900 deaths each year due to Leptospirosis worldwide which make the disease as a leading zoonotic cause of morbidity and mortality. China, Southeast Asia, Africa and South and Central America have a warm and humid environment that make the disease endemic in that area (Tilahun et al., 2013). Locally, there was a dramatic increases in human Leptospirosis cases over the last decade. Based on the data from Disease Control Division of Ministry of Health (2015), the cases of Leptospirosis in Malaysia showed a rising trend from year 2009 to 2014 with 1418 cases in 2009 and it increased to 7806 cases in 2014 with 92 deaths. Therefore, Leptospirosis cases increased by 69% from 2009 to 2014 (Figure 1.2). Until the end of year 2015, there were 8291 cases and 78 deaths due to Leptospirosis reported in Malaysia. Meanwhile, in 2016, Leptospirosis cases reported in Malaysia decreased to 5284 with 52 number of death. Eventhough, it showed a decreasing trend in 2016, the number of cases were still quite high and worrying.

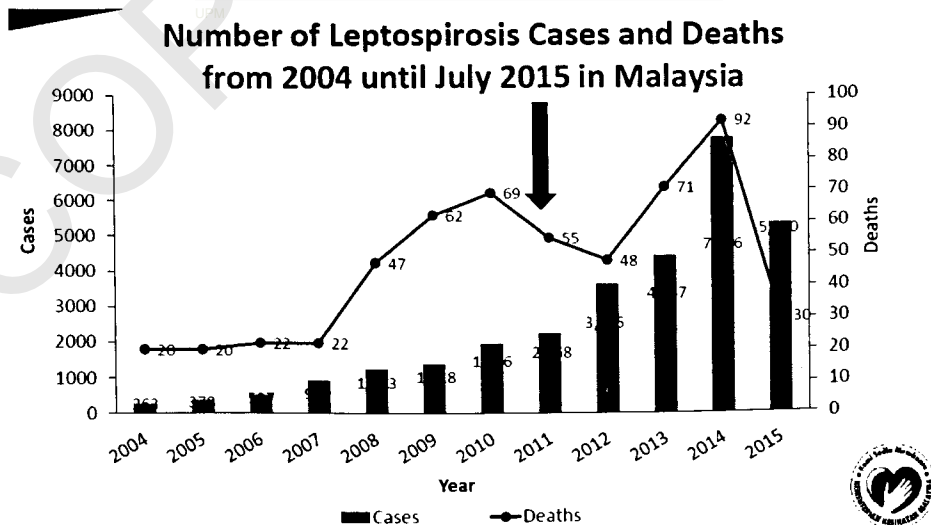


Figure 1.2 : Number of leptospirosis cases and deaths from 2004 until July 2015 in Malaysia (MOH, 2015)

In Malaysia, Leptospirosis outbreaks were commonly associated with recreational activities and it is also known as occupational disease which commonly happen among farmers, veterinarians, fishermen, livestock and abattoir workers (Victoriano et al., 2009). The signs and symptoms of Leptospirosis disease can range from headaches and fever, to jaundice, severe myalgia and conjunctival suffusion (Levett, 2001). In addition, the Department of Health And Human Services of USA (2015) stated that symptoms of Leptospirosis may develop anywhere from 2 days to 4 weeks after being exposed to the bacteria. The common symptoms mentioned by the organization are fever, chills, headache, muscle aches, vomiting, diarrhea, abdominal pain, jaundice, skin rash and red eyes.

There are several methods available for the diagnosis of Leptospirosis in the laboratory. The disease is commonly diagnosed by detecting antibodies, culturing the bacteria from blood, urine or tissues or demonstrating the presence of leptospire in tissues using antibodies labelled as fluorescent markers (WHO, 2003). Other methods may be available in different centres such as polymerase chain reaction (PCR) and immuno staining.

Antibiotic treatment should be initiated as soon as the Leptospirosis diagnosis is suspected and preferably before the fifth day after the onset of illness (WHO, 2003). WHO (2003), also stated that severe cases of Leptospirosis should be treated with high doses of intravenous penicillin while less severe cases can be treated with oral antibiotics such as amoxicillin, ampicillin, doxycycline or erythromycin.

1.2 Problem Statement

Leptospirosis is an emerging infectious disease of global significance and it is endemic in tropical countries like Malaysia (Benacer et al. 2016). Over the last decade, statistic showed a dramatic increase of human Leptospirosis cases in Malaysia where there was only 527 cases in 2006 and it increased to 8291 cases in 2015 (MOH, 2015). In 2014, Selangor was the state that reported the highest number of Leptospirosis cases in Malaysia with 1832 cases. While in 2015, Kelantan reported the highest number of cases as much as 1270 and Selangor was reported as a state with second highest cases in Malaysia which was 879 cases (Figure 1.3).

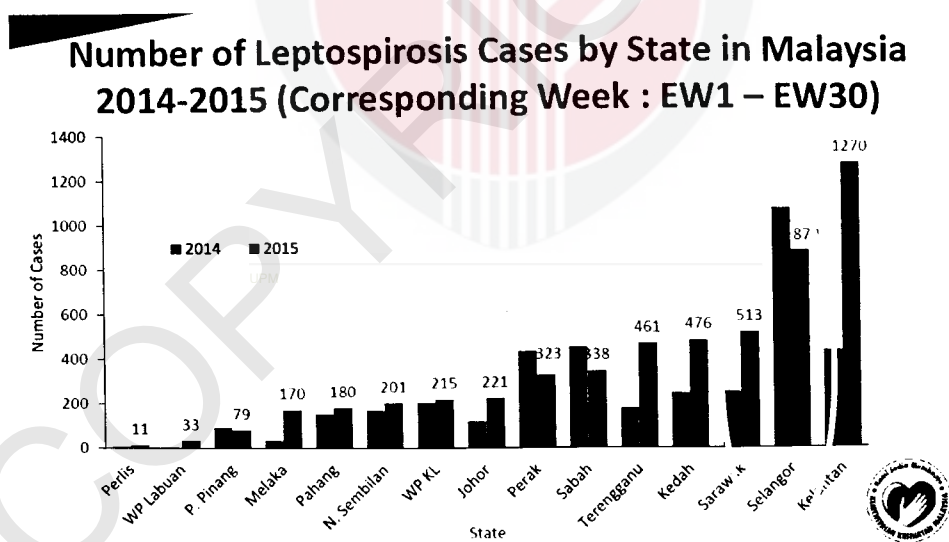


Figure 1.3 : Number of Leptospirosis cases by state in Malaysia 2014-2015

(MOH, 2015)

Figure 1.4 also showed that Selangor had reported most of cases of Leptospirosis disease in Malaysia. Due to that, Universiti Putra Malaysia where located in Selangor is chosen as study location in this research.

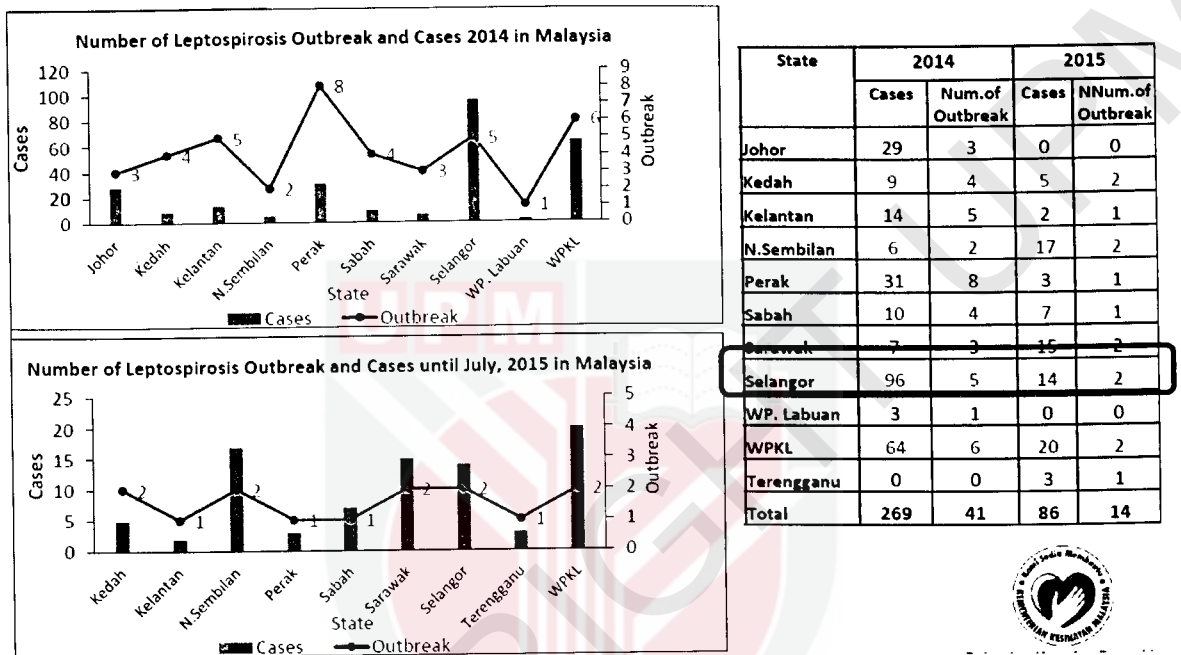


Figure 1.4 : Number of Leptospirosis outbreak and cases in 2014 and until July 2015 in Malaysia (MOH, 2015)

In half a year of 2016, there was 14 outbreaks of Leptospirosis disease in Malaysia and nearly half of the outbreaks happened in Selangor with 2200 people have been infected (MOH, 2016). Recently, The Straits Times had published an article on Jun 2016 about Malaysia warns of Leptospirosis risk at natural water spots.

Furthermore, in Malaysia, most of the outbreaks happen were related to recreational activities (Sapian et al. 2012). The infection occurs through direct contact with urine, blood and tissue from infected animals or indirect contact with contaminated environment during recreational activities (Prabhu et al. 2014). The Straits Time (2016) reported that in May 2016, a Seremban college student contracted Leptospirosis while swimming in Jeram Toi Recreation Park in Jelebu and he died after two weeks. In April 2016, an 18 year old polytechnic student died due to Leptospirosis after bathing in a picnic spot in Lata Sedim, Kedah a month earlier (The Star, 2016). Plus, Gunung Pulai Recreational Forest had to be closed in October 2015 for three months after samples from a waterfall there tested positive for Leptospirosis (The Star, 2015). Thus, previous cases highlighted that majority of the patients were among students who went to the recreational areas and unaware about the signs and symptoms of Leptospirosis that shown after few weeks.

The finding from various of previous studies indicate that there was lack of knowledge and awareness on the significance of symptoms and negative social attitudes among the respondents which obviously affect the practice to control and prevent from Leptospirosis disease. Besides, there is no study on knowledge, attitude and practice on Leptospirosis disease being done among university students in Malaysia. Therefore, due to high number of Leptospirosis cases in Malaysia and other causes stated, this study need to be conducted.

1.3 Research Justification

Leptospirosis is one of the most widespread zoonotic diseases with a worldwide distribution which particularly in tropical and subtropical regions where climatic conditions provide an optimal environment to support the survivability of leptospire (Prabhu et al., 2014). Malaysia has a tropical climate with high temperature and humidity throughout the year that encourage the growth and survival of the leptospire. The leptospire breed in warm, moist soil and immersion in water for long period (Ullmann and Langoni, 2011).

Recently, Leptospirosis has developed as an urban public health problem as the rural poor population has migrate to the cities (Johnson et al. 2004). Selangor was reported with the highest number of cases in 2014 which were 1832 cases compared to other states in Malaysia. Based on the Department of Statistics, Malaysia (DOSM), in 2016, Selangor has the highest percentage of population (19.9%), followed by Sabah (12.0%) and Johor (11.5%). Rapid urbanization that increase the number of urban slums added with poor irrigation and waste management may lead to the high cases and outbreaks of Leptospirosis in Selangor. According to Benacer et al (2016), Leptospirosis can be one of major public health issues and it is an emerging infectious disease. Therefore, it should be concerned by people especially health students.

Leptospirosis may cause morbidity and mortality to the infected people especially in South and Southeast Asia, where this disease is an under-recognized public health problem (Costa et al., 2015). Leptospirosis may also cause pulmonary haemorrhage syndrome and acute kidney injury because of Weil's disease in endemic region with fatality case of more than 10% and 70% respectively. Moreover, according to Costa et al. (2015), Leptospirosis was often misdiagnosed as malaria, dengue and other febrile diseases due to the undifferentiated fever. However, young people who got infected may have complication and unable to identify the signs and symptoms of this disease. Thus, it is important for young people mainly university students to have knowledge, attitude and practice on this disease for prevention and control purpose in the future.

According to Samarakoon and Gunawardena (2013), Leptospirosis has been an ignored disease and enhancing the awareness is necessary to identify disease burden in a society. Plus, individual knowledge of Leptospirosis and health behavior plays an important role in the disease prevention and control, and also in enhancing occupational health and safety (Arbiol et al, 2016). However, most of death cases due to Leptospirosis were because of lack of knowledge about the disease such as signs and symptoms which lead to late diagnosis and treatment.

In order to address this issue, study of knowledge, attitude and practice (KAP) among ENVOCH, Nursing and Veterinary Medicine students should be done. This is because these groups of people will be the next generation who involve directly or indirectly in communicable diseases control and management. Therefore,

it is important to educate current and young generation who will be involved in this field in the future. In addition, the final year students who will become future workers may apply the KAP on Leptospirosis to their staffs in the workplace who may be unable to recognize the disease as part of mitigation measure to enhance workers' awareness. Meanwhile, these group of students may be the high risk groups to be infected by Leptospirosis due to recreational setting and occupational exposure particularly among Veterinary Medicine students who are constantly in contact with animals and their residues.

This research intends to determine and identify the KAP on Leptospirosis disease for better prevention and control as well as to present valuable outcome that will help for improvement of Leptospirosis control programmes in Malaysia. Besides, this study may help in enhancing the KAP towards Leptospirosis among students and reduce their exposure to the outdoor activities such as extreme sports and outdoor training like Reserve Officer Training Unit (ROTU) that may increase their risk to the infection. Other than that, since there is only a little study on KAP of Leptospirosis disease conducted in Malaysia, so this research will help to provide more data and resources for further study.

1.4 Objectives

1.4.1 General Objective

To study the knowledge, attitude and practice (KAP) on Leptospirosis disease among final year students of selected programmes in Univesiti Putra Malaysia (UPM).

1.4.2 Specific Objectives

1. To identify the socio-demographic status of respondents (age, gender, race).
2. To identify the level of knowledge, attitude and practice towards Leptospirosis disease among final year students of ENVOCH, Nursing and Veterinary Medicine.
3. To determine the association between socio-demographic data (age, gender, race) towards knowledge, attitude and practice of Leptospirosis disease.
4. To determine the association between knowledge and attitude with practice level of Leptospirosis disease.
5. To compare knowledge, attitude and practice on Leptospirosis disease among the final year students of ENVOCH, Nursing and Veterinary Medicine in UPM.

1.5 Hypothesis

1. There is a significant association between socio-demographic data (age, gender, race) towards knowledge, attitude and practices of Leptospirosis disease.
2. There is a significant association between knowledge and attitude with practice level of Leptospirosis disease.
3. There is no significant difference between final year students of ENVOCH, Nursing and Veterinary Medicine towards knowledge, attitude and practice of Leptospirosis disease.

1.6 Definition of Variables

1.6.1 Conceptual Definition

i. Leptospirosis disease

Leptospirosis is a bacterial disease that affects human and animals. It is caused by bacteria of the genus *Leptospira*. It can cause a wide range of symptoms in human body, some of which may be mistaken for other diseases. Some infected persons, however, may have no symptoms at all (CDC, 2015).

ii. Socio-demographic factors

Socio-demographic factors refer to a group defined by its sociological and demographic characteristics. For example, age, gender, education level, income level and etc (Reference, 2016).

iii. Knowledge factors

Knowledge is defined as facts, information and skills acquired through experience or education; the theoretical or practical understanding of a subject (Oxford Dictionary).

iv. Attitude factors

Attitude is a predisposition or a tendency to respond positively or negatively towards a certain idea, object, person or situation. Attitude influences an individual's choice of action, and responses to challenges, incentives and rewards (Business Dictionary).

v. Practice factors

Practice is the action of an individual in response to a stimulus. This is something that is usually or regularly done, often as a habit, tradition or custom (Cambridge Dictionary).

vi. Nursing students

Nursing students are person who are trained to be a nurse to care for sick or injured people at a nursing school or hospital. They are usually work in hospitals or doctors' office (Merriam Webster's Learner's Dictionary).

vii. Environmental and Occupational Health (ENVOCH) students

Students who study the discipline that focus on the health interrelationships between people and environment, promotes human health and well being, fosters a safe and healthful environment and occupational area (National Association of City and County Health Officials, 2015).

viii. Veterinary Medicine students

Person who is study the branch of medicine that deals with the prevention, diagnosis and treatment of disease, disorder and injury in non-human animals or trained to give medical care and treatment to animals (Merriam Webster's Learner's Dictionary).

ix. University students

Person who are studying at a university or other place of higher education. They are also someone who are studying in order to enter a particular profession and take an interest in a particular subject (Oxford Dictionary, 2017).

1.6.2 Operational Definition

i. Leptospirosis disease

In this research, the KAP of Leptospirosis disease will be evaluated by self-administered questionnaire that will be distributed to final year students of ENVOCH, Nursing and Veterinary Medicine in UPM.

ii. Socio-demographic factors

Socio-demographic factors will be measured using self-administered questionnaire which consist of information about age, gender and race in Section A of the questionnaire.

iii. Knowledge factors

Knowledge factors will be evaluated by using self-administered questionnaire that consist of questions regarding the general information about Leptospirosis disease, causes, risk factors, signs and symptoms and also prevention of the disease.

iv. Attitude factors

Attitude factors will be evaluated by using self-administered questionnaire consist of questions on the attitude that should be have regarding the Leptospirosis disease.

v. Practice factors

Practice factors will be evaluated by using self-administered questionnaire that comprise of questions on the practices that should be done to prevent and control the Leptospirosis disease.

vi. ENVOCH, Nursing and Veterinary Medicine students

In this research, all final year students of selected programmes in UPM will be the respondents. The questionnaire will be distributed among them.

1.7 Conceptual Framework

Conceptual framework is defined as a visual or written product, one that explains, either graphically or in narrative form, the main things to be studied. It is also the key factors, concepts or variables and presumed relationships among them (Miles & Huberman, 1994). Figure 1.5 show the conceptual framework of this research.

Leptospirosis disease has occur highly in Selangor and it may caused by several factors. There are external factors, program factors, environmental factors, cultural factors and awareness factor. Students awareness on leptospirosis disease is considered important especially among human and animal health practitioner students. Nursing students was chosen since they are studying one of subjects offered in university that related to health field and they are exposed to various of patients at hospitals. ENVOCH students was chosen because they are studying environmental subject that is being one of the causes of the spread of this disease. Lastly, Veterinary Medicine students was chosen because they are in contact with animals most of the time during training and work. Therefore, study of KAP of Leptospirosis disease among ENVOCH, Nursing and Veterinary Medicine students was conducted with socio-demographic factors like age, gender and race involved.

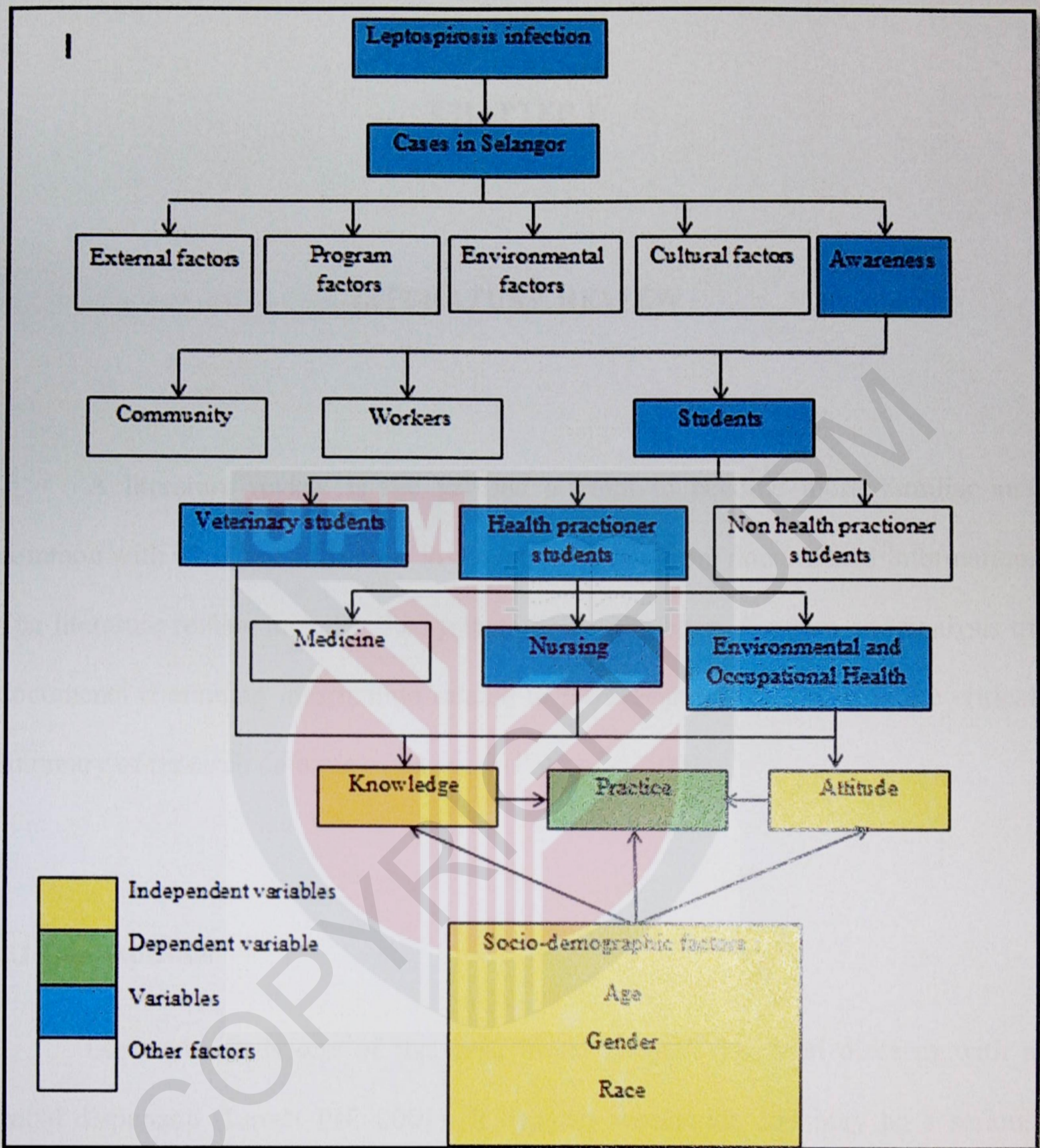


Figure 1.5 : Conceptual Framework

CHAPTER 2

LITERATURE REVIEW

A literature review is the focused attempt to become more familiar and common with what has been done in the area of study from documented information. The literature review includes the systematic identification, location and analysis of documents containing information related to the research problem. It is the critical summary of research on topic of interest. (Polit et al. 2001).

2.1 Leptospirosis

Leptospirosis is one of the most broad zoonotic bacterial diseases with a global dispersion (Levett PN, 2001). It happens worldwide and may be a serious public health issue in a humid tropical and subtropical country like Malaysia (Noor Rafizah et al. 2012). Leptospirosis is an infectious disease caused by pathogenic bacteria called leptospire, which are transmitted directly or indirectly from animal to human (WHO, 2003). The bacteria may be excreted in the urine of infected animals like rodents, livestock and domestic pets (Bharti et al. 2003). Leptospirosis is a globally important zoonotic disease that the pathogenic leptospire then can survive in the environment for weeks and may enter the body through cuts, abrasions, mucous membranes, or waterlogged skin (Nally et al. 2003).

2.2 Causes of Leptospirosis Infection

Leptospirosis is caused by pathogenic spirochetes that belong to the genus *Leptospira*, with 22 species and 300 serovars (Bourhy et al, 2014). The most sources of Leptospirosis infection are urine of infected or carrier animals, as well as contaminated surface water, mud and soil (Monahan et al, 2009). Domestic and wild animals such as rodents, cattle, dogs and swine are characterized as the principal reservoirs for this spirochete, that has been recorded in at least 150 species of mammalian (Sykes et al, 2011). Research by Bunnell et al (2000), mentioned that rodents (20%), bats (35%) and marsupials (35%) are the animals that most likely to spread the Leptospirosis infection. The infection can be transmitted through direct or indirect contact with infected animals or their secretions.

2.3 Risk Factors of Leptospirosis Infection

Infectious diseases like Leptospirosis are globally spread because of some human activities such as eco-tourism, wildlife research, reintroduction, rehabilitation, pet trade, hunting, food industry and laboratory demands and also farming (Beatty et al, 2008). Other than infecting local community, *Leptospira* may also result in sickness among travelers to tropical areas especially those who correlated with adventure travel and eco-tourism (Crevel et al, 1994).

Leptospirosis infection and outbreak also may due to the geographical factors.

Infection of human is primarily in tropical and subtropical areas, with clear incidence in Southeast Asia (Amilasan et al, 2012). Malaysia as a tropical country has high humidity and warm temperature that let the *Leptospira* to survive for a long time in the environment (Benacer et al, 2016).

Climatic factor also contribute to the distribution of Leptospirosis. This is due to the climatic condition like high humidity (70-90%) and warm weather that give a suitable place for the organism to outlast longer in the environment (Benacer et al, 2016). Condition of the weather mainly in tropical countries, have a significant impact on the disease occurrence, especially during rainy season (Levett, 2001). In addition, according to Benacer et al (2016), cases that being reported previously showed significant increase during wet season compared to dry season, mainly between October to March in peninsular and between October to February in east Malaysia. In Kelantan. Leptospirosis cases and outbreaks were related with the flood disaster that commonly occurred. Incidence of communicable diseases including Leptospirosis were reported before, during and after flooding. There were 357 cases in pre-flood time, 147 cases during the flood and it increase dramatically to 725 cases after the flood phenomena (Firdaus et al, 2017). The monsoon season is commonly followed by heavy rainfall and floods that enhance the risk of Leptospirosis. There were many outbreaks of this disease reported in many countries during this extreme weather condition (Amilasan et al, 2012).

Other than that, Leptospirosis also associated with recreational activities. (Sapian et al, 2012). According to Victoriano et al (2009), trip and travel to the endemic areas and recreational activities like water sports have risingly reported as major risk factor for Leptospirosis infection. Furthermore, recreational water activities like kayaking, fishing and water skiing in contaminated water have been reported as risk factors for Leptospirosis infection, particularly when people ingest the contaminated water (WHO, 2013).

Moreover, rapid urbanization may cause an increase of Leptospirosis infection. Rural-to-urban demographic migration will lead to rapid urbanization and formation of urban slums, and this aspects has been related eith the emergence of Leptospirosis in many regions (Lau et al, 2010). This is because urban slums are commonly connected with bad waste management, poor sanitation insfrastucture and people may live close with animals and environmental reservoirs of infectious agents (Benacer et al, 2016). Therefore, improper management to the rapid growth issue will accidentally cause the rise of slums with bad and poor management of irrigation and flash-flood, all of which develop favorable state for the survival of the host reservoir and eventually lead to the contamination of environmental water and soil by animals' urine and excreation (Benacer et al, 2013).

Besides, socio demographic factos also play a role in the infection of Leptospirosis. People of age between 20 to 40 years old have the highest incidence possibility, while a higher rate of infection among male compared to female. Men was at higher risk in getting infected of Leptospirosis compared to women due to the

nature of their occupations and adventurous outdoor activities (Benacer et al, 2016). Studies have shown that Leptospirosis was a gender-biased disease with mostly males were infected and it can be related with occupational exposure and activities which make men at a higher risk (Hinjoy, 2014). People within age group of 20 to 49 years old are at higher risk to get Leptospirosis infection, while the highest are among those in 30-39 years old. This is because people in middle age groups are likely to move, hence have higher risk of exposure compared to young and school children (Goris et al, 2013). Besides, based on ethnicity, the infection among Malays was the highest followed by Indians and Chinese (El Jalii et al, 2000). This is may due to the highest number of Malay population in Malaysia which is nearly 50%.

2.4 Signs and symptoms of Leptospirosis

Diagnosis of this disease is usually tough due to variety of diagnostic possibilities and symptoms that may commonly be not specific. Previous study stated that Leptospirosis was fail to fully reported in Southeast Asia because of broad range of clinical symptoms related with acute leptospiral infection (Vijayachari et al, 2008). By having proper diagnosis, treatment of the disease can be done appropriately and it will minimize the risk to the public health (Hayaparan et al, 2013). Leptospirosis has been diagnosed in patients from Indonesia with non-malarial fever and clinical jaundice, patients with only clinical jaundice from Laos and Vietnam and also patients with haemorrhagic fever in Cambodia (Vijayachari et al, 2008). According to Bharti et al (2003), this infection may have a big range of symptoms, from a mild flu-like illness to more critical complications like meningitis,

jaundice, hemorrhage and renal dysfunction. Meanwhile, Bharti et al (2003) stated that the symptoms of Leptospirosis disease may range from headaches and fever to jaundice, severe myalgia and conjunctival suffusion.

2.5 Impacts of Leptospirosis

Leptospirosis may have bad impacts to the biodiversity, health of human and livestock, animal welfare and the economy of the country (Russ et al, 2003). The spread of Leptospirosis in a particular country may lead to a critical economic loss to the livestock industries (Lewis, 2003) and a prime factor to the cattle's abortion (Shapiro et al, 1999). According to Hayaparan et al (2013), the possible outcome of this disease is loss of biodiversity as wildlife are having increasing threat and danger and also pressure to survive. Besides, the emerging of zoonotic disease not only give danger and risk to the wildlife but as well as human being.

2.6 Leptospirosis as Occupational Disease.

Leptospirosis was known as an occupational disease which infecting mostly among veterinarians, farmers, fishermen, miners, abattoir and sewer workers (Okello et al, 2015). Meanwhile, rice farmers also were identified to have a higher risk to get the infection. One of the possible causes was the rising of rat population during dry season (Easton, 1999). Other than that, the highest distribution of Leptospirosis was

discovered among labourers working in rubber estates and also workers who working with drainage, sewage, forestry and town cleaning industries (Bahaman et al, 1987). In addition, previous studies showed that males are at higher risk to get Leptospirosis infection due to their occupational exposure. In Malaysia, high Leptospirosis incidence were mostly among male-dominated occupations like paddy planters, palm oil workers, rubber tappers, laborers working with sewage, draining, town cleaning, forestry, those working in antimalarial programs and also military personnel (Shafei et al, 2012)

2.7 Prevention and Control of Leptospirosis

The prevention and control of Leptospirosis disease is a complicated process because it need an understanding in the epidemiology of the disease before taking any intervention measures in order to reduce the risk of infection. The first step of prevention is by controlling the infection source which is the reservoirs. According to Benacer et (2016), rodent control is the best effective method to prevent human infection, especially in urban areas. The previous study also mentioned that, the usage of rodenticides and constant trapping in urban cities have minimized the population of rodents, hence decreasing the infection risk. Other than that, well sanitation and appropriate garbage disposal are critical factors to minimize the population of rodents in urban regions (Benacer et, 2016). Besides, Phraisuwan et al (2002) mentioned in their study that by wearing long pants or skirts, it help to protect people against leptospiral infection primarily when there were wound in the body. It is important to cover any cuts, blisters or broken skins with waterproof plasters,

mostly when swimming in the fresh water (Benacer et al, 2016). Thus, by wearing protective clothing during working and doing recreational activities may help to reduce the risk of infection.

2.8 Leptospirosis as a health problem

Leptospirosis disease had gained public attention when there are outbreaks occurred in association with natural disaster like flooding in Nicaragua, Central America in 1995 or among foreign travellers and extreme athletes (Mortimer, 2005). 70% of major pathogenic serovars have been detected to be isolated from Asia. Plus, Southeast Asia which includes Malaysia is an endemic area for Leptospirosis and human infection have been reported throughout the region. (Laras et al. 2002). Therefore, Leptospirosis is appear as a critical concern to public health in Southeast Asia (Bhatia and Narain, 2010). Recently, Leptospirosis has become an urban public health issue as rural population migrated into the cities and contribute to the high number of cases every year (Ko et al. 1999). WHO (2016) estimated that 0.1 to 1 per 100 000 people living in temperate climates are affected every year, with the number increasing to 10 or more per 100 000 people living in tropical climates. The incidence can soar to 100 or more per 100 000 people during epidemic. Therefore, Malaysia as a tropical country has a high risk to get the outbreak of Leptospirosis.

In Malaysia, Leptospirosis has declared as a health problem due to the increasing trend in the number of cases each year. The incidence rate per 100 000

population is 30.2 in 2015 compared to 25.94 in 2014 (MOH, 2015). The state with the highest number of Leptospirosis cases in Malaysia in 2015 is Kelantan (1270) followed by Selangor (879), Sarawak (513), Kedah (476) and Terengganu (461) (MOH, 2015). Meanwhile, Selangor recorded the highest number of cases in 2014 with 1832 cases. Thus, high number of cases with suitable climate for the survivability of the bacteria in Malaysia, make Leptospirosis as a critical health problem that should get concern from public including students.

2.9 Burden of disease

Earlier to 2010, the number of reported cases and outbreaks rising significantly, causing in a high number of deaths. Due to this pressure, local health authorities suggest that Leptospirosis be categorized as a mandatory notifiable disease from December 2010 (Benacer et al, 2016). In addition, Leptospirosis is a life-threatening disease and known as a prominent cause of pulmonary haemorrhage syndrome. A previous study on global morbidity and mortality of Leptospirosis estimated that there were annually 1.03 million cases and 58 900 deaths due to Leptospirosis worldwide (Costa et al. 2015). Costa et al. (2015) also mentioned that high proportion of cases (48%) and deaths (42%) were estimated to happen among adult males with age of 20-49 years old. Besides, the highest estimate of disease morbidity and mortality were observed in Global Burden of Disease (GBD) regions of South and Southeast Asia, Oceania, Caribbean, Andean, Central, Tropical Latin America and East Sub-Saharan Africa.

Ministry Of Health Malaysia (2015) reported that male has higher risk of getting Leptospirosis infection compared to female with 5056 (65%) cases among male and 2750 (35%) among female in 2014. In Malaysia, people with age range from 25-60 years old contributed to the highest number of cases in 2014 with 4098 (52%) cases. Leptospirosis also known as occupational disease and most cases reported were among agricultural workers, sewerage workers, livestock handlers, pet shop workers and military personnel (MOH, 2011). Based on the statistic provided by MOH Malaysia, the distribution of area of Leptospirosis outbreak in 2015 were mostly in residential area (43%) followed by recreational area (22%).

2.10 Leptospirosis Outbreak in Malaysia

A significant increase in the number of reported Leptospirosis cases and frequency of outbreaks have been reported in Southeast Asia such as Thailand, India, Malaysia and Indonesia, and also included Central and South America (Victoriano et al, 2009). In the early 1920s, the first case was reported and subsequent outbreaks have been recorded with a rising number of cases over the years (Benacer et al, 2016). The first outbreak in Malaysia was happened in Mulu Caves, Sarawak in 1984. The outbreak happened when 16 British cave explorers had an exploration in Mulu caves of Gunung Mulu National Park, Sarawak. They return to Britain in the bad health condition where 5 patients had fever of unknown origin and hepatomegaly with absence of renal failure. They were suspected with Leptospirosis disease and later confirmed by serology (Self et al, 1987). The next outbreak also occurred in Sarawak in 1985 when a group of British tourists had a trip to the Sarawak chamber

and 2 of them were confirmed being infected by Leptospirosis (Sheena and Buchan, 1987).

In Peninsular Malaysia, the first Leptospirosis outbreak was happened in Johor between December 2006 to January 2007. There were flood disaster that affected eight districts in Johor and it caused 20 cases of Leptospirosis with two death (Hisham et al, 2009). Next, in 2009, there were 26 cases of Leptospirosis with two death reported at the illegal migrant detention center in Juru, Penang. They were Burmese migrants who died because of Leptospirosis infection suspected to be due to drinking water that contaminated with animal urine which was potentially rats (International Detention Coalition, 2009). In addition, Leptospirosis outbreak also reported in Kangar , Perlis in 2012 when 8 of 28 men of a family who were in fishing activities at a swamp developed some symptoms and were hospitalized in Hospital Tuanku Fauziah, Kangar, Perlis. From the serological test, 6 out of 8 men were positively infected. Then, water sample from the swamp was screened and confirmed that it was contaminated with *Leptospira* bacteria (Baharudin et al, 2012).

CHAPTER 3

METHODOLOGY

3.1 Study Design

A cross sectional study is conducted in this research. The disease and exposure status is measured simultaneously in a given population. This study is used to assess the knowledge, attitude and practice (KAP) associated with Leptospirosis disease among final year students of selected programmes in UPM.

3.2 Study Location

The location of the research was conducted in Universiti Putra Malaysia, Serdang Selangor. It was selected because of high cases of Leptospirosis in Selangor in 2014 and 2015. Furthermore, UPM is the only university in Malaysia which has all three programmes that involved in this study which are ENVOCH, Nursing and Veterinary Medicine.

3.3 Study Sampling

3.3.1 Sample Population

The sampling population was among final year students of ENVOCH, Nursing and Veterinary Medicine programmes in UPM.

3.3.2 Sample Frame

The sample frame in this study was all final year of ENVOCH, Nursing and Veterinary Medicine students in UPM. The name list of the final year students were obtained from the Academic Division, Faculty of Medicine and Health Sciences and Faculty of Veterinary Medicine, UPM.

3.3.3 Inclusive and Exclusive Criteria

- Inclusive Criteria
 1. Final year of Veterinary Medicine students
 2. Final year of Health Sciences students who are related with human and environmental health.

- Exclusive Criteria
 1. Non-health practitioner students in UPM.

3.3.4 Sampling Method

The first method was purposive sampling where the three programmes (ENVOCH, Nursing and Veterinary Medicine) were purposively selected to involve in this study due to several criteria that related with Leptospirosis disease. Then, universal sampling was used which means all final year students of ENVOCH, Nursing and Veterinary Medicine in UPM were involved in this study.

3.3.5 Sample Sizes

The sample size involved in this study were all final year students of ENVOCH, Nursing and Veterinary Medicine in UPM. There were 57 students of ENVOCH, 22 students of Nursing and 91 students of Veterinary Medicine. Thus, the total sample sizes were 170 students.

3.4 Study Instrumentation

Questionnaire

The level of KAP on Leptospirosis among final year students of ENVOCH, Nursing and Veterinary Medicine were evaluated by using self-administered questionnaire. The questionnaire comprised of four sections:

- i. Section A consist of socio-demographic characteristics of the respondents (age, gender and race).
- ii. Section B consist of general questions.

- iii. Section C consist of 3 subsections:
- Knowledge about Leptospirosis disease
 - Attitude towards Leptospirosis disease
 - Practice on Leptospirosis disease
- iv. Section D consist of question on suggestion recommended by respondents for information dissemination and also prevention and control measure of Leptospirosis disease in Malaysia.

The questionnaire was modified from other research by Prabhu et al., (2014) according to the suitability of this research. It was developed in stages which included discussion with experts and pre-testing the questionnaire to ensure good content validity. The language used in the questionnaire was English which understandable by the university students. The questionnaire then was distributed to the respondents and required them to fill the information as mentioned above.

3.5 Variables

3.5.1 Independent variable

The independent variables were knowledge and attitude on Leptospirosis disease and also socio-demographic of respondents..

3.5.2 Dependent variable

The dependent variable was practice on Leptospirosis disease.

3.6 Data Collection Procedure

All of final year students of ENVOCH, Nursing and Veterinary Medicine students were gathered in a place at different time. The respondents were briefly explained about the purpose of the research before distributing the questionnaire. Their personal information and responses were kept confidential by the study researcher. They were required to fill in the consent form to take part in this study. The respondents were given self-administered questionnaire to be answered within 20 to 30 minutes and collected at the end of the survey. The information obtained from the questionnaire was used to measure the level of KAP on Leptospirosis disease among final year students of ENVOCH, Nursing and Veterinary Medicine.

3.7 Data Analysis

After the questionnaires were collected, each item was coded and analyzed by using the Statistical Package for Social Sciences (SPSS) version 22.0. The assumption of normality for significance level was ($p > 0.05$). The normality test showed that $p < 0.05$, thus the data was not normally distributed.

Table 3.1 : Type of Data Analysis

No.	Variables	Type of analysis
1.	To identify the socio-demographic status of respondents (age, gender and race).	Descriptive Analysis
2.	To identify the source of information about Leptospirosis disease.	Descriptive Analysis
3.	To identify the level of knowledge, attitude and	Descriptive Analysis

	practice towards Leptospirosis of respondents.	
4.	To determine the association between socio-demographic variables with knowledge, attitude and practice towards Leptospirosis.	Chi-Square test
5.	To determine the association between knowledge and attitude with practice towards Leptospirosis.	Chi-Square test
6.	To compare knowledge, attitude and practice on Leptospirosis disease between ENVOCH, Nursing and Veterinary Medicine students.	Kruskal-Wallis test
7.	To identify the best medium to disseminate information and the most effective measure for prevention and control of Leptospirosis.	Descriptive Analysis

3.8 Quality Control

To ensure reliability of the questionnaire, a pre-test was conducted among 10% of students from different course who had similar characteristics with the sample subject. They were excluded in the study. The purpose of the the pre-test was to ensure that the respondents could understand the questions well and found any difficulties during answering the questions. The questionnaire was analyzed by using statistic package for the SPSS version 22 to arrive at Cronbach alpha to test the reliability and consistency of the questions. The value of the Cronbach's Alpha obtained from the pilot study was 0.796 which covered for all sections. Thus, the questions were considered acceptable and reliable.

3.9 Study Limitation

Limitation of this study was information bias and recall bias may be occurred due to the determinant of association between variables were based on the questionnaire and depend on the answers filled by the respondents. The respondents may not remember and misjudge some important information related to this research.

3.10 Research Ethics

This research was approved by Ethic Committee for Research involving Human Subjects of Universiti Putra Malaysia (JKEUPM). A written consent forms of participant for this research were given to the respondents and explanation about the research also was given to them. All the information and identity used in this research were remain confidential.

CHAPTER 4

RESULTS AND DISCUSSION

The results of this research were divided based on the findings from the distributed questionnaires. The questionnaire consists of four sections which is Section A (Socio-demographic data), Section B (General questions), Section C (Knowledge, Attitude and Practice) and Section D (Recommendation). This chapter includes the descriptive and analytical results on socio-demographic, knowledge, attitude and practice on Leptospirosis disease.

This study was conducted among final year students of selected programmes in Universiti Putra Malaysia (UPM). In this study, 139 out of 170 respondents (81.76% response rate) which were among final year students of Environmental and Occupational Health (ENVOCH) (n=57), Nursing (n=22) and Veterinary Medicine (n=60) were involved to assess their knowledge, attitude and practice on Leptospirosis disease. However, only 60 out of 91 students of final year of Veterinary Medicine involved in this study (65.93% response rate). The findings of the study were displayed as the following.

4.1 Socio-Demographic Characteristics

This part showed the frequency distribution of selected variables describing the background profiles of the respondents. Table 4.1 shows the socio-demographic information of respondents such as age, gender and race. Figure 4.1, 4.2 and 4.3 had summarized the socio-demographic information in bar chart form.

Table 4.1 reveals the socio-demographic profiles of the respondents who have taken part in this study. From the total 139 final year students who had participated, 57 of them were from programme of ENVOCH, 22 from Nursing and remaining 60 were from Veterinary Medicine. Most of the students from all three programmes had an age from 23 to 24 years old where ENVOCH (84.2%), Nursing (90.9%) and Veterinary Medicine (68.3%). Besides, majority of the respondents from all programmes were female which are ENVOCH (73.7%), Nursing (100%) and Veterinary Medicine (81.7%). Furthermore, most of the respondents are among Malay students which were ENVOCH (93%), Nursing (81.8%) and Veterinary Medicine (56.7%).

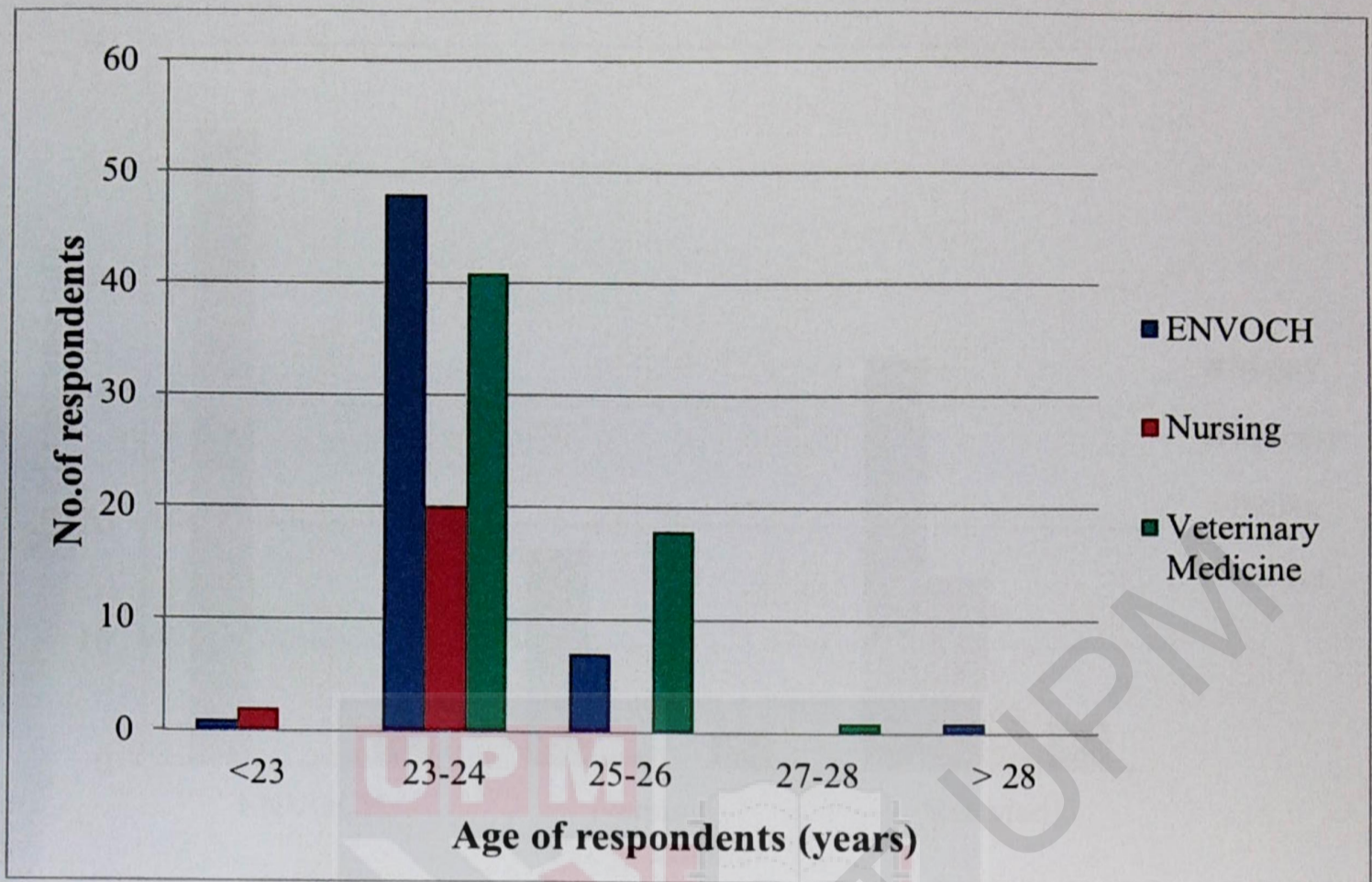


Figure 4.1: Age of the respondents

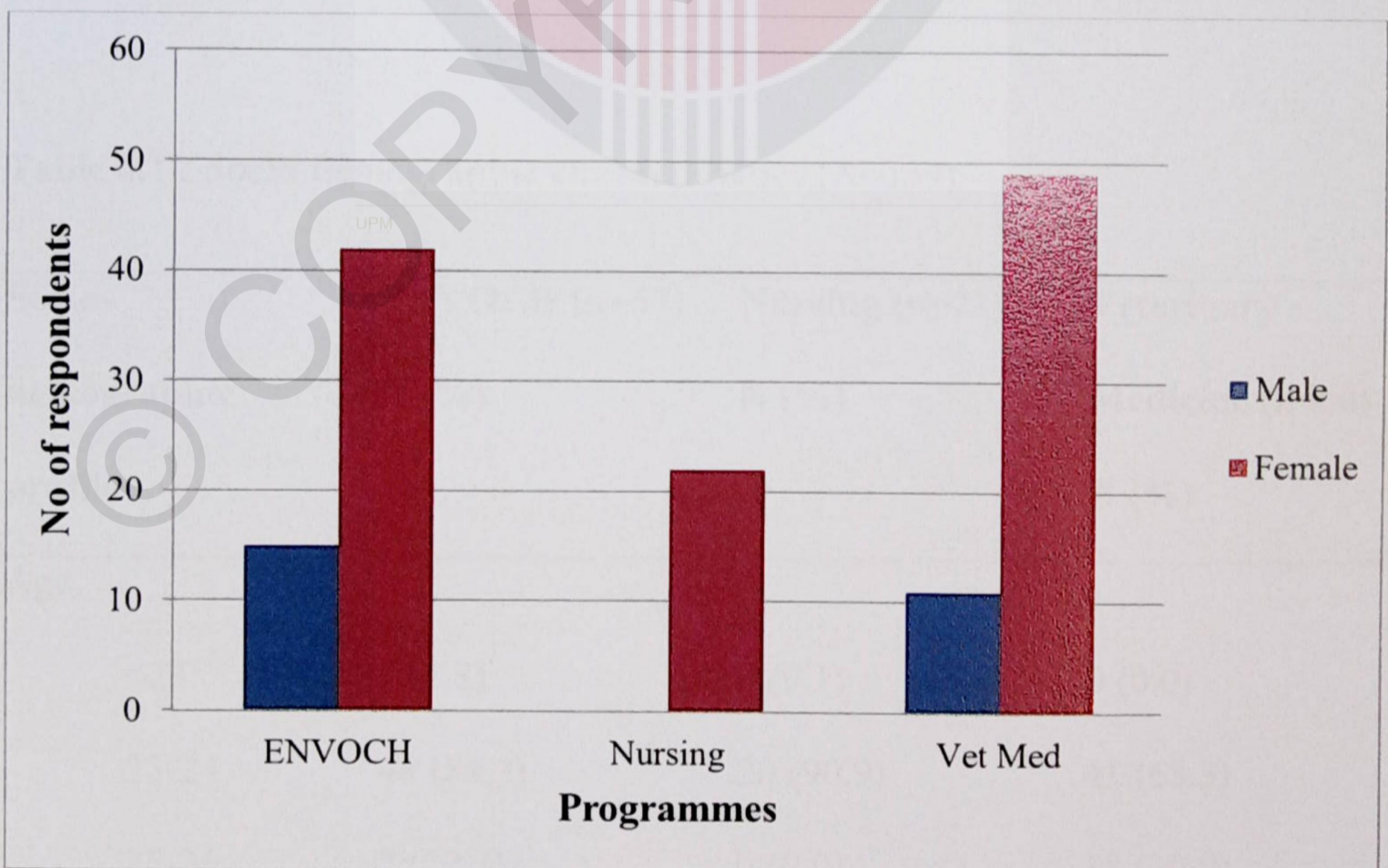


Figure 4.2: Gender of the respondents

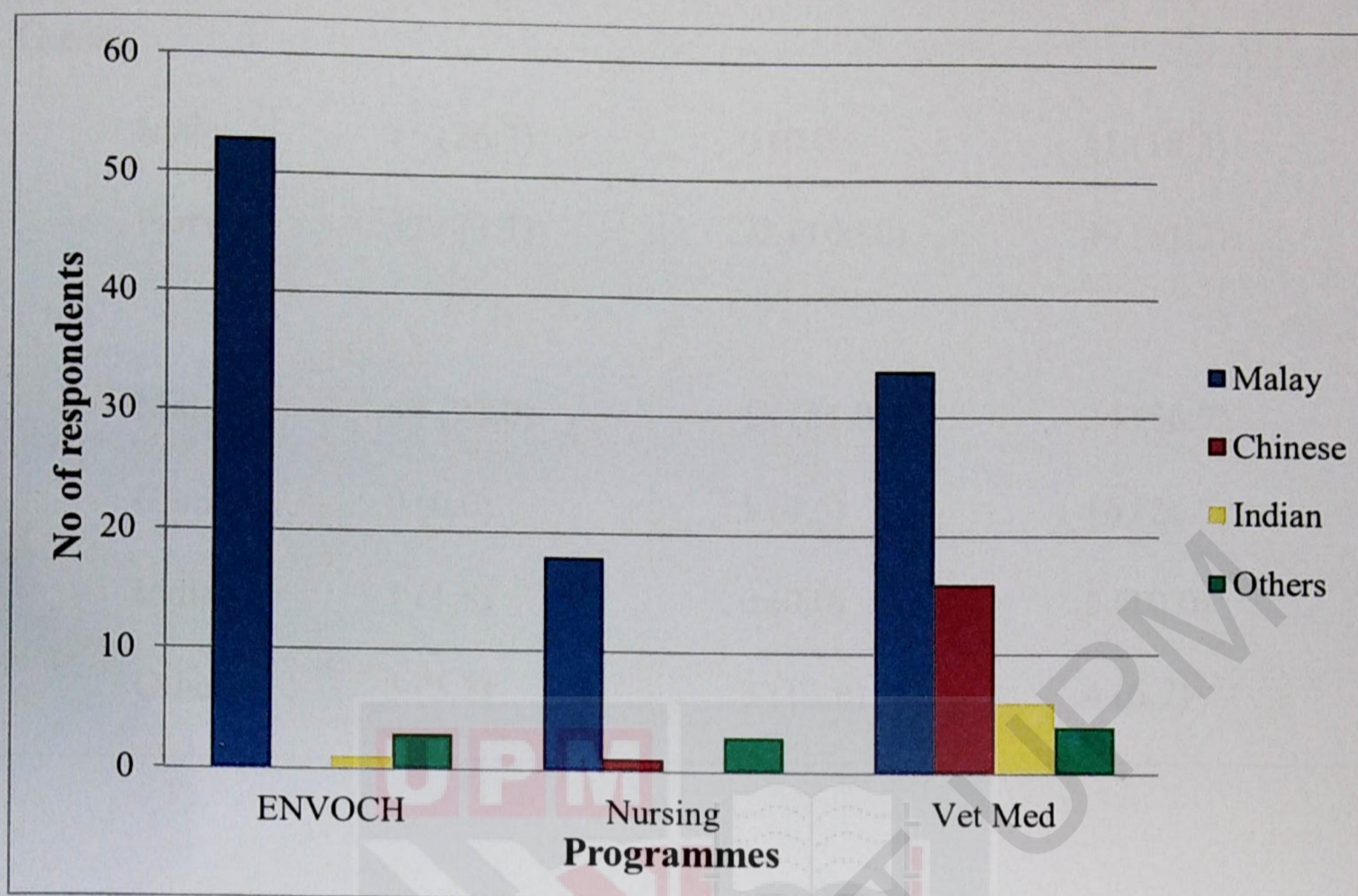


Figure 4.3: Race of the respondents

Table 4.1 : Socio-demographic characteristics (N=139)

Socio-demographic profile	ENVOCH (n=57)	Nursing (n=22)	Veterinary Medicine (n=60)
	N (%)	N (%)	N (%)
Age			
<23	1 (1.8)	2 (9.1)	0 (0.0)
23-24	48 (84.2)	20 (90.9)	41 (68.3)
25-26	7 (12.3)	0 (0.0)	18 (30.0)
27-28	0 (0.0)	0 (0.0)	1 (1.7)
>28	1 (1.8)	0 (0.0)	0 (0.0)

Gender

Male	15 (26.3)	0 (0.0)	11 (18.3)
Female	42 (73.7)	22 (100.0)	49 (81.7)

Race

Malay	53 (93.0)	18 (81.8)	34 (56.7)
Chinese	0 (0.0)	1 (4.5)	16 (26.7)
Indian	1 (1.8)	0 (0.0)	6 (10.0)
Others	3 (5.3)	3 (13.6)	4 (6.7)

A total of 139 respondents were selected from three programmes in UPM which are ENVOCH, Nursing and Veterinary Medicine. Only final year students were involved in this study. Majority of them are in age from 23 to 24 years old, female and Malay.

The three programmes which are ENVOCH, Nursing and Veterinary Medicine were selected in this study because these programmes are related with environment, human and animal health. As environment, human and animal health practitioners in the future, they should have good knowledge, attitude and practice on the zoonotic diseases like Leptospirosis disease. However, most of the veterinarians are not very aware about the importance of zoonoses than they should be while medical clinician who identify zoonoses in human patients probably fail to recognize them or only focus on treating the patient rather than control of disease (Cripps, 2000). Therefore, a better understanding among healthcare practitioners on perception, awareness and

practices about zoonoses is crucial and vital for the design of effective programs in order to enhance the treatment and diagnosis of these diseases (Zhang et al, 2016). Hence, environmental health, human health and veterinary medicine students who have higher responsibility compared to other courses to prevent and control the spread of this disease were selected in this study.

4.2 General Information on Leptospirosis Disease

Table 4.2 illustrated the second section in the questionnaire which was the general knowledge. Four questions have been asked to the respondents. The purpose of this section was to know their general knowledge on Leptospirosis disease. Descriptive statistic was done to get the frequency and percentage of respondents chosen answer based on three different programmes.

Based on Table 4.2, all of the respondents (100%) have heard about Leptospirosis disease. Besides, most of the respondents (93.5%) notice that Leptospirosis disease is epidemic in Asia and all of them (100%) aware that it happen in Malaysia. In addition, majority of the respondents (95%) gain the information about Leptospirosis disease from lectures and it followed by internet sources (89.2%). There were only few students (30.9%) got the information about Leptospirosis disease from parents.

Table 4.2 : General information about Leptospirosis Disease (N=139)

General knowledge	Number (n)	Percentage (%)
Heard of Leptospirosis disease		
Yes	139	100
No	0	0
Notice that Leptospirosis disease epidemic in Asia		
Yes	130	93.5
No	9	6.5
Notice that Leptospirosis disease happen in Malaysia		
Yes	139	100
No	0	0
Source of information		
Mass media	123	88.5
Printed media	103	74.1
Internet	124	89.2
Friends	91	65.5
Lectures	132	95.0
Parents	43	30.9

4.3 Knowledge about Leptospirosis Disease

There were 20 questions being asked to determine the respondents' knowledge on Leptospirosis disease. The respondents got 1 point for each correct answer and 0 score for wrong answer. The overall score was then converted in term of score level and was classified into three levels which are low, moderate and high. The range of scores was between 0 to 20 points. A mean score for knowledge which is 13.43 and standard deviation of 2.71 was used to classify the subjects into three groups as follows (Ajit & Robert, 2011):

High level : more than 16

Moderate level : 11 to 16

Low level : less than 11

Level of knowledge of the respondents on Leptospirosis disease and its distribution was shown in Table 4.3. Majority of the respondents from ENVOCH, Nursing and Veterinary Medicine had moderate knowledge level which was 41 (71.9%), 14 (63.6%) and 46 (76.7%) respectively. Whereas, only 2 (3.5%) respondents from ENVOCH and 12 (20%) from Veterinary Medicine had high knowledge level on Leptospirosis disease while there was no Nursing students who had high level of knowledge. Meanwhile, 14 (24.6%), 8 (36.4%) and 2 (3.3%) of respondents from ENVOCH, Nursing and Veterinary Medicine respectively had poor level of knowledge on Leptospirosis disease.

Table 4.3 : Level of knowledge on Leptospirosis disease (N=139)

Variable	ENVOCH		Nursing		Veterinary Medicine	
	N	(%)	N	(%)	N	(%)
Knowledge						
Low	14	24.6	8	36.4	2	3.3
Moderate	41	71.9	14	63.6	46	76.7
High	2	3.5	0	0.0	12	20.0

Based on Table 4.3, most of the final year students of all three programmes had moderate knowledge level about Leptospirosis. Although they are in their final year of study, they are still unable to identify some of the basic information regarding Leptospirosis which they had learnt in their subject syllabus.

According to Cripps (2000), eventhough the veterinarians graduate with enough knowledge, many of them had low awareness and understanding to discover, recognise, prevent and control the zoonotic diseases like Leptospirosis. In addition, previous study showed that shortage of knowledge was clear among medical health students on the epidemic zoonoses, mode of transmission and epidemiology (Kakkar et. al, 2011). Therefore, moderate level in the knowledge of Leptospirosis had almost similar result with the study by Kakker et. al (2011). In addition, Rahim et. al. (2011) stated that without knowing and realising the risk factors of the disease, we cannot expect people to aware about the disease and it is nearly impossible for them to be enthusiastic to practice good preventive measures. Plus, incorrect belief regarding the

disease also indicates that people had huge misconceptions about Leptospirosis and they can be confuse it with other diseases that more familiar to them like Dengue (Rahim et. al, 2011).

4.4 Attitude towards Leptospirosis Disease

To explore the attitude towards Leptospirosis disease among final year students of selected programmes, there were 15 questions being asked on the opinion either agree or not with the statements for attitude on this disease. The scoring method was used to classify the attitude level. The score was 5 for strongly agree answer, 4 for agree answer, 3 for not sure, 2 for disagree and 1 for strongly disagree answer. The score obtained was sum up and classified into three levels which were high, moderate and low attitude level. A mean score of 62.09 and standard deviation of 7.02 was used to classify the subjects into three levels as follows (Ajit & Robert, 2011):

High level : more than 69

Moderate level: 56 to 69

Low level : less than 56

To sum up the attitude level towards Leptospirosis disease, the distribution were tabulated in Table 4.4. Most of the respondents from ENVOCH, Nursing and Veterinary Medicine had moderate attitude towards Leptospirosis disease which

were 42 (73.7%), 18 (81.8%) and 40 (66.7%) respectively. Meanwhile, 5 (8.8%) of ENVOCH students, 3 (13.6%) of Nursing students and 10 (16.7%) of Veterinary Medicine students had high attitude level. Besides, 10 (17.5%), 1 (4.5%) and 10 (16.7%) final year students from ENVOCH, Nursing and Veterinary Medicine respectively had low level of attitude.

Table 4.4 : Level of attitude towards Leptospirosis disease (N=139)

Variable	ENVOCH		Nursing		Veterinary Medicine	
	N	(%)	N	(%)	N	(%)
Attitude						
Low	10	17.5	1	4.5	10	16.7
Moderate	42	73.7	18	81.8	40	66.7
High	5	8.8	3	13.6	10	16.7

Based on Table 4.4, majority of the respondents of all three programmes had moderate level of attitude towards Leptospirosis. Arbiol et. al (2016), mentioned that positive attitude must be accompanied with good knowledge to maximize the capability of individuals to integrate preventive measures into practice. Based on Table 4.3, majority of students had moderate knowledge about Leptospirosis, thus it leads to the moderate level of attitude among them.

4.5 Practice towards Leptospirosis Disease

For practice towards Leptospirosis disease, there were 15 questions being asked to the respondents to know their practice to prevent and control the disease. The respondents were asked about the frequency to practice each of the statement provided in the questionnaire. 1 point was given for never option answer, 2 point for seldom answer, 3 for sometime answer, 4 for often answer and 5 point for always option answer. The obtained practice score was converted in term of score level and classified into three levels which were high, moderate and low practice level. A mean score of 64.32 and standard deviation of 7.70 were used to classify the subjects into three levels as follows (Ajit & Robert, 2011):

High level : more than 72

Moderate level: 57 to 72

Low level : less than 57

Table 4.5 showed the distribution of level of practice among final year students of ENVOCH, Nursing and Veterinary Medicine towards Leptospirosis disease. Majority of the respondents for all three programmes had moderate practice which were 41 (71.9%), 17 (77.3%) and 44 (73.3%). For high practice level, only 8 (14%) of ENVOCH students, 4 (18.2%) of Nursing students and 9 (15%) Veterinary Medicine students had good practice towards Leptospirosis disease. Besides, ENVOCH, Nursing and Veterinary Medicine students who had low level of practice towards Leptospirosis disease were 8 (14%), 1 (4.5%) and 7 (11.7%) respectively.

Table 4.5 : Level of practice on Leptospirosis disease (N=139)

Variable	ENVOCH		Nursing		Veterinary Medicine	
	N	(%)	N	(%)	N	(%)
Practice						
Low	8	14.0	1	4.5	7	11.7
Moderate	41	71.9	17	77.3	44	73.3
High	8	14.0	4	18.2	9	15.0

From Table 4.5, most of the respondents had moderate practice level towards Leptospirosis disease. The success of a programme is depend on the level of practice of an individual. The higher the practice level, the greater the possibility for the success to be achieved (Tan et. al, 2013). According to a health belief model, a person's perception about the disease and the probability to adopt positive attitude and practice is depend on four critical parameters which are perceived severity of a disease, perceived tendency to get the disease, perceived advantages of good attitude and practice and finally perceived barriers that might prevent an individual to commit positive transformation (Jones and Barlett, 2012). Thus, it can be that students were not in these situations that lead them to have a good practice level to prevent and control the spread of Leptospirosis.

4.6 Association between Socio-Demographic Data with Knowledge, Attitude and Practice towards Leptospirosis Disease

The association between age, gender and race with final year students' knowledge, attitude and practice towards Leptospirosis disease was analysed using Chi-square test and presented in Table 4.6, Table 4.7 and Table 4.8 below. The Chi-square test was conducted in order to determine the relationship between two categorical variables.

Table 4.6: Association between socio-demographic with knowledge (N=139)

Variables	Level of knowledge, n (%)			X ²	p-value
	Low	Moderate	High		
Age					
< 23	0 (0.0)	3 (2.2)	0 (0.0)	12.071	0.148
23-24	19 (13.7)	81 (58.3)	9 (6.5)		
25-26	5 (3.6)	16 (11.5)	4 (2.9)		
27-28	0 (0.0)	0 (0.0)	1 (0.7)		
>28	0 (0.0)	1 (0.7)	0 (0.0)		
Gender					
Male	4 (2.9)	19 (13.7)	3 (2.2)	0.135	0.935
Female	20 (14.4)	82 (59.0)	11 (7.9)		

Race					
Malay	20 (14.4)	77 (55.4)	8 (5.8)	17.509	0.008*
Chinese	0 (0.0)	11 (7.9)	6 (4.3)		
Indian	1 (0.7)	6 (4.3)	0 (0.0)		
Others	3 (2.2)	7 (5.0)	0 (0.0)		
Total	24 (17.3)	101 (72.7)	14 (10.1)		

N=139, Chi-square test, *significant at $p < 0.05$

Based on Table 4.6, there was no association between age and gender with the students' knowledge. The p-value for age and gender with the knowledge level was more than 0.05, thus indicating that there was no significant association between age and gender with knowledge of respondents. However, race shows a significant association with the knowledge level. The Chi-square test obtained was 17.509 and the p-value was less than 0.05 which was 0.008. Thus, there was an association between race and level of knowledge among final year students.

Previous study by El Jalii et al, (2000) emphasized that there was influence of ethnicity on the distribution of Leptospirosis in Malaysia. Thus, it showed that races has an association with the knowledge of Leptospirosis. Besides, one of the previous study showed that knowledge of Leptospirosis seems to be related with the education level, but geographical location of residence also does have more effect to the knowledge level (Mohan and Chadee, 2011). Students who live in a residence that have high Leptospirosis cases that can be due to flood disaster, may have higher knowledge compared to others. However, both previous educational level and residence area information are not included in the questionnaire of this study.

Table 4.7: Association between socio-demographic profile with attitude (N=139)

Variables	Level of attitude, N (%)			X ²	p-value
	Low	Moderate	High		
Age					
< 23	0 (0.0)	3 (2.2)	0 (0.0)	14.142	0.078
23-24	15 (10.8)	80 (57.6)	14 (10.1)		
25-26	5 (3.6)	17 (12.2)	3 (2.2)		
27-28	0 (0.0)	0 (0.0)	1 (0.7)		
>28	1 (0.7)	0 (0.0)	0 (0.0)		
Gender					
Male	10 (7.2)	13 (9.4)	3 (2.2)	13.735	0.001*
Female	11 (7.9)	87 (62.6)	15 (10.8)		
Race					
Malay	13 (9.4)	80 (57.6)	12 (8.6)	5.731	0.454
Chinese	4 (2.9)	10 (7.2)	3 (2.2)		
Indian	1 (0.7)	4 (2.9)	2 (1.4)		
Others	3 (2.2)	6 (4.3)	1 (0.7)		

N=139, Chi-square test, *significant at $p < 0.05$

There was no association between age and race with the students' attitude level of all three programmes. However, there was a significant association between gender and attitude level as shown in Table 4.7. The Chi-square test obtained was 13.735 and the p-value was 0.001 which less than 0.05. Therefore, there was an association between gender and attitude level.

According to Reis et al (2008), socio-demographic characteristics have been known as independent factors for Leptospirosis transmission and thus may give effect to an individual preventive and control health behavior.

Table 4.8: Association between socio-demographic profile with practice (N=139)

Variables	Level of practice, N (%)			X ²	p-value
	Low	Moderate	High		
Age					
< 23	0 (0.0)	3 (2.2)	0 (0.0)	9.114	0.333
23-24	11 (7.9)	81 (58.3)	17 (12.2)		
25-26	5 (3.6)	17 (12.2)	3 (2.2)		
27-28	0 (0.0)	0 (0.0)	1 (0.7)		
>28	0 (0.0)	1 (0.7)	0 (0.0)		
Gender					
Male	3 (2.2)	20 (14.4)	3 (2.2)	0.324	0.850
Female	13 (9.4)	82 (59.0)	18 (12.9)		
Race					
Malay	12 (8.6)	77 (55.4)	16 (11.5)	6.392	0.381
Chinese	1 (0.7)	11 (7.9)	5 (3.6)		
Indian	1 (0.7)	6 (4.3)	0 (0.0)		
Others	2 (1.4)	8 (5.8)	0 (0.0)		

N=139, Chi-square test, *significant at p<0.05

Based on Table 4.8, there were no association between age, gender and race with the practice level towards Leptospirosis disease among final year students of ENVOCH, Nursing and Veterinary Medicine. The p-value for all selected variables were more than 0.05. Thus, it indicates that there was no significant association between socio-demographic variables and level of practice of students.

Previous study by Arbiol et al, (2016) showed that gender had a significant association with the Leptospirosis prevention practice which is contrasting with the result of this study. The study mentioned that male respondents were less likely compared to female to involve in the prevention and control practices of Leptospirosis. Thus, Leptospirosis was less prevalent among female than male due to their engagement in less risky behavior (Cacciapuoti et al, 1994). Meanwhile, the prior study also mentioned that age was not significantly associated with the practice towards prevention and control of this disease which support the result of this study (Arbiol et al, 2016).

4.7 Association between Knowledge and Attitude with Practice towards Leptospirosis Disease

To analyse the association between knowledge and attitude on practice to prevent and control the Leptospirosis disease, Chi-square test was used. The data obtained was tabulated in Table 4.9 and Table 4.10.

Table 4.9: Association between knowledge and practice (N=139)

Variable	Practice, N (%)			X ²	p-value
	Low	Moderate	High		
Knowledge					
Low	4 (2.9)	17 (12.25)	3 (2.2)	5.834	0.212
Moderate	11 (7.9)	77 (55.4)	13 (9.4)		
High	1 (0.7)	8 (5.8)	5 (3.6)		

N=139, Chi-square test, *significant at $p < 0.05$

Based on Table 4.9, about 77 (55.4%) students had moderate knowledge and moderate practice on Leptospirosis disease. Meanwhile, only 5 (3.6%) students had high level of knowledge with good practice and 4 (2.9%) students had low knowledge level with low level of practice. The Chi-square test obtained was 5.834 and the p-value was 0.212 which is more than 0.05. Therefore, there was no association between knowledge and practice level.

Previous study have checked on the relationship between knowledge and practice level among students and they found that the association between them were weak (Kakkar et. al, 2011). Similar to this study, there was no significant association between knowledge and practice level among the final year students. There were also some studies that support this present study which was on dengue fever, reported that there was no association between knowledge and pratice about the disease (Yboa et al, 2013).



Table 4.10: Association between attitude and practice (N=139)

Variable	Practice, N (%)			X ²	p-value
	Low	Moderate	High		
Attitude					
Low	5 (3.6)	15 (10.8)	1 (0.7)	18.204	0.001*
Moderate	11 (7.9)	77 (55.4)	12 (8.6)		
High	0 (0.0)	10 (7.2)	8 (5.8)		

N=139, Chi-square test, *significant at p<0.05

Table 4.10 showed the association between attitude and practice towards Leptospirosis disease. There was 77 (55.4%) students who had moderate attitude with moderate practice level and 12 (8.6%) students had moderate attitude and good practice. Meanwhile, only 8 (5.8%) students who had high attitude and high practice level. The Chi-square test gained was 18.204 and the p-value is less than 0.05 which was 0.001. Thus, there was an association between attitude and practice on Leptospirosis disease.

There was previous study on rabies and dengue fever that reported significant association between knowledge and attitude with the prevention and control practices towards the disease (Sambo et al, 2014). According to Arbiol et al, (2016), highly positive and good attitude among the respondents was considered as a good indication of welcoming health intervention efforts.

4.8 Comparison of Knowledge, Attitude and Practice of Leptospirosis between Final Year Students of ENVOCH, Nursing and Veterinary Medicine

The comparison of knowledge, attitude and practice of Leptospirosis between final year students of ENVOCH, Nursing and Veterinary Medicine were analyzed using Kruskal-Wallis test since the data was not normally distributed. The results were tabulated in Table 4.11, 4.12 and 4.13.

Table 4.11: Comparison of knowledge of Leptospirosis (N=139)

Programmes	n	Median	X ²	p-value
ENVOCH	57	13.0	23.588	0.001*
Nursing	22	12.5		
Vet Med	60	15.0		

N=139, Kruskal-Wallis test, *significant at $p < 0.05$

Based on Table 4.11, the p-value obtained from the test was 0.001 which was less than 0.05. Thus, there was a significant difference of knowledge level between final year students of ENVOCH, Nursing and Veterinary Medicine. Since there was a significant difference ($p < 0.05$, $p = 0.001$) existed, Mann-Whitney U test must be conducted. The results was shown in Table 4.12.

Table 4.12: Comparison of knowledge of Leptospirosis (N=139)

Programmes	n	Median	z	p-value
ENVOCH	57	13.0	-1.202	0.229
Nursing	22	12.5		
ENVOCH	57	13.0	-4.015	0.001*
Vet Med	60	15.0		
Nursing	22	12.5	-4.069	0.001*
Vet Med	60	15.0		

N=139, Mann-Whitney test, *significant at $p < 0.05$

From Table 4.12, there was significant difference on the knowledge level between ENVOCH and Veterinary Medicine and also Nursing and Veterinary Medicine where the p-value was less than 0.05, (0.001) respectively. This may due to the high knowledge among Veterinary Medicine students compared to others on Leptospirosis disease. They are more exposed to the animals in the lecture and training session that make them to know more on the disease. Students can understand the concept and importance of the disease only when there is exposure and experience on it (Martha et. al, 2009).

Table 4.13: Comparison of attitude towards Leptospirosis (N=139)

Programmes	n	Median	X ²	p-value
ENVOCH	57	62.0	1.977	0.372
Nursing	22	65.5		
Vet Med	60	63.0		

N=139, Kruskal-Wallis test, *significant at $p < 0.05$

Based on Table 4.13, the p-value obtained from the test was 0.372 which was more than 0.05. Thus, there was no significant difference of attitude level between final year students of ENVOCH, Nursing and Veterinary Medicine. This may be due to the inability of the students to look for the advantages of the good attitude and prevention practices (Prabhu et. al, 2014). Mann-Whitney test was not required since there was no significance difference between them.

Table 4.14: Comparison of practice on Leptospirosis (N=139)

Programmes	n	Median	X²	p-value
ENVOCH	57	63	1.086	0.581
Nursing	22	66		
Vet Med	60	66		

N=139, Kruskal-Wallis test, *significant at $p < 0.05$

Based on Table 4.14, the p-value obtained from the test was 0.581 which was more than 0.05. Thus, there was no significant difference of practice level towards prevention and control of Leptospirosis between final year students of ENVOCH, Nursing and Veterinary Medicine and Mann-Whitney test was not required to be done. This happen may be due to the lack of practical ways to prevent and control Leptospirosis by educational campaigns with theater, pamphlets and drama that include risk factors of the disease (Prabhu et. al, 2014).

4.9 Recommendation

The recommendation was proposed in Section D of the questionnaire distributed to the final year students of ENVOCH, Nursing and Veterinary Medicine.

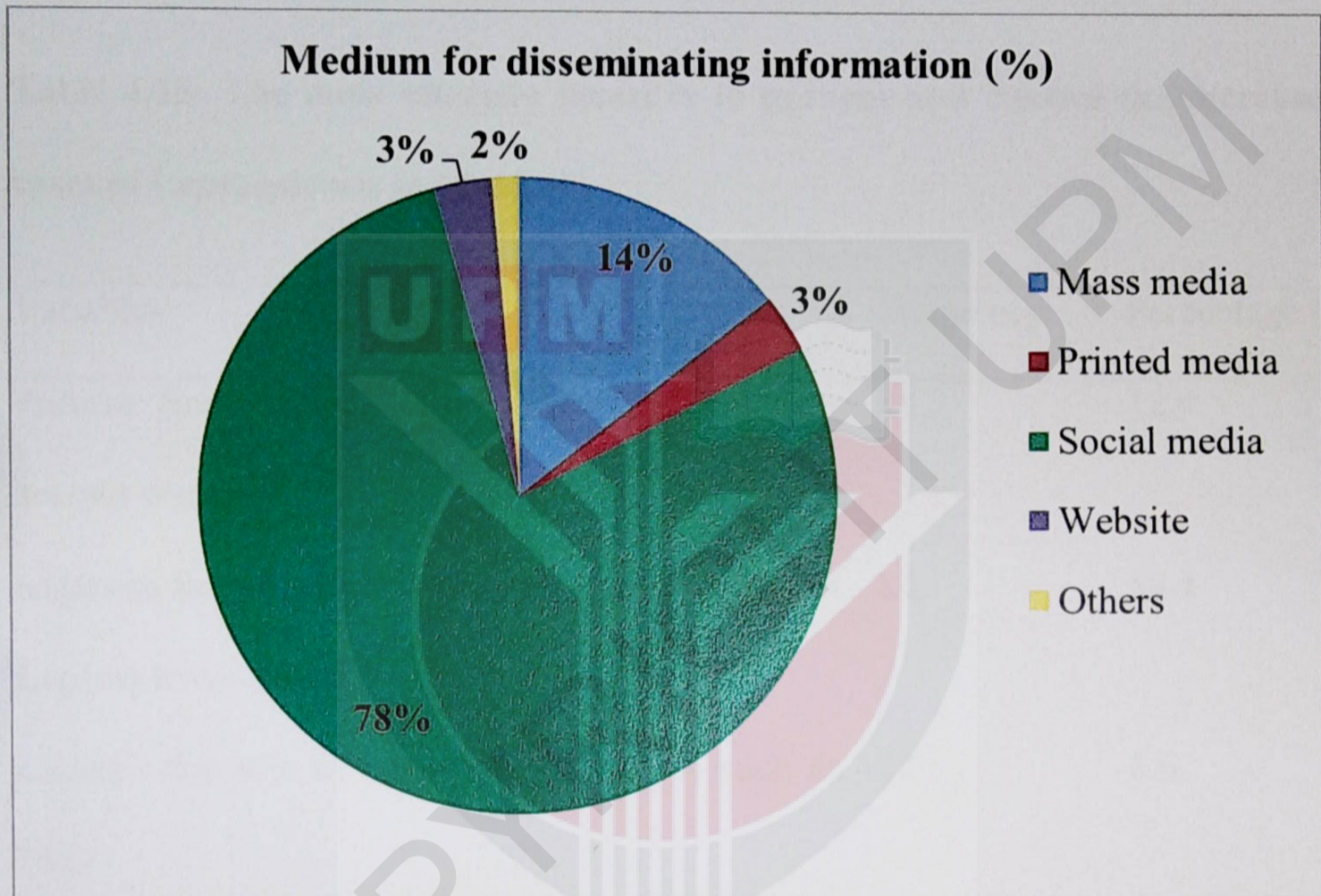


Figure 4.4: The most appropriate medium for disseminating information about Leptospirosis disease

Based on Figure 4.3, the most appropriate medium chosen by the students to disseminate the information regarding Leptospirosis disease was social media which was 109 (78.4%) followed by mass media 20 (14.4%). Meanwhile, 4 (2.9%) students have chosen printed media and website as the best medium to spread the information about Leptospirosis.

There was a relationship between broadcast media and prevention practices of Leptospirosis disease showed in previous studies, that indicated that social and mass media may contribute to the positive transformation in health-related behaviors (Wakefield et al, 2010).

Table 4.15: The most effective measure to prevent and control the increase in cases of Leptospirosis in Malaysia

Variables	Frequency	Percentage (%)
Prevent from visiting dirty recreational areas or hotspot places	18	12.9
Improve knowledge, attitude and practice about Leptospirosis disease	84	60.4
Enhance the role of responsibility parties such as PKD	12	8.6
Improve the dissemination of information related to Leptospirosis disease in press and mass media	20	14.4
Others	5	3.6

Table 4.13 showed the most effective measure chosen by final year students to minimize the cases of Leptospirosis in Malaysia. Most of the students which was 84 (60.4%) suggested that by enhancing the knowledge, attitude and practice may help in preventing and controlling Leptospirosis cases in our country. Meanwhile, 20 (14.4%) students recommended that to improve the information dissemination of Leptospirosis disease to the students and public through press and mass media.

Besides, only 12 (8.6%) students think that by enhancing the role of responsibilities parties like district health officer can minimize the cases of this disease in Malaysia.

Therefore, good and effective delivery strategies should involve the usage of broadcast media to disseminate the information on Leptospirosis in order to increase the knowledge, attitude and practice among public especially students, and also enhance the capacity of local government health units to organize effective and efficient health promotion activities (Arbiol et al, 2016). Besides, previous study showed that there was statistically significant enhancement in the knowledge and attitude after the education program (Jaiswal et al, 2005).

CHAPTER 5

CONCLUSION & RECOMMENDATION

5.1 Conclusion

Generally, this study indicated that the knowledge, attitude and practice towards Leptospirosis was in moderate level among final year students of ENVOCH, Nursing and Veterinary Medicine. Most of them are found to have basic knowledge about Leptospirosis such as the signs and symptoms, prevention and control, factors that lead this disease and other general knowledge. However, most of them confused the *leptospira* virus as a causative agent, but actually Leptospirosis is caused by *leptospira* bacteria. Majority of students also did not know or uncertain that men have higher risk to get Leptospirosis compared to female. Therefore, necessary steps to enhance the knowledge among students about Leptospirosis must be taken into action.

Then, there is an association between race and knowledge of respondents based on this study. Meanwhile, the result showed the association between gender and attitude among students is exist. However, there is no association between socio-demographic with practice level towards Leptospirosis among final year student of

selected programmes. In addition, attitude showed a significant association with the practice level.

The study showed that there is a significant difference in the knowledge level among ENVOCH and Nursing with Veterinary Medicine students. Final year students of Veterinary Medicine have higher knowledge compared to other programmes. Hence, the result also proved that high attitude level towards Leptospirosis is also mostly among Veterinary Medicine students. This indicates that high knowledge may lead to a good attitude.

Leptospirosis is one of zoonotic disease that can cause death and it should be aware and concerned by people especially human health and veterinary students. The present study showed that even though most of respondents have high knowledge and attitude level, but it does not mean that they will practice it in their daily life. Therefore, undergraduate training course should promote a better understanding about the importance of zoonotic disease like Leptospirosis and how to prevent and control it. Plus, the participation of more health students and workers is necessary to educate more people, so that the disease can be recognized and treated immediately. Thus, it help to reduce the cases of Leptospirosis in Malaysia.

5.2 Recommendation

Based on this study, there are some improvement that should be made. Based on the results obtained, majority of students gain the information about this disease from the lecture that they attained and followed by internet. Therefore, it is important to improve the learning process in the lectures and include variety of programmes and activities that require students to apply the knowledge so that they able to understand and practice what they have learnt in the lectures or activities. During lectures, all basic and important information such as causative agent, mode of transmission, sources and causes, signs and symptoms, prevention and control, and also diagnosis and treatment must be included and emphasized. This is because based on this study, most students were unable to know the causative agent of Leptospirosis which is the very basic knowledge.

Moreover, majority of students obtained the knowledge on this disease from the internet. Even in the recommendation part of the questionnaire, students suggest to spread the information via social media since it is easy to be used and more attractive and interesting. Plus, most of the university students prefer to use and get information and entertainment from the social media compared to mass and printed media. Therefore, it is more interesting and practicable to use social media to share the knowledge between lecturers and students and do activities or games in the social media like Whatsapp, Youtube, Facebook and Instagram since they are also expert in using that medium.

In addition, students also can do some study or investigation on the Leptospirosis cases in Malaysia either previous or current cases. By doing this, students may increase their knowledge in order to gather information about the cases and identify the causes and signs and symptoms of the disease. Moreover, students will have real practice and experiences to investigate the cases and identify the root causes of Leptospirosis disease for different patients and situations. This kind of worktask may help to enhance the awareness about Leptospirosis among university students.

For the improvement of study, it is recommended that this study should involve other socio-demographic variables such as previous educational level, residential area and other related profiles. Other than that, involvement of students from other programmes either related to health or not can be considered in the future study. This study also can include research in multi level such as other government universities, non-government universities, private universities, colleges and even schools. Finally, the number of population involved in the study should increased in order to get better distribution of level of knowledge, attitude and practice towards Leptospirosis.

REFERENCES

- Abdul Wahab, Z. (2015). Epidemiology and current situation of leptospirosis in Malaysia. *Persidangan Kesihatan Persekitaran Pihak Berkuasa Tempatan 2015*, WP Labuan.
- Adler, B. and de la Peña Moctezuma, A. (2010). *Leptospira* and leptospirosis. *Vet Microbiol.* 140: 287-96.
- Ajit, PS., & Robert, SC. (2011). Knowledge, attitude and practice (KAP) on disposal of sharop waste, used for home management of Type-2 Diabetes Mellitus. New Delhi, India, 25(3): 135-140.
- Amilasan, AS., Ujiie, M., Suzuki, M., Salva, E., Belo, MC., Koizumi, N., et al. (2012). Outbreak of leptospirosis after flood: the Philippines 2009. *Emerg. Infect. Dis.* 18: 91–94.
- Antony, SJ. (1996). Leptospirosis—An emerging pathogen in travel medicine: A review of its clinical manifestations and management. *J Travel Med.* 3(2): 113-8.
- Arbiol, J., Orencio, PM., Romena, N., Nomura, H., Takahashi, Y., Yabe, M. (2016). Knowledge, attitude and practice towards Leptospirosis among lakeshore communities of Calamba and Los Banos, Laguna, Philippines. *Agriculture.* 6,18; doi:10.3390.
- Badrul Hisham, AS., Nor Azian Shaharom, CMD., Marzukhi, MI., et al. (2009). Spectrum of flood-related diseases encountered during flood disaster in Johore, Malaysia. *Malays J Community Health.* 15: 15-23.
- Bahaman, AR., Ibrahim, AL., Adam, H. (1987). Serological prevalence of leptospiral infection in domestic animals in West Malaysia. *Epidemiol Infect.* 99(2): 379-92.
- Baharudin, B., Hanapiah, RM., Yasin, MS., Othman, A., Abdullah, Z. (2012). Outbreak of leptospirosis in Pauh, Arau, Perlis. Paper presented at: 11th International Annual Symposium on Sustainability Science and Management; July 9-11,2012; Terengganu, Malaysia.
- Beatty, AS., Scott, KA., Tsai, P. (2008). Achieving sustainable global capacity for surveillance and response to emerging diseases of zoonotic origin: workshop summary. washington, DC: The National Academies Press.
- Benacer, D., Mohd Zain, SN., Amran, F., Galloway, RL., Thong, KL. (2013). Isolation and molecular characterization of *Leptospira interrogans* and *Leptospira borgpetersenii* isolates from the urban rat populations of Kuala Lumpur, Malaysia. *Am. J. Trop. Med. Hyg.* 88: 704–709.

- Benacer, D., Mohd Zain, SN., Sim, SZ., Mohd Khalid, MKN., Galloway, RL., Souris, M. And Thong, KL. (2016). Determination of *Leptospira borgpetersenii* serovar Javanica and *Leptospira interrogans* serovar Bataviae as the persistent *Leptospira* serovars circulating in the urban rat populations in Peninsular Malaysia. *Parasites & Vectors*. 9-117.
- Benacer, D., Thong, KL., Verasahib, KB., Renee, L., Galloway, Rudy, A., Hartskeer, John, W., Lewis, and Zain, SNM. (2016). Human leptospirosis in Malaysia: reviewing the challenges after 8 decades (1925-2012). *Asia Pacific Journal of Public Health*. 28(4): 290-302.
- Bharti, A., Nally, J., Ricaldi, J., Matthias, M., Diaz, M. and Lovett, M. (2003). Leptospirosis: a zoonotic disease of global importance. *Lancet Infect*. 3: 757-771.
- Bhatia, R., Narain, JP. (2010). Review paper: the challenge of emerging zoonoses in Asia Pacific. *Asia Pac J Public Health*. 22(4): 388-94.
- Bourhy, P., Collet, L., Brisse, S., Picardeau, M. (2014). *Leptospira mayottensis* sp. nov., a pathogenic species of the genus *Leptospira* isolated from humans. *Int J Syst Evol Microbiol*. 64: 4061-4067.
- Bunnell, JE., Hice, CL., Watts, DM., Montrueil, V., Tesh, RB., Vinetz, JM. (2000). Detection of pathogenic *Leptospira* spp. infections among mammals captured in the Peruvian Amazon basin region. *Am J Trop Med Hyg*. 63(5-6): 255-8.
- Cacciapuoti, B., Ciceroni, L., Pinto, A., Apollini, M., Rondinella, V., Bonomi, U., Benedetti, E., Cinco, M., Dessì, S., Dettori, G., et al. (1994). Survey on the prevalence of leptospira infections in the Italian population. *Eur. J. Epidemiol*. 10: 173-180.
- Cerqueira, GM. and Picardeau, M. (2009). A century of *Leptospira* strain typing. *Infect Genet Evol*. 9: 760-8.
- Costa, F., Hagan, JE., Calcagno, J., Kane, M., Torgerson, P., Martinez-Silveira, MS., et al. (2015). Global morbidity and mortality of leptospirosis: a systematic review. *PLoS Negl Trop Dis*. 9: 3898.
- Cripps, PJ. (2000). Veterinary education, zoonoses and public health: a personal perspective. *Acta Tropica*. 76: 77-80.
- Easton A. (1999). Leptospirosis in Philippine floods. *BMJ*. 319(7204): 212.
- El Jalii, IM., Bahaman, AR., Mohd-Azmi, ML., Mutalib, AR. (2000). Occurrence of human leptospirosis in Malaysia: a retrospective study. *J. Trop. Biomed*. 16: 1-5.
- Firdaus, R., Jamal, HH., Hasni, MJ., Rozita, H., Norfazilah, A., Azmawati, N., Gul, MB., Rohaida, I., Izzah, A. (2017). Leptospirosis outbreak following 2014

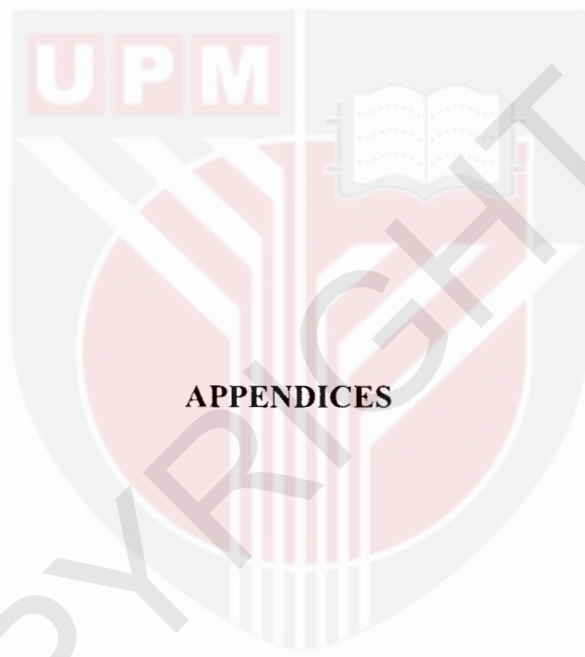
major flooding in Kelantan, Malaysia-a spatial-temporal analysis. Seminar on Climate Change: Exploring the Linkages in UNU-IIGH KL, 4th May 2017.

- Goris, MGA., Boer, KR., Duarte, TATE., Kliffen, SJ., Hartskeerl, RA., (2013). Human leptospirosis trends the Netherlands, 1925–2008. *Emerg. Infect. Dis.* 19: 371–378.
- Hinjoy, S., (2014). Epidemiology of leptospirosis from Thai National Disease Surveillance System 2003–2012. *Outbreak Surveill. Investig. Rep.* 7: 1–5. International Detention Coalition.
- Jaiswal, S., Magar, BS., Thakali, K., Pradhan, A., Gurubacharya, DL. (2005). HIV/AIDS and STI related knowledge, attitude and practice among high school students in Kathmandu valley. *Kathmandu University Medical Journal.* 9: 69-75.
- Johnson, MA., Smith, H., Joeph, P., Gilman, RH., Bautista, CT., Campos, KJ., et al. (2004). Environmental exposure and leptospirosis, Peru. *Emerg Infect Dis.* 10: 1016-1022.
- Johnson, RC., Harris, VG. and Walby, JK. (1969). Characterization of leptospire according to fatty acid requirements. *J Gen Microbiol.* 55: 399-407.
- Jones and Barlett. (2012). Health belief model. Chapter 4. Theory Essence Sentence, Personnel beliefs influence health behaviors.
- Kakkara, M., Ramania, S., Menonb, G., Sankhec, L., Gaidhaned, A., Krishnan, S. (2011). 'Zoonoses? Not sure what that is. . .' An assessment of knowledge of zoonoses among medical students in India. *Transactions of the royal society of tropical medicine and hygiene.* 105: 254-261.
- Ko, AI., Galvao, RM., Ribeiro, CM., Johnson, WD., Riley, LW. and the Salvador Leptospirosis Study Group. (1999). Urban epidemic of severe leptospirosis in Brazil. *Lance.* 354: 820-825.
- Laras, K., Cao, BV., Bounlu, K., et al. (2002). The importance of leptospirosis in Southeast Asia. *Am J Trop Med Hyg.* 67: 278-86.
- Lau, CL., Smythe, LD., Craig, SB., Weinstein, P. (2010). Climate change, flooding, urbanisation and leptospirosis: fuelling the fire? *Trans. R. Soc. Trop. Med. Hyg.* 104: 631–638.
- Levett, PN. (2001). Leptospirosis. *Clin Microbiol Rev.* 14: 296–326.
- Lewis, RJ. (2003). Animal health centre. *Diagno Diary.* 13: 1-14.
- Martha, ST., Anna, HB., Rachel, BM., Haidong, Z. (2009). The importance of nursing research. *J Nurs Educ.* 48(3): 167-170.

- Mohan, ARM. and Chadee, DD. (2011). Knowledge, attitudes and practices of Trinidadian households regarding Leptospirosis and related matters. *International Health*. 3: 131–137.
- Monahan, AM., Miller, IS. and Nally, JE. (2009). Leptospirosis: risk during recreational activities. *J Appl Microbiol*. 107: 707-16.
- Mortimer, RB. (2005). Leptospirosis in a caver returned from Sarawak, Malaysia. *Wilderness Environ Med*. 16: 129-31.
- Nally, JE., Ricaldi, JN., Matthias, MA., Diaz, MM., Lovett, MA., Lev-ett, PN., et al. (2003). Leptospirosis: a zoonotic disease of global importance. *Lancet Infect*. 3: 757-71.
- Noor Rafizah, AA., Aziah, BD., Azwany, YN., Kamarul Imran, M., Mohamed Rusli, A., et al. (2012). Leptospirosis in Northeastern Malaysia : misdiagnosed or coinfection?. *International Journal of Collaborative Research on Internal Medicine & Public Health*. 4: 7.
- Okello, AL., Burniston, S., Conlan, JV., et al. (2015). Prevalence of endemic pig-associated zoonoses in Southeast Asia: A review of findings from the Lao People's Democratic Republic. *Am J Trop Med Hyg*. 92: 1059-1066.
- Phraisuwan, P., Whitney, EA., Tharmaphornpilas, P., et al. (2002). Leptospirosis: skin wounds and control strategies, Thailand, 1999. *Emerg Infect Dis*. 8(12): 1455-9.
- Prabhu, N., Meera, J., Bharanidharan, G., Natarajaseenivasan, K., Ismail, M., Uma, A. (2014). Knowledge, attitude and practice towards Leptospirosis among municipal workers in Tiruchirapalli, India. *Pharma Health Sciences*. 2(3): 246-254.
- Prabhu, N., Natarajaseenivasan, K., Uma, A. and Thirumalaikolundusubramanian, P. (2014). Leptospirosis now: epidemiology, progress, challenges and research gaps. *Elix Hum Physiol*. 67: 21173-21179.
- Rahim, MS., Aziah, BD., Nazri, MS., Azwany, YN., Habsah, H., Zahirudin, WM., et al. (2011). Town service workers' knowledge, attitude and practice towards leptospirosis. *Brunei Darussalam Journal of Health*. 5: 1-12.
- Reis, RB., Ribeiro, GS., Felzemburgh, RDM., Santana, FS., Mohr, S., Melendez, AXTO., Queiroz, A., Santos, AC., Ravines, RR., Tassinari, WS., et al. (2008). Impact of environment and social gradient on leptospiral infection in urban slums. *PLoS Negl. Trop. Dis*. 2: 228.
- Russ, A., Jali, I., Bahaman, A., Tuen, A., Ismail, G. (2003). Seroepidemiological study of leptospirosis among the indigenous communities living in the periphery of Crocker Range Park Sabah, Malaysia. *ARBEC*. 1-5.

- Samarakoon, YM. and Gunawardena, N. (2013). Knowledge and self-reported practices regarding leptospirosis among adolescent school children in a highly endemic rural area in Sri Lanka. *Rural and Remote Health*. 13: 2360.
- Sambo, M., Lembo, T., Cleaveland, S., Ferguson, H.M., Sikana, L., Simon, C., Urassa, H., Hampson, K. (2014). Knowledge, attitudes and practices (KAP) about rabies prevention and control: A community survey in tanzania. *PLoS Negl. Trop. Dis*. 8: 3310.
- Sapian, M., Khairi, MT., How, SH., Rajalingam, R., Sahhir, K., Norazah A., et al. (2012). Outbreak of melioidosis and leptospirosis co-infection following a rescue operation. *Med J Malaysia*. 67: 293–7.
- Self, CA., Iskrzynska, WI., Waitkins, SA., Whicher, JW., Whicher, JT. (1987). Leptospirosis among British cavers. *Cave Sci*. 14: 131-134.
- Shafei, MN., Sulong, MR., Yaacob, NA., Hassan, H., Wan Mohammad, WMZ., Daud, A., Ismail, Z., Abdullah, MR. (2012). Seroprevalence of leptospirosis among town service workers on northeastern State of Malaysia. *IJCRIMPH*. 4: 395–403.
- Shapiro, JL., Prescott, JF., Henry, G. (1999). Equine abortions in eastern Ontario due to leptospirosis. *Can Vet J*. 40(5): 350-1.
- Sheena, A., Buchan, J. (1987). Leptospirosis in British cavers in Malaysia: the Sarawak experience. *Isr J Vet Med*. 43: 346.
- Sthayaparan, Robertson, ID., Fairuz, A., Suut, L., and Abdullah, MT. (2013). Leptospirosis, an emerging zoonotic disease in Malaysia. *Malaysian J Pathol*. 35: 123-132.
- Sykes, JE., Hartmann, K., Lunn, KF., Moore, GE., Stoddard, RA., Goldstein, RE. (2011). ACVIM small animal consensus statement on leptospirosis: diagnosis, epidemiology, treatment, and prevention. *J Vet Intern Med*. 25: 1-13.
- Tan, AB., Salleh, MD., Hj. Hassan., Jusang, B., Ramdzani, A. (2013). Exploring the level of knowledge, attitude and environmental-friendly practices among young civil servants in Malaysia. *Journal of social sciences and humanity*. 21: 21-38.
- Thayaparan, S., Robertson, ID., Fairuz, A., Suut, L. and Abdullah, MT. (2013). Leptospirosis, an emerging zoonotic disease in Malaysia. *Malaysian J Pathol*. 35(2): 123–132.
- Ullmann, LS., and Langoni, H. (2011). Interactions between environment, wild animals and human leptospirosis. *J Venom Anim Toxins Incl Trop Dis*. 17: 119–29.

- Van Crevel, R., Speelman, P., Gravekamp, C., Terpstra, WJ. (1994). Leptospirosis in travelers. *Clin Infect Dis.* 19(1): 132-4.
- Victoriano, AF., Smythe, LD., Gloriani-Barzaga, N., Cavinta, LL., Kasai, T., Limpakarnjanarat, K., et al. (2009). Leptospirosis in the Asia Pacific region. *BMC Infect Dis.* 9: 147-156.
- Vijayachari, P., Sugunan, AP., Shriram, AN. (2008). Leptospirosis: an emerging global public health problem. *J Biosci.* 33(4): 557-69.
- Wakefield, MA., Loken, B., Hornik, RC. (2010). Use of mass media campaigns to change health behaviour. *Lancet.* 376: 1261–1271.
- World Health Organization. (2003). Human leptospirosis: guidance for diagnosis, surveillance and control. World Health Organization 1-109.
- Yboa, BC., Labrague, LJ. (2013). Dengue knowledge and preventive practices among rural residents in samar province, philippines. *Am. J. Public Health Res.* 1: 47–52.
- Zhang, HL., Mnzava, KW., Mitchell, ST., Melubo, ML., Kibona, TJ., Cleaveland, S., et al. (2016). Mixed methods survey of zoonotic disease awareness and practice among animal and human healthcare providers in Moshi, Tanzania. *PLoS Negl Trop Dis.* 10(3): 4476.

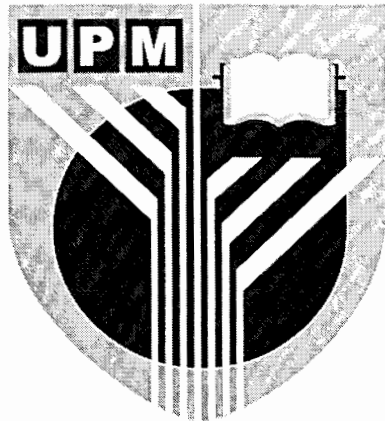


APPENDICES

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**DEPARTMENT OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH
FACULTY OF MEDICINE AND HEALTH SCIENCES
UNIVERSITI PUTRA MALAYSIA**

**KNOWLEDGE, ATTITUDE AND PRACTICE ON
LEPTOSPIROSIS DISEASE AMONG FINAL YEAR STUDENTS
OF SELECTED PROGRAMMES IN UNIVERSITI PUTRA
MALAYSIA (UPM)**

QUESTIONNAIRE FORM

Respondent's ID : _____
Date : _____

All responses will be treated as confidential.

There are FOUR sections in this questionnaire.

SECTION A : SOCIO DEMOGRAPHIC DATA

Instruction : Please answer the question by ticking (/) in the spaces provided.

1. Age : _____

2. Gender :

Male Female

3. Race :

Malay Chinese Indian Others

Please state: _____



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SECTION B : GENERAL QUESTIONS

1. Have you heard about Leptospirosis disease?

Yes No

2. Is Leptospirosis disease epidemic/regularly happen in Asia?

Yes No

3. Are you aware that Leptospirosis disease happen in Malaysia?

Yes No

4. Where do you get information about Leptospirosis disease? (Can answer MORE THAN ONE)

Mass media (Television/Radio)

Printed media (Newspaper/Magazine)

Internet

Friends

Lectures

Parents

Others. Please state: _____

SECTION C : KNOWLEDGE, ATTITUDE AND PRACTICE

i. Knowledge on Leptospirosis disease.

No	Statement	Right	Wrong
1	Leptospirosis disease is caused by <i>leptospira</i> virus.		
2	Vaccine is given to people to prevent Leptospirosis infection.		
3	Vaccine is given to pets to prevent Leptospirosis infection.		
4	Antibiotics are given to patients with Leptospirosis disease as a treatment.		
5	Leptospirosis disease can lead to death.		
6	Leptospirosis disease is more infected by men compared to women.		
7	Adults will not be infected by Leptospirosis disease.		
8	People who are regularly going to the recreational area are easier to suffer from this disease.		
9	Leptospirosis disease is only caused by rats		
10	Leptospirosis patients will have fever and headache.		
11	Leptospirosis disease patients will experience yellowing of the skin and eyes.		
12	Pain in the abdomen will not occur in patients with this disease.		
13	Leptospirosis disease will cause rashes on the skin.		
14	Diarrhea is one sign of this disease.		
15	Leptospirosis not occur in tropical countries.		
16	Employees who work outside (farms, forests) and in contact with animals have higher risk of getting Leptospirosis disease.		
17	Drink water contaminated with rat urine will not spread the disease.		
18	An individual can be infected when his/her injured hand in contact with water contaminated with the urine of rats.		
19	Selangor is one of 19 states that had the highest rates of Leptospirosis cases in Malaysia from 2014-2015.		
20	This disease can be prevented by wearing protective clothing (shoes/rubber gloves) when exposed to contaminated water/soil.		

ii. Attitude towards Leptospirosis disease

Scale: 1 = strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, 5 = strongly agree

No.	Statement	Scale				
		1	2	3	4	5
1	I am interested to read about Leptospirosis disease.					
2	I feel the culture of throwing trash in the right place must be applied to each individual.					
3	Prevention of this disease is not my responsibility, but it is the responsibility of the community only.					
4	I want to take some time to attend any health promotion programmes on Leptospirosis disease to increase the knowledge about this disease.					
5	Addition of new cases of Leptospirosis disease over time do not give anything that worries me.					
6	I would feel disappointed if I do not follow or join any programmes about this disease.					
7	I feel that residence inspection by local authority officials will interfere with my daily activities.					
8	I often change the television channel that broadcasts information about this disease.					
9	I am not interested to take any brochure/pamphlet about this disease if given.					
10	I want to help reducing the rate of new cases of Leptospirosis disease.					
11	I would travel with my family/friends to the country in Asia during the outbreak of this disease.					
12	If there is a vaccine to prevent this disease, I would like to give a shot to my pet.					
13	If there is no one to monitor my behavior in a recreation center, I will not take care of personal hygiene and the surrounding area.					
14	I do not like being advised if I do not maintain personal hygiene and the cleanliness of environment.					
15	I do not care if I saw my friends do not maintain personal					

	hygiene and the environment.					
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iii. Practice on Leptospirosis disease

Scale: 1 = Never, 2 = Seldom, 3 = Sometime, 4 = Often, 5 = Always

No.	Statement	Scale				
		1	2	3	4	5
1	I throw garbage in the proper place.					
2	Before doing activity in a recreational area, I make sure the area is clean first.					
3	I pick and throw the scattered garbages surround the recreational area into the trash before bathing.					
4	I would see doctor if experience prolonged fever after visiting the recreational area.					
5	I would take care of my friend who had Leptospirosis disease.					
6	I would wear protective clothing when working / in contact with water or soil that may be contaminated with animal urine.					
7	I would get the vaccine for my pets.					
8	I would avoid myself from contact with urine / animal's fluid if there are cuts on my fingers.					
9	I would not going to shower in water that has been contaminated with animal urine.					
10	I search and find information about Leptospirosis disease.					
11	I would share information on leptospirosis infection with family and friends.					
12	I would ensure that the water is clean before drink.					
13	I would make a medical examination if there are signs of this disease.					
14	I would read brochures about Leptospirosis disease if given to me.					
15	I would participate in the awareness and prevention programmes of Leptospirosis disease if organized.					

Scale: 1 = Never, 2 = Seldom, 3 = Sometime, 4 = Often, 5 = Always

SECTION D : RECOMMENDATION

- a. In your opinion, what is the most appropriate medium for disseminating information about Leptospirosis disease. Choose **ONE** and include the reason for your choice.

Mass media (television/radio)

Printed media (newspaper/magazine)

Social media (exp: *Facebook*)

Website

Others. Please state : _____

Reason _____ :

- b. What is the most effective measure to prevent and control the increase in cases of Leptospirosis in Malaysia? Choose only **ONE**.

Prevent from visiting dirty recreational areas or any hotspot places.

Improve knowledge, attitude and practice about Leptospirosis disease.

Enhance the role of the responsible parties such as PKD by conducting programs / campaigns to prevent and control this disease.

Improve the dissemination of information related to Leptospirosis disease in the press and mass media

Others. Please state :

End of questions.

Thank you.



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

FORM B1: RESPONDENT'S INFORMATION SHEET AND CONSENT

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE :

KNOWLEDGE, ATTITUDE AND PRACTICE ON LEPTOSPIROSIS DISEASE AMONG FINAL YEAR STUDENTS OF SELECTED PROGRAMMES IN UNIVERSITI PUTRA MALAYSIA (UPM).

2. INTRODUCTION:

This study intends to investigate the knowledge, attitude and practice on Leptospirosis disease among final year students of Environmental and Occupational Health, Nursing And Veterinary Medicine in UPM.

3. WHAT WILL YOU HAVE TO DO?

As respondent, you need to sign the consent form which indicate you are interested and willing to cooperate with this study. Then, you need to answer the questions in the questionnaire honestly and accurately. You need to tick (/) in the space given.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

First, second and third year of Environmental and Occupational Health, Nursing And Veterinary Medicine students in UPM.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

You can evaluate the level of knowledge, attitude and practice of leptospirosis disease on yourself.

(b) TO THE INVESTIGATOR?

Investigator able to collect data from the study to identify the factors like KAP of Leptospirosis that can affect its cases in Malaysia. Other than that, investigator can obtain useful data from the study for improvement of prevention and control programme of Leptospirosis disease in Malaysia.

6. WHAT ARE THE POSSIBLE RISKS?

There is no possible risk in this research. All information obtained from respondents are confidential.

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

Information and identity of respondents are remain confidential.

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

If you have additional questions, you can contact:

**Siti Maryam Binti Abu Bakar
Researcher**

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Occupational Health)
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**Assoc. Prof. Dr. Haliza Abdul Rahman
Project Leader**

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Occupational Health
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
Tel : 03 89472403
Fax : 03 89472395
dr.haliza@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)



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

Research title	: Knowledge, Attitude And Practice On Leptospirosis Disease Among Final Year Nursing Students Of Research Universities In Klang Valley
Study Site	: Klang Valley
JKEUPM Ref No.	: FPSK(EXP16-OSH)U015
Researcher	: Siti Maryam Bt Abu Bakar
Supervisor	: Assoc Prof. Dr. Haliza Abdul Rahman

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 (Malay) Version 1 dated 18/10/2016
3. Proposal (English), Version 1 dated 18/10/2016
4. Questionnaire (Malay), Version 2 dated 21/11/2016
5. Curriculum Vitae of:
 - a. Assoc Prof. Dr. Haliza Abdul Rahman

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

Decision by JKEUPM:

- Approved
- Permission MUST BE OBTAINED from the respective hospitals/ institutions before conducting the research**
- Disapproved

Please note that the approval is valid until 29 November 2017

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.