

The following are supplemental materials and will be published online only

Supplementary information

Resurgence of pertussis infections in Shandong, China: Space-time cluster and trend analysis

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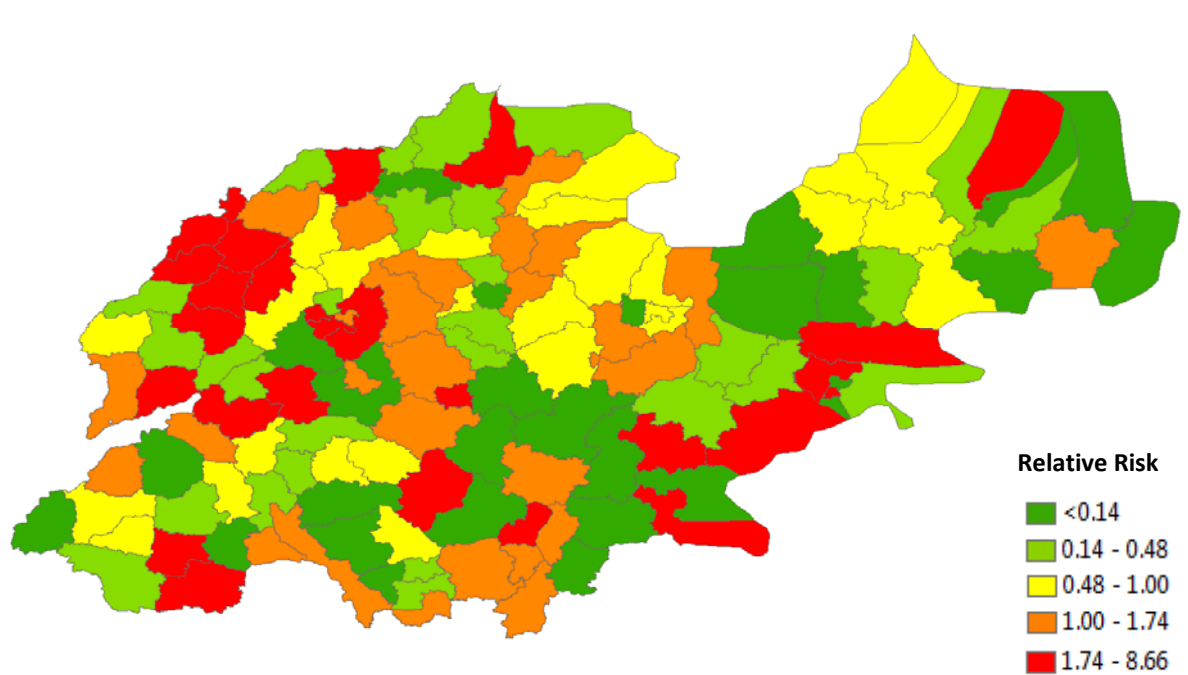
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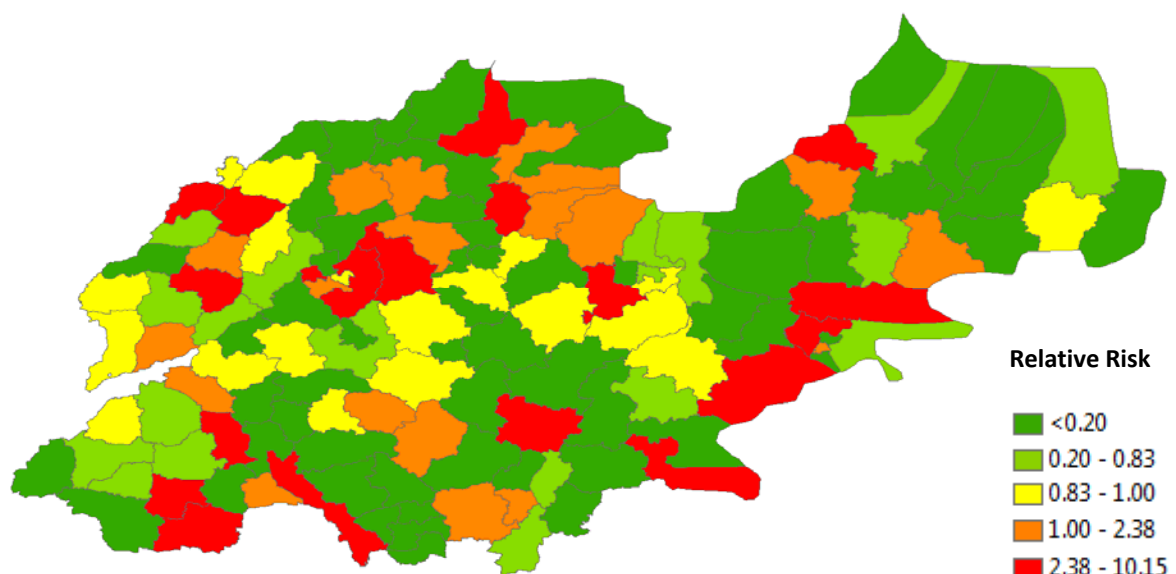
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Figure 1. Spatial distributions of the relative risks at county level across Shandong province, 2009-2017 (A: study period 2009-2017, B: period 1, C: period 2, D: period 3).

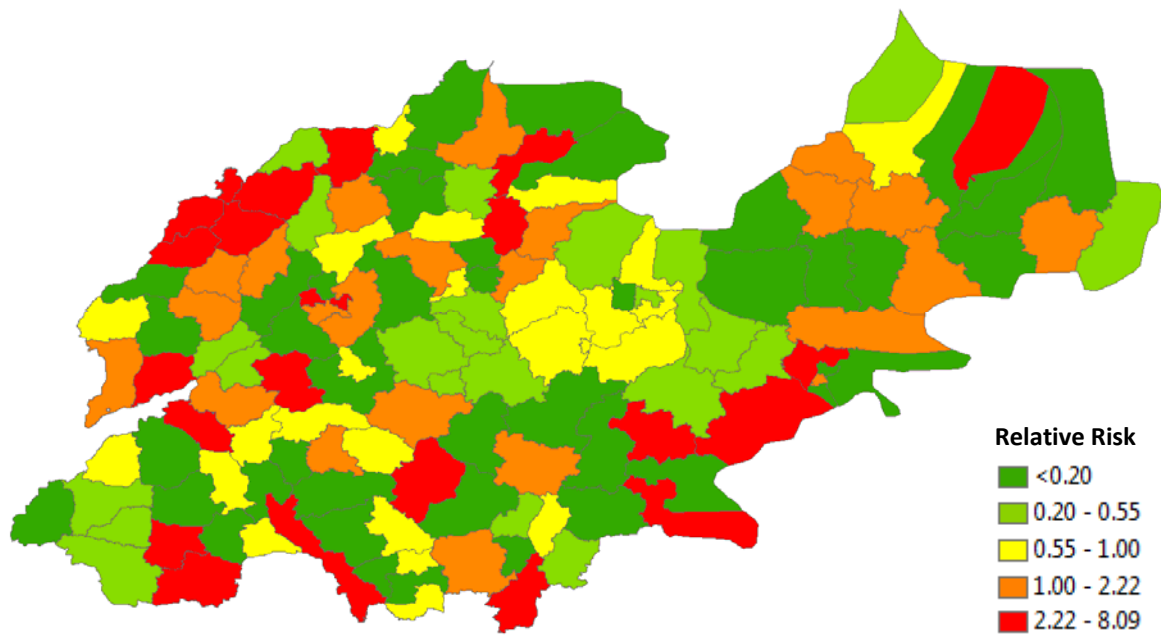
A



B



C



D

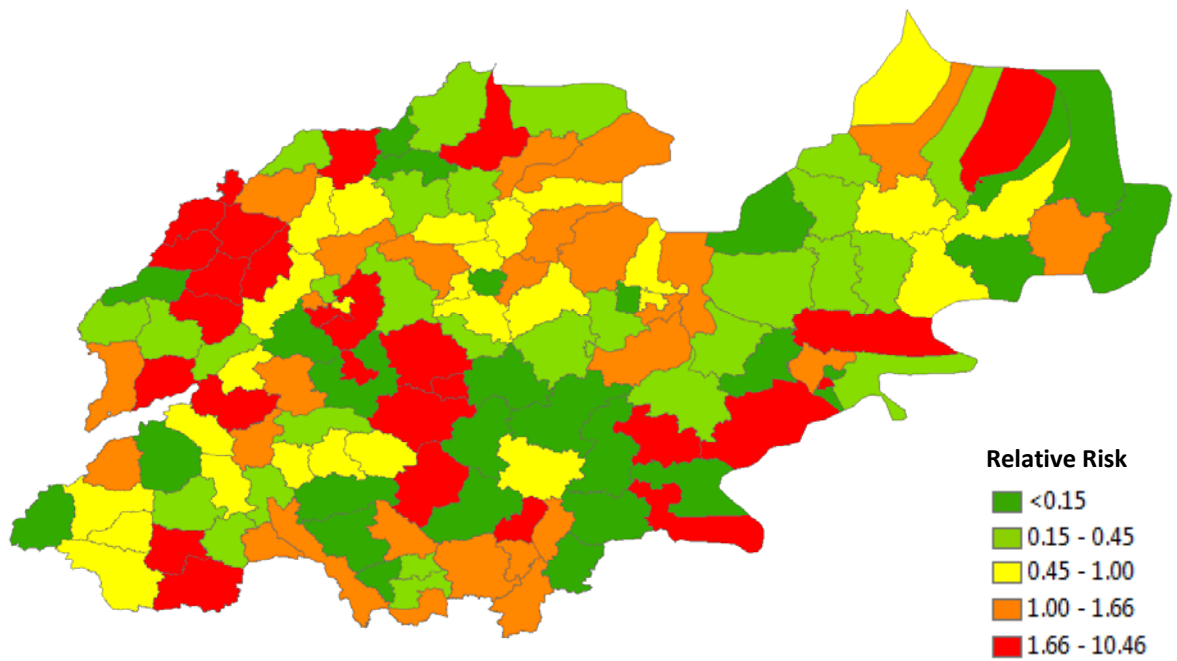
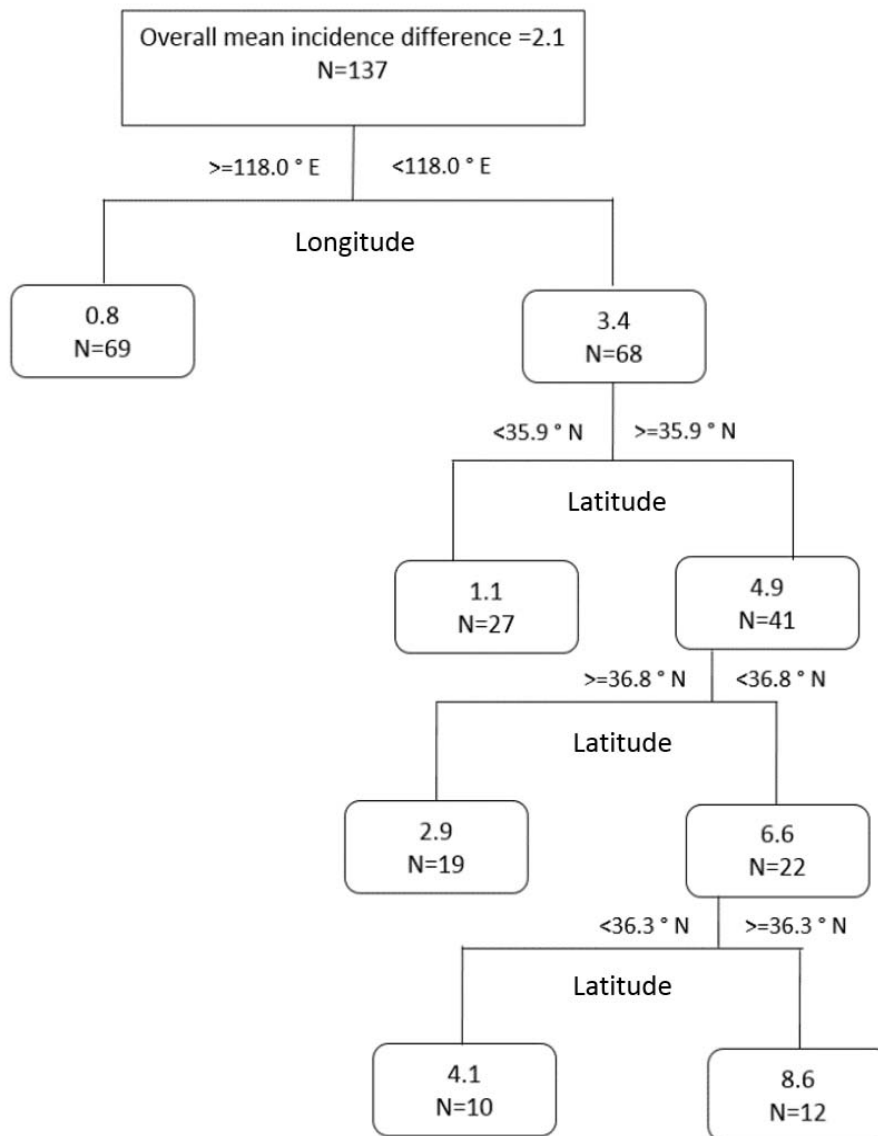
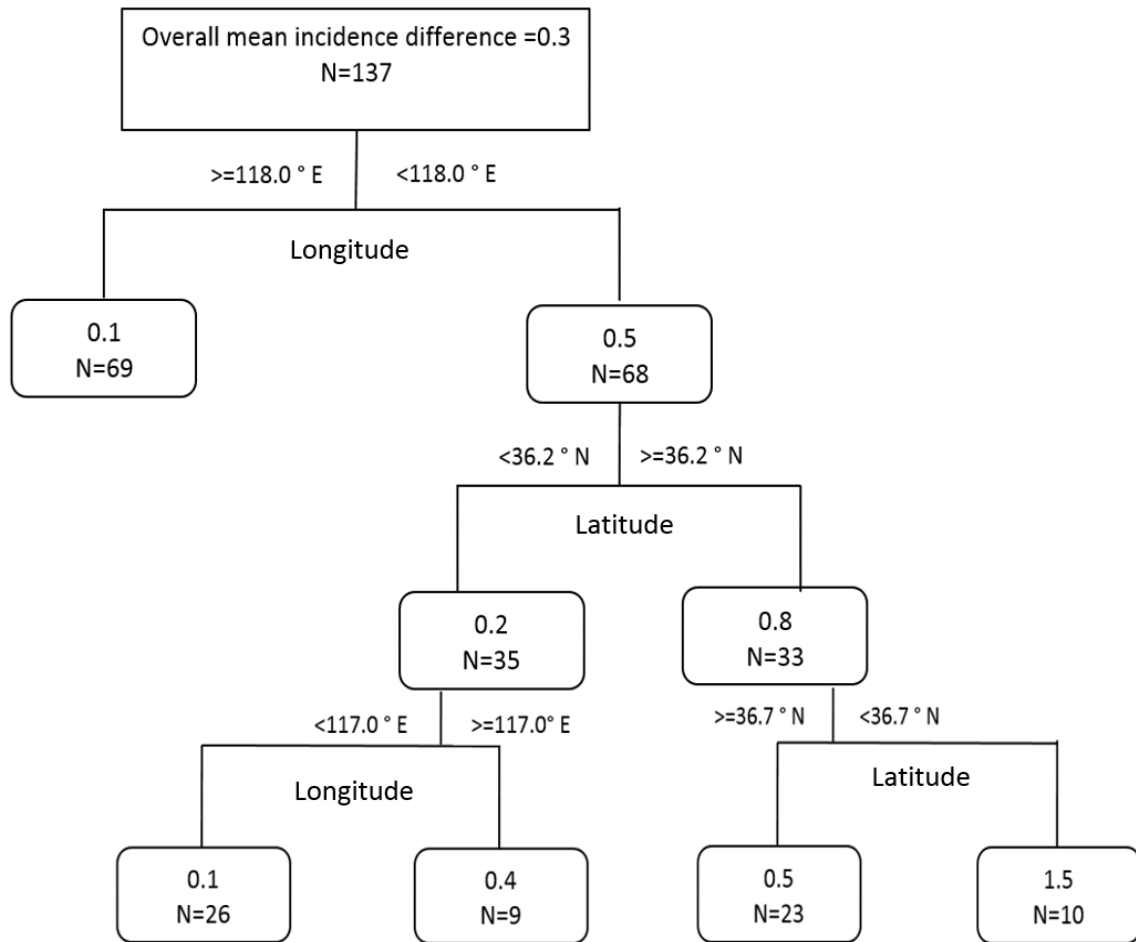


Figure 2. The regression tree modeling the hierarchical relationship between the differences of yearly mean pertussis incidence between periods with the locations of counties in Shandong, 2009-2017. (The regression tree shows the threshold values, mean differences in yearly average pertussis incidence between periods, N is the total number of counties; A: difference between period 1 and 3, B: difference between period 1 and 2, C: difference between period 2 and 3)

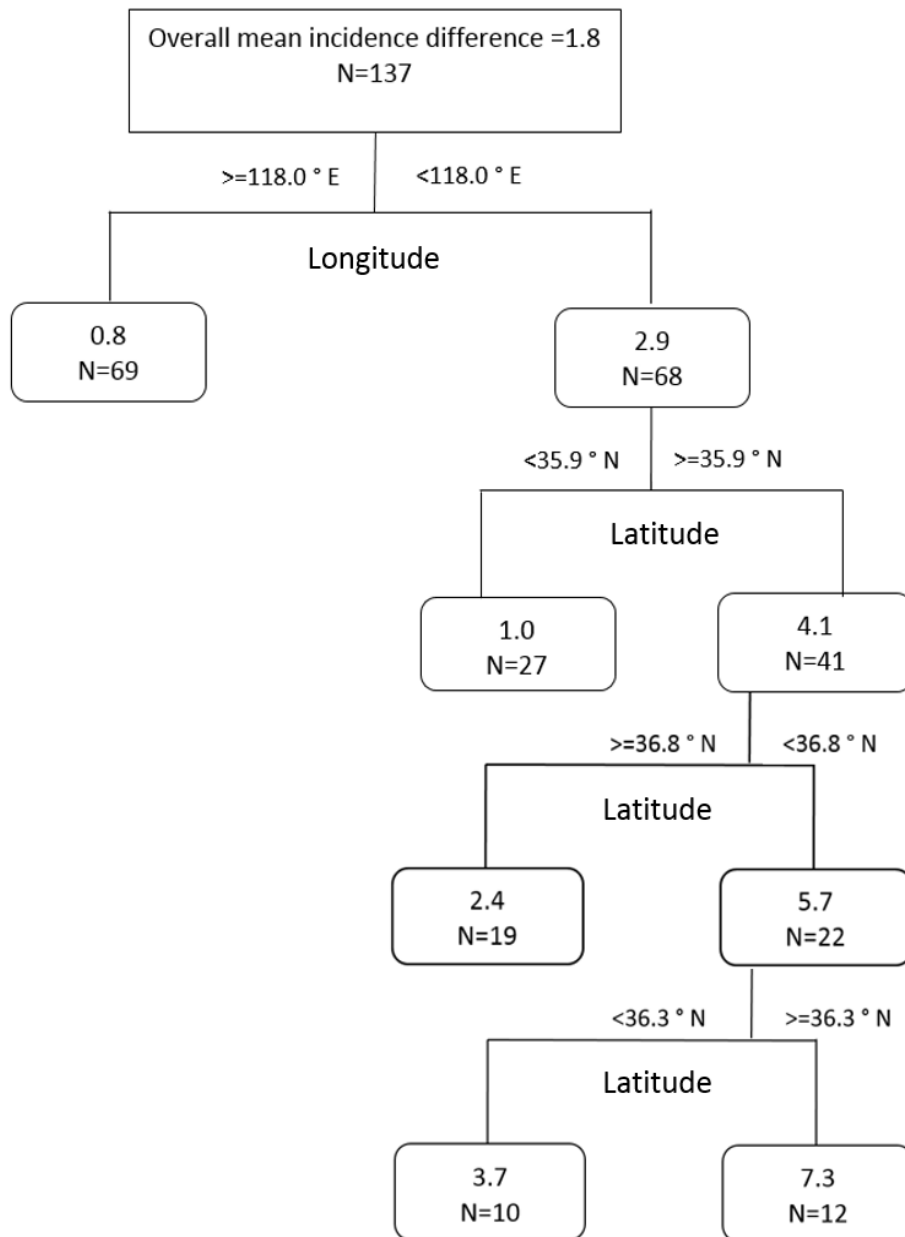
A



B



C



The definition of Relative Risk in the study

For Shandong province A under study, the RR is defined to be the infection risk λ_Z of county Z compared to the risk $\lambda_{A/Z}$ in all other counties A/Z . Let

$$\lambda_Z = E(Y_Z) / E_Z,$$

$$E_Z = N * P_Z / P_+,$$

where Y_Z is the Poisson random variable of pertussis notifications in county Z , with expected cases given by $E(Y_Z)$, E_Z is the observed number of cases in county Z , P_Z is the population of county Z , P_+ is the total population at risk in the province and N is the total number of notifications. Analogously we define $\lambda_{A/Z}$. This way, the RR is defined as $RR = \lambda_Z / \lambda_{A/Z}$.