

Travel restrictions are most useful in the early and late phase of an epidemic: study

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3D print of a spike protein of SARS-CoV-2, the virus that causes COVID-19—in front of a 3D print of a SARS-CoV-2 virus particle. The spike protein (foreground) enables the virus to enter and infect human cells. On the virus model, the virus surface (blue) is covered with spike proteins (red) that enable the virus to enter and infect human cells. Credit: NIH

Analysis of human mobility and epidemiological data by a global consortium of researchers, led by the University of Oxford and Northeastern University, shows that human mobility was predictive of the spread of the epidemic in China. Restrictions of travel from Wuhan unfortunately came too late and research showed that the impact of travel restrictions declines as the epidemic grows. Provinces outside Hubei that acted early to test, track and contain imported COVID-19 cases fared the best at preventing or containing local outbreaks.

Mobile geolocation data from Baidu Inc, combined with a rich epidemiological dataset from the Open COVID-19 Data Working Group, showed that local person-to-person [transmission](#) happened extensively early on in the coronavirus outbreak and was mitigated by drastic control measures. However, with an average incubation period of 5 days, and up to 14 days in some cases, these mobility restrictions did not begin to positively impact the data on new cases for over a week—with things appearing to get worse in the 5-7 days immediately after the lockdown as local transmission was well under way.

Among cases reported outside Hubei, 515 cases had a known travel history to Wuhan and a symptom onset date before 31st January 2020, compared with only 39 after 31st January, illustrating the effect of travel restrictions in decreasing the spread to other Chinese provinces.

"Our findings show that early in the [coronavirus](#) outbreak travel restrictions were effective in preventing the import of infections from a known source," said Dr. Moritz Kraemer from the Oxford Martin Programme on Pandemic Genomics and the Department of Zoology at the University of Oxford. "However, once COVID-19 cases begin spreading locally the contribution of new importations was much smaller. This is where a full package of measures including local mobility restrictions, testing, tracing and isolation need to work together to mitigate the epidemic. Chinese provinces and other countries that

have successfully halted internal transmission of COVID-19 need to consider carefully how they will manage reinstating [travel](#) and mobility to avoid the reintroduction and spread of the disease in their populations."

Professor Samuel V. Scarpino of Network Science Institute (NetSI) at Northeastern University adds, "The political will in many countries is lagging behind the spread of COVID-19. Travel and mobility restrictions are the most useful right at the start, when local transmission has not yet become a factor. After transmission is established, physical distancing and the quarantine of sick individuals will work, but it takes time. "

The full paper "The effect of human mobility and control measures on the COVID-19 epidemic in China" was published in the journal *Science* on 25th March 2020 and available at [science.sciencemag.org/lookup/ ... 1126/science.abb4218](https://science.sciencemag.org/lookup/.../1126/science.abb4218)

More information: The effect of human mobility and control measures on the COVID-19 epidemic in China, *Science* (2020). [science.sciencemag.org/lookup/ ... 1126/science.abb4218](https://science.sciencemag.org/lookup/.../1126/science.abb4218)

Provided by University of Oxford

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