EPIDEMIOLOGY OF HUMAN LEPTOSPIROSIS IN COLOMBIA

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Abstract

Leptospirosis is an emerging acute zoonotic infection caused by bacteria of the genus Leptospira, with a high prevalence in tropical and subtropical countries. According to the Ministry of Public Health's database on leptospirosis cases during the years 2023-2020, the year with the highest number of reported cases was 2022 with 240 cases, followed by 2023 with 222 cases. Regarding gender, the highest number of leptospirosis cases reported during the study period was male, and the average age was between 29 and 39 years. The department with the highest number of cases reported in 2023 was Antioquia with 38 cases, followed by Tolima, Bogotá, Santander, and Cundinamarca. In 2022, the department with the highest number of cases was Huila, followed by Antioquia, Tolima, Santander, and Risaralda. While in 2021 and 2020, the department with the highest incidence was Antioquia, followed by Tolima and Bogotá. The occurrence of leptospirosis is significantly associated with several host characteristics, such as male gender and working age group; social and environmental determinants remain the main variables.

Keywords: Leptospirosis, Zoonosis, Reservoirs, Bacteria

INTRODUCTION

Leptospira spp. (order: Spirochaetales, family: Leptospiraceae) is a bacterial genus comprising long, thin, flexible Gram-negative spirochetes (Silva et al, 2024), it is currently subdivided into 69 genomic species, including saprophytic or pathogenic bacteria, infections in humans are caused by eight pathogenic species, which are divided into at least 26 serogroups, currently, the members of the genus are predominantly L. kirschneri and L. interrogans, (Harran et al, 2024).

Leptospirosis is an emerging acute zoonotic infection caused by Gram-negative spirochetal bacteria of the genus Leptospira (Susana et al., 2025). It is present on all continents except Antarctica (Susana et al., 2025). It is highly prevalent in tropical and subtropical countries, where temperature and humidity favor its persistence in the environment (Muniz et al., 2024). This infectious disease affects a wide range of animals, including domestic animals and wildlife, such as mice, rats, horses, cows, pigs, dogs, sea lions, cats, and also humans (Chou et al., 2025). The brown rat, Rattus norvegicus, is the main reservoir (Hong et al., 2025; Souza et al., 2023).

Humans become infected through direct contact with Leptospira-contaminated urine or indirectly through contact with contaminated soil, water, or infected animals. Most cases occur in young adults between the ages of 20 and 40, with men being more affected than women (Chou et al., 2025). The manifestation of human leptospirosis can range from asymptomatic to very severe or life-threatening (Phuong et al., 2022). Leptospirosis resembles a variety of illnesses, including influenza, dengue fever, hanta fever, rickettsial diseases, and other viral hemorrhagic diseases, making leptospirosis infections difficult for medical professionals to identify (Farman et al., 2024). It frequently affects the kidneys, with blood urea and creatinine levels. Urinalysis can detect protein, white blood cells, and microscopic hematuria (Farman et al., 2024). Ninety percent of clinical illnesses begin as nonspecific acute febrile illnesses, while 10% develop into severe, life-threatening illnesses, ranging from self-limited anicteric febrile illness with or without meningitis to pulmonary hemorrhage syndrome and a severe, life-threatening condition known as Weil's syndrome, characterized by hemorrhage, kidney failure, and jaundice, associated with high mortality (Silva et al., 2023). Pregnancy-related leptospirosis can cause fetal problems, including stillbirth or abortion (Farman et al., 2024).

The immune phase of the disease typically lasts 4 to 30 days. The disappearance of leptospires from the blood and cerebrospinal fluid coincides with the appearance of IgM antibodies. The organisms can be detected in almost all tissues and organs, and in urine for several weeks, depending on the severity of the disease (Gutiérrez et al., 2024). Early detection of leptospirosis serves as a gateway to effectively manage the

infection and control its spread. However, diagnosis remains a challenge because currently available tests are expensive, time-consuming, require technical expertise or sophisticated equipment, and are not available in most leptospirosis-endemic areas (Clemente et al., 2022). Currently, the microscopic agglutination test (MAT) is the reference method for the detection of serogroup-specific antibodies against leptospires, although MAT requires a lot of time and the maintenance of a collection of live antigens, it remains the most widely used tool for epidemiological studies and diagnosis in humans (Saraullo et al, 2024).

According to the World Health Organization (WHO), there are more than 500,000 cases of leptospirosis worldwide annually by 2024. It is a disease with epidemic potential, primarily following heavy rains or flooding. Outbreaks have been reported in Brazil, Nicaragua, Guyana, and several other Latin American countries; although cases have been reported in most countries in the Americas.

In Colombia, 85% of the Colombian national territory is made up of tropical and subtropical ecosystems, which highlights the relevance of tropical diseases for the country's population and visiting foreigners (Silva et al, 2024). The disease is considered a mandatory and individual notification event to the National Surveillance System (SIVIGILA) since 2007. During 2023, 7,818 cases were reported, according to the type of case, 5,722 (73%) were classified as suspected, 1,868 (23.8%) were ruled out, and 228 (2.8%) were laboratory confirmed (MAT test with four-dilution seroconversion), presenting a national incidence of 0.44 cases per 100,000 inhabitants. According to the territorial entities, the regions of Amazonas, Antioquia, Caldas, Cartagena, Chocó, Córdoba, Guaviare, Huila, Risaralda, Santander and Tolima (National Health Institute, 2024).

METHODOLOGY

A search was conducted in the Ministry of Health database during the years 2023, 2022, 2021, and 2020.

RESULTS

Case Reports by Year

From the Ministry of Public Health's database on leptospirosis cases during the years 2023-2020, it can be said that the year with the highest number of reported cases was 2022 with 240 cases, followed by 2023 with 222 cases, while the year with the fewest reported cases was 2020 with 32 cases.

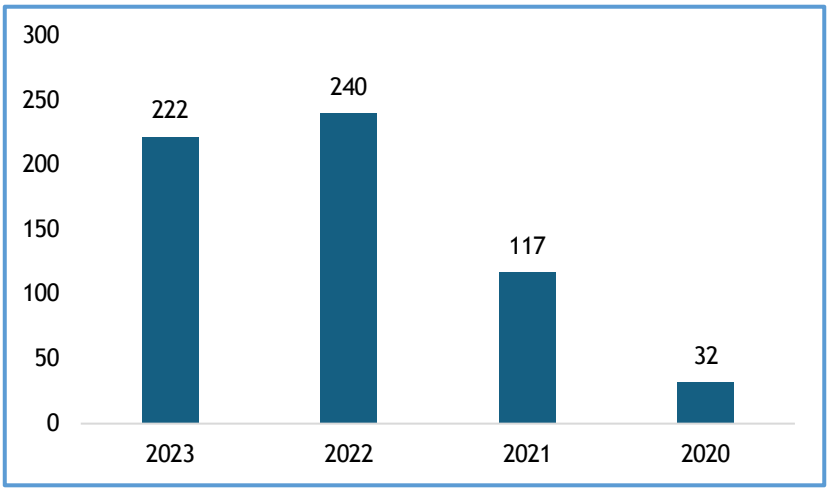

Figure 1: Number of cases per year

Sociodemographic Factors

Regarding gender, the highest number of leptospirosis cases reported during the study period was male, and the average age was between 29 and 39 years.

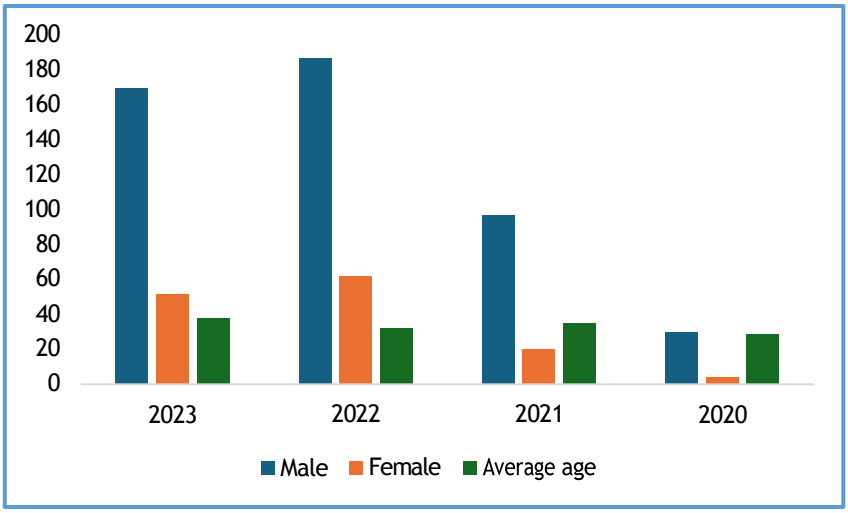

Figure 2: Sociodemographic factors associated with leptospirosis

Departments with Leptospirosis Cases

The department with the highest number of cases in 2023 was Antioquia with 38 cases, followed by Tolima, Bogotá, Santander, and Cundinamarca. In 2022, the department with the highest number of cases was Huila, followed by Antioquia, Tolima, Santander, and Risaralda. In 2021 and 2020, the department with the highest number of cases was Antioquia, followed by Tolima and Bogotá.

Table 1. Number of cases of leptospirosis per year

	2023	2022	2021	2020
	Number of cases	Number of cases	Number of cases	Number of cases
Antioquia	38	26	13	9
Tolima	30	26	8	8
Bogotá	25	16	9	3
Santander	16	20	8	4
Cundinamarca	14	9	3	0
Huila	14	33	8	1
Córdoba	11	5	7	1
Bolívar	10	13	3	2
Atlántico	8	11	5	0
Caldas	8	10	3	1
Valle	7	13	5	2
Risaralda	7	15	8	1
Sucre	4	3	4	0
Boyacá	4	6	3	2
Choco	4	2	1	1
Meta	3	0	0	0
Cauca	3	0	1	0
Amazona	3	1	0	0
Magdalena	2	4	1	0
Quindío	2	4	3	0
Norte de Santander	2	5	4	0
Guaviare	2	3	1	0
Vaupés	1	0	13	0
Cesar	1	6	2	0
Casanare	1	2	1	0

Arauca	1	2	0	0
Nariño	1	4	3	0

DISCUSSION

The first step in the pathogenesis of leptospirosis is the penetration of tissue barriers to enter the organism. Possible routes of entry include the skin through a cut or abrasion and the mucous membranes of the conjunctiva or oral cavity. The importance of the oral mucosa as an entry route is demonstrated by various studies that have shown that ingestion while swimming in contaminated water is a risk factor for infection (Haake, 2015). According to previous studies, it is estimated that more than 500,000 human cases of leptospirosis occur worldwide each year (Sarabandi et al., 2025). In recent years, the risk of leptospirosis outbreaks has increased markedly due to global warming and extreme weather events, particularly floods (Wang et al., 2025).

In Colombia, the years with the highest number of cases reported by the Ministry of Health were 2022 with 240 cases and 2023 with 2022 cases, possibly due to the increase in human activities, such as agriculture, environmental manipulation, urban development and transportation of materials, which have a significant impact on the terrestrial environment and the distribution of pathogenic organisms such as Leptospira spp. (Sato et al., 2025). The increase in notifications can be explained by the implementation of public health surveillance for leptospirosis and by the winter period associated with the La Niña climatic phenomenon that occurred in the country.

Regarding sex, males were the most affected during the study, possibly due to what was suggested by Notobroto et al, 2021, as a result of an epidemiological investigation by the Ponorogo District Health Office showed that cases of leptospirosis were frequently detected in farmers (60.5%), ranchers and sand miners in rivers (17.4%), activities that are frequently carried out by men, similar results were reported by Jacomelli et al, 2023.

Regarding age, the affected individuals in the present study ranged in age from 29 to 38 years. Similar results were presented in the study by Notobroto et al., 2021, where the majority of cases were men of productive age between 30 and 55 years old.

Leptospirosis remains a major global public health problem, especially in regions with hot and humid climates (Sandoval et al., 2025). In Colombia, reporting the disease to the National Public Health Surveillance System has been mandatory since 2007. The leading departments in terms of the number of reported cases are Antioquia, Tolima, Bogotá, Santander, and Cundinamarca. These departments are heavily involved in

agriculture and livestock farming, with high rainfall throughout most of the year. These factors favor the prevalence of leptospirosis (Notobroto et al., 2021).

CONCLUSION

The occurrence of leptospirosis is significantly associated with several host characteristics, such as male gender and working-age group. Social and environmental determinants remain the main variables, such as low educational levels and ineffective rodent, wastewater, and garbage management.

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