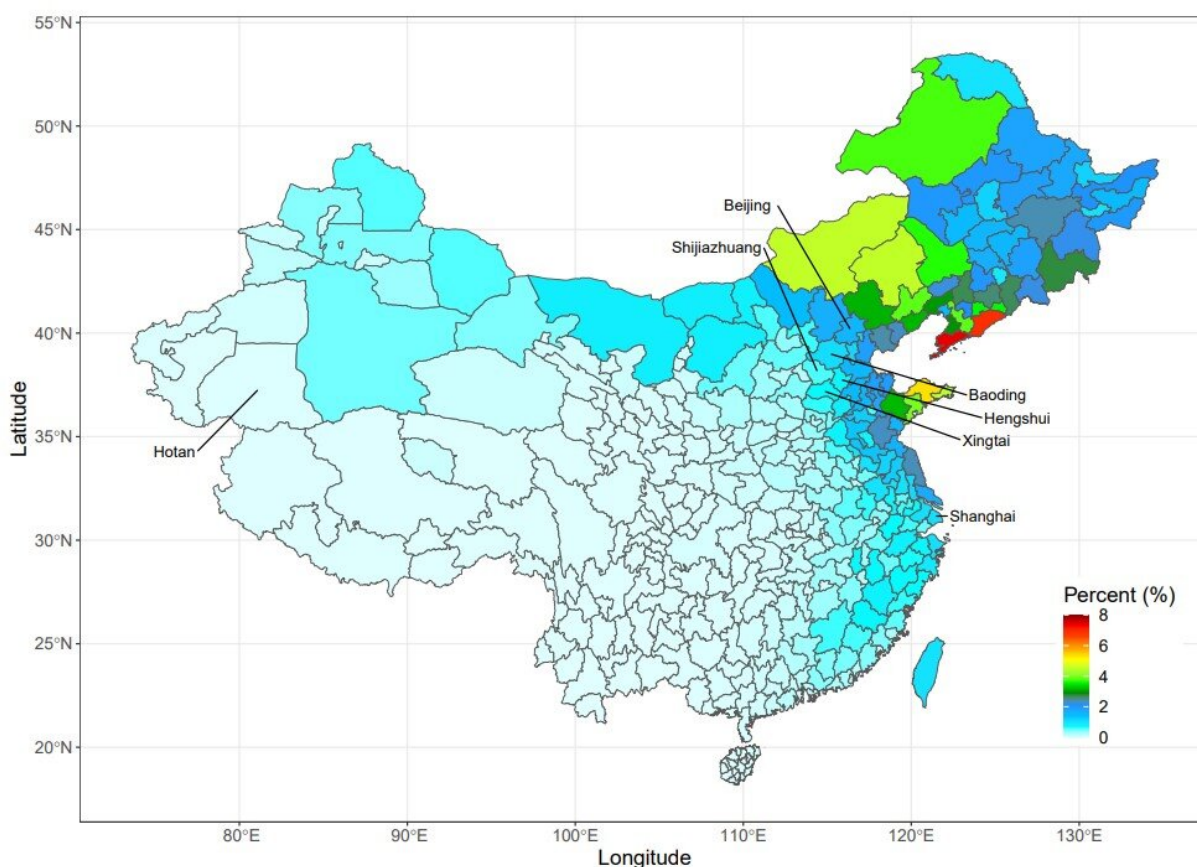


China's pollution policies have improved air quality, with benefits extending to South Korea

February 1 2023



Paths of Trajectories that Traveled Through China and Reached South Korea. This figure shows how often each city in China had a trajectory that passed the city and reached South Korea. For each city in South Korea, we use the HYSPLIT model to obtain backward trajectories for each day-hour during our sample period (January 2015 to December 2019). We then compute how often

these backward trajectories passed each city in China. That is, the denominator is the total number of hours from January 1, 2015 to December 31, 2019. The numerator is the total number of hours in which a trajectory passed a city in China and reached cities in South Korea. The duration of the backward trajectories we use is 200 hours. For example, if this value is 5% for a city in China, it means that in 5% of the total hours in our sample period, a trajectory passed this city and reached a city in South Korea. Credit: [International Spillover Effects of Air Pollution: Evidence from Mortality and Health Data](#).

While air pollution from China makes South Korean residents sicker, strong Chinese air policies have led to fewer deaths over time—saving South Korea \$2.62 billion per year.

Leaders have long thought that air pollution crossing lines from neighboring countries posed a significant challenge. But how much of a challenge and what to do about it has remained an open question. A new study sheds some light by measuring the toll of transboundary air pollution on people's health, as well as the important role strong policies can play in improving health outcomes throughout the region.

"Using recent advances in [atmospheric science](#) that allowed us to measure the trajectory of fine particulate pollution—the deadliest form of air pollution—we discovered that countries are vastly impacted by the pollution caused by their neighbors," says Koichiro Ito, an associate professor at the University of Chicago Harris School of Public Policy.

"The good news is the benefits of strong policies to reduce pollution also extend to neighboring states. This underscores the importance of treating air pollution as a regional and even global challenge that requires cooperation, and not just a problem to confront at a local level."

Ito and his co-authors Rao Kotamarthi from the U.S. Department of

Energy's Argonne National Lab, and Seonmin Will Heo, a Ph.D. student at UC Santa Barbara who began work with Ito in 2020 as a Harris Public Policy graduate student, study the case of South Korea. Northwest South Korea experiences strong westerly winds from China during the fall and winter. The researchers found that these winds lead to significantly higher levels of pollution compared to southeast South Korea. The northwest and southeast experience similar pollution levels during the spring and summer—when there is far less westerly wind from China.

This pollution has a direct impact on people's health in South Korea, leading to a 0.6% increase in mortality for every one microgram per cubic meter increase in transboundary particulate matter pollution (PM_{2.5}). That translates to an additional 31.2 deaths for every million people annually. The youngest members of society—babies who are a year old or younger—are the most vulnerable, with the mortality rate increasing by 2.1% for every one microgram per cubic meter increase in transboundary particulate pollution from China.

Other health indicators also increased during the time studied, 2013 to 2017. The researchers found that a one microgram per cubic meter increase in particulate pollution from China leads to about 18 additional ER visits for every million people a year for asthma and 176 additional ER visits for every million people for rhinitis (nasal inflammation)—a 0.5% and 3.4% increase, respectively.

"Pollution coming from China makes people in South Korea sicker and die at higher rates—that much is clear," says Ito. "But China's immense success in reducing pollution in recent years provided the perfect case study to see that the benefits of pollution policies also travel across boundaries."

After China began its "war on pollution" in 2014, which came with a series of strong clean air rules, pollution significantly declined

nationwide. Ito and his co-authors find that China had a 14.07 microgram per cubic meter drop in particulate pollution and South Korea had a 9.63 microgram per cubic meter drop in transboundary particulate pollution from China from 2015 to 2019. This drop led to fewer deaths from transboundary air pollution—about 300 fewer deaths for every million people a year—which they calculate saved South Korea \$2.62 billion per year.

Ito and his co-authors did find evidence that China may have strategically reduced more air pollution in Chinese cities where most air pollution stays inside the country borders and reduced less in cities where most air [pollution](#) blows outside of the country. This implies the spillover benefits of clean air rules could be larger for neighboring countries, and therefore, further regional or global cooperation can be valuable to address [air pollution](#).

More information: International Spillover Effects of Air Pollution: Evidence from Mortality and Health Data.

[epic.uchicago.cn/working_paper ... ity-and-health-data/](https://epic.uchicago.cn/working_paper...ity-and-health-data/)

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