UNIVERSITI PUTRA MALAYSIA

KNOWLEDGE, ATTITUDE, BELIEF, AND PRACTICE IN RELATION TO LEPTOSPIROSIS PREVENTION AMONG URBAN RESIDENTS IN SELECTED TOWNSHIPS IN HULU LANGAT, SELANGOR, MALAYSIA

NURUL MUNIRAH BINTI ABDULLAH

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By

NURUL MUNIRAH BINTI ABDULLAH

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

KNOWLEDGE, ATTITUDE, BELIEF, AND PRACTICE IN RELATION TO LEPTOSPIROSIS PREVENTION AMONG URBAN RESIDENTS IN SELECTED TOWNSHIPS IN HULU LANGAT, SELANGOR

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Leptospirosis endemicity has been affecting people's health and their livelihoods. In Malaysia, it is still considered to be underreported and cases are prevalent in Selangor. Since leptospirosis is a great depiction of the complexity surrounding the disease transmission between humans, animals and the ecosystem, an effective prevention would require awareness of the public regarding the disease. Surveys would be used to evaluate behaviours, awareness and mindset in general prior to initiating any intervention measure. This study determined the knowledge, attitude, belief, and preventive practice (KABP) among urban residents in Hulu Langat, where leptospirosis was most prevalent. Then, association between KABP with respondents' socio-demographics and risk factors was also determined. This cross-sectional study involved 315 healthy adolescents from urban residential areas in Hulu Langat drawn using multi stage cluster sampling method. A validated questionnaire consisted of leptospirosis-related questions was administered to respondents to explore the insights of urban residents regarding leptospirosis prevention. The data was analysed using Statistical Package for Social Sciences (SPSS) version 22.0. Descriptive analysis was presented as frequencies (%) and $\chi 2$ test was used to analyse the association between KABP and both socio-demographics and risk factors. Then, significant predictors influencing KABP were identified. Majority of respondents were Bumiputra with a mean age of 32.5 (SD 13.0) years. Of 315, only 19.7% of respondents had good knowledge, while 87.0% showed good attitude and 91.1% showed good practice in avoiding to eat or drink while handling waste. However, 56.2% of them had poor belief. The regression analysis then identified age ($p = 0.005$; 95% CI = 1.298, 4.396) as the significant predictor influencing overall knowledge of respondents. Respondents' monthly income ($p = 0.012$; 95% CI = 0.322, 0.868) and their awareness of open waste dumping sites ($p = 0.013$, 95% CI = 1.138,

2.918) also influenced their overall belief. Meanwhile, respondents' education level (p = 0.024; 95% CI = 1.109, 4.352) was the significant predictor influencing overall practice. The current findings identified weakness in respondents' knowledge and belief despite exhibiting good attitude and preventive practice. This indicates the importance of integration of knowledge, attitude and belief into forming an acceptable practice to reduce transmission of leptospirosis among urban population in Selangor.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Sarjana Sains

PENGETAHUAN, SIKAP, KEPERCAYAAN, DAN AMALAN PENCEGAHAN LEPTOSPIROSIS DALAM KALANGAN PENDUDUK BANDAR TERPILIH DI HULU LANGAT, SELANGOR

Oleh

NURUL MUNIRAH BINTI ABDULLAH

April 2018

Pengerusi : Tengku Zetty Maztura binti Tengku Jamaluddin, PhD
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Tahap leptospirosis yang endemik telah memberi impak kepada tahap kesihatan manusia dan kehidupan mereka. Kadar pelaporan kes di Malaysia masih berkurangan meskipun ianya prevalen di Selangor. Leptospirosis merupakan gambaran yang sesuai tentang hubungan penyebaran penyakit di antara manusia, haiwan dan ekosistem yang kompleks. Oleh itu, langkah pencegahan efektif memerlukan kesedaran daripada masyarakat. Kajian tinjau selidik ini dilakukan untuk menilai tingkah laku, kesedaran, dan tahap pemikiran masyarakat sebelum sesebuah kajian intervensi dapat dilaksanakan. Kajian ini menentukan tahap pengetahuan, sikap, kepercayaan, dan amalan penduduk bandar terpilih di Hulu Langat yang mencatatkan prevalen kes leptospirosis yang tinggi. Kajian ini juga mengenal pasti hubungan di antara pengetahuan, sikap, kepercayaan dan amalan dengan faktor sosiodemografi dan faktor risiko responden. Kajian keratan lintang ini melibatkan 315 responden dewasa daripada perumahan sekitar bandar di Hulu Langat yang dipilih menerusi kaedah persampelan gugusan berbilang tahap. Responden diberikan set soal selidik yang disahkan untuk mengetahui pendapat mereka mengenai pencegahan leptospirosis. Data daripada kajian ini dianalisis menggunakan perisian Statistical Package for Social Sciences (SPSS) versi 22.0 di mana analisis deskriptif dilaporkan dalam bentuk frekuensi (%) manakala ujian $\chi 2$ digunakan untuk menganalisis hubungan di antara KABP dengan faktor sosiodemografik dan faktor risiko. Kemudian, analisis regresi logistik dilakukan untuk mengenal pasti prediktor signifikan yang mempengaruhi tahap KABP responden. Hasilnya, kajian ini menunjukkan kebanyakan responden adalah Bumiputera dengan purata umur (SD) 32.5 (13.0) tahun. Daripada 315 responden, hanya 19.7% mencatatkan pengetahuan yang baik mengenai leptospirosis walaupun 87.0% menunjukkan sikap yang baik manakala 91.1% menunjukkan amalan yang baik dari segi

penghindaran daripada makan atau minum semasa menguruskan sisa. Selain itu, 56.2% responden mempunyai kepercayaan yang rendah terhadap pencegahan leptospirosis. Analisis regresi logistik menentukan bahawa umur (p = 0.005; 95% CI = 1.298, 4.396) merupakan prediktor signifikan dalam mempengaruhi pengetahuan responden. Manakala pendapatan bulanan (p = 0.012; 95% CI = 0.322, 0.868) dan kesedaran akan kewujudan longgokan sampah terbuka (p = 0.013, 95% CI = 1.138, 2.918) mempengaruhi kepercayaan responden. Sementara itu, tahap pendidikan (p = 0.024; 95% CI = 1.109, 4.352) adalah prediktor signifikan yang mempengaruhi amalan responden. Kajian ini menemui kelemahan dari segi pengetahuan dan kepercayaan responden walaupun sikap dan amalan yang ditunjukkan adalah baik. Oleh itu, pengetahuan, sikap dan kepercayaan harus diintegrasi dengan baik untuk menerbitkan amalan pencegahan terhadap leptospirosis dalam kalangan penduduk bandar.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

CDC	Centers for Disease Control and Prevention
DALY	Disability-Adjusted Life Year
ELISA	Enzyme-linked Immunosorbent Assay
IFAT	Immunofluorescence Antibody Test
IMR	Institute for Medical Research
KABP	Knowledge, attitude, belief, and practice
MAT	Microscopic Agglutination Test
MOH	Ministry of Health
MSAT	Macroscopic Slide Agglutination Test
OR	Odds ratio
PAHO	Pan American Health Organization
SEA	South East Asia
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Leptospirosis is classified as a zoonotic disease due to its ability to get transmitted between animals and human under certain circumstances (Shakespeare, 2002; WHO, 2017a). The causative agent of the disease is the spirochete *Leptospira interrogans*. It mostly affected the underdeveloped, developing, and also developed regions of the world; covering a vast epidemiological setting (Costa et al., 2015; Schneider et al., 2011). Leptospirosis endemicity has been affecting people's health and their livelihoods indefinitely. Hence, it was regarded as a disease of poverty, targeting vulnerable populations in underdeveloped and certain developed regions such as Southeast Asia, Western Pacific, and Africa (WHO, 2011). Higher disease incidence occurred in developing nations, particularly with tropical climate (Schneider et al., 2013). Nevertheless, individuals from developed regions would still be exposed to leptospirosis through travelling, outdoor expeditions and recreational activities while abroad (Pappas et al., 2008).

Annually, disease incidence worldwide ranged from approximately 0.1 to 1 per 100, 000 population and 10 to 100 per 100, 000 depending upon the climate. However, the number could go up even further during seasonal outbreaks and among high-risk populations (WHO, 2017a). In Oceania region, incidence ranged from less than 0.5 per 100,000 population to 157 per 100,000 population in Queensland. Meanwhile, the number varied significantly between Pacific Island countries and its territories: 45 per 100,000 population in New Caledonia (Tubiana et al. 2013), 150 per 100,000 population in French Polynesia (Coudert et al. 2007), 402 per 100,000 population in Palau (Stevens et al. 2011) and 844 per 100,000 in Futuna (Massenet et al. 2015). In South-East Asia, countries with high endemicity of leptospirosis included India, Indonesia, Thailand, and Sri Lanka. The latter reported the highest incidence rate up to 150 per 100,000 population, affecting mostly males around the age 20 until 44 years (WHO, 2009). Although it is generally endemic in humid tropics and subtropics climates, it is also possible to turn epidemic (Schneider et al., 2013; PAHO, 2015). Furthermore, it was estimated that almost 3 million Disability-Adjusted Life Years (DALY) were lost per annum based on annual cases reported. According to WHO, this surpassed those of global burden of cholera by 70%. Despite the statistics, leptospirosis still posed a significant health burden, under-appreciated, and often misdiagnosed with other febrile diseases.

Leptospirosis has been considered as an emerging infectious disease which raised many public health issues in Asia and Latin America (Bharti et al., 2003). Subsequently, it has earned its neglected tropical disease status due to having inconclusive estimates of the disease burden. In between the year 1995 to 2015, numerous outbreaks have been reported in Nicaragua, Peru, Ecuador, Orissa, Philippines, India, Indonesia, and Malaysia due to natural disasters and flooding (Schneider et al., 2011; Vijayachari, Sugunan & Shriram, 2008). Undoubtedly disasters and extreme weather occurrences have been recognised to precipitate the epidemicity of this disease (Lau et al., 2010).

Many SEA countries are endemic for leptospirosis in which seasonal outbreaks occurred in Thailand and India upon the heavy rains and floods. Malaysia is no different. Although not included as SEA countries predominantly affected by leptospirosis, it is still endemic in Malaysia. Since the dangers of the disease have come to the fore due to increasing number of cases, it was made a notifiable disease in 2010 after the government had recognised the potential threat of this disease to the public. Number of cases reported nationwide showed a steady increase from 2004 until 2014 where it reached the highest – 7806 cases with 92 deaths. According to Ministry of Health Annual Report (2012), a total of 2268 cases were reported with 55 deaths while 19 outbreaks were reported in Malaysia in 2011. In 2015, the number of cases dropped to 5370 cases with only 30 deaths reported (Figure 1.1). Between the year 2004 until July 2015, the incidence rate in Malaysia was at its peak in 2015 with 30.2 per 100, 000 population. During the same period, the mortality rate was the highest at 0.31 per 100, 000 population in 2014 nationwide (Abdul Wahab, 2015).

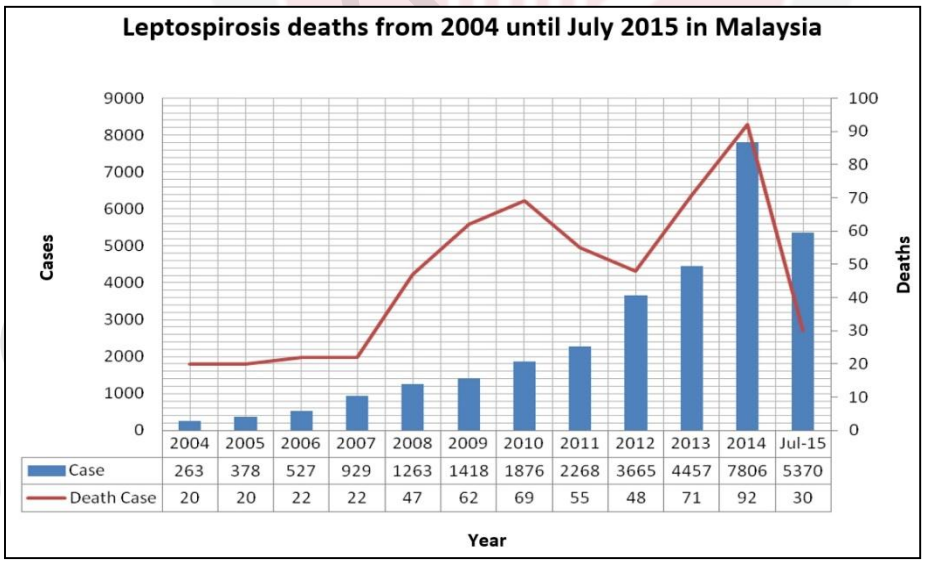
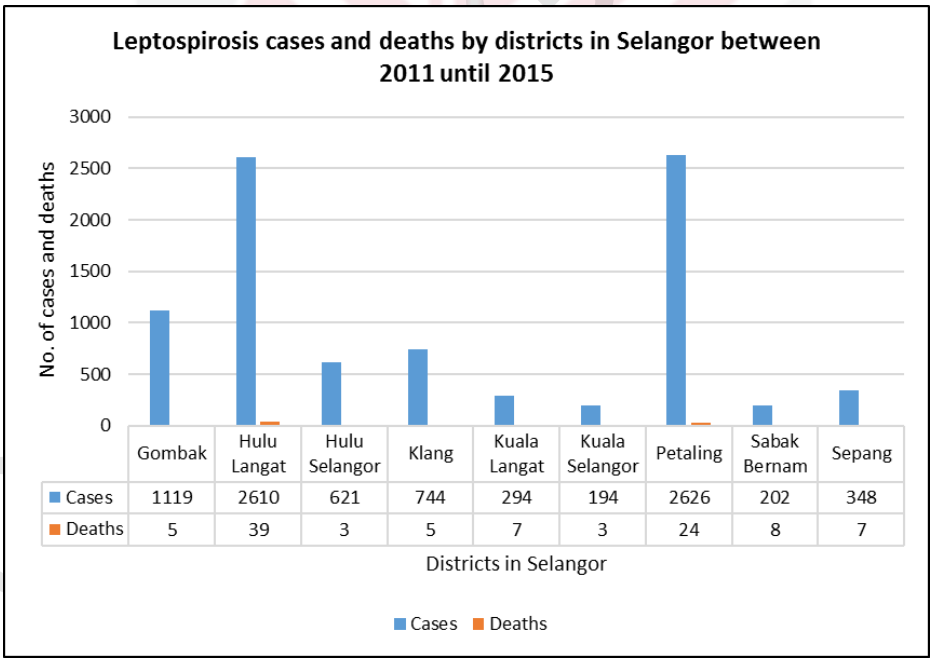


Figure 1.1: Leptospirosis Cases and Deaths from 2004 until July 2015 in Malaysia. (Source: Abdul Wahab (2015))

Influence of globalisation has led to the emergence of this disease into a health threat in new settings, while reported cases often peaks seasonally due to climate changes, poor urban settlements and participation in recreational activities (Costa et al., 2015). Leptospirosis was prevalent in dense urban, peri-urban, as well as in rural areas with scarce infrastructures, limited access to clean water, and poor sanitation system (Lau et al., 2012; Schneider et al., 2012). Research findings showed the growing slum settlements created suitable conditions for transmission of rat-borne diseases like leptospirosis in urban settlements (Costa et al., 2014; Felzemburgh et al., 2014).

Leptospirosis infection can be linked to several risk factors. This disease can be contracted through occupational exposures and recreational exposures, to name a few. There were also both socio-cultural and socio-economic factors and also environmental factors that equally played a crucial role in association with leptospirosis infection (Adler, 2015; Bharti, 2003; Lau et al., 2010). These factors affect the public's knowledge, attitude, and preventive practice on their perceived risk of this disease. Hence, understanding factors associated with public's perceived risk of leptospirosis could facilitate future educational and clinical interventions among the public.

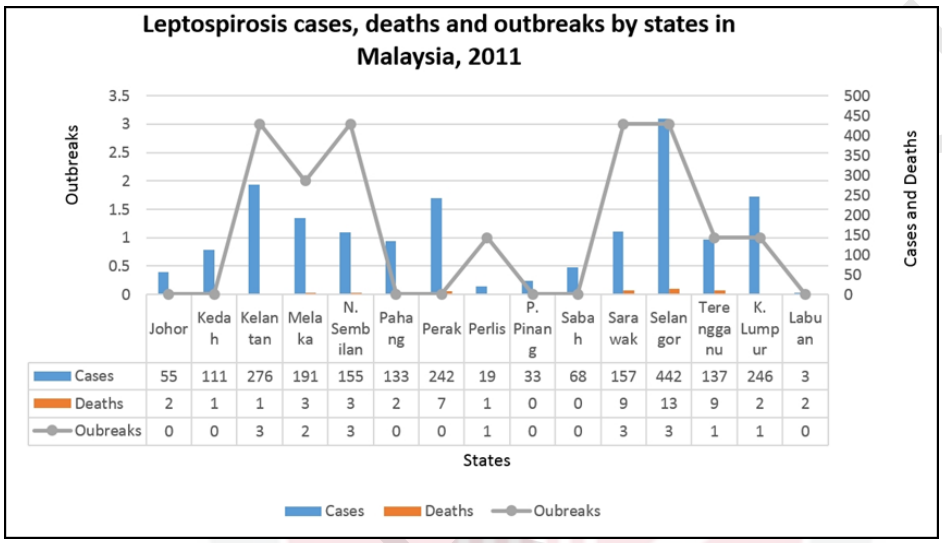


	Gombak	Hulu Langat	Hulu Selangor	Klang	Kuala Langat	Kuala Selangor	Petaling	Sabak Bernam	Sepang
Cases	1119	2610	621	744	294	194	2626	202	348
Deaths	5	39	3	5	7	3	24	8	7

Figure 1.2: Leptospirosis Cases, Deaths and Outbreaks According to States in Malaysia in 2011. (Source: Disease Control Division, Ministry of Health)

1.2 Problem Statement

The annual report of Ministry of Health Malaysia back in 2011 revealed that Selangor had the highest number of leptospirosis cases (442) with 13 deaths and 3 outbreaks altogether (Figure 1.2). Additionally, from 2011 to 2015, Hulu Langat and Petaling showed the highest accumulated number of cases and deaths due to leptospirosis (Figure 1.3).



	Johor	Kedah	Kelantan	Melaka	N. Sembilan	Pahang	Perak	Perlis	P. Pinang	Sabah	Sarawak	Selangor	Terengganu	K. Lumpur	Labuan
Cases	55	111	276	191	155	133	242	19	33	68	157	442	137	246	3
Deaths	2	1	1	3	3	2	7	1	0	0	9	13	9	2	2
Oubreaks	0	0	3	2	3	0	0	1	0	0	3	3	1	1	0

Figure 1.3: Leptospirosis Cases and Deaths According to Districts in Selangor between 2011 until 2015. (Source: Communicable Disease Control Unit, Selangor Health State Department)

Meanwhile, Abdul Wahab (2015) presented the findings where Selangor had 1030 and 1832 leptospirosis cases respectively in the year 2013 and 2014. However, in 2015 the number has dropped significantly to 879 cases. Then, there were two cumulative outbreaks with 14 cases occurred in Selangor over the course of 2015. In the previous year, there were 5 outbreaks with 96 cases reported. Hulu Langat district showed the highest number of cases, particularly in 2015 with 483 cases. Number of deaths due to leptospirosis in Selangor was the highest in 2013 with 31 deaths.

Malaysia is one of the Asian countries affected by leptospirosis. One of its prominent states, Selangor is facing an increasing number of leptospirosis cases each year. Various reasons could be the contributing factors, for instance the increasing animal carrier population in residential and commercial areas that exist due to waste dumping sites in densely populated urban settlements (Barcellos & Sabroza, 2001). Parts of Selangor was situated in the Klang Valley, known for its rapid urbanisation and densely populated residential

areas. Hence, improper waste management operation became a common cause for the increase in animal carriers, especially rodents (Benacer et al., 2013). Average daily disposed solid waste collection in Selangor in 2013 was 4595 tonnes, an increase of 743 tonnes since 2008 (Ministry of Urban Wellbeing, Housing and Local Government, 2013). To make matters worse, food and rubbish thrown into the drain would promote rodent feeding and places for their shelters. This proliferation of rodents and other animal carriers of leptospirosis tend to contaminate fresh water and soil. Disease transmission to human typically occurred at places most frequented by the public including recreational parks and densely populated residential areas with a close proximity to waste accumulation sites such as slum settlements (Barcellos & Sabroza, 2001; de Araújo et al., 2013).

Despite reported in Malaysia since early 1920s, leptospirosis is still less understood. Before it was gazetted as a notifiable disease under the Prevention and Control of Communicable Diseases Act 1988 in December 2010, the actual burden of leptospirosis was not clearly determined. Thus, development of new intervention strategies is still hampered despite the disease being discovered for more than a century now. Apart from that, the clinical diagnosis of leptospirosis was depicted as challenging. This occurred in the situation where cases were underreported and when the clinical information was inaccessible. Incidence rates were being underestimated as patients were often misdiagnosed with other illnesses such as malaria, dengue or others which shared similar signs and symptoms with leptospirosis.

Henceforth, prevention of leptospirosis requires awareness from the public, mainly on its very existence and general knowledge. Both knowledge and awareness would lead to behaviour change, though this was not entirely adequate (Agampodi et al., 2010). Leptospirosis is a great depiction of the complexity surrounding the disease transmission between humans, animals and the ecosystem. Thus, efficient preventive and control measures play a significant role in controlling the disease. The first step before any intervention programs can be initiated is to determine the level of KAP using questionnaires. However, these questionnaire sets were mostly specific only to a particular region. There was no universal questionnaire that can be used in all regions affected by leptospirosis. This was due to socio-cultural differences, different socio-economic makeup, education levels, municipal waste management and so forth. Thus, it is inevitable to have contents of different aspects while designing the questionnaire. As such, certain contents from previous questionnaires can be applied in Malaysia, yet certain contents, for instance, practice items do differ in this country. Contents from previous questionnaires need to be adapted to match the Malaysian public. A proper questionnaire development is necessary to determine the true level of knowledge, attitude and practice.

1.3 Research Justification

The statistical findings by the Ministry of Health Malaysia and Selangor Health State Department showed that leptospirosis is being prevalent in Selangor. Alarmingly, the two districts with the highest number of cases are parts of the urban areas in Selangor. That makes the general public residing in urban areas being at risk of contracting leptospirosis, apart from the known high-risk groups. Addressing this issue may already be emphasised among the later. However, the general public also needs to be educated regarding their susceptibility towards the disease and when to seek intervention as well. Since the prevention of leptospirosis requires a change of behaviour towards the subject matter, instilling a proper knowledge and awareness among them is similarly crucial.

Primordially, determining the public's knowledge, subsequently their attitude, belief, and then preventive practices are important in designating an effective preventive measure towards leptospirosis. Often, survey-based research was used in describing and exploring human behaviour towards a subject matter (Singleton & Straits, 2009). Knowledge, attitude, belief, and practice (KABP) study is useful in evaluating human behaviours, awareness, and mind set.

Many previous studies have utilised these knowledge, attitude, and practice (KAP) dimensions to study leptospirosis predictors within the high-risk groups. This study however, attempted to determine the public's awareness, including the ones who never contracted or ever heard of the disease in this region using knowledge, attitude, preventive practices, as well as exploring the belief domain in the form of questionnaire. Then, the association between socio-demographics and risk factors with knowledge, attitude, belief, and preventive practices on leptospirosis among urban residents was also identified. This study took place in urban region of Hulu Langat, Selangor, where leptospirosis cases were highly prevalent. Findings of this study would provide a baseline information needed for the next step in intervention programs in the future.

1.4 Research Objectives

1.4.1 General Objective

To determine knowledge, attitude, belief, practices, as well as associated factors related to leptospirosis and its prevention among urban residents in Hulu Langat.

1.4.2 Specific Objectives

1. To determine socio-demographics (age, gender, ethnicity, level of education, occupation, and monthly income) and risk factors for leptospirosis infection among urban residents of Hulu Langat.

2. To determine level of knowledge, attitude, belief, and preventive practices on leptospirosis among urban residents.
3. To determine the association between socio-demographics (age, gender, ethnicity, level of education, occupation, and monthly income) and risk factors for leptospirosis infection with knowledge, attitude, belief, and preventive practices on leptospirosis among urban residents.
4. To determine predictors influencing knowledge, attitude, belief, and preventive practice on leptospirosis among urban residents.

1.5 Research Hypothesis

There is a significant association between socio-demographics (age, gender, ethnicity, level of education, and monthly income) and risk factors for leptospirosis infection with knowledge, attitude and practice on leptospirosis among urban residents.

1.6 Definition of Variables

Conceptual Definition

Age

"Age is the length of time that a person has lived or a thing has existed" (Oxford Dictionaries, 2016).

Education level

Level of education is "the progression from very elementary to more complicated learning experience, embracing all fields and programme groups that may occur at that particular stage of the progression" (OECD, 2013).

Occupation

Occupation is defined as "a job or profession" (Oxford Dictionaries, 2016).

Monthly income

Monthly income is defined as "income earned from employment. Monthly income is defined as self-employed persons and employees differently. As self-employed persons, monthly income refers to the average monthly profits from their business, trade or profession before deduction of income tax. While for employees, monthly income refers to the monthly wages before deduction of employee CPF contributions and personal income tax" (Ministry of Manpower, 2013).

Knowledge

Knowledge is "facts, information, and skills acquired through experience or education, the theoretical or practical understanding of a subject" (Oxford Dictionaries, 2016).

Attitude

Attitude is “a settled way of thinking or feeling about something” (Oxford Dictionaries, 2016).

Belief

Belief is noted as “an acceptance that something exists or is true, especially one without proof” (Oxford Dictionaries, 2016).

Practice

Practice is “the actual application or use of an idea, belief, or method, as opposed to theories relating to it” (Oxford Dictionaries, 2016).

Ethnicity

Ethnicity is “each of the major divisions of humankind, having distinct physical characteristics” (Oxford Dictionaries, 2016). Ethnicity, or race in Malaysia comprised of Bumiputera and non-Bumiputera, which “depended on the place of origin of applicants” (Ministry of Higher Education, 2016).

Gender

Gender refers to “the socially constructed characteristics of women and men – such as norms, roles and relationships of and between groups of women and men” (WHO, 2016).

Risk factor

Risk factor is defined as “something that increases risk or susceptibility; something that makes a person more likely to get a particular disease or condition” (Merriam-Webster, 2016).

Urban area

Urban areas are “gazetted areas with their adjoining build-up areas, which had a combined population of 10,000 or more at the time of the Census 2010. It can also be recognised as the special development area that can be identified, which at least had a population of 10,000 with at least 60% of the population (aged 15 and above) were involved in non-agricultural activities” (Population and Housing Census, Department of Statistics Malaysia, 2010).

Urban community

Urban community is “a group of people living in the town or city” (Oxford Dictionaries, 2016)

Operational Definition

Age

Mean (SD) age for this study is 32.49 (13.004). Age is categorised into two categories which are <32 years old and ≥32 years old based on this cut-off point.

Education level

Education level is defined as 'Informal education, primary school, secondary school (lower and upper), and tertiary education'. These categories are further clustered into two main categories of 'high education' and 'low education' for statistical analysis. 'High education' includes tertiary education which covers all post-secondary education in public and private universities, colleges, technical training institutes, and vocational schools (The World Bank, 2018). 'Low education' includes informal education, primary school, and secondary school.

Occupation

Occupation is defined as 'employed' for individuals who is currently working or conducting business that generates income and 'unemployed' for those who are not working or conducting business that generates income.

Monthly income

Monthly income is defined as monthly average income earned through employment. Median income for the data is RM1950. In this study, the monthly income is divided into income less than RM1950 as 'low income' and RM1950 and above as 'high income'.

Knowledge

Knowledge is depicted as the knowledge regarding leptospirosis. It is then further categorised into good knowledge and poor knowledge. Respondents who obtained more than 80% from the total score are considered to have good knowledge while a score below 80% is considered a poor knowledge. The cut-off point of 80% was chosen after discussion with the panel of experts (Zahiruddin et al., 2018).

Attitude

In this study, attitude is focused on the scope of prevention and control measures against leptospirosis. Attitude is categorised into good attitude and poor attitude. Respondents who obtained more than 75% from the total score are considered to have good attitude while a score below 75% is considered an unacceptable attitude. The cut-off point of 75% was based on previous literature (Mohd Rahim et al., 2012).

Belief

Belief is defined as belief towards leptospirosis infection. In this study, belief is categorised into good belief for respondents who score 87% and above, and poor belief for those who score less than 87%. The cut-off point of 87% was based on the median value of the data.

Practice

Practice in this study defined as practice which is routinely done toward prevention of leptospirosis. Practice is categorised into good practice and unacceptable practice. Respondents who scored more than 75% are considered having good practice, whereas a score below that is considered an unacceptable practice. The cut-off point of 75% was based on previous literature (Mohd Rahim et al., 2012).

Ethnicity

Ethnicity is defined as Malay, Chinese, Indian, Bumiputra Sabah, Bumiputra Sarawak, and Others. These categories are further clustered into two main categories: Bumiputera and non-Bumiputera.

Gender

Gender is categorised into male and female. The prevalence of each category would be determined in relation to their level of KABP and whether it is influencing the prediction of good KABP would also be determined.

Risk factor

Risk factor is defined as risk factors related to exposure of respondents towards leptospirosis. It consists of behavioural risk factors and environmental risk factors. Environmental risk factors are characteristics in a person's surroundings that increase their likelihood of contracting leptospirosis while behavioural risk factors are individual's behaviour that increases the chances of acquiring the disease.

Urban area

Urban area in this study consisted of area in Hulu Langat district which had a combined population of 10,000 or more, which at least had a population of 10,000 with at least 60% of the population (Department of Statistics, 2010). Urban areas involved in this study were Bandar Baru Bangi, Cheras, and Kajang.

Urban community

Urban community in this study is defined as adult residents of Bandar Baru Bangi, Cheras, and Kajang which are located in Hulu Langat district.

1.7 Conceptual Framework

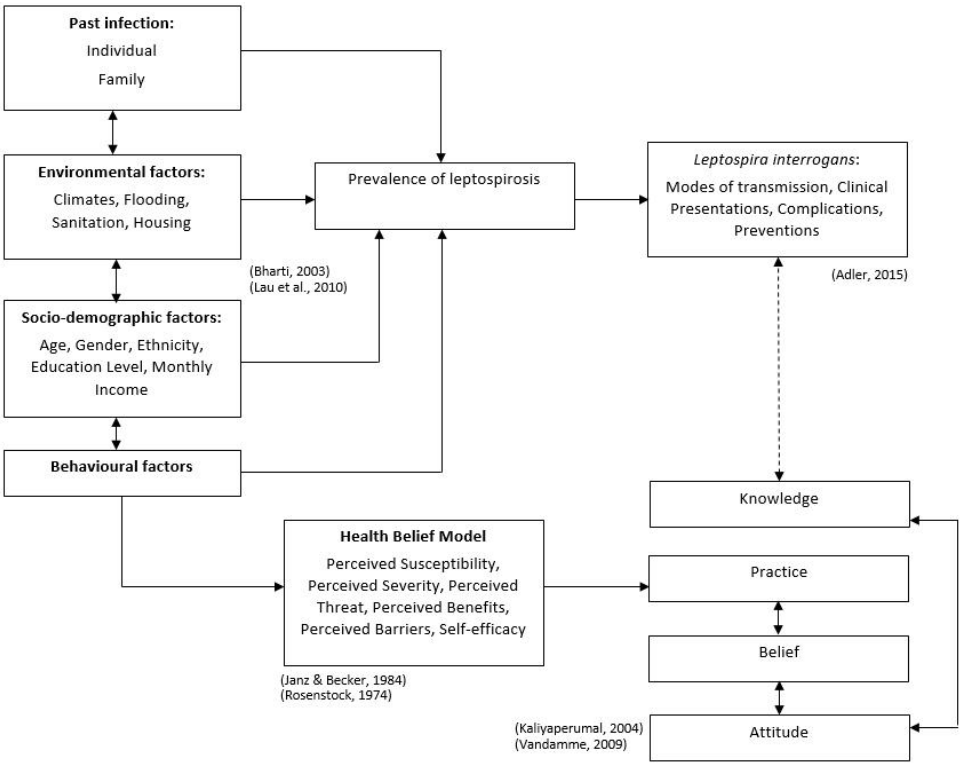


Figure 1.4: Conceptual Framework of Knowledge, Attitude, Belief, and Preventive Practice on Leptospirosis Prevention Among Urban Community in Hulu Langat

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LIST OF PUBLICATIONS

Nurul Munirah Abdullah, Rosni Ibrahim, Siti Norbaya Masri, Suhainizam Muhammad Saliluddin, Tengku Zetty Maztura Tengku Jamaluddin. Leptospirosis at first glance: Determining knowledge, attitude, belief, and preventive practice among urban residents of Hulu Langat. 2016. Regional Profiling on Leptospirosis Burden and Control: Global Leptospirosis Environmental Action Network (GLEAN)-Malaysia Leptospirosis Research Network (MYLEPTO) meeting 2016. P1.1, p6.

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