

News in focus



Social distancing has been used to halt the transmission of the coronavirus in China.

WHAT CHINA'S CORONAVIRUS RESPONSE CAN TEACH THE REST OF THE WORLD

Researchers are studying the effects of China's lockdowns to glean insights about controlling the viral pandemic.

By David Cyranoski

As the new coronavirus marches around the globe, countries with escalating outbreaks are eager to learn whether China's extreme lockdowns were responsible for bringing the crisis there under control. Other nations and regions are now following China's lead and limiting movement within their borders, and dozens have restricted international visitors.

In mid-January, Chinese authorities introduced unprecedented measures to contain the virus by stopping movement in and out

of Wuhan, the centre of the epidemic, and 15 other cities in Hubei province – home to more than 60 million people. Flights and trains were suspended, and roads were blocked.

Soon after, people in many Chinese cities were told to stay at home and venture out only to get food or medical help. Some 760 million people, roughly half the country's population, were confined to their homes, according to *The New York Times*.

It's now two months since the lockdowns began – some of which are still in place – and the number of new cases there is around a couple of dozen per day, down from thousands

per day at the peak. "These extreme limitations on population movement have been quite successful," says Michael Osterholm, an infectious-disease scientist at the University of Minnesota in Minneapolis.

In a report released late last month, the World Health Organization (WHO) congratulated China on a "unique and unprecedented public health response [that] reversed the escalating cases".

But the crucial question is which interventions in China did the most to slow the virus's spread, says Gabriel Leung, an infectious-disease researcher at the University of

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Hong Kong. “The countries now facing their first wave [of infections] need to know this,” he says.

Nature talked to epidemiologists about whether the lockdowns really worked, if encouraging people to avoid large gatherings would have been enough and what other regions can learn from China’s experience.

What happened after the lockdowns?

Before the interventions, scientists estimated that each infected person passed on the coronavirus to more than two others, giving it the potential to spread rapidly. Early models of the disease’s spread, which did not factor in containment efforts, suggested that the virus, called SARS-CoV-2, would infect 40% of China’s population – some 500 million people.

But between 16 and 30 January, a period that included the first 7 days of the lockdown, the number of people to whom each infected individual gave the virus dropped to 1.05, estimates Adam Kucharski at the London School of Hygiene and Tropical Medicine, who models infectious-disease spread. “That was amazing,” he says.

The number of new daily infections in China seems to have peaked on 25 January – just two days after Wuhan was locked down.

As of 24 March, roughly 81,000 cases have been reported in China, according to the WHO. Some scientists think that many cases there were unreported – either because symptoms were not severe enough for people to seek medical care, or because tests were not carried out. But it seems clear that measures implemented during this time did work, says Christopher Dye, an epidemiologist at the University of Oxford, UK.

Could China’s response have worked better?

Epidemiologists say China’s mammoth response had one glaring flaw: it started too late. In the initial weeks of the outbreak in December and January, Wuhan authorities were slow to report cases of the mysterious infection, which delayed measures to contain it, says Howard Markel, a public-health researcher at the University of Michigan in Ann Arbor. “The delay of China to act is probably responsible for this world event,” says Markel.

A model simulation by Lai Shengjie and Andrew Tatem, emerging-disease researchers at the University of Southampton, UK, shows that if China had implemented control measures a week earlier, it could have prevented 67% of all cases there (go.nature.com/393nhr3). Implementing the measures 3 weeks earlier, from the beginning of January, would have cut the number of infections to 5% of the total.

Data from other cities also show the benefits of speed. Cities that suspended public transport, closed entertainment venues and banned

public gatherings before their first COVID-19 case had 37% fewer cases than cities that did not, according to a preprint¹ by Dye and his colleagues on the containment measures used in 296 Chinese cities.

Were China’s travel bans effective?

Multiple analyses of air travel suggest that the Hubei travel bans, which stopped people leaving the province in planes, trains or cars, slowed the virus’s spread, but not for long². A 6 March study³ published in *Science* by researchers in Italy, China and the United States found that cutting off Wuhan delayed disease spread to other cities in China by roughly four days.

The bans had a more lasting effect internationally, stopping four of five cases from being exported from China for two to three weeks, the team found. But after that, travellers from cities with no travel bans in place took the virus outside China, seeding new outbreaks. The team’s model suggests that blocking 90% of travel slows the virus’s spread only moderately, unless other measures are introduced.

Because travel bans can only slow the spread of this type of disease, it’s important that bans foster trust, says Justin Lessler, an epidemiologist at Johns Hopkins University in Baltimore, Maryland. “If you encourage people to lie or try to circumvent the ban, it is destined to fail,” he says.

Dozens of countries and regions across

Europe, the Americas, Africa and Asia have now introduced travel restrictions.

What are the lessons?

Tatem and Lai’s model assesses the combined effect of China’s early detection and isolation, the resulting drop in contact between people and the country’s intercity travel bans. Together, these measures prevented cases from increasing by 67-fold – otherwise, there would have been nearly 8 million cases by the end of February.

The effect of the drop in contact between people was significant on its own. Using mobile-phone location data from Chinese Internet giant Baidu, the team found a dramatic reduction in people’s movements, which they say represents a drop in person-to-person contact. Without this decrease, there would have been about 2.6 times as many people infected at the end of February, they say.

But early detection and isolation were the chief factors in reducing COVID-19 cases. Without those efforts, China would have had five times as many infections at the end of February. “If you are to prioritize, early detection and isolation are the most important,” says Tatem.

1. Tian, H. et al. Preprint at *medRxiv* <https://doi.org/10.1101/2020.01.30.20019844> (2020).
2. Wells, C. et al. *Proc. Natl. Acad. Sci. USA* <https://doi.org/10.1073/pnas.2002616117> (2020).
3. Chinazzi, M. et al. *Science* <https://doi.org/10.1126/science.aba9757> (2020).

SCIENTISTS EXPOSED TO CORONAVIRUS WONDER: WHY WEREN’T WE TOLD?

US authorities are failing to test people and notify their contacts, a cornerstone of outbreak response.

By Amy Maxmen

“I’ve been in the ICU fighting ... wait for it ... Coronavirus!” tweeted a 38-year-old geneticist last week. Clement Chow, from the University of Utah in Salt Lake City, was in a hospital intensive care unit (ICU). Pretty soon, two dozen geneticists who had attended a meeting with him nine days earlier saw the tweet. Many were upset that this was how they found out.

The worried researchers from 16 states scrambled to work out who they had spent time with since returning home from the meeting. They were upset that four days had passed between when their colleague was hospitalized with symptoms of COVID-19 and when they found out, through Twitter, that he had

the disease. With every passing minute, the virus has a chance to move to someone else.

“In the middle of a known pandemic, how is this not moving faster?” asks David Pollock, an evolutionary genomicist at the University of Colorado School of Medicine in Aurora who attended the meeting.

Across the United States, overwhelmed health departments are failing to diagnose people with COVID-19 and do the detective work usually used to contain outbreaks of contagious disease. This involves rapidly identifying the people with whom infected individuals have been in contact, requesting that close contacts quarantine themselves in their homes for two weeks and testing them as soon as they have symptoms. The World Health Organization (WHO) considers these containment