

Original Research



Health-seeking behaviour for leptospirosis in the Monaragala District of Sri Lanka

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Abstract

Introduction: Health-seeking behaviour (HSB) plays a crucial role in determining outcomes for infectious diseases such as leptospirosis, a bacterial zoonosis prevalent in tropical regions, including Sri Lanka. Understanding the factors influencing HSB is essential for improving early diagnosis and treatment, thereby reducing morbidity and mortality associated with the disease.

Objectives: To evaluate the health-seeking practices of individuals in the Monaragala District, an endemic area for leptospirosis

Methods: A hospital-based cross-sectional study was conducted from 2018 to 2019 in all major hospitals in the Monaragala District. Patients aged 15 years and older who were diagnosed with suspected leptospirosis were included. Data on socio-demographic characteristics, clinical presentations and laboratory results were collected through a pre-tested, interviewer-administered questionnaire. The timeliness of presentation, reasons for delays and their consequences were assessed.

Results: Out of 450 participants, 77.6% presented late for medical care and the primary reasons for delays included misattributing symptoms to occupational hazards (23.8%) and lack of awareness of leptospirosis as a significant health threat (16.4%). Most participants first contacted general practitioners (53.3%) or government hospitals (43.1%). Laboratory confirmation rates showed a significant difference in timely versus delayed presentations.

Conclusions & Recommendations: The findings highlight the urgent need for targeted health education campaigns in the Monaragala District to raise awareness of leptospirosis symptoms and encourage timely healthcare seeking. Enhancing community knowledge and engagement can improve early detection and treatment, ultimately reducing the disease burden in endemic areas.

Key words: Health-seeking behaviour, Leptospirosis, Sri Lanka

Introduction

Health-seeking behaviour (HSB) is a specific subset of help-seeking behaviour. Individuals vary in their inclination to seek medical assistance; some pursue treatment readily while others do so only when experiencing significant pain or advanced stages of illness. Health-seeking behaviour encompasses any actions-or inactions taken by individuals who believe they are facing a health issue, with the intent of finding an appropriate remedy. It is also referred to as illness behaviour or the sick-role behaviour. It forms part of the broader concept of health behaviour, which includes efforts to maintain health, prevent disease and address disruptions to a healthy state (1).

Leptospirosis is a bacterial zoonosis caused by spirochetes from the *Leptospira* genus. It predominantly affects tropical and subtropical regions, where periods of heavy rainfall enhance the survival and dissemination of the pathogen in the environment (2). Individuals infected with *Leptospira* may exhibit a wide range of symptoms, from being asymptomatic or experiencing mild illness to severe life-threatening multi-organ infections. Typically, leptospirosis presents as an acute febrile illness with two distinct stages: an initial *bacteraemia phase* characterized by high fever, chills, muscle pain, nausea, vomiting and red eyes lasting 5-7 days; followed by an *immune phase*, during which the body's immune response causes tissue damage (3).

In 2015, there were an estimated 1.03 million cases of leptospirosis worldwide, leading to 58,900 deaths and resulting in the loss of approximately 2.9 million disability-adjusted life years (DALYs) (4). The global case fatality rate was reported at 6.85% (95% CI: 5.66, 8.03), with an incidence ranging from 0.1 to 975 cases per 100,000 people annually (5). Even though the world history of leptospirosis extends for more than 100 years, the first confirmed cases of leptospirosis were reported from Sri Lanka in 1959 from Colombo and Batticaloa Districts. They were diagnosed using serological methods (6). In 1991, leptospirosis was made a notifiable disease. Since

then, notification data shows a steady increase in reporting of leptospirosis cases over the last two decades (7). According to the Epidemiology Unit, the estimated annual reported incidence of leptospirosis in Sri Lanka is 5.4 cases per 100,000 population (3). In contrast, a systematic review conducted on leptospirosis in Sri Lanka revealed an estimated annual case load of 10,423 cases from 2008 to 2015, with a cumulative annual incidence requiring hospitalization of 52.1 cases (95% CI: 51.7, 52.6) per 100,000 individuals (8).

The Microscopic Agglutination Test (MAT) is the preferred method for diagnosing leptospirosis, enabling serological confirmation after the first week of illness (3). Treatment is often started during the first week and before confirmation, as this approach is more effective (9). Implementing secondary preventive strategies, such as early diagnosis and treatment is crucial for reducing morbidity and mortality associated with the disease. Additionally, healthcare-seeking behaviour plays a significant role in the success of these secondary prevention efforts.

The Health Belief Model suggests that an individual's decision to seek healthcare is shaped by their perceptions of risk, benefits, susceptibility and disease severity. In the case of leptospirosis in Monaragala District, Sri Lanka, the public needs to have a solid understanding of the disease to maintain a high level of awareness and avoid delays in obtaining medical care. Assessing the community's existing knowledge and attitudes toward leptospirosis is critical for developing effective strategies to shift perceptions. These initiatives can lead to improved health-seeking behaviours and ultimately enhance disease prevention and management.

Sri Lanka consists of 25 administrative districts, with Monaragala recognized as an endemic region for leptospirosis. In 2018, the Epidemiology Unit reported 5,257 suspected cases, of which 422 (8%) originated from this district. The disease burden was assessed based on laboratory-confirmed cases in

2019, resulting in an estimated burden of 44.9 DALYs per 100,000 population. Additionally, a significant portion of the population over 15 years of age is employed in agriculture, with 50% of males and 46% of females working in the sector, making it a suitable context for the current study (10). Despite its importance, evidence on health-seeking behaviour is limited in both global and national literature. This study aimed to assess the health-seeking practices of patients in the Monaragala District to inform future program planning.

Methods

This hospital-based, descriptive, cross-sectional study was conducted from November 2018 to June 2019. The study was carried out in all major hospitals of Monaragala District: District General Hospital, Monaragala and three base hospitals (Bibile, Wellawaya and Siyambalanduwa). The study population consisted of patients aged 15 years and older, admitted to medical wards and clinically diagnosed with suspected leptospirosis by a specialist physician. Notably, there were no reported cases of leptospirosis among individuals aged 0-9 years during the first quarter of 2018 (11), leading to the exclusion of children under 14 years from the study. If a patient suspected of having leptospirosis died after admission, they were also excluded from the study due to challenges in confirming the diagnosis.

The sample size was computed using a prevalence of 50%, precision of 5%, and significance level of 5%. The calculated sample size was 385. To account for a 15% non-response rate, the final sample size was rounded up to 450. Informed written consent, assent or proxy consent was obtained from the patients or their relatives. Data were gathered from patients' medical and laboratory records, focusing on sociodemographic, clinical and laboratory variables. Any patient seeking health care including general practitioners (GP), outpatient clinics or hospitals within three days of the onset of symptoms was considered to have presented 'timely' and any patient

who has taken more than three days in seeking health care was 'delayed' in health care seeking (12).

A pre-tested, interviewer-administered questionnaire, developed using modified Delphi technique, served as the primary data collection instrument. This tool included information on healthcare-seeking behaviour for leptospirosis, causes for delays in hospitalization and a checklist to monitor the status and laboratory results pertinent to the disease. Data collectors participated in a one-day training workshop to ensure proper administration of the questionnaire.

For the laboratory diagnosis of leptospirosis, blood samples were collected from the suspected leptospirosis patients and transported to the National Reference Laboratory (NRL) of Medical Research Institute by ambulance in a cool box. In case of delays, samples were refrigerated at +4 °C until dispatch. If a patient presented within five days of the illness to hospital, real-time polymerase chain reaction (rtPCR) was performed, and if later, MAT was performed (3). A confirmed case of leptospirosis was defined as a clinically suspected patient who has undergone laboratory testing to confirm the infection: PCR test for direct evidence of an active infection; and MAT for serological testing. The diagnosis was confirmed if the MAT titre was $\geq 1:320$, if there is a four-fold increase in antibody levels between acute and convalescent sera; or if seroconversion occurs, indicating a recent immune response to the infection (3).

The investigation reports were emailed to the relevant visiting physicians in the four hospitals as well as to the principle investigator (PI) to update the database. If MAT was $\geq 1:320$, another blood sample was taken at 7-10 days later to check the convalescent phase. The patients were requested to visit the injection room, show the diagnosis card and provide the convalescent blood sample for the investigation. The patients were advised based on the investigation reports via telephone by the PI.

Data analysis

Data analysis was done using the Statistical Package for Social Sciences (SPSS) version 21. Binary logistic regression was performed to assess the sociodemographic factors that were independently associated with health-seeking behaviour among patients. The dependent variable in the model was health-seeking behaviour, while the independent variables comprised a range of sociodemographic and accessibility factors. Adjusted odds ratios (AORs) with 95% confidence intervals (CI) were calculated.

Results

A total of 450 participants were included in the study, yielding a response rate of 82%. The majority of respondents (60%) were between 20 and 49 years of age. Agricultural workers represented the largest occupational group comprising 283 participants (62.8%). The sociodemographic characteristics of the study population are detailed in Table 1.

Table 1: Sociodemographic characteristics of the study population (N=450)

Characteristic	No.	%
Age (years)		
15 - 19	33	7.3
20 - 29	72	16.0
30 - 39	96	21.3
40 - 49	128	28.4
50 - 59	77	17.1
≥ 60	44	9.8
Sex		
Male	355	78.9
Female	95	21.1
Ethnicity		
Sinhala	427	94.9
Tamil	17	3.8
Muslim	6	1.3
Current marital status		
Unmarried	108	24.0
Married	319	70.9
Widowed	11	2.4
Separated/Divorced	12	2.7
Highest educational attainment		
Not attended school	33	7.3
Grade 1-5	82	18.2
Grade 6-11	114	25.3
GCE (O/L) passed ¹	139	30.9
GCE (A/L) passed ²	51	11.3
Graduate or higher	6	1.3
Not relevant/ still schooling	25	5.6
Current employment status		
Not employed	64	15.0
Legislators, senior officials and managers	0	0.0

Professionals	4	1.0
Technicians & associated professionals	5	1.3
Clerks & clerical support workers	11	2.9
Services & sales workers	33	7.3
Agricultural workers ³	283	62.8
Craft and related workers	7	1.8
Plant & machine operators and assemblers	6	1.5
Armed forces	37	8.2
Average monthly income (LKR)		
<50,000	96	21.3
50,000 - 99,999	307	68.2
≥100,000	18	4.0
Missing values	29	6.5

¹General Certificate of Education, Ordinary Level; ²General Certificate of Education, Advanced Level; ³cereal farmer, cotton farmer, potato farmer, rice farmer, skilled farm worker (field crops), sugar-cane grower (ISCO – 08)

More than half of the study participants (n=240; 53.3%) initially sought care from a GP as their first healthcare provider. A substantial proportion (43%) chose to visit a government hospital, while only 3.6% consulted Ayurvedic or other alternative healthcare providers. Regarding the timeliness of presentation, 23.9% of the laboratory-confirmed patients presented

to a healthcare institution within three days of symptom onset. In the non-respondent group, 15.2% sought timely care, whereas 84.8% had delayed presentation. Overall, 22.4% (n=101) of the study population were timely presenters, while 77.6% (n=349) sought care late (Table 2).

Table 2: Distribution of the study population according to laboratory confirmation status and timeliness of presentation

Timeliness of presentation	No. (%)				Total
	Investigation positive ¹	Investigation negative ²	Non-respondents ³	Others ⁴	
No delay	64 (23.9%)	22 (24.2%)	12 (15.2%)	3 (25.0%)	101 (22.4%)
Delayed	204 (76.1%)	69 (75.8%)	67 (84.8%)	9 (75.0%)	349 (77.6%)
Total	268	91	79	12	450

¹Clinically suspected case of leptospirosis with laboratory confirmed positive; ²Clinically suspected case of leptospirosis with laboratory confirmed negative; ³Clinically suspected case of leptospirosis with MAT (-) from the 1st sample and not provided the convalescent sample; ⁴Laboratory results inconclusive due to haemolysis

The most common reason for delayed hospital admission was the belief that symptoms were a normal consequence of their occupation (23.8%), followed by the perception that leptospirosis primarily affects paddy farmers (16.4%). Other

reasons included inadequate prophylaxis adherence, lack of awareness about the benefits of early treatment and insufficient updates from health authorities (Table 3).

Table 3: Main causes of delay for hospital admission among the study population (N=349)

Main cause of delay	No. *	%
Thought the symptoms were normal due to the nature of the occupation	107	23.8
Did not think of leptospirosis as I do not engage in paddy farming	74	16.4
Did not take prophylaxis properly as I thought the disease would not infect	30	6.7
Did not know that urgent medication would reduce the severity of the disease	27	6.0
We do not get regular updates from the health sector	26	5.8
Thought leptospirosis is not a deadly disease	15	3.3
Inappropriate healthcare-seeking	9	2.0
Did not think of leptospirosis as I am practising farming with precautions and using tricks to repel mice	9	2.0
Do not want to lose my daily income	8	1.8
Not aware of signs and complications of leptospirosis	7	1.6
Thought that resting at home would cure leptospirosis	7	1.6
Previous bad incidents related to healthcare institutions	7	1.6
Treated with Ayurvedic medication	6	1.3
Thought the signs were due to other chronic medical conditions	5	1.1
There were no rats around the premises, so I did not think of leptospirosis	4	0.9
Afraid of being hospitalized and blood investigations	3	0.7
Thought leptospirosis is a once in a lifetime disease	2	0.4
You need to take paracetamol for a few days before consulting a doctor if you have a fever	1	0.2
Though leptospirosis is a chronic disease even with medical treatment	1	0.2
No leave given from the workplace to go to the hospital	1	0.2

*101 patients were timely presented to healthcare providers/healthcare institution

Delay in reaching a healthcare facility was associated with a significantly higher likelihood of developing complications compared to timely presentations (OR=2.6; 95% CI: 1.16, 5.88; $p=0.01$) (Table 4). After adjusting for confounding factors, the source of infection (OR=3.64; 95% CI: 1.48, 8.98) was significantly associated with health-seeking behaviour. Goodness of fit of the model was satisfactory, with Cox and Snell R^2 of 8%, Nagelkerke R^2 of 13% and non-significant Hosmer-Lemeshow test ($\chi^2=3.23$; $df=8$; $p=0.92$).

Table 4: Complications based on the timeliness of presentation among confirmed leptospirosis patients

Timeliness of presentation	Complications present (n=63)		Complications absent (n=205)		Total	Odds ratio (95% CI)	Significance
	No.	%	No.	%			
Delayed	55	26.9	149	73.1	204	2.6 (1.16-5.88)	$\chi^2=5.66$; $df=1$ $p=0.01$
No delay (reference)	08	12.7	56	87.5	64	1.0	
Total	63	100.0	205	100.0	268		

Table 5: Socio-demographic factors associated with health-seeking behaviour in patients with leptospirosis

Associated factor	B	S.E.	Wald	df	Sig.	Adjusted OR	95% CI	
Age 15-44 years	0.15	0.38	0.15	1	0.69	1.16	0.55	2.45
Sex being a male	0.01	0.4	0.0	1	0.97	1.01	0.45	2.25
Nationality other than Sinhalese	-0.24	0.89	0.07	1	0.77	0.77	0.13	4.45
Being married	-0.25	0.37	0.44	1	0.5	0.77	0.37	1.62
Distance <3 km to the nearest hospital	-0.19	0.35	0.3	1	0.58	0.82	0.41	1.65
Mode of travel – public transport	-0.09	0.4	0.05	1	0.82	0.91	0.4	2.03
Cost of travel <LKR100.00	0.47	0.88	0.28	1	0.59	1.60	0.28	9.05
Monthly Income <LKR 50,000	0.75	0.52	2.11	1	0.14	2.13	0.76	5.93
Passed GCE (O/L) and above ¹	0.51	0.37	1.9	1	0.16	1.67	0.8	3.49
Time taken to travel to the nearest hospital <30 min	-1.67	1.05	2.52	1	0.11	0.18	0.02	1.47
Occupation other than a farmer	0.43	0.37	1.35	1	0.24	1.53	0.74	3.18
Source of infection other than a paddy field	1.29	0.46	7.9	1	0.0	3.64	1.48	8.98
Constant	2.1	0.78	7.16	1	0.0	8.23		

¹General Certificate of Education, Ordinary Level

Discussion

The findings from this study highlight significant delays in HSB among leptospirosis patients in the Monaragala district, Sri Lanka. Almost 78% delayed seeking healthcare within three days of symptom onset. This delay is serious, especially given the potential severity of leptospirosis, which can lead to multi-organ failure and death if not treated promptly.

In our study, we discovered that a substantial proportion of participants (53.3%) identified GPs as their primary point of contact. In contrast, a relatively small percentage sought care from Ayurvedic and other healthcare providers. However, only 43% of participants in our study reported utilizing government hospitals, despite the availability of free services. This discrepancy raises a critical question on what motivates villagers to favour private GPs over government hospitals. Understanding the factors behind this preference is essential for improving healthcare delivery in the region, highlighting the need for further research to explore these underlying influences.

Several factors contributed to the delay in hospital admission. The most common reason (23.8%) was the

misperception that symptoms are related to the nature of one's occupation, particularly among those engaged in agriculture. This suggests that many individuals did not recognize the symptoms of leptospirosis as serious or did not associate them with the disease, reflecting a gap in public awareness and understanding. Furthermore, 16.4% of patients did not seek care promptly because they believed that leptospirosis only affected individuals who engage in paddy farming. This finding underscores the need for targeted health education campaigns that correct misconceptions and emphasize that leptospirosis is not limited to farmers but can affect anyone exposed to contaminated environments. In line with our findings, another study (13) reported that only 25.1% of the sample demonstrated good healthcare-seeking behaviour for leptospirosis. The majority initially attempted to manage their symptoms with paracetamol and other home remedies (66.2%), while 33.6% sought medical attention on the first day of developing fever during paddy cultivation. These results highlight a common trend of delayed healthcare-seeking, underscoring the need for better awareness and education on the importance of prompt medical intervention in managing leptospirosis, particularly in agricultural communities.

Another significant factor was lack of awareness about the benefits of early treatment. The majority (6.0%) were unaware that early medical intervention could reduce the severity of the disease. This highlights the importance of strengthening health communication efforts, particularly regarding the advantages of prompt treatment and the potential for severe complications if left untreated.

Interestingly, a small percentage (2.0%) of patients sought treatment from Ayurvedic practitioners or relied on home remedies, which may have contributed to the delay in receiving appropriate care. This suggests a need for integrating traditional medicine practitioners into public health campaigns to ensure that they can guide patients toward timely medical interventions when necessary. Additionally, factors such as the lack of regular updates from the health sector (5.8%) and previous negative experiences with healthcare institutions (1.6%) further influenced delays in care-seeking behaviour. This indicates that improving patient trust in healthcare services and maintaining consistent health communication are vital components in encouraging timely healthcare-seeking behaviour.

The findings of this study highlight the critical role of timely healthcare-seeking behaviour in preventing complications associated with leptospirosis. Patients who delayed seeking medical attention were significantly more likely to develop complications compared to those who presented early, with an odds ratio of 2.6 (95% CI: 1.16, 5.88; $p=0.01$). This suggests that early diagnosis and intervention play a key role in reducing the severity of the disease. The higher prevalence of complications among delayed presenters (26.9%) compared to timely presenters (12.7%) underscores the importance of prompt recognition of symptoms and immediate access to healthcare facilities. In contrast, a higher proportion of timely-presented patients (87.5%) remained free of complications compared to those who delayed seeking care (73.1%), reinforcing the protective effect

of early medical intervention. These findings align with previous research emphasizing the need for improved public awareness, early detection strategies, and accessible healthcare services to mitigate the disease burden (14-15). Strengthening community-based education programs and ensuring timely referral systems could help reduce delays in seeking treatment, ultimately improving clinical outcomes in leptospirosis patients. According to the study, the source of infection accounted for 8% of health-seeking behaviour in the Monaragala district. Additionally, factors beyond the study's scope, including potential unknown influences, may also contribute to patients' health-seeking decisions in this region.

This study fills a critical gap in understanding health-seeking behaviour related to leptospirosis in Sri Lanka, where evidence on the subject is scarce. The findings underscore the importance of health education tailored to local contexts, particularly in endemic regions like Monaragala. Future interventions should focus on raising awareness about the symptoms of leptospirosis, the importance of early treatment, and the broader risks associated with delaying care. Additionally, improving access to healthcare and addressing the socioeconomic factors that hinder timely healthcare-seeking behaviour, such as concerns about income loss, could further enhance disease outcomes.

Conclusions & Recommendations

The study provides valuable insights into the factors that influence health-seeking behaviour in the context of leptospirosis in Sri Lanka. To reduce morbidity and mortality from this disease, public health programs should prioritize early diagnosis and treatment, as well as strengthen communication strategies to dispel misconceptions and encourage timely healthcare-seeking behaviour.

Public Health Implications

- The research underscores significant healthcare-seeking behaviour challenges for leptospirosis in Monaragala District.
- Targeted education campaigns are essential for raising awareness of symptoms and the need for early treatment, particularly among high-risk agricultural workers.
- Improving access to specialized care and training healthcare workers in endemic areas could further reduce delays caused by symptom misattribution.
- Additionally, community-based surveillance and outreach efforts would support early detection, promoting timely healthcare-seeking and better disease control in rural communities.

Author Declarations

Competing interests: The authors declare that they have no competing interests.

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Author contributions: PK was involved in designing and implementing the study, conducting statistical analysis and drafting the paper; JV and JA served as supervisors, providing technical guidance and overall supervision; LK provided expert opinion on laboratory confirmation of leptospirosis.

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