COVID-19 pandemic-related lockdown: response time is more important than its strictness

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ABSTRACT
The rapid spread of SARS-CoV-2 and its threat to health systems worldwide have led governments to take acute actions to enforce social distancing. Previous studies used complex epidemiological models to quantify the effect of lockdown policies on infection rates. However, these rely on prior assumptions or on official regulations. Here, we use country-specific reports of daily mobility from people cellular usage to model social distancing. Our data-driven model enabled the extraction of lockdown characteristics which were crossed with observed mortality rates to show that: (1) the time at which social distancing was initiated is highly correlated with the number of deaths, \( r^2 = 0.64 \), while the lockdown strictness or its duration are not as informative; (2) a delay of 7.49 days in initiating social distancing would double the number of deaths; and (3) the immediate response has a prolonged effect on COVID-19 death toll.

Association with mortality rates

There is a high correlation, between the response time of a country and its mortality rate (at 31.8.2020). This finding suggests that countries that took early measures to limit population mixing had better control on the viral-related mortality, with a long term impact. In contrast, neither the lockdown duration nor the lockdown strictness were significantly associated with mortality rates. These results imply that a tight lockdown could have been unnecessary.

Indirect inference of epidemiological parameters

The offset between the mobility and the mortality growth rate serves as a proxy for the time between infection and fatality. The time offset that yielded the highest correlation was 25.75 days on average across countries. This result highly resembles previous estimations of the time from infection to fatality, although here it was derived from entirely different data and analysis.

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