Leptospirosis is one of the most widespread zoonotic diseases in the world affecting people, dogs, and other domestic and wild animals and causing renal and hepatic failure in both dogs and humans.[3-5] The disease is typically transmitted through direct contact of oral or nasal mucosa or broken skin with infected urine or contaminated water.[5-6] Dogs can be at risk for infection by drinking contaminated water.

The disease has been documented as a re-emerging canine disease in the United States and has been linked to environmental, land use, and socio-economic factors including proximity to colleges or parks, percentage of wetlands, evergreen forest cover, frequently flooded areas, and poverty.[6-10] However, no analysis of these risk factors has been conducted on a countrywide scale. Given the increasing prevalence of canine leptospirosis there is a need for better understanding of the areas at risk and the associated environmental risk factors for the disease.

**Results**

The model suggests that landscape and environmental factors, specifically low-density developed land (e.g. residential areas with houses built on large lots or areas with 20-40% of surface areas covered with impervious material), deciduous forest land, precipitation and temperature are useful in predicting MAT test results (Table 1).

**Discussion**

This is the first comprehensive predictive risk map for canine leptospirosis in the contiguous US, accessible to both veterinarians and pet owners through a dedicated webpage https://www.zoetisus.com/conditions/dogs/leptospirosis/index.aspx. The variation in canine leptospirosis risk in specific counties and regions of the US appears to be mainly influenced by environmental (e.g., precipitation and temperature) and land use factors (e.g., residential areas with houses built on large lots).

Limitations: Due to a lack of available testing data, some areas of the contiguous US (i.e. the central and southeastern parts of the Southern US) were poorly represented in our testing data (Figure 1). While the use of the of predictive methods allows us to make predictions even when data are lacking, the inclusion of data from these areas would increase predictive accuracy. Data were aggregated at the county level, which may be too large a scale for some environmental interactions. Given the complexity of our model and the number of variables included (e.g., over a dozen land cover variables), we can identify important variables but not describe the precise relationship between one variable and leptospirosis risk.

Leptospirosis is found across the United States and appears to vary across geographic and temporal space—based on season as well as environmental factors, including climate and land use. Focusing on climatic and environmental risk factors allows for a more in-depth understanding of the dynamics of canine leptospirosis and allows for creation of a risk profile even in areas where data is sparse. The outputs allow individuals to identify the likelihood of getting a positive canine leptospirosis case in each county of the contiguous US. This model is thus intended to help inform veterinary diagnostics and vaccination, and identify areas for disease research and surveillance.

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**References**