



## Knowledge Regarding Leptospirosis among Farmers in a Selected Medical Officer of Health Area in Ratnapura District, Sri Lanka

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### Abstract

The impact of leptospirosis is huge since it causes high morbidity and mortality, while it remains a neglected disease due to a lack of knowledge and gaps in using preventive measures. The present study aimed to assess the knowledge regarding leptospirosis among paddy farmers in the Weligepola MOH area in Ratnapura district, Sri Lanka. A descriptive cross-sectional study was conducted among 344 paddy farmers from selected five Grama Niladari divisions in the Weligepola MOH area. A content-validated, interviewer-administered questionnaire to assess farmers' knowledge and their characteristics. As revealed, almost all participants (99.1%) were ever heard about leptospirosis. Mean $\pm$ SD overall knowledge of leptospirosis was 58.32 $\pm$ 13.74, and only 52.6% of participants had good knowledge on leptospirosis while others did not. Though farmers are adequately aware of preventive methods and sources of infection, their knowledge regarding mode of transmission, reservoirs, initial symptoms, and the organs affected by leptospirosis has yet to be improved. Even though almost all the farmers had heard about Doxycycline (98.5%), only 65.9% of farmers used it. Study findings reveal some knowledge gaps. Therefore, the present study underscores the importance of implementing regular education programmes on leptospirosis among farmers in this community widely.

**Keywords:** Leptospirosis; farmers; knowledge; Weligepola; Sri Lanka

### Introduction

Leptospirosis is a re-emerging zoonotic infectious disease that can be caused by *Leptospira* interorgan. More commonly, *Leptospira* lives in proximal renal tubules of host animals like livestock, wild animals, and domestic pets, and they excrete this *Leptospira* with urine (Warnasekara et al., 2019). Leptospirosis occurs in diverse epidemiological settings globally. Now, it is considered a health threat in humans due to increased morbidity and mortality (Nozmi et al., 2018).

Humans can get leptospirosis by direct and indirect contact with contaminated soil, water, and host animals' urine and tissues. High incidence of leptospirosis can be caused by various factors such as frequent rainfalls, human activities, climate change, a high number of host animals, and frequent floods. Especially, flooding was highlighted as a main factor of leptospirosis transmission in Asian countries (Nozmi et al., 2018; Ehelepola et al., 2019).

Environmental and occupational determinants also influence the leptospirosis. Furthermore, occupations such as paddy farmers, laborers, military, and health care workers have a high chance of getting leptospiral infection (Azfar et al., 2018). The disease has a wide clinical spectrum ranging from asymptomatic to hemorrhagic phenomena. Nonetheless, it can be developed up to life-threatening complications such as multi-organ failure (Weil's disease) and even death. Other than that, it can be acute kidney injury,

myocarditis, pulmonary hemorrhage, or acute respiratory distress syndrome (Nisansala et al., 2019).

Leptospirosis is a notifiable disease in Sri Lanka, and most people call this disease “rat fever.” It is reported as the leading cause of mortality from common infectious diseases in Sri Lanka. According to a study in 2019, the fatality ratio of leptospirosis was 6.85%, of which 30–60% of cases were leading to complicated forms of leptospirosis (Fonseka et al., 2019). Out of all districts in Sri Lanka, Ratnapura is the most affected area for leptospirosis, accounting for 1245 cases during the year 2019 (Annual Health Bulletin, 2029). An observation of leptospirosis cases in Sri Lanka from 2010 to 2016 shows that the highest number of reported cases occurred in the Ratnapura district, making it the most affected district, followed by Kurunegala, Gampaha, and Kalutara (Gnanapragasam, 2017). More importantly, in 2019, there were 24 notified hospital admissions reported in the Weligepola MOH area due to leptospirosis. Moreover, in the first half of the year 2020, there were 12 notified cases found in the Weligepola area, emphasizing the need to set priority for immediate intervention.

As shown by Mathanamohan et al. (2020), there is a considerable delay in patient recognition in the early stages due to a lack of knowledge about the disease condition among people. As reported in previous studies, knowledge gaps existed about the disease condition in the community (Mathanamohan et al., 2020; Adhikari et al., 2020). As documented by Agampodi et al. (2010), knowledge about chemoprophylaxis among the general population was unsatisfactory. Thus, it is important to know the existence situation of knowledge among farmers considering the high prevalence of leptospirosis and its’ harmful outcomes towards farmers. Therefore, the present study was aimed at assessing the level of knowledge regarding leptospirosis among paddy farmers in the Weligepola MOH area.

## **Methods:**

### **Study design and setting**

This was a quantitative descriptive cross-sectional

study conducted in five Grama Niladari divisions in the Weligepola MOH area.

### **Study sample**

A total of 344 paddy farmers were included in the study. These farmers were selected using the simple random sampling technique from five out of 30 Grama Niladari divisions in the Weligepola MOH area. Farmers were aged between 18 and 80 years in both genders were included for the study. Acutely ill and cognitively impaired farmers were excluded from the study.

### **Study Instrument**

An interviewer-administered questionnaire was used to collect data for the study. It was developed by referring to literature and was comprised of three main sections. Section A included a socio-demographic profile of the farmers, including age, working status, nature of farming, education status, and monthly income; Section B was comprised of questions assessing farmers’ knowledge on leptospirosis, occupational hazards, vectors, initial symptoms, and complications. Response categories of questions on knowledge were “yes,” “no,” and “don’t know.” The questionnaire was developed in English and translated into Sinhala. The content validity of the instrument was ensured by two experts in community health and research, and necessary modifications were made by incorporating their suggestions. In order to improve the clarity of the instrument, it was pre-tested among 10 farmers who were selected from another Grama Niladari division, and they were not included in the study.

### **Data collection**

Data were collected by investigators during the months of September and October 2020 after obtaining permission to access the community from the Regional Director of Health Service, Ratnapura, and Medical Officer in Charge, Weligepola MOH area. The questionnaire was administered by home visits and around 15-25 minutes were spent to complete a

questionnaire.

### Ethical Considerations

The ethical clearance for the study was obtained from the Ethics Review Committee of Sabaragamuwa University. Data were collected from the participants who volunteered for the study, and written informed consent was obtained from all the participants prior to their participation. Anonymity and confidentiality of the participants were ensured, and the right to withdraw from the participant was granted at any point. Compensation was not provided for any participant.

### Data Analysis

Data were analyzed using SPSS version 25. All continuous variables were described using mean and standard deviation (SD), whereas the categorical data were presented as frequencies (%). To determine the mean±SD of knowledge, responses were re-categorized as yes = 1, no = 0, and don't know = 0 and transformed into percentage scores by dividing the scores and multiplying by 100. A higher percentage of knowledge scores denotes good knowledge. Mann–Whitney U test and Kruskal–Wallis test were performed to examine the association between knowledge and participants' characteristics. Significance was accepted at  $p < 0.05$ .

### Results

A total of 344 farmers participated in the present study. The response rate was 100%.

#### Socio-demographic characteristics of the participants

Participants' characteristics are shown in Table 1. Most of the sample were males ( $n = 246$ ) and age  $< 65$  years (85.4%,  $n = 294$ ). More than 40% of the sample participants were qualified with the O/L examination.

**Table 1.** Socio-demographic characteristics of the study sample ( $N=344$ )

Characteristics	Category	n(%)
Sex	Male	246(71.5)
	Female	98(28.5)
Age (in years)	18-35	50(14.5)
	36-50	120(34.9)
	51-65	124(36)
	66-80	50(14.5)
Education	No school education	9(2.6)
	Primary education	76(22.1)
	Up to grade 10	111(32.3)
	O/L qualified	110(32)
	A/L qualified	32(9.3)
	Diploma	3(0.9)
Civil status	Graduate	3(0.9)
	Single	25(7.3)
	Married	318(92.4)
	Divorced	1(0.3)

**Table 2.** Participants' knowledge on leptospirosis based on domains ( $N=344$ )

Domains of knowledge	Mean %	SD
Mode of transmission	60.03	22.53
Reservoirs	26.72	19.12
Source of infection in animals	72.97	30.40
Initial symptoms	51.24	26.23
The organs affected by leptospirosis	37.33	33.61
Preventive methods	85.55	18.27
Actions taken when get fever	74.46	12.80

#### Participants' knowledge on leptospirosis

As revealed, almost all farmers (99.1%,  $n = 341$ ) have ever heard about leptospirosis. Farmers' knowledge of leptospirosis was assessed on seven domains, including mode of transmission, reservoirs, source of animals, initial symptoms, the organs affected by

leptospirosis, preventive methods, and actions taken when getting fever. Summary findings of the above aspects are shown in Table 2. Accordingly, participants have relatively higher knowledge regarding preventive methods (mean = 85.55%), actions that should be taken when getting fever (mean = 74.46%), and source of infection in animals (72.97%). However, very low level of knowledge was found regarding reservoirs of the disease (mean 26.72%). Even though most of the farmers had ever heard about Doxycy-

cline (98.5%), only 65.9% of them used Doxycycline as a chemoprophylaxis to prevent leptospirosis.

Mean±SD overall knowledge of leptospirosis was 58.32±13.74. Knowledge was categorized as good and poor considering its mean value. Accordingly, only 52.6% of participants (n = 181) had good knowledge of leptospirosis, while others did not.

**Table 3.** Participants' knowledge on leptospirosis based on categories

Category	n	%	Mean	SD
good knowledge	181	52.6	68.71	7.11
poor knowledge	163	47.4	46.66	9.33

**Participants' knowledge on mode of transmission of leptospirosis**

Figure 1 presents the findings regarding the participants' understanding of the mode of transmission of leptospirosis. Accordingly, most of the participants had good knowledge (> 70%) on exposure to water contaminated with bacteria, and bacteria can enter the body via foot cracks, skin wounds, and mucosal contact. However, very low knowledge was found regarding the possibility of transmitting the infection via blood transfusion (24.1%).

**Participants' knowledge on infection source of leptospirosis**

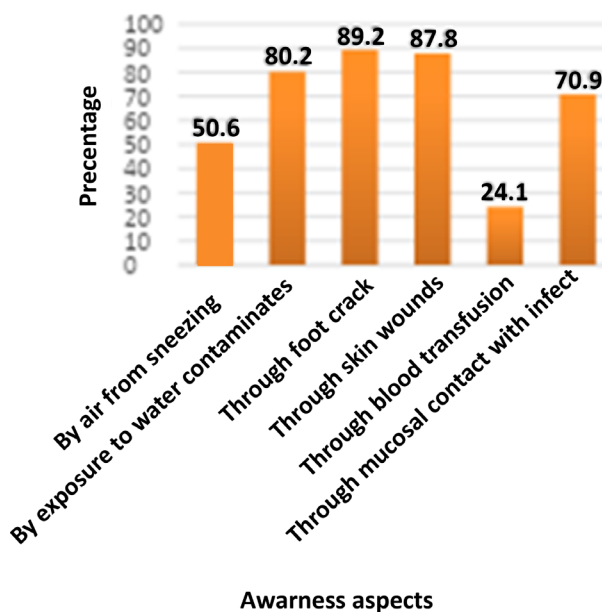
Participants' knowledge on sources of infection with leptospirosis is shown in Figure 2. Accordingly, most of the participants were aware of the main infection source of leptospirosis as urine (91%) and stool (86.9%).

**Participants' knowledge on signs and symptoms of leptospirosis**

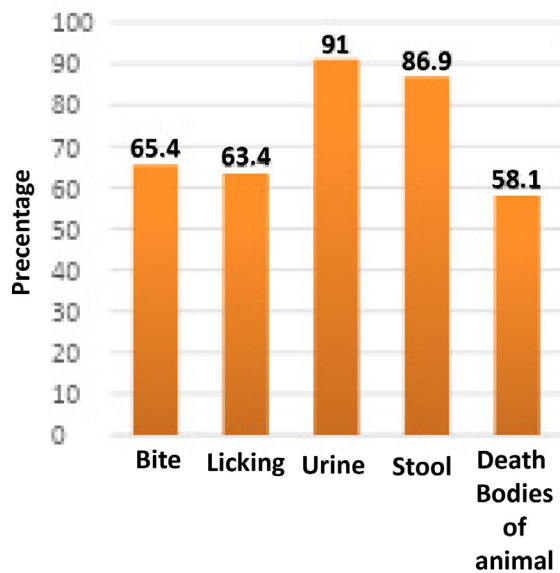
Figure 3 shows participants' knowledge regarding signs and symptoms of leptospirosis. As revealed, they have higher knowledge on some of the main symptoms of leptospirosis, including fever (95.3%),

headache (87.2%), muscle aches (86.6%), and joint pain (74.7%). Their knowledge on other signs and symptoms was average or lower than the average.

In addition, most participants identified rats (98.8%) and other rodents (73.5%) as the main vectors of leptospirosis. Other vectors were identified as possible, such as bats (26.7%) and pigs (24.4%). a minority of farmers.

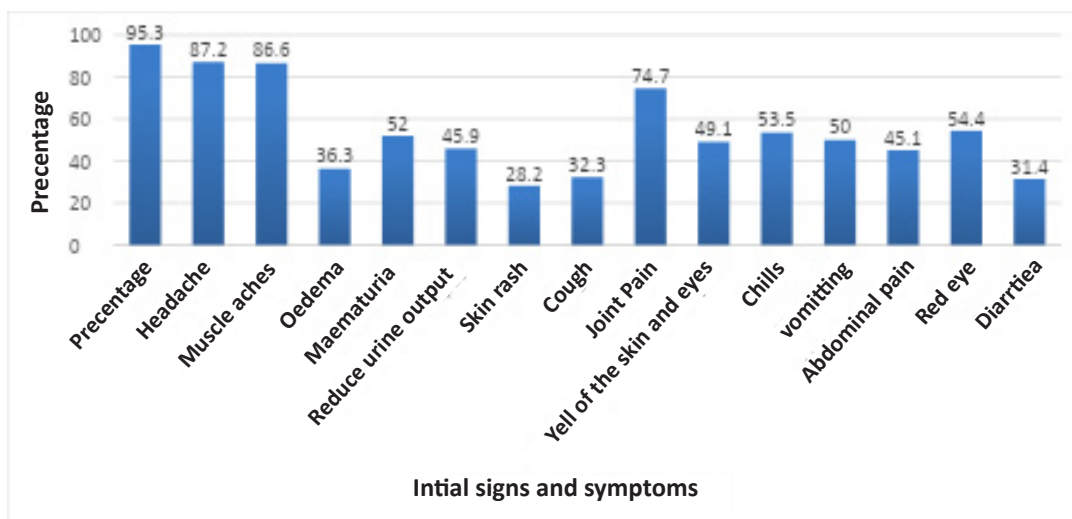


**Figure1.** Participants' knowledge on mode of transmission of leptospirosis



### Source infection

**Figure 2.** Participants' knowledge on source of infection of leptospirosis



**Figure 3.** Participants' knowledge on signs and symptoms of leptospirosis

### Discussion

For many years, the rising morbidity and mortality of leptospirosis have placed a significant burden on healthcare costs. It is considered one of the preventable communicable diseases through raising knowledge and improving preventive practices. The present study indicates important findings regarding knowledge of leptospirosis among farmers in the Weligepola MOH area in Ratnapura district. The study demonstrates that farmers' overall knowledge on

### Relationship between overall knowledge and participants' characteristics

There was no relationship between participants knowledge and their demographic variables, including age, sex, marital status, educational status, and income ( $p > 0.05$ ). However, there was a relationship between their knowledge and Doxycycline use. Overall knowledge was found to be significantly higher among participants who used Doxycycline as a prophylaxis than non-users (mean $\pm$ SD 62.53 $\pm$ 15.21 vs 55.71 $\pm$  14.13,  $p = 0.002$ ).

Leptospirosis is unsatisfactory, ranging from 58.32 to 13.74, with half of the sample revealing poor knowledge. Despite almost all farmers (99.1%,  $n = 341$ ) having heard about this disease condition, which is mostly prevalent in their living area, their low knowledge suggests that they may not have received proper information about the disease condition.

The present study revealed that farmers possessed a greater understanding of leptospirosis preventive methods, as well as the mode of transmission and



the source of infection. A recent cross-sectional study among farmers in the Colombo district reported consistent findings. The study also demonstrated a satisfactory level of knowledge in several important areas, such as the method of transmission, symptoms, complications, and preventive measures of leptospirosis (Mathanamohan et al., 2020). According to an earlier study, most respondents were unaware of the modes of transmission, which include contaminated water and direct contact with the urine of infected animals (Agampodi et al., 2010). Compared to recent studies, the understanding of the modes of transmission has improved over time.

Though farmers need to be more aware about important areas such as reservoirs of infection, present findings indicated notably poor knowledge in this important aspect. The animal species are the main reservoirs of this spirochete, and the role they play in infecting humans is very important (Soo et al., 2000). The present study, like studies elsewhere, primarily restricted knowledge on reservoirs to rats and other rodents. For instance, a study in Argentina has reported rats and mice (79.8%) as main animal hosts (Ricardo et al., 2018). Our present finding is not surprising, as leptospirosis was traditionally known as the rat fever for a long time in Sri Lanka (Agampodi et al., 2010).

Knowing about the signs and symptoms of leptospirosis is a key point in the prevention of lethal complications of the disease since it enables the victims to seek early treatment. A retrospective multi-center study found that headaches, vomiting, jaundice, and shortness of breath, along with hematological and biochemical markers, are linked to a confirmed diagnosis of leptospirosis (Nisansala et al., 2019). A previous study conducted in Malaysia highlighted fever, overmyalgia, and jaundice as mostly identified signs and symptoms (Nozmi et al., 2018; Abdullah et al., 2019).

As noted in the present study, farmers' knowledge on organs affected by leptospirosis was found to be inadequate. Since leptospirosis gravely affects the

human body by altering the functions of the organs, knowing about affecting organs is important. It undoubtedly helps individuals to take preventive measures, and for early identification of the disease and directing to seek for treatments of leptospirosis. Further, Nisansala et al. (2019) has reported acute kidney injury as the predominant complication observed among patients diagnosed for leptospirosis. Doxycycline widely used as a chemoprophylaxis throughout the country among high-risk groups of leptospirosis (Fonseka et al., 2019). As found in the present study almost all farmers had heard about Doxycycline. Consistent findings were reported in previous study by Agampodi et al. (2010). Knowledge gaps found in present study highlighted the importance of raising awareness regarding the disease condition for prevention of the disease and promote seeking for early treatments among high-risk group of leptospirosis (Mathanamohan et al., 2020).

#### **Limitations**

This study has several limitations. The study was conducted in the Weligepola MoH area within the Ratnapura district, thereby limiting the generalizability of the results to the entire Ratnapura district or to Sri Lanka. Additionally, the use of an interviewer-administered questionnaire may have introduced response bias.

#### **Conclusions**

This study has shown that the level of knowledge about leptospirosis among farmers in the Weligepola MOH area in Ratnapura district remains low. Despite farmers' adequate awareness of preventive methods and animal infection sources, their understanding of the mode of transmission, reservoirs, initial symptoms, and the organs affected by leptospirosis remains inadequate. Therefore, the present study underscores the importance of implementing regular leptospirosis knowledge widely among farmers and other high-risk groups at the community level.

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