



## Prevalencia y factores de riesgo de leptospirosis canina en una población de la provincia de El Oro

*Prevalence and risk factors for canine leptospirosis in a population of the El Oro province*

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**Palabras claves:**

Leptospira,  
zoonosis,  
salud pública  
veterinaria,  
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**Resumen**

**Introducción:** La leptospirosis canina, es una enfermedad zoonótica que genera creciente preocupación a nivel mundial y, en el Ecuador ha registrado un incremento de casos potenciales en diversas provincias. Por la cual la realización de esta investigación surge ante la ausencia de información detallada sobre la leptospirosis en la ciudad de Santa Rosa, provincia de El Oro, lo cual constituye una limitación significativa para diseñar intervenciones adaptadas a nivel local, esto unido a la falta de estrategias específicas para esta área, son factores que motivaron la ejecución de este estudio con el propósito de identificar tanto la prevalencia de la enfermedad como los factores de riesgo asociados. **Objetivos:** El objetivo principal de este estudio fue determinar la prevalencia de la leptospirosis canina mediante la detección de anticuerpos IgM e IgG en perros, así como identificar los factores de riesgo asociados en la ciudad de Santa Rosa, provincia de El Oro, durante los meses de junio a septiembre de 2023. Para lograr este propósito, se buscó establecer la prevalencia de la infección aguda de leptospirosis canina mediante la detección específica de anticuerpos IgM, así como evaluar la presencia de anticuerpos IgG relacionados con la enfermedad. Además, se llevaron a cabo investigaciones para identificar los factores de riesgo que contribuyen al desarrollo de la leptospirosis canina y sus posibles complicaciones. **Metodología:** Este estudio adopta un enfoque observacional descriptivo transversal, utilizando pruebas serológicas de Inmunocromatografía IgM e IgG en una muestra de 60 perros en la ciudad de Santa Rosa, provincia de El Oro. La selección de los participantes se llevó a cabo por conveniencia, considerando aquellos con sintomatología sugestiva o factores de riesgo vinculados a la leptospirosis. Además de las pruebas serológicas, se complementó la investigación con encuestas a los propietarios con el objetivo de identificar los factores de riesgo predominantes. **Resultados:** Este estudio reveló que el 5% de la población canina evaluada en Santa Rosa, El Oro, Ecuador, mostró anticuerpos IgM, indicando infecciones agudas de leptospirosis canina. Sin embargo, no se detectaron anticuerpos IgG, señalando la ausencia de infecciones pasadas. La mitad de los perros estaban vacunados, pero el contacto con

roedores alcanzó un preocupante 75%. Las condiciones ambientales desfavorables, como viviendas con techos de paja y pisos de tierra, sugieren posibles facilitadores de la enfermedad. Estos resultados resaltan la necesidad de estrategias preventivas enfocadas en la reducción del contacto con roedores y la mejora de las condiciones ambientales en la región. **Conclusiones:** Se identificó una presencia modesta (5%) de infecciones agudas; sin embargo, se destaca la necesidad de implementar estrategias preventivas. La ausencia de infecciones pasadas sugiere una vía de investigación clave. Factores de riesgo, como el contacto elevado con roedores y condiciones ambientales desfavorables, indican áreas críticas para intervenciones específicas. En conjunto, este estudio no solo cuantifica la prevalencia y los factores de riesgo, sino que también establece un precedente valioso para futuras investigaciones y estrategias de control en la región. **Área de estudio general:** Medicina Veterinaria. **Área de estudio específica:** Enfermedades Infecciosas **Tipo de Estudio:** Estudio Observacional Descriptivo Transeccional.

**Keywords:**

Leptospira,  
zoonosis,  
veterinary public  
health, disease  
surveillance,  
Ecuador

**Abstract**

**Introduction:** Canine leptospirosis is a zoonotic disease that is of growing concern worldwide. In Ecuador, there has been an increase in potential cases in various provinces. This research is conducted in response to the lack of detailed information on leptospirosis in the city of Santa Rosa, province of El Oro. This constitutes a significant limitation for designing locally tailored interventions. The absence of specific strategies for this area further motivated the execution of this study with the aim of identifying both the prevalence of the disease and associated risk factors. Objectives: The main objective of this study was to determine the prevalence of canine leptospirosis by detecting IgM and IgG antibodies in dogs, as well as to identify associated risk factors in the city of Santa Rosa, province of El Oro, during the months of June to September 2023. To achieve this purpose, the prevalence of acute canine leptospirosis infection was sought by specifically detecting IgM antibodies, and the presence of IgG antibodies related to the disease was evaluated. Additionally, investigations were carried out to identify risk factors contributing to the development of canine

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leptospirosis and its potential complications. **Methodology:** This study adopts a descriptive cross-sectional observational approach, using IgM and IgG immunochromatography serological tests in a sample of 60 dogs in the city of Santa Rosa, province of El Oro. Participant selection was conducted for convenience, considering those with suggestive symptoms or risk factors linked to leptospirosis. In addition to serological tests, the research was complemented with surveys to the owners aimed at identifying predominant risk factors. **Results:** This study revealed that 5% of the canine population evaluated in Santa Rosa, El Oro, Ecuador, exhibited IgM antibodies, indicating acute infections of canine leptospirosis. However, IgG antibodies were not detected, signifying the absence of past infections. While half of the dogs were vaccinated, the worrying finding was a 75% contact rate with rodents. Unfavorable environmental conditions, such as homes with thatched roofs and dirt floors, suggest potential facilitators of the disease. These results underscore the need for preventive strategies focused on reducing rodent contact and improving environmental conditions in the region. **Conclusions:** A modest presence (5%) of acute infections was identified, emphasizing the need for preventive strategies. The absence of past infections suggests a key avenue for further investigation. Risk factors, such as high contact with rodents and unfavorable environmental conditions, highlight critical areas for specific interventions. Overall, this study not only quantifies prevalence and risk factors but also establishes a valuable precedent for future research and control strategies in the region.

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## Introduction

Canine leptospirosis, a zoonotic bacterial disease, represents a significant public and veterinary health concern in various regions of the world due to its morbidity and mortality.(1)In this context, an increase in potential cases has been observed in different provinces of Ecuador.(2). According to(3),Scientific background supports the need to address this problem, highlighting the importance of understanding the prevalence and associated risk factors to implement effective prevention and control strategies.

The relevance of this study lies in the lack of detailed information on the specific situation of canine leptospirosis in Santa Rosa, which limits the ability to design interventions tailored to local needs. As suggested by(4),|The presence of the disease in domestic animals not only threatens their well-being, but also poses risks to public health, given its potential zoonotic nature.

The scientific problem guiding this research focuses on the lack of updated and contextualized data on canine leptospirosis in Santa Rosa, El Oro, and the absence of specific prevention strategies for this area. This knowledge gap motivates the need to carry out a comprehensive study that identifies the prevalence of the disease, local risk factors and, ultimately, informs the most appropriate preventive and therapeutic actions.

The justification for carrying out this study is based on the importance of public health, animal health and the intrinsic connection between the two. According to(5), leptospirosis being a disease that can be transmitted between animals and humans, highlights the need for a comprehensive and localized understanding of its presence to safeguard not only pets but also the human population. Furthermore, addressing canine leptospirosis in Santa Rosa will contribute to building a solid framework for future research and public health strategies in the region.

In this context, the main objective of this research is to determine the prevalence of canine leptospirosis by detecting IgM and IgG antibodies of this disease in dogs and the risk factors in the city of Santa Rosa, province of El Oro, in the months of June to September 2023. Through this study, we seek not only to quantify the magnitude of the problem, but also to provide crucial information for the design of prevention and control strategies adapted to the specific characteristics of this locality.

### ***Generalities***

Canine leptospirosis, a zoonotic bacterial disease caused by various strains of *Leptospira*, is a pathology of increasing relevance in veterinary medicine.(6.7)It is characterized by its ability to affect both animals and humans, presenting itself as a significant public health and veterinary challenge.(8).

According to(9), |The disease begins with exposure to the urine of infected animals, with rodents, mainly rats, being the most common reservoirs of the bacteria and definitive host; the penetration of *Leptospira* through mucous membranes or cuts in the skin initiates the infection, after which a phase of bacterial replication occurs in various organs. This replication triggers an immune response, manifested in the detection of IgM antibodies (for detection during the first week of the disease).(10)and IgG (which increase two to three weeks after infection)(11).

### ***Epidemiology***

According to(10), the prevalence of canine leptospirosis is influenced by a number of factors, including local geographic and climatic conditions; the lack of updated data highlights the need for research to provide accurate statistics on the frequency of the disease in the canine population of this region during the study period. As suggested by(12), sThe aim is to identify the most affected groups of dogs, considering those with access to aquatic environments, those living in recently flooded areas, and those that share spaces with *Leptospira* reservoirs, such as rodents, among other wild animals.

### ***Pathogens and Vectors***

The pathogens of canine leptospirosis are various strains of the bacteria of the genus *Leptospira*, these bacteria, especially *Leptospira interrogans* (serovars: canicola, icterohaemorrhagiae, pomona, grippityphosa, hardjo and bratislava), are responsible for infection in dogs.(13)Transmission occurs mainly through contact with the urine of infected animals, with rodents, especially rats, being the most common reservoirs.(14).

The bacteria enters the canine organism through mucous membranes or cuts in the skin. Once inside, a replication phase occurs in various organs, which triggers the host's immune response; the detection of IgM and IgG antibodies in the blood may be indicative of infection.(15).

As for the spread of the disease, rodents act as crucial vectors, their urine, rich in *Leptospira*, contaminates the environment, especially water and soil; dogs, upon coming into contact with these contaminated sources, become susceptible to infection.(12). In some recent studies, such as that of(7),It is indicated thatIn addition to rodents, other animals can act as reservoirs, contributing to the spread of leptospirosis in the canine population.

### ***Symptoms and Diagnosis***

Canine leptospirosis presents a range of clinical symptoms that vary in severity; symptoms can vary in severity but the most common include high fever, weakness, lethargy, anorexia, vomiting, diarrhea, abdominal pain, muscle pain, nasal congestion, cough, acute renal failure, jaundice, and hemorrhages.(16). On the other hand(17), indicate that the infection may be asymptomatic in some animals depending on the serovar involved.

Diagnosis of leptospirosis in dogs involves a combination of clinical evaluation and laboratory testing; given the variability in clinical presentation and the similarity of symptoms to other diseases, definitive diagnosis requires specific testing.(10).

As suggested(18), the fundamental laboratory tests include the detection of antibodies, mainly IgM and IgG, using immunochromatography techniques. These serological tests are essential to confirm the presence of the infection and determine whether it is acute or chronic; the gold standard test is the microscopic agglutination test (MAT) that measures seroconversion or the increase in antibody titers to *Leptospira*. On the other hand, according to(5), PCR tests can be performed to detect *Leptospira* genetic material in biological samples.

### ***Transmission and Risk Factors***

*Leptospira* disease can be transmitted in two ways; direct transmission is when there is direct contact with infected urine, venereal and placental transfer, bite wounds or ingestion of infested tissues, indirect transmission occurs through contact with contaminated water sources, soil and food.(19).

Environmental conditions, such as the presence of domestic and wild animals and areas prone to stagnant water, create a favorable environment for the survival of the bacteria; contamination of water and soil with the urine of infected rodents increases the likelihood of exposure of dogs.(20).

According to(21), the presence of vectors, in this case rodents, plays a key role in transmission; the population density of these animals and their proximity to inhabited areas can increase the risk of contact with domestic dogs. In the case of(15), indicate that husbandry practices, such as animal hygiene and housing conditions, are additional factors that can influence the spread of the disease.

### ***Impact on Public Health and Veterinary Medicine***

Canine leptospirosis has important implications for public and veterinary health; the disease, being zoonotic, represents a risk for both canine and human health. (22).

As mentioned(23) in the veterinary field, early detection of leptospirosis is essential for effective management of the disease in the canine population; accurate diagnosis, followed by appropriate treatment, not only improves the welfare of affected animals, but also contributes to reducing the burden of the disease in the canine community.

The implementation of preventive measures, such as education on safe practices with animals and the promotion of environmental hygiene, becomes essential to reduce the zoonotic threat.(24). Effective control of canine leptospirosis in Santa Rosa requires close collaboration between health and veterinary authorities. Strategies that include epidemiological surveillance, vaccination, rodent population management and public awareness are crucial.(25).

### ***Prevention and Control Approaches***

In Ecuador, strategies to prevent and control canine leptospirosis address several fronts, systematic vaccination of dogs against prevalent strains of *Leptospira* is a central measure to reduce the incidence and severity of the disease.(26)In the environmental field, strategies are implemented to control rodent populations, the main carriers of the *Leptospira* bacteria.(27).

As you have suggested(28)Epidemiological surveillance is essential to monitor the prevalence of canine leptospirosis; early detection of outbreaks or unusual patterns allows for rapid response and adjustments in control strategies.

Something very important to note is what they say(20), which refer to the fact that continued research supports these strategies, providing a deeper understanding of the local epidemiology of canine leptospirosis and allowing for adaptive adjustments in prevention and control strategies as needed. Together, these comprehensive measures seek to significantly reduce the incidence of canine leptospirosis in Ecuador, protecting the health of the canine population and mitigating the associated risks to human health.(2).

### **Methodology**

This study adopts a descriptive, observational, cross-sectional design. The research focuses on the application of IgM and IgG immunochromatography serological tests in 60 dogs with symptoms compatible with leptospirosis or that meet various risk factors identified with the disease under study.

Blood samples were taken from canines for the identification of anti-*Leptospira* antibodies by immunochromatography (SensPERT Canine *Leptospira* IgM Ab Test Kit; sensitivity 97.7% vs. MAT for IgM, specificity 100.0% vs. MAT for IgM). It consists of an antigen-antibody reaction immunoassay where a *Leptospira* antigen is immobilized on a nitrocellulose membrane. The patient's blood or serum is applied to this membrane. If it contains anti-*Leptospira* IgM and/or anti-*Leptospira* IgG, an antigen-antibody complex will form which is revealed by the appearance of a line when adding an anti-IgM antibody and/or an anti-IgG antibody labeled with colloidal red gold particles.

The sample was selected using non-probability convenience sampling. In addition, surveys were conducted with property owners to determine the predominant risk factors in the area.

### **Results and discussion**

A total of 60 dog owners with symptoms compatible with leptospirosis or who met various risk factors identified with the disease under study were surveyed. The presence of different risk factors was found in the population studied, including whether the pet



drinks river water, has contact with rodents, contact with wild animals, pigs, cows, goats, if the roof where it lives is made of straw, the floor is dirt, housing without sewage, presence of stagnant water in the surroundings of the house and recent flooding at home. The frequency of these factors is summarized in Table 1.

**Table 1.** -Frequency of risk factors associated with leptospirosis in dogs from 60 people surveyed

Risk factor	n	(%)
Vaccinated	29/60	48.3
River water consumption	22/60	36.7
Contact with rodents	45/60	75.0
Contact with wild animals	21/60	35.0
Contact with pigs	1/60	1.7
Contact with cows	10/60	16.7
Contact with goats	0/60	35.0
Thatched roof house	2/60	3.3
Ground floor housing	26/60	43.3
Housing without sewage	27/60	45.0
Stagnant waters in surroundings	31/60	51.7
Recent floods	24/60	40.0

The results reveal that approximately half of the dogs studied were vaccinated against leptospirosis, which represents an important preventive measure. Contact with rodents was significantly high, reaching 75%, highlighting the importance of addressing this risk factor. Furthermore, the presence of thatched-roof dwellings, dirt floors, and lack of sewage, suggest conditions that could favor the spread of the disease. Exposure to stagnant water and recent flooding was also considerable, pointing to possible risk areas. These findings underscore the need for prevention and education strategies, especially focused on reducing contact with rodents and improving environmental conditions to mitigate the risk of canine leptospirosis in the city of Santa Rosa, El Oro province.

Table 2 describes that, out of 60 animals evaluated, 3 were positive for IgM antibodies, calculating the prevalence of canine leptospirosis at 5%. In the case of IgG, 0% of animals were positive for this type of antibodies.

**Table 2.** -Seroprevalence of canine leptospirosis in a population of the province of El Oro

		Frequency	%	% accumulated
<b>IgM</b>	Negative	57	95,00	95,00
	Positive	3	5	100
	Total	53	88,33	
<b>IgG</b>	Negative	60	100	100
	Positive	0	0	100

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Total	60
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These additional results indicate that out of 60 animals tested, 3 tested positive for IgM antibodies, leading to a calculated prevalence of 5% of canine leptospirosis. However, in the case of IgG antibodies, no positives were detected, representing 0% of the sample. These findings suggest that recent or acute infection, indicated by the presence of IgM, is present in a small proportion of the canine population studied, while no cases of past infection or previous exposure, indicated by IgG, were observed. These detailed data on specific antibody types provide a more complete understanding of the dynamics of canine leptospirosis in the population tested.

### Conclusions

- The research reveals that 5% of the canine population in Santa Rosa, El Oro, shows evidence of acute leptospirosis infection, while no cases of previous exposure were detected. These results underline the need for targeted preventive strategies, especially considering the identified enabling environmental conditions. The absence of IgG antibodies indicates low past exposure, highlighting the importance of understanding disease dynamics in local contexts. This differentiated focus on antibody types provides valuable insight for future research. In summary, this study not only contributes to the understanding of canine leptospirosis in Santa Rosa, but also provides a basis for targeted prevention and control strategies. The identification of risk factors and the differentiation between acute and past infections open new avenues to effectively address this zoonosis.

### Conflict of interest

The authors declare that there is no conflict of interest.

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