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Future zoonotic disease incidence informed by climate change scenarios

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The role that climate variability and change play in altering infectious disease risk is a major issue calling for a multi-disciplinary approach. We demonstrate the integration of skills from human and veterinary epidemiology, statistical modelling and climate science in estimating the burden of infectious disease in New Zealand 2015, 2040 and 2090 under three future climate change scenarios. We used baseline weekly data from 1997 to 2007 to model the effect of past climate variation on notifications of campylobacteriosis and cryptosporidiosis. These models produced adjusted regression coefficients that were coupled with the National Institute of Water & Atmospheric Research's climate projections to project the future burden of disease in 2015, 2040 and 2090. The weekly average absolute humidity, rainfall and temperature were positively associated with the probability of campylobacteriosis notification. Campylobacteriosis notifications were projected to increase especially during the summer in the top half and coastal areas of the north island. Cattle density and poor drinking water quality were risk factors for campylobacteriosis notification while Maori ethnicity was protective. Weekly average rainfall and temperature were positively associated with the probability of cryptosporidiosis notification. Cryptosporidiosis notifications were projected to both increase and decrease with season and location. Rural living and poor drinking water quality were risk factors while Maori ethnicity was protective. Disease projection estimates are currently being incorporated into a web-based tool to identify communities at risk and help aid the implementation of informed strategies for disease risk reduction. Our disease projections are our best estimates of the future burden of disease and must be seen in the light of multiple uncertainties including model estimates and future emissions, settlement, land use and policy changes.