

Exploring the dynamic relationship between mobility and the spread of COVID-19, and the role of vaccines

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Abstract

The novel coronavirus disease 2019 (COVID-19) outbreak, which began at the end of 2019, has caused tremendous turmoil worldwide and is yet to be contained. Therefore, mitigating the number of people infected by COVID-19 remains a fundamental policy goal for several countries. This study aims to analyze the dynamic relationship between mobility and the rate of change in the number of new infections (NNIs) in Japan. Another goal is to evaluate the effects of various policies, such as mobility control and vaccination, as well as the impact of climate factors on the NNIs. The analysis reveals a strong positive relationship between the growth rate of the NNIs and mobility. Our results also indicate that the governmental policy of regulating mobility shows a weaker effect on preventing the spread of infection, as the emergency declaration is repeatedly invoked. By contrast, the recent increase in the infection rate seems to reduce the spread of infection by inducing voluntary restraint, and this phenomenon has become even stronger in the recent period. Regarding the effect of vaccination, the results demonstrate little effect on attenuating the spread of infection by reducing the susceptible population. However, it has significantly weakened the mobility–spread relationship, suggesting that it may help in the implementation of economic revitalization policies.