

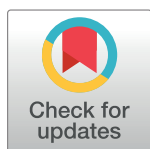
RESEARCH ARTICLE

Association of rodent-borne *Leptospira* spp. with urban environments in Malaysian Borneo

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Abstract

Although leptospirosis is traditionally considered a disease of rural, agricultural and flooded environments, *Leptospira* spp. are found in a range of habitats and infect numerous host species, with rodents among the most significant reservoirs and vectors. To explore the local ecology of *Leptospira* spp. in a city experiencing rapid urbanization, we assessed *Leptospira* prevalence in rodents from three locations in Malaysian Borneo with differing levels of anthropogenic influence: 1) high but stable influence (urban); 2) moderate yet increasing (developing); and 3) low (rural). A total of 116 urban, 122 developing and 78 rural rodents were sampled, with the majority of individuals assigned to either the *Rattus rattus* lineage R3 ($n = 165$) or *Sundamys muelleri* ($n = 100$). *Leptospira* spp. DNA was detected in 31.6% of all rodents, with more urban rodents positive (44.8%), than developing (32.0%) or rural rodents (28.1%), and these differences were statistically significant. The majority of positive samples were identified by sequence comparison to belong to known human pathogens *L. interrogans* ($n = 57$) and *L. borgpetersenii* ($n = 38$). Statistical analyses revealed that both *Leptospira* species occurred more commonly at sites with higher anthropogenic influence, particularly those with a combination of commercial and residential activity, while *L. interrogans* infection was also associated with low forest cover, and *L. borgpetersenii* was more likely to be identified at sites without natural bodies of water. This study suggests that some features associated with urbanization may promote the circulation of *Leptospira* spp., resulting in a potential public health risk in cities that may be substantially underestimated.

Author summary

Leptospirosis is a significant zoonotic disease that is found in a range of environments worldwide, most notably tropical regions prone to flooding. The bacterial agents of this disease, *Leptospira* spp., are most often associated with rodents, including species