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A recent outbreak of Dobrava-Belgrade hantavirus in a population of wild rodents in northern Italy: causes and implications

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Dobrava-Belgrade hantavirus (DOBV) is an infection carried by wild yellow-necked mice (*Apodemus flavicollis*) that may cause serious zoonoses in humans, with a case fatality rate of 12%. The prevalence of antibodies to DOBV in a wild population of *Apodemus flavicollis* in the Province of Trento (northern Italy) from 2000–2013, ranged from 0% to 12.5%, with an abrupt increase from 2010. Over the 14-year study period, 2189 animals were live-trapped and mean hantavirus seroprevalence was 3.15% (SE = 0.3%). Climatic (temperature and precipitation) and host (population density; individual body mass and sex; and larval tick burden) variables were analyzed with Generalized Linear Models, giving indications that mean annual precipitation, annual maximum temperature and individual body mass have a positive effect on DOBV seroprevalence. We then analyzed the transmission dynamics of the recent outbreak of this virus using a computational model that accounts for territorial behavior and seasonal changes of the host population. This model underlined the high stocastic fadeout of DOBV, due to natural population drops associated to seasonal mating and winter mortality. DOBV established an endemic infection in the rodent population under study, and the predicted increase in rodent seroprevalence implies a possible higher risk of spillover to humans in the future. Continued surveillance on the rodent population is recommended to monitor future trends.