

A spatio-temporal analysis of the environmental correlates of COVID-19 incidence in Spain

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Abstract

Early in 2020 the novel SARS-CoV2 swept the globe, disrupting health systems and the economy. Public health interventions have slowed the spread of the virus, albeit at a high cost. How and when to ease restrictions to movement hinges in part on whether SARS-CoV2 will display seasonality due to variations in temperature, humidity, and hours of sunshine. Here, we address this by means of a spatio-temporal analysis of the incidence of COVID-19 in Spain. Use of spatial Seemingly Unrelated Regressions (SUR) allows us to model the incidence of reported cases of the disease per 100,000 population as an inter-regional contagion process, in addition to a function of temperature, humidity, and sunshine. In the analysis we also control for GDP per capita, percentage of older adults in the population, population density, and presence of mass transit systems. The results support the hypothesis that incidence of the disease is lower at higher temperatures and higher levels of humidity. Sunshine, in contrast, displays a positive association with incidence of the disease. Our control variables also yield interesting insights. Higher incidence is associated with higher GDP per capita and presence of mass transit systems in the province; in contrast, population density and percentage of older adults display negative associations with incidence of COVID-19.

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