

**KNOWLEDGE AND ATTITUDE OF
LEPTOSPIROSIS AMONG STUDENTS IN SCHOOL
OF HEALTH SCIENCES, UNIVERSITI SAINS
MALAYSIA**

by

THEODORA HABAI ANAK KEROH

**Dissertation submitted in partial fulfilment of the
requirements for the degree of
Bachelor of Health Sciences (Nursing)**

JUNE 2015

ACKNOWLEDGEMENT

First and foremost, praises and thanks to the God, the Almighty, for His showers of blessings throughout my research work. Without Him, I would not have had the wisdom or strength to complete this study.

I would like to express my deep and sincere gratitude to my research supervisor, Madam Zakira binti Mamat@Mohamed Senior Lecturer of School of Health Sciences, Universiti Sains Malaysia for providing invaluable guidance throughout this research. It was a great privilege and honor to work and study under her guidance.

My gratitude goes to the statistician of Statistic Department, who guided me in data analysis. Thanks for his patience and kindness in providing a clear and useful suggestion for my data analysis using SPSS version 22.0.

I also would like to thank the Research Ethical Committee (Human) of Universiti Sains Malaysia for giving me the approval for conducting this research and permission for data collection.

Special thanks and appreciation I give to my family especially to my mother Christina Mily anak Elom and my father Keroh anak Tegong without whose love, understanding, prayers and support I might not be able to complete this study.

Finally, my thanks go to all the people who have supported me to complete the research work directly or indirectly. This research would not be possible without the help of several people who humbly and kindly contributed and made time to assist in completion of this study, sincerest thanks and profound gratitude for all those who made this study possible.

TABLE OF CONTENTS

	PAGES
DECLARATION	i
CERTIFICATE	ii
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vii
LIST OF ABBREVIATIONS	viii
ABSTRACT	ix
ABSTRAK	v
CHAPTER 1: INTRODUCTION	1
1.1 Background of Study	1
1.2 Problem Statement	5
1.3 Research Objectives	7
1.3.1 General Objective	7
1.3.2 Specific Objectives	7
1.4 Research Questions	8
1.5 Research Hypothesis	8
1.6 Significant of Study	9
1.7 Definition of Operational Terms	10
1.7.1 Knowledge	
1.7.2 Attitude	
1.7.3 Leptospirosis	
1.7.4 Undergraduate Students in School of Helath Sciences	
CHAPTER 2: LITERATURE REVIEW	12
2.1 Introduction	12
2.2 Review of Literature	12
2.2.1 <i>Recreational Exposure and Outbreak of Leptospirosis</i>	12
2.2.2 <i>Knowledge on Leptospirosis</i>	13
2.2.3 <i>Attitude on Leptospirosis</i>	16

2.2.4 Instrumentation and Methodology	17
2.3 Theoretical Framework	17
CHAPTER 3: METHODOLOGY AND METHODS	20
3.1 Research Designs	20
3.2 Population and Setting	20
3.3 Sampling	20
3.3.1 Sample	20
3.3.2 Sampling Method	21
3.3.3 Sample Size	21
3.4 Variables	22
3.4.1 Variables Measurement	22
3.5 Instrumentation	23
3.5.1 Instrument	23
3.5.2 Translation of Instrument	24
3.5.3 Validity and Reliability of the Data Collection Instruments	24
3.6 Ethical Considerations	24
3.7 Data Collection	25
3.8 Data Analysis	26
CHAPTER 4: RESULTS	27
4.1 Introduction	27
4.2 Demographic Characteristics	27
4.3 Knowledge on Leptospirosis	28
4.4 Attitude on Leptospirosis	31
4.5 Association between Gender and Knowledge	32
4.6 Difference in Mean Age between Different Level of Knowledge	33
4.7 Association between Gender and Attitude	33
4.8 Difference in Mean Age between Different Level of Attitude	34
CHAPTER 5: DISCUSSION	35
5.1 Introduction	35
5.2 Knowledge on Leptospirosis	35
5.3 Attitude on Leptospirosis	37

5.4 Association between Gender and Knowledge	38
5.5 Difference in Mean Age between Different Level Knowledge	39
5.6 Association between Gender and Attitude	41
5.7 Difference in Mean Age between Different Level of Attitude	42
CHAPTER 6: CONCLUSION AND RECOMMENDATION	44
6.1 Introduction	44
6.2 Summary of the Findings	44
6.3 Strengths and Limitations	45
6.4 Implication and Recommendation	46
6.4.1 Implication on the Selected Theory	46
6.4.2 Nursing Practice	47
6.4.3 Nursing Education	47
6.4.4 Nursing Research	48
6.5 Conclusion	48
REFERENCES	49
APPENDICES	55
Appendix 1: Research information sheet for respondents	55
Appendix 2: Participant Information and Consent Form	60
Appendix 3: Permission to use questionnaire	61
Appendix 4: Questionnaire form	63
Appendix 5: Gantt chart	66
Appendix 6: Ethical approval letter	68
Appendix 7: Permission to conduct study	71

LIST OF TABLES

	PAGES
Table 4.2.1: Demographic characteristic with frequency, percentage, mean and standard deviation (n=301).	27
Table 4.3.1: Level of knowledge of respondents (n=301)	29
Table 4.3.2: Main source of information on leptospirosis with frequency and percentage (%).	29
Table 4.3.3: Knowledge items with mean score (SD) and percentage (%) of correct answer (n=301).	30
Table 4.4.1: Level of knowledge and attitude of respondents (n=301).	31
Table 4.4.2: Attitude items with mean score (SD) and percentage (%) of positive attitude (n=301).	32
Table 4.5.1: Association of gender with level of knowledge on leptospirosis (n=301).	32
Table 4.6.1: Difference in mean age between different level of knowledge (n=301).	33
Table 4.7.1: Association of gender with level of attitude on leptospirosis (n=301).	33
Table 4.8.1: Difference in mean age between different level of attitude on leptospirosis (n=301).	34

ABBREVIATIONS

PCR	- Polymerase Chain Reaction
ELISA	- Enzyme-linked Immunosorbent Assay
MAT	- Microscopic Agglutination Test
WHO	- World Health Organization
SPSS	- Statistical Package for Social Sciences
n	- Number/Frequency
SD	- Standard deviation
df	-Degree of freedom

KNOWLEDGE AND ATTITUDE OF LEPTOSPIROSIS AMONG STUDENTS IN SCHOOL OF HEALTH SCIENCES, UNIVERSITI SAINS MALAYSIA

ABSTRACT

A cross sectional study was conducted to assess the knowledge and attitude towards leptospirosis among students of School of Health Sciences in Universiti Sains Malaysia. The response rate of questionnaire distributed was 97.1%. A total of 301 respondents was randomly selected and recruited for this study. Self administered questionnaire consisted of questions on demographic data and knowledge and attitude of leptospirosis questions was distributed to all the respondents. Analysis of collected data is done using SPSS version 22.0 software. Respondents consisted of 96 (31.9%) males and 205 (68.1%) females with mean age of 21.63 (SD 1.1) years old. The age ranged from 20 to 24 years old. Based on the calculated mean percentage of total knowledge score, about 183 (60.8%) respondents had good knowledge whereas 118 (39.2%) respondents had moderate knowledge. No respondents claimed never heard of the disease which is considered as poor knowledge. With score $\geq 75\%$ considered as satisfactory, attitude towards leptospirosis was generally good as 286 (95.0%) respondents obtained satisfactory attitude score and only 15 (5.0%) respondents obtained unsatisfactory score. Although knowledge on disease transmission and prevention strategies were high, students knowledge on common signs and symptoms of leptospirosis still need to be improved. Thus, this study recommend that health education program on leptospirosis should be implemented among students to prevent leptospirosis outbreak among students.

**PENGETAHUAN DAN SIKAP TERHADAP LEPTOSPIROSIS DALAM
KALANGAN PELAJAR SEKOLAH SAINS KESIHATAN DI UNIVERSITI
SAINS MALAYSIA**

ABSTRAK

Satu kajian keratan rentas telah dijalankan untuk menilai pengetahuan dan sikap terhadap leptospirosis dalam kalangan pelajar Pusat Pengajian Sains Kesihatan, Universiti Sains Malaysia. Kadar tindak balas untuk soal selidik yang diedarkan adalah 97.1%. Seramai 301 responden telah dipilih secara rawak dan diambil untuk kajian ini. Soal selidik yang ditadbir sendiri terdiri daripada soalan mengenai data demografi serta soalan mengenai pengetahuan dan sikap terhadap leptospirosis telah diedarkan kepada semua responden. Analisis data yang telah dikumpul dilakukan dengan menggunakan perisian SPSS versi 22.0. Responden terdiri daripada 96 (31.9%) lelaki dan 205 (68.1%) perempuan dengan usia purata 21,63 (SD 1.08) tahun. Julat umur adalah antara 20 hingga 24 tahun. Berdasarkan peratusan min yang dikira daripada jumlah skor pengetahuan, seramai 183 (60.8%) responden mempunyai pengetahuan yang baik manakala 118 (39.2%) responden mempunyai pengetahuan yang sederhana. Tiada responden yang tidak pernah mendengar tentang penyakit ini yang boleh klasifikasikan sebagai berpengetahuan rendah. Dengan pembahagian skor $\geq 75\%$ sebagai memuaskan, sikap terhadap leptospirosis pada umumnya baik kerana 286 (95.0%) responden memperolehi skor sikap yang memuaskan dan hanya 15 (5.0%) responden memperolehi markah yang tidak memuaskan. Walaupun pengetahuan mengenai transmisi penyakit dan strategi pencegahan adalah tinggi, pengetahuan pelajar mengenai tanda-tanda dan gejala biasa leptospirosis masih perlu diperbaiki. Oleh itu, kajian ini mencadangkan bahawa program pendidikan kesihatan mengenai leptospirosis perlu dilakukan dalam kalangan pelajar untuk mengelakkan wabak leptospirosis dalam kalangan ini.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Leptospirosis happens worldwide especially in country with subtropical and tropical climates. World Health Organization estimates that 0.1 to 1 per 100 000 people in temperate climate and 10 to more per 100 000 people in tropical climate affected by leptospirosis each year. The number of people were affected by leptospirosis increased during an epidemic in which up to 100 or more per 100 000 people. The most recent estimates that 500 000 cases of leptospirosis happens annually (World Health Organization, 2014).

Leptospirosis is an infectious disease that is caused by the bacteria with genus *Leptospira sp.* which usually is found in animals, such as rodents, dogs and horses. The disease is transmitted through contact of human with water contaminated with the urine of the animals. The bacteria enters human body through mucous membrane such as mouth, nose and eyes as well as through cut or wound of the skin when human is in contact with the water and soil contaminated with *Leptospira sp.* reservoir urine. The bacteria occasionally transmitted through the ingestion of food or water contains the urine of the animal, such as rodents that become the reservoir for the bacteria.

The clinical manifestations of the bacterial infection include flu like fever, nausea and vomiting, chills, jaundice and shortness of breath. Leptospirosis infection can cause septicemic shock which lead to severe condition such as renal failure and inflammation of important organs including heart which can lead to death. In the outbreak of leptospirosis after the flood in a hospital in Philippines in 2009 there were 458 cases of leptospirosis reported. Among 51 death, 12 people discharge from the hospital without improvement and seven people were transferred to other hospital for dialysis. The main causes of death in the patient with leptospirosis are acute respiratory distress, kidney failure and disseminated intravascular coagulation (Suzuki et al., 2012).

The ecology plays an important part in the outbreak of leptospirosis, which usually occurs during flood and heavy rainfall. In rural area, transmission is usually associated with farming and livestock in rainy months. Infection in urban area is associated with overcrowding, poor hygiene standards, inadequate sanitation and poor drainage system, which typically occur in urban slums in developing countries. In developed countries, infection is now increasingly being associated with outdoor recreational exposure and travelling activities (Lau, Smythe, Craig & Weinstein, 2010).

Leptospirosis usually treated with antibiotic, such as penicillin, amoxicillin, ampicillin and other antibiotic. Early diagnosis and treatment increase chance of survival of patient with leptospirosis, decrease days of illness and post leptospirosis complication such as kidney failure which require haemodialysis (Hartskeerl, Collares-Pereira & Ellis, 2011). The diagnosis of leptospirosis is based on signs and symptoms, history of contact with contaminated water as well as confirmatory laboratory tests such as blood culture, real time polymerase chain reaction (PCR), IgM enzyme-linked immunosorbent assay (ELISA) and microscopic agglutination test (MAT).

Occupational activities that increase human exposure to the water or soil contaminated by the urine of reservoir of the *Leptospira sp.* bacteria such rodents especially rate increase the risks for getting the infection. According to a study conducted in Ireland males are more prominent to get the disease from occupational exposure. The study also show that high risk occupation includes those who have contact with livestock, for example farmers, forestry, sewage workers, veterinary practitioners, and water-based recreational sports participants, in particular kayakers (Garvey, Connell, O'Flanagan & McKeown, 2014).

Recreational activities can lead to the outbreak of leptospirosis. In 2005, the outbreak of leptospirosis happened among adventure race participants in Florida. The race involved paddling, cycling, trekking, and orienteering in the swamp. Hurricane Wilma passed over western Florida two weeks before the race and brought heavy rains and flooding to the Hillsborough River State Park. During the event, racers had prolonged exposure to surface water in the Hillsborough River and in creeks and swamps. 192 (96%) of 200 racers from 32 states and Canada was interviewed by The Centers for Disease Control

and Prevention and participating state health departments. A suspected case was defined as fever plus 2 signs or symptoms of leptospirosis occurring in a racer after 4 November 2005. Forty-four (23%) of 192 racers met the definition for a suspected case. Fourteen (45%) of the 31 patients with suspected cases who were tested had their cases confirmed by serological testing positive for species *Leptospira noguchii*. Factors associated with increased risk of leptospirosis included swallowing river water, swallowing swamp water, being submerged in any water and eating wet food during the event (Stern et al., 2010).

Youth especially students are particularly has high exposal to the recreational risk for leptospirosis. It is because youth are the group of people in the community that usually involved in recreational activities. The youth usually involved in program or activities such as camping, jungle trekking and other activities. These outdoor activities usually involve contact with source of leptospirosis infection, for example contaminated river, waterfall and pool.

As leptospirosis is caused by the direct contact with the urine and indirect contact with the water and soil contaminated with the urine, it can be prevented by taking preventive measure that decreases the contact with the source of the disease. Preventive measure such as rodent control, use of protective equipments while handling animals waste, using waterproof dressing for wound, proper garbage management and use of clean water should be made known by the society through education so that they are able to practice it to protect themselves and their family (Hartskeerl et al., 2011). High knowledge regarding the disease prevention, sources and signs and symptoms help could increase people awareness regarding the disease to combat it and to get early treatment if the shows signs and symptoms of the disease in them.

Knowledge and awareness are very important aspect to prevent and control the increase in incidence of a disease. A study is conducted in Sri Lanka after the outbreak of leptospirosis. The results of the study shows that most of the respondents which is 9.37% knew that rat as the reservoir animal but there are few people which is 3% knew other animals such cattle and buffalo are reservoir too. Contact with infected water as a mode of transmission was reported by 57.9% of the population but 30.8% of them were aware that the infection can go through wound. 63.5% of them knew that farming increased risk

to be infected, but knowledge on other exposure activities were less than 20% (Agampodi et al., 2010). This study shows that knowledge on the reservoirs animal of *Leptospira* sp. was mainly restricted to rat and other rodents and associated risk factors limited to farming activities even though recreational activities can also increase risk for leptospirosis.

Attitude is the 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. Knowledge on Leptospirosis may influence attitude towards the disease. Even though knowledge itself is not adequate in changing the attitude and behavior it can increase public awareness and be the platform for behavior change and way to view something.

In previous study, an exploratory questionnaire-based survey of animal health workers (n=36) and livestock keepers (n=43) was carried out in Tanga and Arusha regions, northern Tanzania, to assess local knowledge, attitudes and public awareness for animal zoonoses. About 91% (n=39/43) of the livestock keepers perceived certain animal diseases could infect humans. This level of awareness was significantly higher in animal health workers and smallholders dairy keepers compared to traditional livestock keepers ($P < 0.05$). There was a significant difference in the perception of the risk posed by contact with potentially infected animals or animal products with animal health workers having a much higher level of perception compared to livestock keepers. This may be due to higher knowledge regarding animal zoonoses in animal health workers as compare to livestock keepers (Swai, Schoonman & Daborn, 2010).

Thus, it is important to assess the current knowledge and attitude of students related to leptospirosis in order to identify the severity of the problems and for better planning and prevention. Lack of knowledge and awareness leads to reduce the perceived threat of the disease. It may minimize action of taking preventive measures during recreational activities in students.

1.2 Problem Statement

Leptospirosis is common zoonotic disease in our country. The annual report from the Ministry of Health Malaysia in 2009 shows the increase of leptospirosis in Malaysia from the year 2005 to 2009. The cases increases every year 378 cases reported in 2005, 527 cases in 2006, 929 cases in 2007, 1263 cases in 2008 and 1418 in 2009 (Ministry of Health Malaysia, 2009). In 2010, the cases increase to 1976 cases (Ministry of Health Malaysia, 2010). The cases of leptospirosis also increased in 2011 with 2268 cases reported (Ministry of Health Malaysia, 2012).

The rise of leptospirosis cases left questions on why this case increases every year, whether public know about the diseases prevention and treatment and whether public aware about the disease and taking preventive measure to avoid it. The lack of knowledge regarding the disease lead to the increase of the cases since public does not know what they should do to prevent it. In Malaysia, the involvement of youth and students in camping activities as well as involvement in National Service Training Program that involve water-based activities put them at risks for leptospirosis. In March 2012, a trainee in of National Service Training camp at Sungai Siput, Perak died of suspected leptospirosis and this result in the suspension of National Service camps (Thayaparan, Robertson, Fairuz, Suut & Abdullah, 2013). The outbreak of leptospirosis in camping sites can increase morbidity and mortality rate in our country.

In June 2010, a youth is drowned in natural recreational forest and waterfall known as Lubuk Yu in Pahang. Outbreak of melioidosis and leptospirosis co-infection belief to had happen following the rescue operation. A total of 153 people were exposed to this outbreak with 85 (55.5%) were professional rescuers from various government agencies and 68 (44.5%) were villagers. Ten cases were confirmed melioidosis, six melioidosis alone and four co-infected with leptospirosis. The water sample from the location showed positive laboratory test for *Leptospira sp.* There were few dilapidated food stalls that showed signs of rat infestation as evidenced by the presence of dead rats and rat droppings (Sapian et al., 2012). The tropical climates of Malaysia with warm and rainy environment increase the risks for leptospirosis outbreak including in recreational area in Malaysia. Recreational activities that present some risk include canoeing, hiking,

kayaking, fishing, windsurfing, swimming, waterskiing, wading, trail-bikes riding through puddles, white-water rafting, and other outdoor sports played in contaminated water. Involvement in these recreational activities can lead to leptospirosis infection to happen.

Even though there are studies conducted on high risks group such as sewer workers, army and farmers, there are no studies regarding leptospirosis among youth. Youth especially schools and universities students are at risk for recreational related leptospirosis. It is because, students are usually involves in co-curricular activities such as camping and hiking in the forest and water based sport activities such as swimming and kayaking. Improper handling of garbage during camping can cause accumulation of garbage and food waste near the water source which attracted rats that can contaminate the river (Sapian et al., 2012). The used contaminated water for daily chores during camping can possibly contributed to the outbreak of leptospirosis among students during the activities.

Leptospirosis can cause illness and symptoms such as fever, myalgia, headache, diarrhea as well as nausea and vomiting. This illness can cause students to feel weak and unable to do their daily activities such as going for school and classes. The prolonged time of the illness in student can increase rate of absence from school which can affect their academic performance. It is a very importance matter because young generation will be the pillar of nation's future and education is a very important aspect to produce excellent and highly skilled workforce for the country.

In this study it will focus on the knowledge and attitude of students of School of Health Sciences of Universiti Sains Malaysia towards leptopirois. The involvement of students in co-curricular activities such as camping, kayaking and hiking may put students at risks for the leptospirosis infection. Thus, it is important to determine student level of knowledge and awareness towards the disease so that early prevention can be made to prevent outbreak of the disease among them.

Moreover, leptospirosis can increase cost in healthcare. These include the cost of health care diagnosis and treatment for the acute illness, management of long-term medical complications, loss of income as a result of the illness, and potential effects on long-term

earning capacity. Standard tests, such as culturing, Real Time PCR and the microscopic agglutination test (MAT), are tedious, laborious and require well-equipped laboratories with experienced staff and, therefore, are restricted to a few expert centre. Although serology tests such as IgM ELISA available, it has the disadvantage that it detects antibodies 7–10 days after the onset of the disease which is too late for effective antibiotic treatment, which should start within the first 4 days (Hartskeerl et al., 2011). The difficulty to diagnose leptospirosis left patient untreated with appropriate treatment and increase days of illness and lengthened the time for hospitalization that can increase economic cost of the hospital.

1.3 Research Objectives

1.3.1 General Objective

- To assess the level of knowledge and attitudes related to leptospirosis among undergraduate students of School of Health Sciences in Universiti Sains Malaysia.

1.3.2 Specific Objectives

- To determine the level of knowledge among undergraduate students of School of Health Sciences in Universiti Sains Malaysia related to leptospirosis.
- To determine the level of attitude among undergraduate students of School Health Sciences of Universiti Sains Malaysia related to leptospirosis.
- To determine the difference of mean age between different level of knowledge (good, moderate, poor) on leptospirosis among undergraduate students of School of Health Sciences of Universiti Sains Malaysia.
- To determine the difference of mean age between different level of attitude (satisfactory, unsatisfactory) on leptospirosis among undergraduate students of School of Health Sciences of Universiti Sains Malaysia.

1.4 Research Questions

- Do undergraduate students of School of Health Sciences of Universiti Sains Malaysia have knowledge related to leptospirosis?
- What are their attitudes towards leptospirosis?
- Is there any association between selected demographic data (gender) with level of knowledge and attitude related to leptospirosis among undergraduate students of School of Health Sciences of Universiti Sains Malaysia?
- Are there difference in mean age in group with different level of knowledge and attitude?

1.5 Research Hypothesis

1. Null hypothesis H_0 : There is no significant association between gender and level of knowledge on leptospirosis among students of School Health Sciences of Universiti Sains Malaysia.
Alternative hypothesis H_A : There is a significant association between gender and level of knowledge on leptospirosis among students of School Health Sciences of Universiti Sains Malaysia.
2. Null hypothesis H_0 : There is no significant association between gender and level of attitude on leptospirosis among students of School Health Sciences of Universiti Sains Malaysia.
Alternative hypothesis H_A : There is a significant association between gender and level of attitude on leptospirosis among students of School Health Sciences of Universiti Sains Malaysia.
3. Null hypothesis H_0 : There is no difference of mean age between different level of knowledge (good, moderate, poor) on leptospirosis among students of School of Health Sciences of Universiti Sains Malaysia.
Alternative hypothesis H_A : There is a difference of mean age between different level of knowledge (good, moderate, poor) on leptospirosis among students of School of Health Sciences of Universiti Sains Malaysia.

4. Null hypothesis H_0 : There is no difference of mean age between different level of attitude (satisfactory, unsatisfactory) on leptospirosis among students of School of Health Sciences of Universiti Sains Malaysia.

Alternative hypothesis H_A : There is a difference of mean age between different level of attitude (satisfactory, unsatisfactory) on leptospirosis among students of School of Health Sciences of Universiti Sains Malaysia.

1.6 Significant of Study

The purpose of this study is to determine the level of knowledge and attitude of students of Health Sciences in Universiti Sains Malaysia in Kubang Kerian, Kelantan regarding leptospirosis. In community level, thousands of people can be affected by the disease if in a short time during epidemic and morbidity and mortality rate can increase drastically.

Students are at risk for leptospirosis infection because of their involvement in outdoor activities such a camping, hiking and doing water sports such as kayaking. Implementation of public health preventive measure and control through health education and other activities through multiple strategies is a must in students to prevent the outbreak of leptospirosis during participation in outdoor activities held by schools and universities.

However, before health preventive activities such as health education can be implemented, it is important to know the current level of knowledge and attitude of students regarding leptospirosis so that successful plan can be formed. A proper needs assessment has to be done to ascertain the target groups' needs in order to alleviate their fear and concerns to ensure that messages delivered are relevant, timely and culturally acceptable to the target groups which are students. Thus, this study will help to determine current level of knowledge and attitude of students of Health Sciences in Universiti Sains Malaysia regarding leptospirosis for assessment of the need for implementation of leptospirosis related health education.

1.7 Definition of Operational Terms

1.7.1 Knowledge

Knowledge is defined as the information and understanding that gain through education and experience (Hornby, 2005). In this study knowledge is defined as the available of information and understanding on leptospirosis causative organism and transmission, common signs and symptoms as well as preventive and control strategies on leptospirosis as measured using questionnaire by (Quina, Almazan & Tagarino, 2014).

1.7.2 Attitude

Attitude is defined as the perception towards an issue and severity we compared the issue with other issues that were well recognized in the community (Aroujo et al., 2013). It also defined as the way that people think about something, belief about something and the way they behave towards something (Hornby, 2005). In this study, attitude is defined as the belief, perception and judgment of students on leptospirosis as measured using questionnaire by (Quina, Almazan & Tagarino, 2014).

1.7.3 Leptopirosis

Leptospirosis is a bacterial infection that occurs worldwide. It is cause by bacteria *Leptospira* sp. The symptoms include fever, headache and myalgia, jaundice, and possible to cause kidney failure, bleeding of pulmonary, meningitis, myocardiatitis and uveitis. Leptospirosis Burden Epidemiology Reference Group formed by World Health Organization agreed that case definition of leptopirosis is the consistence presentation of symptoms with any one of as follows: 1. A 4-fold increase in microscopic agglutination test (MAT) titre between acute and convalescent serum samples 2. A single MAT \geq 1:400 or single MAT \geq 1:100 in non-endemic regions 3. Isolation of *Leptospira* spp. from a normally sterile site and detection of *Leptospira* spp. in specimens using histological, histochemical or immunostaining techniques 4. *Leptospira* DNA detected by a method

based on the polymerase chain reaction (PCR) 5. Presence of IgM antibodies in enzyme-linked immunosorbent assay (ELISA) or dipstick or present of IgM or IgG antibodies in immunofluorescence assay (IFA) (World Health Organization, 2010).

1.7.4 Undergraduate Students in School of Health Sciences

All students in School of Health Sciences, Universiti Sains Malaysia whose have not yet earned a bachelor's or diploma. These students attended health sciences courses (audiology, biomedicine, dietetics, forensic, medical radiation, degree and diploma in nursing, nutrition, speech pathology, exercise and sports science as well as environment and occupational health) in Universiti Sains Malaysia.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Leptospirosis is an infectious disease that is caused by bacterial *Leptospira* sp. It affects human and animals worldwide. (Keenan, Ervin, Aung, McGwin & Jolly, 2010). In tropical climatic zone, where environmental conditions are most favorable for survival of leptospires extreme weather events such as cyclones and floods occurring in may result in outbreak (Wasiński & Dutkiewicz, 2013). This chapter discussed about the previous studies on leptospirosis which included literature on recreational exposure on leptospirosis, knowledge on leptospirosis and attitude on leptospirosis.

2.2 Review of Literature

2.2.1 *Recreational Exposure and Outbreak of Leptospirosis*

People reported a recent history of recreation such as water-related recreational activities are 2.4 times more likely to contract leptospirosis compared to those who did not report similar recent recreational activity (Rafizah et al., 2013). The recreational exposures are high among students as they are involved in recreational activities and water based sport activities held by the school. In 2012, recreational related leptospirosis outbreak occurs in Sri Lanka among 20 office workers who were involved in white-water rafting during a staff outing. Two weeks after the rafting event on 7 September 2012, six participants developed fever, of which four had classical clinical features of leptospirosis. Four weeks after the exposure, an outbreak investigation was conducted for 19 of the 20 participants. Of six fever participants, four confirm to have acute leptospirosis through laboratory test MAT and positive IgM ELISA test result. Seventeen of the 19 participants investigated showed anti-leptospiral antibodies (Agampodi et al., 2014).

Outbreak of leptospirosis also happened among participants of canyoning activities on the Caribbean island of Martinique. 45 participants were contacted where 41 participants returned a completed questionnaire, in which eight people met the outbreak case definition. The eight cases sought medical treatment and were given antibiotics within the first week after fever onset. No severe manifestations of leptospirosis were reported. In seven of the eight cases, the Leptospirosis infection was confirmed positive by PCR (Hochedez et al., 2013).

In 2000, the outbreak of leptospirosis happened due to water related sports activities in Eco Challenge Sabah 2000 in Malaysia. The Idaho Department of Health, the Los Angeles County Department of Health Services And the GeoSentinel Network notified the Centers for Disease Control and Prevention (CDC) of at least 20 cases of febrile illness which characterized by the acute onset of high fever, chills, headache, and muscle aches. All ill persons had participated in the Eco-Challenge-Sabah 2000 which involves activities such as jungle trekking, kayaking and swimming in Segama river. Symptoms and exposure history, as well as initial laboratory testing, suggested that the illness was leptospirosis. A study conducted to study the outbreak. In the study, twenty-six (68%) of 38 case-patients tested positive for leptospiral antibodies (Sejvar & Bancroft, 2000).

2.2.2 Knowledge on Leptospirosis

Researches on knowledge of leptospirosis usually covered prevailing knowledge on the causative organism, disease transmission, common signs and symptoms and prevention and control practices regarding leptospirosis. Quantitative study done among 106 respondents consist of municipal workers in India revealed that majority of the respondents lack of knowledge regarding leptospirosis in which is 81.1% of them never heard about the disease. 6.7% have good knowledge and 6.1% have moderate knowledge on the disease. The analysis for knowledge item was carried out among those who had ever heard about leptospirosis (n=20). Respondents have good knowledge on causes of the disease with 85% responds correctly to the question leptospirosis causes by microorganisms, 80% to the question it is transmitted by animal and 80% correctly to the

question it transfer through contaminated food. However, respondents have poor knowledge on signs and symptoms of leptospirosis as less than half of the respondents knew that leptospirosis can cause jaundice, liver damage, kidney failure, myalgia and arthralgia. In this study, there is no significant different between educational level, age, job category and duration of employment with knowledge in leptospirosis where p value <0.01 respectively (Prabhu et al., 2014).

In previous study with 800 participants, almost half of the participants which are 341(47.6%) participants never heard about leptospirosis while 419(52.4%) claimed that they have heard about the disease. Of 419 participants that claimed have heard about the disease, 197 (47%) does not know about the symptoms. Only six people (1.4%) knew that the disease treated using antibiotic. Of the interviewees who knew about the disease before the interview, 21.5% (90) did not know how a person could get the disease, while 39.9% (167) said that humans got the disease from rats but could not say exactly disease transmission could take place, and 38.6% (162) gave more specific answers, with 20.5% (86) giving the answer of direct contact with infected urine. This study shows no significant association between level of education and knowledge of how humans get the disease with p value 0.286. However, there was a significant difference among participants of different location and knowledge of how humans get the disease with p value less than 0.01 (Mohan & Chadee, 2011).

In a cross-sectional qualitative study conducted among 257 residents of slum area in Brazil, about 225 respondents or 90% of the sample size are aware of the disease and more than two-thirds of them correctly identified the modes of transmission of the disease and ways to reduce exposure. However about 9.3% of the residents still never heard about leptospirosis. Respondents reported have heard about the disease mostly through television with 43.9% followed by information from friends and neighbors 41.2%, health services (39.2%), school (29.9%), family (12.4%), work (7.4%), newspaper (4.2%), radio (3.9%) and community association (2.3%). In this study, participants older than 18 years old and who had completed primary school more frequently gave correct answers to the questions "What is leptospirosis." "What can be done to avoid leptospirosis?" and "What are the symptoms of leptospirosis?" than studied

participants less than 18 years of age and who did not complete primary school. Participants older than 18 years old also had a higher proportion of correct answers to the question "How is leptospirosis transmitted?" when compared with less than 18 years old (Aroujo et al., 2013).

In a study conducted on knowledge and self-reported practices regarding leptospirosis among adolescent school children in highly endemic area in Sri Lanka, all students had heard of leptospirosis (100%, n=460) and 99.6% (n=458) identified paddy farmers as a high risk population. Only 29 (6.3%) students identified bacteria as the disease agent. The 440 (95.7%) identified rat as the main animal. 449 students (97.6%) identified paddy fields as a place where leptospirosis transmission occurs while 351 (76.6%) identified marshy land. The majority (93.4%, n=443) identified fever as a common symptom of leptospirosis. About half had a good level of knowledge regarding leptospirosis (52.0%, n=239). About 209 (45.7%) students reported that they swim, bath and wash in stagnant water ponds either frequently or rarely which can put them at risks for leptospirosis. In this study, students with parents' involvement in paddy cultivation is higher compares to student whom parents' not involve in cultivation. These findings may indicate that education programs may be reaching only families involved in cultivation (Samarakoon & Gunawardena, 2013).

A previous study among town service workers in Kota Bharu, Malaysia suggested that majority of the workers had never heard about the disease thus considers poor knowledge (87.2%). Only 12.8% had heard about the disease. Out of 38 workers who had ever heard about the disease some have false belief that leptospirosis can be transmitted by mosquito and can cause lung cancers with percentages 73.7% and 78.9% respectively. There were no difference between knowledge, attitude and practice with education level, age and duration of employment. There was also no significant association between knowledge and job category. However, there was a significant difference between attitude and practice level with job category (Mohd Rahim et al., 2012). False belief about the disease implies that the workers had gross misconceptions about leptospirosis and they may confuse it with some other diseases which are more familiar to them such as dengue and cancer.

2.2.3 Attitude on Leptospirosis

According to a previous study, even though majority of the participant (87.2%) had poor knowledge and unsatisfactory practices (64.5%) regarding leptospirosis, satisfactory attitude is shown. All participants obtained a mean percentage score of 76.8 in items regarding attitude toward leptospirosis. The attitude towards leptospirosis was generally good as 69.8% of the participants had satisfactory attitude score and 30.2% had unsatisfactory score. For each items on attitude such as interested in knowing about the disease, doubting for drinking during working, free rodents environment and others item the majority of participants had positive attitudes (Prabhu et al., 2014).

A cross-sectional design study is done in 43 communities within the parish of St. Mary, Jamaica between September 2008 and March 2009. Households that had at least one confirmed case of leptospirosis during the 2005 or 2007 outbreaks were assessed for environmental hygiene, knowledge and attitude towards leptospirosis. The findings show that even though 97% of the respondents had ever heard about leptospirosis, only 40% of the household with history of leptospirosis consider the disease as a problem in the area. The perception that nothing could be done to control rodents was reported often (Allwood, Munoz-Zanzi, Chang & Brown, 2014).

An analytical research design study is done to determine knowledge, attitudes, and practices of leptospirosis among barangay residents, health workers, and barangay officials in Catbalogan, City Samar. The health workers with higher knowledge score than residents are found to be highly concern regarding leptospirosis issue while barangay residents are considered moderately concern. Furthermore, health workers frequently maintain cleanliness while barangay residents always practice them (Quina, Almazan&Tagarino, 2014). The finding is consistent with previous study where hygienic practices are determines by health knowledge, awareness and concern (Deodhar, 2003).

In a study among Malay male 296 town service workers in Kota Bharu, Kelantan, Malaysia, the result shows that although the knowledge level are poor and the practices have unsatisfactory score, 64.9% workers have satisfactory attitude score. The score for positive attitude shows high positive scores to the questions "I need a safe work practice

course in order to prevent from getting the disease” (94.9%). “I must know about leptospirosis” (93.6%) and “I don’t mind if the dustbin in my house had no cover (91.2%) (Mohd Rahim et al., 2012).

2.2.4 Instrumentation and Methodology

The instrument that usually be used in the research regarding knowledge and attitude on leptospirosis were usually develop by the researchers. In a study carried out in Kota Bahru, open-ended questionnaire was developed by the researcher. The questionnaire consists of three domains which are domain for knowledge, attitude and practice (Mohd Rahim et al., 2012). In a study in carried out in among the Philippines, the researchers also develop their own questionnaire which includes the knowledge and attitudes questions on leptospirosis (Quina, Almazan & Tagarino, 2014). Simple random sampling method to select the participants so that biased can be prevented (Prabhu et al., 2014).

2.3 Theoretical Framework

The theoretical framework used in this study was Rosenstock’s and Becker’s Health Belief Model. In 1950s Rosenstock proposed a health belief model that was intended to predict which individuals would or would not use preventive measures such as early screening for cancer (Rosenstock, 1974). Becker modified Rosentock’s Health Belief Model to include individual perceptions, modifying factors and variable that likely to influence initiating action (Becker, 1974).

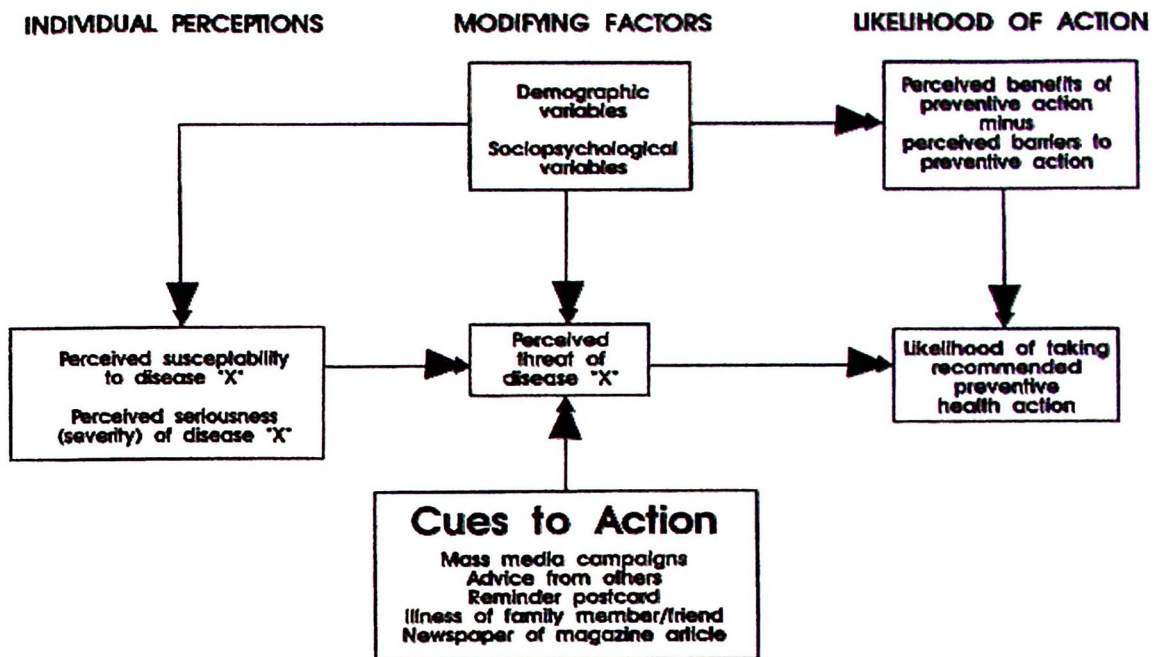


Figure 2.3.1: Health Belief Model (Janz & Becker, 1984)

Health Belief Model suggested that health behavior is determined by individual perception on the disease and strategies available to prevent the occurrence. According to the health belief model, it explained that there are four components that can influence the compliance to health action. The four components are perceived seriousness, perceived susceptibility, perceived benefits and perceived barriers (Janz & Becker, 1984). Perceived seriousness refers to an individual’s judgment as to the severity of the disease. Perceived susceptibility refers to an individual’s assessment on the chance for his or her to get the disease. Perceived benefits refers to an individual’s conclusion whether the behavior brings good circumstances as compare to current behavior while perceived behavior refers to an individual’s thoughts of what might prevent him or her to take the preventive actions.

According to this model, perceived seriousness and perceived severity combine to form perceived threat to the disease. It also explained that if someone belief that a new behavior (perceived benefits) is useful but do not think that she can do it (perceived barrier) there are chances for the behavior not to be tried. It is suggested in this model

that modifying factors such as demographic data which are age, gender, socioeconomic and knowledge can influences personal perceptions of an individual on a disease. Cues to actions refer to the events, people or things that move people to change their behavior (Janz & Becker, 1984). It can include illness of family member and media reports (Graham, 2002).

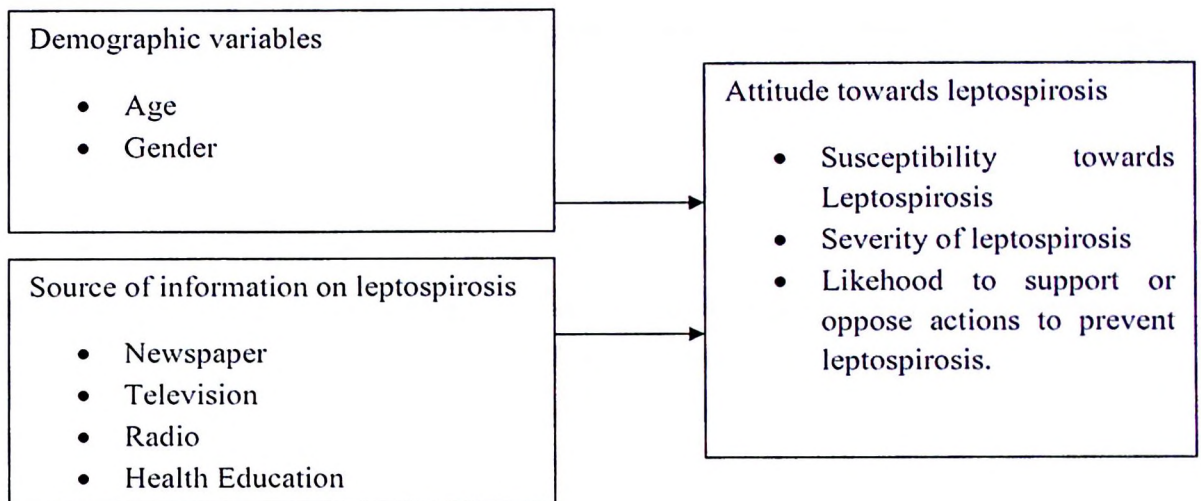


Figure 2.3.2 Theoretical framework for this study.

Based on this conceptual framework factors which are gender, age and level of knowledge on leptospirosis will influence the attitude towards the disease. This model suggests that age, gender and level of knowledge on the disease can affect the perception on susceptibility towards the disease, disease severity and likelihood to support or oppose preventive actions on leptospirosis. Besides, availability of information from various sources may also influence the attitude towards leptospirosis.

CHAPTER 3

METHODOLOGY AND METHODS

3.1 Research Designs

This research was a quantitative and non-experimental cross-sectional study (Chua, 2012).

3.2 Population and Setting

This study was done among undergraduate students of School of Health Sciences in Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia.

3.3 Sampling

3.3.1 Sample

Inclusion criteria

1. Student who is willingly agree to participate in the study.
2. Student with no history of leptospirosis.

(Aroujo et al., 2013).

Exclusion criteria

1. Student who has history of leptospirosis.
2. Students whom family member with history of leptospirosis.

(Aroujo et al., 2013).

3.3.2 Sampling Method

Sampling method used in this study was random sampling method. In this sampling method each member of the population has an equal chance of being selected as subject (O'Leary, 2009). To select the participants, the names of the participants will be listed and given code number to represent them. Then the number will be written on paper strips. The paper will be folded and put in a container. After shaking the container, the paper strip will be picked by the researcher according to number of sample size needed. The person presented by the code number on the picked paper will be the participants for this study (Chua, 2012).

By using this sampling method, bias was prevented as it is also considered as a fair way of selecting a sample from a given population since every member is given equal opportunities of being selected (Blaxter, Hughes & Tight, 2010). An unbiased random selection for a representative sample is important in drawing conclusions from the results of a study.

3.3.3 Sample Size

The population of undergraduate students of School of Health Sciences, Universiti Sains Malaysia is 1354. Raosoft software is used to calculate the sample needed for this study. To determine the sample size, an analysis was conducted by using Raosoft with a confidence level 95 % and a margin of error that can be tolerate amount 0.05, thus the recommended sample size for this study is 300 students. The recommended sample is then added with 10% drop out that makes the final sample needed for this study is 310 students (Raosoft.com, 2014). In this study, the response rate was 97.1%. A number of 301 out of 310 selected students were involved in this study.

3.4 Variables

3.4.1 Variables Measurement

The independent variables for this study were based on demographic data which were age and gender.

The dependent variables were level of knowledge and attitude towards leptospirosis. Knowledge questions started asking whether the participants had ever heard of leptospirosis and they were asked to specify the source of their information. Participants who had never heard of leptospirosis considered to have poor knowledge on leptospirosis. Only participants who had ever heard of the disease were allowed to proceed to answer the rest of knowledge questions which were designed as “true” and “false” questions (Quina, Almazan & Tagarino, 2014).

One mark was given to a correct question and zero mark was given to incorrect answer. The maximum score for knowledge items is 12. The mark obtained by the participants then was divided with maximum score and times by 100% to convert the score to percentage. The percentage score was used in the analysis rather than the raw score because it is easier to appreciate the level of scores in the scale of zero to 100. The mean percentage score for knowledge was calculated as 86%. Participants with score more than or equal to mean percentage score considered to have good knowledge while participants with score less than mean percentage score considered to have moderate knowledge (Quina, Almazan & Tagarino, 2014).

Questions on attitude were designed to be answered using a Likert scale (strongly agree / agree / not sure / not agree / strongly not agree). For positive attitude items, scores of “4”, “3”, “2”, “1”, and “0” for “strongly agree”, “agree”, “not sure”, “not agree”, and “strongly not agree”, were given respectively. For negative attitude, the above scoring system was reversed. Total maximum score for attitude domain is 32. Allowing the minimum average of three points for each item, a total score of less than 24 (3 points x 8 items) out of 32 indicates unsatisfactory attitude. If we convert them into percentages, a score from zero to <75% may be considered unsatisfactory whereas a score of ≥ 75 to 100% may be taken as satisfactory attitude (Quina, Almazan & Tagarino, 2014).

3.5 Instrumentation

3.5.1 Instrument

A self-administered questionnaire used in this study was based on early work published by (Quina, Almazan & Tagarino, 2014). The questionnaire were categorize into two sections as follows:

Section 1: Section 1 consisted of three questions on socio demographic data which were age, gender and course. The age of the participants was how years old are the participants and it depends on the year of birth. As for gender the participants chose whether they are male and female.

Section 2: Section 2 consisted of two subparts which is Part A and Part B. Part A consists of two questions. The first question asked whether the participants had ever heard about leptospirosis and another questions asked about the source of information on leptospirosis. Only participants who had heard about the leptospirosis can answer question number 2 in part A and all questions in Part B. Participants who had never about leptospirosis proceeded to answer questions in Section 3. Part B consisted of total 12 "true" and "false" questions on knowledge items regarding leptospirosis. It included the three questions on causative organism, three questions on disease transmission, three questions on common signs and symptoms and three questions on prevention and control practices regarding leptospirosis (Quina, Almazan & Tagarino, 2014).

Section 3: Section 3 consisted of eight questions to determine the prevailing attitude of the participants towards leptospirosis. Likert scale (strongly agree / agree / not sure / not agree / strongly not agree) was used in Section 3. For positive attitude items, scores of "4", "3", "2", "1", and "0" for "strongly agree", "agree", "not sure", "not agree", and "strongly not agree", were given respectively. The above scoring system was reversed for negative attitude (Quina, Almazan & Tagarino, 2014).

3.5.2 Translation of Instrument

The instrument use in this study was used in its original language from which is English language to increase participants' understanding during the survey. It was also to conserve the original meaning of the questions asked in the questionnaire. A pilot study is done to ensure participant understanding on the questionnaire.

3.5.3 Validity and Reliability of the Data Collection Instruments

The questionnaire used in this study is a validated questionnaire by (Quina, Almazan & Tagarino, 2014). A pilot study was done previously by the owner of the questionnaire Cronbach's alpha for knowledge domain and attitude domain was 8.3 and 8.7 (Quina, Almazan & Tagarino, 2014).

To ensure the reliability of the questionnaire and to ensure that the questionnaire is easy to be understood and answered by the participants a pilot study must be conducted to test for reliability (Chua, 2012). Thus, prior to the real study, a pilot study which involved 30 medical students of Universiti Sains Malaysia had been done to ensure the reliability of the questionnaire. The Cronbach's alpha for each domain were calculated. The Cronbach's alpha for knowledge domain and attitude domain were 0.85 and 0.83 respectively.

3.6 Ethical Considerations

Researcher sought approval from Research Ethical Committee (Human), Hospital Universiti Sains Malaysia (HUSM) and Dean of School of Health Sciences, Universiti Sains Malaysia before conducting the study. Reference number of the approval letter from Research Ethical Committee (Human) HUSM is USM/JEPeM/14110422. Written consent is obtained from the participants before answering the questionnaire to indicate their willingness to participate in the study. The purposes of the study and the rights to