
HANTAVIRUS OUTBREAKS IN DEER MICE IN MONTANA MAY BE PREDICTABLE BASED ON MOUSE POPULATION DYNAMICS

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Sin Nombre hantavirus (SNV) is a rodent-borne virus that causes hantavirus pulmonary syndrome in humans, which has a 37% mortality rate. There is no vaccine or cure, therefore the best strategy is to prevent spillover from rodent hosts. Understanding the ecological drivers of infection in rodent populations can lead to better predictive models of disease dynamics in the reservoir and consequent risk to humans. Using an epidemiological model parameterized and cross-validated using a long term dataset from Montana, I show how environmental variation and fluctuating mouse density affects hantavirus prevalence. I provide evidence for a critical host density necessary to sustain transmission and show how there can be long delays between peaks in density and subsequent peaks in infection prevalence. The lengths of these delays vary with density but are predictable. This means that outbreaks may sometimes be predictable many months in advance. These same principles should also apply to many other disease systems in wildlife with fluctuating populations, and may help predict and mitigate wildlife disease.