



Bruce Aylward of the World Health Organization holds up a graphic showing China's plummeting coronavirus cases at a 24 February press conference in Beijing.

INFECTIOUS DISEASES

Can China's COVID-19 strategy work elsewhere?

Rapid decline in cases is real, expert mission concludes—but it came at a high cost

By Kai Kupferschmidt and Jon Cohen

Chinese hospitals overflowing with COVID-19 patients a few weeks ago now have empty beds. Trials of experimental drugs can't find enough eligible patients. And the number of new cases reported each day in China is dropping precipitously.

These are some of the startling observations in a report released on 28 February by a team of 12 Chinese and 13 foreign scientists who toured five cities in China to study the state of the COVID-19 epidemic and the effectiveness of the country's response. Even some on the team, organized jointly by the World Health Organization (WHO) and the Chinese government, say they were surprised. "I thought there was no way those numbers could be real," says epidemiologist Tim Eckmanns of the Robert Koch Institute in Berlin.

But the report is unequivocal. "China's bold approach to contain the rapid spread of this new respiratory pathogen has changed the course of a rapidly escalating and deadly epidemic," it says. To Bruce Aylward, a Canadian WHO epidemiologist who led the mission and briefed journalists in Beijing and Geneva last week, the effort was a huge success. "Hundreds of thousands

of people in China did not get COVID-19 because of this aggressive response," he says.

Aylward and other members of the task force say the rest of the world should learn from China. But critics say the report failed to acknowledge the human rights costs of the most severe measures imposed by China's authoritarian government: massive lockdowns and electronic surveillance of millions of people. "I think there are very good reasons for countries to hesitate using these kinds of extreme measures," says Lawrence Gostin, a global health law scholar at Georgetown University. Many also worry that a resurgence of the disease will occur after the country lifts some of its strictest control measures and restarts its economy, which has taken a huge hit.

The report comes at a critical time in what many epidemiologists now consider a nascent pandemic. The number of affected countries is rising rapidly—it stood at 72 as *Science* went to press, according to WHO. Alarming, in many of these countries, the virus has quickly gained a foothold and started to spread in communities.

But cases have plummeted in China. On 10 February, the first day of the mission, the country reported 2478 new cases. Two weeks later, when the foreign experts packed their bags, the daily number of new

cases had dropped to 409. (On 3 March it had dropped further to 129 new cases, compared with 1848 in the rest of the world.) China's epidemic appears to have peaked in late January, according to the report.

Members of the team traveled to Beijing, Shenzhen, Guangzhou, Chengdu, and the hardest hit city, Wuhan. They visited hospitals, laboratories, companies, live animal markets, train stations, and local government offices. "Everywhere you went, anyone you spoke to, there was a sense of responsibility and collective action—and there's a war footing to get things done," Aylward says.

As part of the effort, Chinese scientists have compiled a massive data set that gives the best available picture of the disease. The mission report says about 80% of infected people had mild to moderate disease, marked by fever and a dry cough; 13.8% had severe symptoms; and 6.1% had life-threatening episodes of respiratory failure, septic shock, or organ failure. The case fatality rate was highest for people over age 80 (21.9%), and people who had heart disease, diabetes, or hypertension, but 3.8% overall. Children made up a mere 2.4% of the cases, and almost none was severely ill. People with mild and moderate illness took 2 weeks on average to recover.

The report highlights how China achieved what many public health experts thought was impossible: containing the spread of a widely circulating respiratory virus. “China has rolled out perhaps the most ambitious, agile, and aggressive disease containment effort in history,” the report notes. The most dramatic—and controversial—measure was the lockdown of Wuhan and nearby cities in Hubei province, putting at least 50 million people under a mandatory quarantine since 23 January. That has “effectively prevented further exportation of infected individuals to the rest of the country,” the report concludes. Most of China did not face such severe measures: People were asked, but not required, to quarantine themselves if they felt ill, and neighborhood leaders monitored their movements.

Chinese authorities also built two dedicated hospitals in Wuhan in about 1 week, sent health care workers from all over China to Hubei, and launched an unprecedented effort to trace contacts of confirmed cases. In Wuhan alone, more than 1800 teams traced tens of thousands of contacts. Aggressive “social distancing” measures implemented in the entire country included canceling sporting events and shuttering theaters, schools, and businesses. Anyone who went outdoors had to wear a mask.

Two widely used mobile phone apps, AliPay and WeChat—which in recent years have replaced cash in China—have helped enforce the restrictions, because they allow the government to keep track of people’s movements and even stop people with confirmed infections from traveling. “Every person has sort of a traffic light system,” says mission member Gabriel Leung, dean of the Li Ka Shing Faculty of Medicine at the University of Hong Kong. Color codes on mobile phone screens—in which green, yellow, or red designate a person’s health status—let guards at train stations and other checkpoints know who to let through.

“As a consequence of all of these measures, public life is very reduced,” the report notes. But the measures did work. In the end, infected people rarely spread the virus to anyone except members of their own household, Leung says. Once all the people living together were exposed, the virus had nowhere else to go and chains of transmission ended. “That’s how the epidemic truly came under control,” Leung says.

It’s debatable how much of this could be done elsewhere. “China is unique in that it has a political system that can gain public compliance with extreme measures,” Gostin says. The country also has an extraordinary ability to do labor-intensive, large-scale projects quickly, says Jeremy Konyndyk, a senior policy fellow at the

Center for Global Development: “No one else in the world really can do what China just did.”

Nor should they, says lawyer Alexandra Phelan, a China specialist at Georgetown’s Center for Global Health Science and Security. “There are plenty of things that would work to stop an outbreak that we would consider abhorrent in a just and free society,” Phelan says.

The report urges China “to more clearly communicate key data and developments internationally.” But it is mum on the coercive nature of China’s control measures and the toll they have exacted. “The one thing that’s completely glossed over is the whole human rights dimension,” says Devi Sridhar, a global public health specialist at the University of Edinburgh. Instead, the report praises the “deep commitment of the Chinese people to collective action in the face of this common threat.”

“To me, as somebody who has spent a lot of time in China, it comes across as incredibly naïve—and if not naïve, then willfully blind to some of the approaches being taken,” Phelan says. Singapore and Hong Kong may be better examples to follow, Konyndyk says: “There has been a similar degree of rigor and discipline but applied in a much less draconian manner.” Jennifer Nuzzo of the Johns Hopkins University Bloomberg School of Public Health also wonders what effects China’s strategy had on, for instance, the treatment of cancer or HIV patients, whose care may have been interrupted. “I think it’s important when evaluating the impact of these approaches to consider secondary, tertiary consequences,” she says.

And the benefit may be short-lived. “There’s no question they suppressed the outbreak,” says Mike Osterholm, head of the Center for Infectious Disease Research and Policy at the University of Minnesota, Twin Cities. Reducing the peak number of cases buys a health system time to deal with later ones, public health experts say. But once the restrictions are lifted, “It’ll come roaring right back,” Osterholm predicts.

Aylward and the other visiting scientists on the team were well aware of the “reality of different political systems,” he says, but they spoke with hundreds of people around the country and “everyone agreed with the approach.” He hopes China’s successes so far will encourage other countries to act quickly. “We’re getting new reports daily of new outbreaks in new areas, and people have a sense of, ‘Oh, we can’t do anything,’” Aylward says. “Well, sorry. There are really practical things you can do to be ready to be able to respond to this, and that’s where the focus will need to be.” ■

ATMOSPHERIC SCIENCE

Why weather systems are apt to stall

A new theory tries to explain enigmatic “blocks” that bring heat waves and drought

By Paul Voosen

It was the summer of 2003 in Europe, and, for a while, it seemed as if Earth’s weather system had broken down. For weeks a huge mass of air stalled over the continent, slowly subsiding and suppressing cloud formation, leaving day after day of brilliantly clear skies. The mercury rose, and a record-breaking heat wave gripped countries including France and Germany, causing 70,000 deaths. Then, as abruptly as it set in, the persistent atmospheric block eased, and high winds brought relief.

Few weather phenomena are as widely experienced—but poorly understood—as an atmospheric block. When a block arises, typically at the western edge of a continent, the jet stream splits, trapping a blob of seemingly static air thousands of kilometers across. Such blocks can last for weeks, and drive heat waves, drought, and winter cold snaps. At the same time, the persistent flows around the edges of a block can route storm after storm to the same spot. A block “has very different impacts in different seasons,” says Tim Woollings, an atmospheric dynamicist at the University of Oxford. “But it’s always quite extreme.” Yet atmospheric scientists have long struggled to understand why blocks occur and last so long, and how they might change in a warming world.

Several new theories are offering answers. A leading idea links blocking to the behavior at high latitudes of the Coriolis force, an effect of Earth’s rotation that can cause the jet stream to meander and constrict. The theory, developed by Harvard University atmospheric scientist Lei Wang, is unlikely to be the full picture, but it has a sobering implication. As the world warms, the jet stream is likely to move to higher latitudes, which could lead to even more blocking events.

The new ideas about blocking emerged from debate over another potential impact of climate change. Researchers led by Jennifer

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