

# Study: Domestic control of COVID-19 takes priority over international travel bans

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Since COVID-19 reached global pandemic status, many countries have faced containment pressures from both domestic and international transmission after experiencing multiple epidemic waves. But according

to a new paper co-written by a University of Illinois Urbana-Champaign urban and environmental economics expert, taming domestic transmission of the novel coronavirus ought to be prioritized over international travel bans or restrictions ostensibly aimed at limiting the threat of the virus from abroad.

New research from Yilan Xu ("E-Lan SHE"), a professor of agricultural and consumer economics at Illinois, shows evidence from China that imported cases of COVID-19 have only a limited effect on a country's confirmed cases—but that's only if domestic-[transmission](#) mitigation mechanisms have kept the virus in check.

"As COVID-19 and its variants continue to spread around the globe, countries need to manage both domestic spread and international importation risks at the same time—but the relative magnitudes of those threats vary over time and are heavily dependent on how weak or strong domestic transmission is," she said.

Transmissibility interventions such as social distancing, mask wearing, testing and timely quarantines are more effective than blanket travel restrictions, according to the paper.

"Other than international travel bans, you can easily blunt international transmission with all sorts of nonpharmaceutical interventions—a double-negative test before travelers enter the country; preregistration of health status; mandatory centralized quarantine; and universal masking, for example," Xu said. "With that said, all of interventions at the international front would have almost negligible effects if domestic transmissibility interventions were not in place or if the domestic virus is already spreading exponentially."

Xu and her co-authors conducted a multiscale geographic analysis of the spread of COVID-19 to quantify virus importation risk under different

policy scenarios using evidence from China in spring 2020.

Using China's large-scale mobility and international flight data, the researchers constructed an integrated network of 284 Chinese cities and 48 countries and regions that accounted for the dynamic effects of travel-restriction policies and various infectious disease transmission vectors, including within-city, between-city and cross-border transmission.

"We found that within-city transmission was the dominant transmission mechanism in China at the beginning of the outbreak, and that all domestic transmission mechanisms were muted or significantly weakened before importation posed a threat," Xu said. "So the timing of various interventions matters. As our simulations suggest that importation risk is limited when domestic transmission is under control, we also found that cumulative cases in China by the end of April 2020 would have been almost 13 times higher if domestic transmissibility had resurged to its pre-containment level after importation, and 32 times higher if domestic transmissibility had remained at its pre-containment level.

"That's why it's imperative to have domestic transmission under control."

The researchers found that even without international travel restrictions and foreign importation transmission controls, imported cases would only have a limited effect on total confirmed cases in China despite its extremely low domestic cases.

"This was because domestic transmission mechanisms were significantly suppressed when importation risk arose," Xu said. "Although the aggressive containment policies of the Chinese government as calibrated in our baseline model may not be viable in other countries, our simulations show that importation-control policies are the most effective when domestic transmissions are at least partially suppressed, because

uncontrolled domestic transmissions can exponentially magnify the effects of importation."

The study fills the gap in the research literature by quantifying importation risk under different mechanisms, dynamics and interactions of COVID-19 transmission at multiple geographic scales as it spreads within cities, between cities and across national borders, Xu said.

"Our findings provide practical insights into infectious disease containment and call for collaborative and coordinated global suppression efforts," she said. "Infectious diseases travel internationally all the time, so it's kind of silly thinking, "We'll just cut off international travel and that'll be it. It'll run its course." The research highlights the need for a coordinated approach in a global pandemic. Every country really needs to coordinate with each other; and even domestically, each state needs to coordinate with each other. We're being reminded of this anew as the delta variant continues to spread in the U.S. and abroad."

The paper was published in the *Proceedings of the National Academy of the Sciences*.

**More information:** Xiaoyi Han et al, Quantifying COVID-19 importation risk in a dynamic network of domestic cities and international countries, *Proceedings of the National Academy of Sciences* (2021). [DOI: 10.1073/pnas.2100201118](https://doi.org/10.1073/pnas.2100201118)

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