

Prevalence, infected density or individual probability of infection? Assessing vector infection risk in the wild transmission of Chagas disease

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Abstract

Vector-borne infectious disease dynamics result mainly from the intertwined effect of the diversity, abundance, and behaviour of hosts and vectors. Most studies, however, have analysed the relationship between host-species diversity and infection risk, focusing on vector population instead of individuals, probably dismissing the level at which the transmission process occurs. In this paper, we examine the importance of the host community in accounting for infection risk, at both population and individual levels, using the wild transmission of the protozoan that causes Chagas disease as a vector-borne disease model. Chagas disease is caused by *Trypanosoma cruzi*, transmitted by triatomine insects to mammals. We assessed if *T. cruzi* infection in vectors is explained by small mammal diversity and their densities (total and infected), when infection risk is measured at population level as infection prevalence (under a frequency-dependent transmission approach) and as density of infected vectors (density-dependent transmission approach), and when measured at individual level as vector infection probability. We analysed the infection status of 1974 vectors and co-occurring small mammal hosts in a semiarid-Mediterranean ecosystem. Results revealed that regardless of the level of analysis, only one host rodent species accounted for most variation in vector infection risk, suggesting a key role in the transmission cycle. To determine the factors explaining vector-borne disease dynamics, infection risk should be assessed at different scales, reflecting the factors meaningful from the vector's perspective and considering vector class-specific features.

Palabras clave

Palabras clave de autor: [vector-borne disease](#); [Trypanosoma cruzi](#); [Mepraia spinolai](#); [vector infection prevalence](#); [infected vector density](#); [individual infection probability](#)

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