# The effects of flooding and weather conditions on leptospirosis transmission in Thailand

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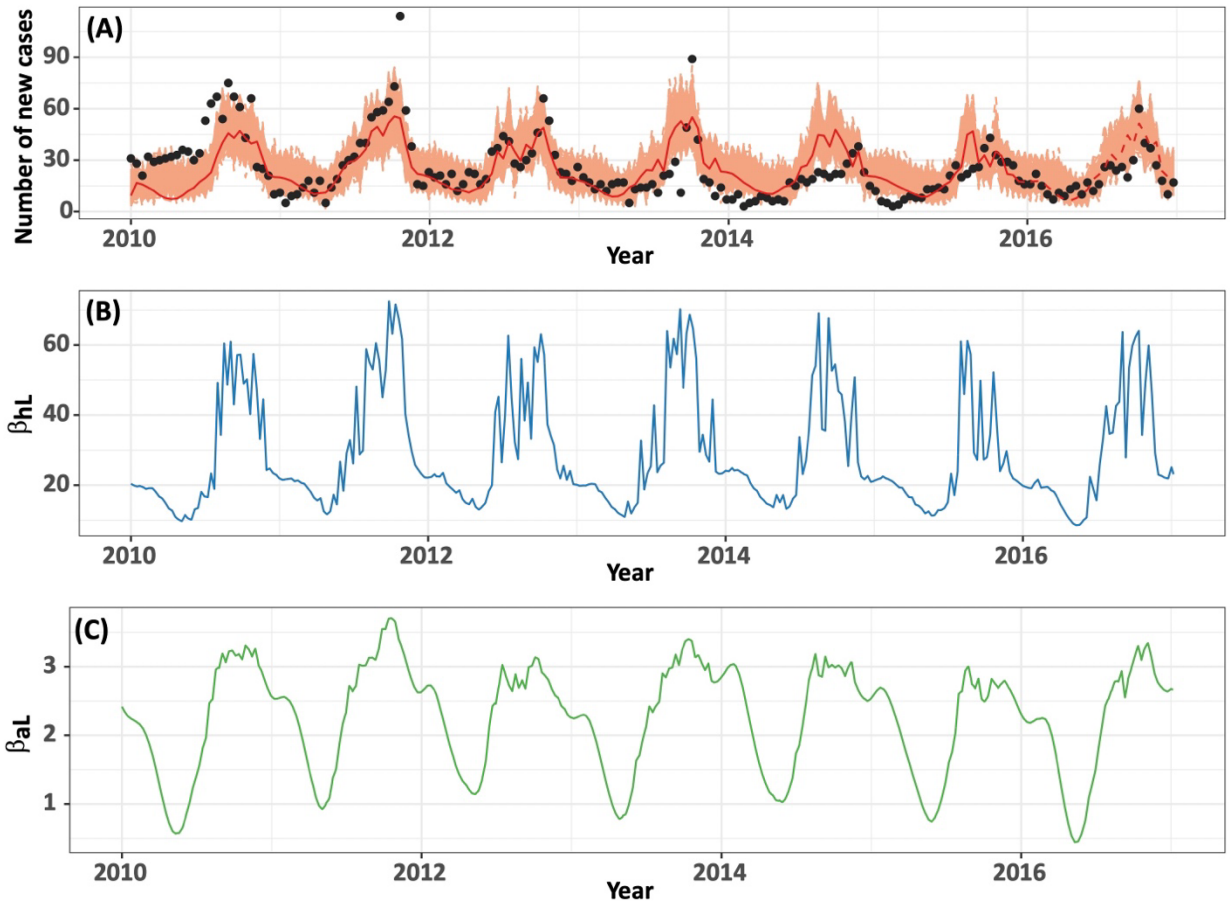
**Rationale and objective:** Leptospirosis is a worldwide zoonotic bacterial disease that is particularly endemic in tropical and subtropical countries. The epidemic of leptospirosis in humans occurs annually in Thailand. The highest number of cases reported in Thailand is during the rainy season from mid-May to mid-October. High-risk groups include farmers and other agricultural workers, who are likely to come into contact with infected animals, and contaminated wet soil and water during their daily activities. In addition, leptospirosis in livestock is also considered an important disease, causing reproductive failures (such as abortion, embryonic death, stillbirths, and weak offspring), decreased milk production and growth rates. A relatively high prevalence of leptospirosis has been detected in the urine of cattle and buffalo in Thailand. In this study, we have developed mathematical models to investigate transmission dynamics between humans, animals, and a contaminated environment. We compared different leptospire transmission models involving flooding and weather conditions, shedding and multiplication rate in a contaminated environment.

**Summary:** We found that the model in which the transmission rate depends on both flooding and temperature, best-fits the reported human data on leptospirosis in Thailand. Our results indicate that flooding strongly contributes to disease transmission, where a high degree of flooding leads to a higher number of infected individuals. Sensitivity analysis showed that the transmission rate of leptospires from a contaminated environment was the most important parameter for the total number of human cases. Our results suggest that public education should target people who work in contaminated environments to prevent Leptospira infections.




**Graphical summary:** (A) The average number of cases obtained from the stochastic modelling (red line) compared to the reported cases of leptospirosis (black dots) for 2010–2015. The orange shaded area displays 1,000 curves from the stochastic simulations. The time-dependent transmission rate from the contaminated environment to susceptible human and susceptible livestock ($\beta_{hL}$ and $\beta_{aL}$) are shown in (B, C), respectively.

**Outcome**: Understanding of Leptospirosis transmission dynamics in Thailand.

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**Related SDGs goal**: 3. Good health and well-being.

**Related publications**:

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