ORIGINAL ARTICLE

Leptospirosis Knowledge, Attitude, and Practice of Town Service Workers in Kuching, Malaysia

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ABSTRACT

Introduction: This study aimed to evaluate town service personnel's knowledge, attitudes, and practices (KAP) regarding leptospirosis prevention and the influencing factors to its practice. **Methods:** A cross-sectional study was conducted in Kuching, Malaysia, involving town service workers using a self-administered validated questionnaire comprising sociodemographic and KAP information. The eligibility criteria included 18 years old and above and having worked for more than six months. The KAP was determined using descriptive analysis, and associations were identified using logistic regression analysis. **Results:** About 189 town service workers responded, giving a response rate of 87.5%, and a majority of them were Bumiputera Sarawak, with a mean age of 38.6 (±11.00) years old. The mean duration of employment was 9.3 (±6.99) years. About 88.9% had good knowledge of leptospirosis. Meanwhile, 85.2% and 79.9% had satisfactory attitudes and good practices. The knowledge on the aetiology of leptospirosis ranged from 25% to 94%. No significant association was found between the knowledge score and income with the practice score. The attitude score (AOR 1.161; 95% CI = 1.090, 1.238; p = 0.000) and working experience (AOR 1.174; 95% CI = 1.023, 1.346; p = 0.022) were found to be significantly associated with their practice score. **Conclusion:** Most town service workers have good knowledge and practice regarding leptospirosis prevention. Workers with good attitudes demonstrate good practising habits toward leptospirosis prevention. Awareness and activities related to disease prevention should be encouraged to ensure the continuity of a positive attitude.
Malaysian Journal of Medicine and Health Sciences (2024) 20(1):234-241. doi:10.47836/mjmhs.20.1.31

Keywords: Attitude, Knowledge, Leptospirosis prevention, Practice, Town service worker

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INTRODUCTION

Leptospirosis is a zoonosis with protean clinical manifestations caused by pathogenic spirochetes of the genus Leptospira. Pathogenic leptospires belong to the species Leptospira interrogans, which is subdivided into more than 200 serovars with 25 serogroups (1). Leptospirosis is also known as Weil's disease,(2) Weil-Vasiliev disease, Swineherd's disease,(3) rice-field fever, waterborne fever, nanukayami fever, cane-cutter fever, swamp fever, mud fever, Stuttgart disease, and Canicola fever. It is a bacterial disease transmitted directly or indirectly from animals to humans. Rodents, wild, and domestic animals naturally carry leptospiral serovars in their renal tubules (4).

Based on the prediction model by World Health Organization (WHO), which includes four variables: geography, weather, health indicators, and urbanisation, the annual global leptospirosis burden is estimated at 873,000 cases and 48,600 deaths (5). The highest disease incidences were estimated in the Global Burden of Disease regions of Oceania (150.68 cases per 100,000, 95% CI 40.32–272.29) followed by South-East Asia (55.54, 95% CI 20.32–99.53), Caribbean (50.68, 95% CI 14.93–87.58), and East Sub-Saharan Africa (25.65, 95% CI 9.29–43.31) (6). The highest morbidity and mortality were projected to happen in resource-poor countries, including regions where leptospirosis's burden has been underreported and underappreciated (6). In Malaysia, based on the data from the Ministry of Health, the prevalence of leptospirosis showed an incremental rise from 2004 to 2015, which sharp increment in 2014 (4457 cases to 7806 cases) may be a result of the flood experienced in many parts of Malaysia. (7-10). An average of 7.80 cases per 100,000 persons are reported annually, with a case fatality rate of 2.11% (the highest number of deaths was recorded in 2014) (9, 11).

Town service workers are in direct contact with waste and garbage, representing occupational hazards. Occupations such as town service workers, paddy planters, army, and health care workers impose a higher risk of leptospiral infection due to occupational and environmental determinants for human leptospirosis (12, 13). A hospital-based study in northeastern Malaysia (14) showed that agriculture and outdoor workers contributed to 50% of leptospirosis cases. This is similar to a study done in India (15); agricultural workers (62.5%) had the highest seroprevalence of leptospirosis. This was by sewage workers (39.4%), animal handlers (37.5%), forest workers (27.3%), and butchers (30.0%). There were a few studies regarding KAP toward leptospirosis prevention in the West Malaysia region. However, a study among Malaysian living in the East Malaysia region is still lacking. The limited data cannot be used to infer a population in Malaysia. Thus, the study adds insight into this matter as there is a mixture of different ethnicity and background in Kuching, Sarawak. We aim to evaluate knowledge, attitudes, and practices (KAP) regarding leptospirosis prevention and the influencing factors to its practice among the town service workers.

MATERIALS AND METHODS

Study design and population

This cross-sectional study was conducted from December 2018 to December 2019 in Kuching, Malaysia. Kuching is the capital city of Sarawak which is part of East Malaysia. The sample size was calculated using a single proportion formula based on the proportion of satisfactory attitude towards leptospirosis among the town service workers was 52% by Azfar et al., 2018 and the precision was equal to 0.07. After considering the non-response rate of 10%, the sample needed for this study was 216 town service workers. This study was conducted among town service workers in Kuching City Council. We included adult workers with work experience of more than six months. The list of town service workers was obtained from the town council, and the workers were selected via simple random sampling. The selected workers, ten at a time, were called to a meeting room at the town council to prevent the disruption of their main task during the working days. The researcher explained the study's aims and information to the town service workers. Those who gave written consent passed the screening question (have ever heard about leptospirosis), fulfilled the inclusion and exclusion criteria, and were given a set of research self-administered questionnaires in hard copy. Both consents for participation and publication were taken. They were given 15 minutes to complete the questionnaires. The respondents were allowed to ask the researcher for clarification should any problem arise upon completing the questionnaires. However, they were not allowed to discuss or search for answers using their devices. The data was collected during the morning briefing before they started their morning duty. The study result was not informed to the participants however they were informed that the study findings would be published for sharing information, particularly among health professionals.

Measures

We used case report forms requiring respondents to provide information on sociodemographic profiles and a Malay version of the knowledge, attitude, and practice towards leptospirosis questionnaire. Sociodemographic data included responses on age, gender, ethnicity, marital status, smoking status, living at flood prone area, level of education, occupation, duration of employment and income. Malay version of the knowledge, attitude, and practice towards leptospirosis questionnaire was used in this study (16). The validated questionnaire revealed a Cronbach alpha for knowledge, attitude, and practice domain as 0.96, 0.71, and 0.74, respectively (17). Permission to use the questionnaire was obtained from Zahirudin et al.,2018. It was designed to be completed within 15 minutes for an average respondent. The summative scores for knowledge, attitude, and practice domains were converted to percentage scores.

The knowledge domain of questions consists of 24 questions that cover the causes, signs, symptoms, complications, and risk factors of leptospirosis. For each item, "2" marks were given for the correct response, "1" mark for "do not know," and "0" mark for "incorrect" answer. This started with whether the respondents had ever heard about leptospirosis and the source from which they heard the information. Only those who had heard of the disease would proceed to answer the rest of the knowledge questions. Scores ranged from 0 to 48 marks. The higher the score, the better the knowledge of the respondents. The total score of each respondent was divided into 48 marks and multiplied by 100 to get the percentage score for knowledge. Based on the previous study's parameter, the 72% or more cut point indicates good knowledge (17, 18).

The attitude domain consists of 13 questions covering safe work practices, personal protective equipment (PPE), and general practices concerning leptospirosis. Questions on attitude are designed to be answered using a Likert scale of "strongly agree," "agree," "not sure," "not agree," and "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. Meanwhile, the above scoring system was reversed for negative attitude items. The items are A7, A8, A10, and A13. Total domain scores ranged from 0 to 52 marks. The higher the score, the better the attitude of the respondents. The total score of each respondent was divided by 52 marks and multiplied by 100 to get the percentage score for attitude. Based on the parameter set by the previous study, a 75% or more cut point indicates a satisfactory attitude (17, 18).

The practice domain of questions consists of 19 questions on practices of safe work practice, the use of PPE during work, and off-work general practices concerning leptospirosis. Questions on practice are designed to be answered using a Likert scale of "never," "seldom," "sometimes," "often," and "always." For good practice items, scores of "4", "3", "2", "1", and "0" for "always," "often," "sometimes," "seldom," and "never" were given, respectively. Meanwhile, the above scoring system was reversed for negative practice items. The items are P2, P4, P15, and P17. Total domain scores ranged from 0 to 76 marks. The higher the score, the better the practice of the respondents. The total score of each respondent was divided into 76 marks and multiplied by 100 to get the percentage score for practice. Based on the parameter set by the previous study, a 75% or more cut of the point indicates good practice (17, 18).

Statistical analysis

Data were analysed using SPSS 25.0 (IBM Corp., Armonk, NY, USA) statistics program. Descriptive statistics were computed for the numerical variables, including means and standard deviation. Frequencies and percentages were done for the categorical variables. Variables with a small number were collapsed to form meaningful combination variables. The variables were age, gender, marital status, income, occupation, working experience, smoking status, flood prone at home, and attitude score. We used logistic regression to assess the association of the variables with practices on leptospirosis prevention. The level of significance was the set to 0.05 and less.

Ethical approval

Ethical clearance was obtained from Research and Ethic Committee (Human), Universiti Sains Malaysia, Health Campus (USM/JEPeM/18080369).

RESULTS

A total of 216 questionnaires were distributed, and about 189 completed questionnaires and returned to the researcher, corresponding to a response rate of 87.5%. Table I shows the respondents' sociodemographic characteristics, which were mostly male (82.5%) and married workers (72.5%). Most respondents have good KAP of leptospirosis prevention; 89%, 85% and 80%, respectively (Figure 1). Table II depicts the KAP scores towards leptospirosis prevention among town service workers. The mean scores for KAP were 87.3(±11.92), 87.1 (±14.67) and 84.7 (±12.05), respectively. Respondents received information about leptospirosis from television/radio/magazine (57%), poster/pamphlet (18%), newspaper/health talk (18%), and others (7%). The knowledge, attitude and practice of leptospirosis are shown in Tables III, IV and V, respectively. The majority of workers answered correctly the items for KAP. The less correct answers were K11, A9, P1 and P19. There were significant associations with good practice on leptospirosis prevention were attitude score (AOR 1.161; 95% CI = 1.090, 1.238; p = 0.000) and working experience (AOR 1.174; 95% CI = 1.023, 1.346; p = 0.022) when other confounders were controlled, as shown in Table VI. Age, gender, marital status, income, occupation, smoking and flood-prone at home were not associated with the practice.

Table 1: Sociodemographic characteristics of the respondents (n = 189)

Variable	Mean (SD)	Frequency (%)
Age	38.6 (11.00)	
Gender		
Male		156 (82.5)
Female		33 (17.5)
Ethnicity		
Bumiputera Sarawak		97 (51.3)
Malay		75 (39.7)
Chinese		14 (7.4)
Indian		3 (1.6)
Married		
Yes		137 (72.5)
No		52 (27.5)
Smoking status		
Yes		89 (47.1)
No		100(52.9)
Flood prone at home		
Yes		44 (23.3)
No		145 (76.7)
Level of Education		
No formal education		4 (2.1)
Primary school		27 (14.3)
Secondary school		121 (64.0)
Form six/ diploma/ certificate		37 (19.6)
Occupation		
Garbage collector		90 (47.6)
Lorry driver		52 (27.5)
Landscaper		14 (7.4)
Road sweeper		20 (10.6)
Cleaners		13 (6.9)
Duration of employment (years)	9.3 (6.99)	
Income (RM)	1387.7 (358.64)	

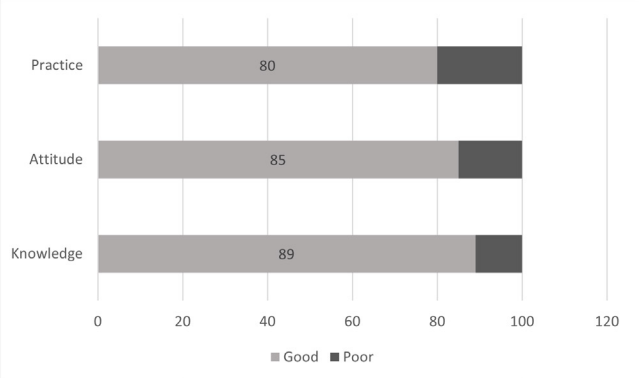

Figure 1: Proportion of good and poor KAP toward leptospirosis prevention

DISCUSSION

KAP questionnaires are essential and have been conducted in various health studies among targeted or high-risk groups to develop appropriate intervention programs. Most town service workers were male gender

Table II: KAP scores towards leptospirosis prevention among town service workers.

Items	Min %	Max %	Mean (SD) %
Total knowledge score	37.50	100.00	87.3 (11.92)
Causes	0.00	100.00	87.3 (20.56)
Signs, symptoms, and complications	28.57	100.00	83.7 (16.69)
Risk factors	0.00	100.00	95.6 (11.80)
Total attitude score	23.80	100.00	87.1 (14.67)
Safe work practice and PPE	25.00	100.00	87.8 (17.07)
General practices (off work)	22.22	100.00	87.2 (14.55)
Total practice score	28.95	100.00	84.7 (12.05)
Safe work practice	31.25	100.00	83.8 (15.54)
General practices (off work)	27.27	100.00	85.1 (12.51)

Table III: Knowledge of leptospirosis among town service workers

Items	Knowledge	Mean (SD)	Correctly answer (%)
	Causes		
K1	known as leptospirosis	1.57 (0.827)	148 (78.3)
K2	caused by bacteria	1.76 (0.656)	166 (87.8)
K3	a zoonotic disease	1.88 (0.469)	178 (94.2)
K4	can be detected through a blood test	1.78 (0.630)	168 (88.9)
K5	Bacteria enter the human body via: (i) Wound on body	1.78 (0.630)	168 (88.9)
K6	(ii) Eyes	1.49 (0.873)	141 (74.6)
K7	(iii) Nose	1.48 (0.879)	140 (74.1)
K8	(iv) Mouth	1.67 (0.743)	158 (83.6)
K9	(v) Contaminated food	1.83 (0.558)	173 (91.5)
K10	(vi) Contaminated water	1.79 (0.617)	169 (89.4)
K11	(vii) Handshakes	0.50 (0.867)	47 (24.9)
	Signs and complications		
K12	Signs: (i) Fever	1.86 (0.508)	176 (93.1)
K13	(ii) Body aches	1.78 (0.630)	168 (88.9)
K14	(iii) Yellowish discoloration of eyes	1.74 (0.679)	164 (86.8)
K15	Complications: (i) Death	1.96 (0.289)	185 (97.9)
K16	(ii) Breathing problems	1.94 (0.352)	183 (96.8)
K17	(iii) Kidney failure	1.82 (0.574)	172 (91.0)
K18	(iv) Liver damage	1.83 (0.558)	173 (91.5)
	Prevention		
K19	(i) Making sure the home environment is clear from garbage	1.97 (0.251)	186 (98.4)
K20	(ii) Avoid walking in flood water	1.80 (0.603)	170 (89.9)
K21	(iii) Take care of self-cleanliness	1.96 (0.289)	185 (97.9)
K22	(iv) Drink clean water	1.97 (0.251)	186 (98.4)
K23	(v) Wear rubber gloves while working	1.90 (0.427)	180 (95.2)
K24	(vi) Avoid bathing in contaminated waterfalls/ rapids/ rivers/ water lines	1.88 (0.474)	178 (94.2)

Table IV: Attitude toward leptospirosis among town service workers

Items	Attitude	Mean (SD)	Satisfactory attitude n (%)
	Safe work practice		
A1	wear gloves while handling garbage	3.56 (0.907)	172 (91)
A2	make sure the rubbish bins are always closed	3.71 (0.718)	182 (96.3)
A3	wear PPE while handling garbage	3.49 (0.861)	170 (89.9)
A4	not worried even if I did not wear while handling garbage	3.31 (1.172)	154 (81.4)
	General practice (off work)		
A5	cooperate with the health authority in the prevention and control	3.54 (0.872)	175 (92.6)
A6	make sure family members clean the home environment	3.65 (0.747)	180 (95.2)
A7	inform the health authority if have the rat urine disease	3.61 (0.809)	177 (93.6)
A8	make sure my family members do not bathe in contaminated waters	3.50 (0.960)	168 (88.9)
A9	not worried if going through floodwater	2.79 (1.387)	127 (67.2)
A10	do not mind if there are rats in home environment	3.54 (0.908)	169 (89.4)
A11	inform the health authority if there were suspected rat urine disease cases	3.51 (0.891)	171 (90.5)
A12	do not mind if home environment is dirty	3.57 (0.979)	172 (91.0)
A13	consult a doctor if have fever during the spread of rat urine disease	3.68 (0.748)	181 (95.7)

and other studies in West Malaysia had shown similar gender predominant. However, the mean age and employment duration of the respondents were lower (17,18).

Our respondents had high levels of knowledge, attitude, and practice. This is in contrast with a study done in northeastern Malaysia; there were low levels of knowledge, attitude, and practice among town service workers (17). A study conducted among urban communities in Malaysia showed a low level of knowledge but good attitude and practice (19). In our study, all respondents had heard of leptospirosis before. Similarly, an overwhelming majority of respondents among Sri Lankan students (20) and Jamaican households (21) reported that they had heard of leptospirosis. In addition, research in Brazil showed that less than 10% of the respondents had never heard of leptospirosis among urban slum residents (22). These high levels of awareness of leptospirosis could be due to the nature of their populations, which were mainly involved in the cultivation and the populations' involvement in disease outbreaks in their respective countries. Based on a study done among Trinidadian households, the percentage of respondents who have heard of leptospirosis before was only 52.4% (23). Meanwhile, studies conducted in Malaysia showed mixed results depicted by a study from Azfar et al. (17) among town service workers in northeastern Malaysia in which 83.2% had heard of leptospirosis before as compared to a study among town service workers in Kota Bharu, Kelantan by Sulong et al. (18) and Yaacob et al. (18, 24) which showed that only 12.8% had ever heard of leptospirosis. This low number could be due to a lack of exposure and awareness of leptospirosis, which was limited to those who directly heard about the disease outbreaks among trainees in the National Service Camps in Malacca and among residents in Johor who were exposed to flood water at

Table V: Practice items with mean score and percentage for good practice.

Items	Practice items	Mean (SD)	Good practice n(%)
	Safe work practice		
P1	managed garbage despite the presence of wounds on their hands or feet	2.99 (1.225)	131 (69.3)
P2	eat/ drink while handling garbage	3.62 (0.912)	169 (89.5)
P3	wash hands with soap after handling garbage	3.71 (0.726)	176 (93.1)
P4	wear PPE while handling garbage: (i) Rubber gloves	3.32 (1.127)	152 (80.4)
P5	(ii) Rubber boots	3.27 (1.179)	149 (78.9)
P6	(iii) Long-sleeved shirts	3.28 (1.166)	149 (78.9)
P7	put on plaster or dressing if there is a small cut while handling garbage	3.27 (1.123)	151 (79.8)
P8	smoke while handling garbage	3.37 (1.176)	148 (78.3)
	General practice (off work)		
P9	make sure there are no rats in my home environment	3.25 (1.133)	143 (75.7)
P10	visited the area of waterfalls/ rapids/ rivers/ lakes/ water lines which had confirmed cases of rat urine disease (the past 6 months)	3.63 (0.923)	172 (91.1)
P11	clean home environment (no garbage)	3.41 (0.881)	160 (84.7)
P12	keep my food in an enclosed place	3.70 (0.798)	179 (94.7)
P13	see a doctor when I have a fever during an outbreak	3.31 (1.243)	159 (84.1)
P14	close my rubbish bins	3.79 (0.642)	183 (96.8)
P15	wash tins/ drink containers before drinking	3.56 (0.901)	167 (88.4)
P16	wash cooking utensils before using them at home	3.76 (0.605)	182 (96.3)
P17	choose clean eateries/ restaurants	3.62 (0.753)	172 (91.0)
P18	go through stagnant water/ flood water without PPE	3.05 (1.362)	136 (71.9)
P19	wear plaster/ dressing if there is a small wound while going through stagnant water/ flood water	2.41 (1.591)	100 (52.9)

Table VI: Associated factors for good practice using multiple logistic regression

Variables	Adj. OR[a]	95% CI[b]	Wald stat[c]	P value
Age	0.977	(0.898, 1.063)	0.289	0.591
Gender				
Male	0.475	(0.074, 3.063)	0.612	0.434
Female	1.000			
Marital status				
Married	0.693	(0.237, 2.027)	0.449	0.503
Single	1.000			
Income	1.001	(0.999, 1.003)	1.459	0.227
Occupation				
Lorry drive	0.368	(0.106, 1.279)	2.474	0.116
Landscaper	0.662	(0.085, 5.158)	0.155	0.694
Road sweeper	1.499	(0.171, 13.162)	0.133	0.715
Cleaner	0.575	(0.078, 4.254)	0.293	0.588
Garbage collector	1.000			
Working experience	1.174	(1.023, 1.346)	5.221	0.022
Smoking				
Yes	0.462	(0.172, 1.240)	2.349	0.125
No	1.000			
Flood prone at home				
Yes	2.884	(0.771, 10.791)	2.476	0.116
No	1.000			
Attitude score	1.161	(1.090, 1.238)	21.233	0.000

[a] Adjusted odds ratio [b] Confidence interval [c] Wald statistic
Note: No significant interaction; no multicollinearity problem; model assumptions met

that time. However, as time progressed, the continuous and unrelenting effort by the Malaysian government in its public health promotion and education increased the level of knowledge in leptospirosis among the population shown in this study.

Our study showed that more than half of the town service workers (57.1%) heard about leptospirosis through television, radio, or magazine. This finding is similar to other studies (17, 18, 24) conducted in Malaysia due to the continued effort of the Malaysian government through the Ministry of Health and all the mass media in which information on leptospirosis was widely available and via public health promotion and education. Comparing studies done in various countries (17, 20, 22), television and newspapers are the main sources of information regarding leptospirosis.

In our present study, a large proportion of the respondents of the workers showed good knowledge of leptospirosis prevention. In contrast, the studies by Azfar et al. (17) and Sulong et al. (18) showed that only 33% and 6.7% of their respondents had good knowledge of leptospirosis. Moreover, a survey among 300 villagers in a highly endemic area in Thailand revealed that only 9% understood leptospirosis (25).

Our study showed that the most indisposed area of knowledge was the "Signs, symptoms and complications." Even though the other two areas ("Causes" and "Risk Factors") scored higher in mean scores (with "Risk factors" achieving the highest mean score), there were workers who scored zero per cent scores in these areas. This showed that while lacking in identifying the disease manifestations and sequelae, our respondents could identify the causative organism of leptospirosis and risk factors, albeit with a few outliers. In comparison, in Azfar et al. (17) and Sulong et al. (18), "risk factors" was identified as the weakest area of knowledge in which a few respondents scored zero per cent.

Interestingly, the majority of our respondents had a false belief that leptospirosis can be transmitted through handshakes with an infected person. This may lead to unjust ostracism of the community towards patients with leptospirosis. Thus, this should be addressed, and more information on the true modes of transmission of leptospirosis should be inculcated in the respondents to dispel this false belief. Other than that, the other items scored relatively similar, with the items in risk factors being the highest scoring area. This shed a good light on our respondents as they have excellent knowledge of risk factors, which is essential in combatting and adopting preventive practices against leptospirosis.

Our study respondents displayed a satisfactory attitude toward leptospirosis prevention. In comparison, in other studies, (17, 18) 35.5% and 52% of their respondents

expressed satisfactory attitudes, respectively. Increasing awareness among Sarawakians has been done through a continuous joint effort by the Sarawak State Health Department and the media. Statements by the state health directors on leptospirosis outbreaks and general advice were published in newspaper articles (26-28). Based on interviews with city council members and workers, regular meetings were held to educate workers on leptospirosis and remind them of the importance of wearing PPE during leptospirosis outbreaks. Looking further into the domain of safe work practice for attitude, most items scored 89.9% and above, except the item that A4 which scored lower at 81.4%. Despite this high score, instilling a sense of responsibility and emphasis on PPE is vital. Concurrently, based on attitude in general practice (off work), an important area identified as a higher risk attitude was A9, in which only 67.2% of the respondents displayed a satisfactory attitude. Regardless of the magnitude and severity of floods, they represent imminent dangers that should be taken seriously. Flood waters are potentially contaminated water sources that could lead to leptospirosis transmission. This is depicted based on a local study in Kelantan after the 2014 major flooding (29). The flood's aftermath was an outbreak of leptospirosis with the highest incidence (59% of the cases). The same scenario was also seen in other countries, such as Guyana (30), the Philippines (31), and Sri Lanka (32), which suffered from leptospirosis outbreaks after the floods.

Town service workers in Kuching showed good practice toward leptospirosis prevention. In contrast, only 35.5% and 39.9% of respondents in Azfar et al. (17) and Sulong et al. (18) demonstrated good practice, respectively. It was due to the town council's efforts to educate town employees about leptospirosis and how to prevent it.

Based on the safe work practice items, the weakest area was that the respondents still "managed garbage despite the presence of wounds on their hands or feet." Wounds are considered to be an entry point for microorganisms. The level of dismissal practice towards the importance of practising caution while handling garbage could lead to contact with contaminated soil or water and contracting leptospirosis and other diseases (33, 34). This issue should be addressed and not taken lightly.

Meanwhile, for the general practice (work off) items, correlating with the above weak area, the respondents also practised poorly when "wearing plaster or dressing for the wound when walking through stagnant water or flood water." Furthermore, the respondent should take greater responsibility for their well-being at work and everyday lives. On a more positive note, the workers had high levels of practice, especially in wearing PPE items like gloves, rubber boots, and long-sleeved shirts, which 80.4%, 78.9%, and 78.9% of the workers wore while managing garbage. This contrasts with Azfar et al. (17) and Sulong et al. (18), in which a low percentage of respondents wore PPE while working.

We investigated the factors such as sociodemographic factors and knowledge and attitude factors that can be associated with good practice in preventing leptospirosis among town service workers. Our result showed significant associations between work experience and attitude score, with good practice in leptospirosis prevention. In our study, more experienced workers had better practices in preventing leptospirosis. Those with higher attitude scores were demonstrated good practice. This finding emphasises the importance of attitude and cumulative work experiences, and these workers were able to implement their information and experiences in preventive practices of leptospirosis.

Based on a study conducted among rural communities in Hulu Langat, Selangor (35), the only significant factor for preventive practice was income. Respondents with an income of RM1500 had more acceptable practices than those who earned less than RM1500. This contrasts with our study, in which income was not significantly associated with preventive practices. On another note, in the same study, similar to ours, those with satisfactory attitudes were more likely to have good practice on leptospirosis prevention than those with unsatisfactory attitudes. According to Abdullah et al., there is a substantial correlation between "age" and "knowledge," as well as "education level" and "preventive practice" (19). In a study done among Lakeshore communities in the Philippines (36), it was found that female respondents, higher education level, use of broadcast media as a source of health information, higher knowledge and attitude scores were significantly associated with good practice on leptospirosis prevention among workers involved in the agricultural sector. Meanwhile, among non-agricultural workers, female workers, older age, higher income levels, use of broadcast media as a source of health information, and higher knowledge and attitude scores were significantly associated with preventive practices. Some findings were similar to our study in that education and satisfactory attitude were significantly associated with good practice in leptospirosis prevention. In contrast, gender, age, income, and good knowledge were insignificantly associated with preventive practices in our study.

In the previous studies in Malaysia (17, 35) utilising the same questionnaire, the association between knowledge, attitude, and practice scores was not explored. Our study determined the association between the practice score and other variables. Based on a simple regression analysis of knowledge and practice scores, no significant association was found between them. Meanwhile, using multiple regression analysis while deciphering the association of attitude score, age, and income with the practice score adjusting to education level among town service workers in Kuching, Malaysia, there was a significant association between the attitude

score and the age of the workers with the practice score. There was no association between the respondents' income and practice scores. An attitude is an essential tool in governing the practice of the respondents. The success and failure of prevention and control programs strongly rely on the beliefs and mentality of respondents. Even though they may be aware of a disease, convincing individuals to take the necessary practice is always difficult. The town service workers in Sarawak exhibit a certain lacking in the area of practice toward leptospirosis prevention; therefore, educating on leptospirosis prevention is essential to improve the practice of leptospirosis prevention.

Strengths and limitations

Many studies on knowledge, attitude, and practice toward leptospirosis have been conducted in the West Malaysia. With the diverse ethnicity of the community in East Malaysia, this study gives an insight into Malaysia's multi-racial society. The limited current data cannot be used to compare with the Malaysian population unless a comparison study was conducted to investigate this matter. In this present study, a self-administered questionnaire was used for data collection. The responses of the town service workers depend on their motivation and honesty in answering the items.

CONCLUSION

The areas of deficiencies in their KAP should be identified and rectified in concordance with the efforts by the health authorities in enhancing intervention programs toward leptospirosis prevention. Most town service workers have good knowledge and practice regarding leptospirosis prevention. Workers with good attitudes demonstrate good practising habits toward leptospirosis prevention. Awareness and activities related to disease prevention should be encouraged to ensure the continuity of a positive attitude.

ACKNOWLEDGEMENTS

We thank the Kuching City Council and the town service workers for cooperating. This work was supported by Universiti Sains Malaysia Short Term Research University Grant no.304/PPSG/6315039.

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