

CURRENT HISTORY

September 2020

“By the time COVID-19 arrived . . . China’s public health system had been remade from the bottom up.”

Did China’s Public Health Reforms Leave It Prepared for COVID-19?

KATHERINE A. MASON

On December 30, 2019, Li Wenliang, a 33-year-old ophthalmologist at Wuhan Central Hospital, sent a group message to several friends on the messaging platform WeChat. He told them something alarming—something that Chinese public health professionals had been dreading for over 16 years.

SARS was back.

Li wasn’t exactly right about the virus that had begun appearing among patients in his hospital a few weeks earlier. But he was close. Six weeks later, Li was dead from COVID-19. The new coronavirus that caused his disease, and would soon spread far beyond Wuhan to become a global pandemic, was named SARS-CoV-2, or SARS coronavirus 2, in homage to its close cousin.

SARS (Severe Acute Respiratory Syndrome) spread from the southeastern Chinese province of Guangdong in late 2002, crossed the border from mainland China into Hong Kong, and went on to seed outbreaks throughout East and Southeast Asia as well as in Toronto, Canada. (There were no major outbreaks in the United States.) Like its successor, SARS-CoV was a novel coronavirus that likely originated in bats and spread to humans through one or more intermediate animal hosts, in ways that are still not fully understood. Also like COVID-19, symptoms of the resulting disease included pneumonia, high fever, and respiratory failure.

But unlike COVID-19, SARS never escalated into a full-blown pandemic. The virus killed around 800 people worldwide, out of 8,000 recorded cases, before disappearing in July 2003 as suddenly and mysteriously as it had arrived. As the

science writer David Quammen put it in a May 2020 article in the *New Yorker*, “SARS was the bullet that went whistling past humanity’s ear.”

It was the pandemic that wasn’t. Most of the world’s attention quickly moved on. But SARS became the spark that remade China’s public health system. It also gave the country an outsized role in a massive global effort to prevent just the sort of nightmarish scenario that the world is now experiencing with COVID-19.

That prevention effort clearly failed. To understand why, and what SARS may have had to do with it, let’s return to the beginning.

A MYSTERIOUS ILLNESS

The 2003 SARS epidemic began in much the same way that COVID-19 did. Intermittent reports of a mysterious pneumonia-like illness began appearing in Chinese hospitals in the fall of 2002. Local officials denied or downplayed reports of the disease, and the general population at first was relatively unconcerned. A local “wet market” that sold wild animals for consumption was quickly identified as a likely source of the virus. The civet, a mammal considered a delicacy in southeastern China, became the face of “zoonotic,” or animal-to-human, transmission. (The civet’s culpability was later called into question when the virus was traced back to bats instead.)

One important difference between SARS and COVID-19 is that SARS first appeared in the third-largest urban area in the world—the region of southeastern China known as the Pearl River Delta. This area encompasses several large cities with a combined population of 60 million people, including Guangzhou and Shenzhen, as well as the Special Administrative Region of Hong Kong, a center of regional and global commerce. Once

KATHERINE A. MASON is an assistant professor of anthropology at Brown University.

the World Health Organization (WHO) became aware of SARS's existence, the new virus immediately raised alarm bells due to the location of the outbreak and its high potential for spreading internationally.

However, SARS was a slower-moving virus than COVID-19, and its international spread did not start in earnest until four months into the outbreak. In February 2003, a Guangzhou doctor crossed the border into Hong Kong, where he stayed at a hotel to attend a wedding, and went on to become the SARS epidemic's first known "superspreader." Hotel guests who stayed on the same floor as the doctor returned home to seed outbreaks in Hanoi, Singapore, Toronto, and other cities.

The WHO declared its first ever "global health alert" and advised against travel to mainland China or Hong Kong—infuriating Chinese public health officials, who were still insisting that the outbreak was under control. Finally, on April 20, 2003, a military doctor revealed to the media that a major outbreak of SARS was raging in the heart of Beijing, more than 1,000 miles from the original epicenter in Guangdong province. This suggested that the deadly new disease might already be spreading out of control in the world's most populous country.

Following this whistleblower report, the central government abruptly changed tactics. Newly appointed President Hu Jintao declared "war" on SARS and began bringing the full power of his authoritarian government to bear on the problem. Local and central authorities built field hospitals in a matter of days, quarantined universities and apartment complexes, set up village watch systems to keep out migrant workers returning home from the cities, and encouraged citizens to report on their neighbors. After bitterly criticizing the government for withholding information about the true extent of China's outbreak for months, the WHO began praising Beijing for its "bold" containment efforts.

Many public health scholars have since pointed to these actions on China's part as among the main reasons that SARS was contained so quickly and that the rash of outbreaks failed to escalate into a pandemic. But some also contended that China's containment measures—at the time considered quite extreme—could only have been implemented by an authoritarian

government with a compliant population used to following its orders. In other words, coercive mass quarantines were not considered to be a viable option for most other countries.

Writing in the wake of SARS in 2003, public health ethicist Lawrence Gostin and colleagues contended that "coercive strategies reflect conceptions of individual rights, the legitimacy of state intrusions, and the appropriate balance between security and liberty. Measures tolerable in an authoritarian regime would not be tolerated in a liberal democratic state." In my own ethnographic field research conducted with public health professionals in the Pearl River Delta in the years following SARS, I heard much the same thing. One of my interlocutors, a higher-up in a local public health institution, told me:

In this area, when it comes to infectious disease, I think that China has better administrative means than the United States—stronger and more effective. If the United States wants to do this sort of thing, it's not easy. . . . A lot of our measures, maybe Americans say it's human rights. For example, the current quarantines, they'll say, "I'm not going; you're violating my human rights." Our country, in this area, is clear about having sense. It can take forcible measures.

SARS became the spark that remade China's public health system.

Of course, 17 years later the United States did do "this sort of thing," and at a much larger scale than China ever resorted to against SARS. Still, watching footage of armed citizens demonstrating against COVID-19 lockdowns in Michigan, and reading the screeds of Americans who argue that even requiring them to wear a mask in public is tantamount to trampling on their civil rights, it is hard not to conclude that Gostin was right. As it turns out, measures tolerable in an authoritarian regime are in fact not at all well tolerated in at least some liberal democratic states.

MAO'S LEGACY

The aftermath of SARS in China, and the massive impact it had on the Chinese public health system—which has informed this year's COVID-19 response—can only be understood in the context of broader systemic reforms that had just been getting underway in China when SARS hit. And these reforms, in turn, can only be understood in

the context of the Mao-era reforms that preceded them.

During the period that some scholars refer to as “high Communism” in China—the years from 1949 to 1976, during which Mao Zedong held power—China’s public health system won global admiration as a model for how to achieve major gains in population health with relatively few resources. Although Mao has been heavily condemned for his highly repressive and often bizarre style of rule, one of his positive accomplishments was to prioritize public health improvements, insisting that they were essential for the success of his communist experiment.

Mao declared in the early 1950s that improving public health was a “patriotic duty,” and that disease prevention was to be a core goal of his “people’s government.” Over the next decade, he built a comprehensive, grassroots public health system focused on sanitation, preventive care, and basic primary care. The ensuing reports of astonishing gains in life expectancy and dramatic falls in infant mortality rates have recently come under a fair amount of scrutiny. Still, there can be little doubt that certain basic measures of public health did greatly improve during this period, particularly in poor rural areas. (It should be noted, however, that tens of millions died from starvation during Mao’s “Great Leap Forward” movement of 1958–62.)

“Barefoot doctors,” the minimally trained health workers who were dispatched to the countryside to provide basic primary and preventive care, became the most famous international symbols of Mao’s public health movement. But the bureaucratic health apparatus and physical infrastructure that Mao built may have had an even more enduring impact. These institutions later formed the backbone of China’s attempt to rebuild, modernize, and scientize the public health system in the early 2000s.

In the early 1950s, Mao established thousands of “anti-epidemic stations” (AESS, or *fangyi zhan*) across the country at the provincial, city, district, and county levels. These stations provided basic sanitation, vaccination, and other preventive care services, but they fell into disrepair during the early economic reform period of the 1980s and 1990s, when interest in public health declined. Government funding for local AESS plummeted. Scrambling to make their own money, they charged fees for sanitation inspections, basic health checks, and other services. Meanwhile,

infectious disease rates, which had dropped precipitously during Mao’s rule, again began to rise.

THE AMERICAN MODEL

At the turn of the century, President Jiang Zemin decided to overhaul the public health system, reasoning that a strong economy required a healthy population. Taking after the US Centers for Disease Control and Prevention, which the Chinese public health community revered, the thousands of AESS scattered throughout China’s cities and rural counties were renamed as CDCs (*jibing yufang kongzhi zhongxin*). A national Chinese CDC, modeled after the American original, was established in Beijing in July 2002 to provide guidance to the centers at the local level.

The process of converting local AESS to CDCs began in 2002 and continued right through the SARS epidemic in 2003. These new CDCs were supposed to modernize the low-tech Maoist approach to public health by prioritizing research and taking a rigorous scientific approach to disease control. But before the arrival of SARS, most of the local CDCs appeared little changed, and the switch remained a bureaucratic footnote of which few outside of public health circles were even aware.

SARS changed all of this. As another of my interlocutors told me, “The whole society knew the CDC” after SARS. The new centers suddenly had purpose, attention, respect, and a lot of new funding. Fears that another outbreak might soon emerge from China—and lead to the pandemic that SARS never became—sparked global calls for serious investment in Chinese public health and science. Money from domestic and international sources poured in, allowing the CDCs to hire many highly educated epidemiologists, virologists, molecular biologists, and others—at all levels of government, down to the county and district levels.

Along with the renewed attention to public health and increased funds for personnel, equipment, information systems, and laboratories came a narrowing and focusing of the goals set for these local institutions. No longer burdened by the need to hustle for money with sanitation inspections and health certificate exams, the new CDCs sought to build reputations as high-tech research institutes with an emphasis on outbreak control and pandemic prevention and preparedness. By the time COVID-19 arrived 17 years later, China’s public health system had been remade from the bottom up.

One of the more internationally visible outcomes of this remaking of Chinese public health was an enhanced spirit of cooperation between Chinese and foreign scientists—particularly US public health and infectious disease experts. The US CDC had begun teaming up with Chinese public health agencies in the late 1990s, in the wake of a 1997 outbreak of the H5N1 avian influenza in Hong Kong. SARS dramatically accelerated and enhanced this budding relationship.

Experts from the US were invited to assist Chinese public health professionals in developing biosecurity systems for markets, farms, and other entities that handle animals or food; building laboratory and testing capacities; and training scientists and health personnel. The US CDC sent representatives to work in the Chinese CDC office in Beijing, launched numerous collaborative research projects and initiatives, and set up a field epidemiology training program in China. The program educated many of China's top epidemiologists and launched regional spin-off programs in large coastal cities and beyond.

DIRECT REPORTS

Apart from this highly visible increased foreign cooperation, another primary focus of China's post-SARS public health reforms was to build an efficient, transparent, and accurate online system for outbreak identification and reporting. The central Chinese CDC set up a real-time surveillance system to detect and facilitate mandated reporting of even the smallest outbreaks of a wide range of viruses. Most virus reports were to be sent upward step by step, from district- to city-level institutions or from city to provincial levels, via an online form. But Beijing mandated that novel influenza viruses be reported directly to the central government, whose health officials would receive an alert on their cell phones.

This was a big change from previous, much slower, and more casual outbreak reporting systems. As a professional who worked at a provincial-level public health institution told me in 2009, "It used to be that a hospital would get a case of flu, and would fill out a form . . . and by the time it got to the provincial level it's a month later and the patient has recovered and the outbreak is over! Now it's totally different—it's all computerized. So there is one case of novel influenza and

everyone knows up to the national level by the next day." By the time COVID-19 appeared in late 2019, this new system had already been through numerous pandemic trial runs, detecting and addressing outbreaks of H5N1 (2005–7), H1N1 pandemic influenza (the 2009 pandemic, which began in North America and was relatively mild), and H7N9 avian influenza (2013–16).

Despite these efforts, a June 2020 Associated Press exposé suggests that public health officials up and down the reporting ladder in China dragged their feet in transmitting information about early cases of COVID-19. This lack of transparency and relatively slow reporting kept the outbreak from the public eye—both internationally and domestically—during its early stages, when containing it still might have been possible.

Local Wuhan officials, afraid of being blamed for a politically inconvenient truth, were reluctant to take responsibility for the outbreak and failed to report upward as they were supposed to. Once the central government eventually found out about the outbreak, it did not immediately share the informa-

tion with the WHO, likely out of reluctance to face the inevitable geopolitical repercussions. Confusion over who was supposed to do what, and internal competition over who should get credit for the scientific advances being

made in decoding and studying the new virus, apparently further impeded reporting to the WHO of crucial information about the virus and its spread.

Such were the early failures of this post-SARS pandemic surveillance system that when Li Wenliang told his friends about a new outbreak of a lethal respiratory disease in Wuhan, he was quickly detained by local authorities, who accused him of spreading rumors and forced him to retract his claims. It was not until the *Wall Street Journal* 10 days later reported the identification of a new coronavirus that the world began to learn about what was happening in Wuhan. At the time of this writing, five months later, COVID-19 has infected nearly 10 million people worldwide and killed almost 500,000.

MIXED MESSAGES

Beyond the push for increased scientific training, the legacy of SARS in China was also shaped by two very clear messages that the international

An outbreak of a novel virus remained, as it was before SARS, a state secret.

community communicated—knowingly or not—in the wake of the epidemic. The first message was that scientific cooperation required scientific transparency: “covering up” outbreaks or failing to share data in a timely fashion was portrayed as a Third World approach to public health, unbecoming of scientists working for a new world power. The second message was that authoritarian impulses could be useful public health tools: top-down massive containment efforts had proved to be impressively effective in fighting SARS, and China’s capabilities in this area gave the country an opportunity to shine.

Both of these messages were heard loud and clear by Chinese public health officials. The twin—and potentially contradictory—goals of broader transparency and increased population control were etched into the backbone of the new CDC system.

When Li Wenliang sent his now-famous WeChat message to his circle of friends in China, he waded into the murky terrain between these two priorities. As a doctor who had trained in China in the wake of SARS, he no doubt had learned that scientific transparency is crucial to effective disease control. But as an employee of a public hospital, he also would have known that an outbreak of a novel virus remained, as it was before SARS, a “state secret” (*guojia mimi*) that only the central government had the right to share with the public. Although he did not release information to the public at large, sharing a state secret on WeChat was venturing into dangerous territory. This transgressive flirtation with free speech briefly made Li a martyr for the cause of government transparency and individual freedom in China following his death.

The case of Li Wenliang and later allegations that Chinese officials covered up the outbreak in the early days of the COVID-19 response together may give the impression that little has changed since SARS in terms of information sharing in China. But that would not be quite accurate. SARS did have a substantive impact on how Chinese public health agencies interact with each other and with the global health community.

Although China apparently withheld information about the genomic sequence of SARS-COV-2 for over a week, the fact that this delay was counted in days rather than weeks still suggests a speeding up of the pace of sharing compared with SARS. Local officials dragged their feet in reporting on the true extent of what was happening until it was too late

to wipe out the outbreak entirely, just as they had done during SARS. But the Chinese CDC nevertheless was informed that something was happening in Wuhan within days of the first documented cases, and its investigators were on the ground in Wuhan almost immediately thereafter.

The hiring of so many highly trained scientists after SARS also paid off. Chinese scientists at the Chinese CDC and other institutions sequenced the new coronavirus genome in record time. There was a downside to this increased scientific rigor, however. The Associated Press reported that internal squabbling over which Chinese scientists and institutions would get credit and publication rights for COVID-19 data may have been as responsible for the delay in data sharing as political concerns were.

Once the news of COVID-19 was out, Chinese authorities did not delay at all in launching the most massive and comprehensive disease containment response in history, putting its authoritarian powers proudly on display. The entire province of Hubei—home to 56 million people, larger than the entire population of South Korea—was almost entirely sealed off. No one was allowed either out or in for more than two months.

As with SARS, field hospitals were built in days. Public health workers went door to door, taking residents’ temperatures and carting away those with a fever, alone, to government-run quarantine facilities. Guards were stationed at the gates of apartment complexes, keeping outsiders out and residents in. The rest of the country quickly followed suit, implementing lockdowns only slightly less restrictive than Hubei’s.

The astonishing thing about the COVID-19 lockdowns in China is not that they were attempted, or even that they were successful. SARS clearly laid the groundwork, in a more muted fashion, for that outcome. More remarkable is that this time, the rest of the world attempted to mimic what China had done. Brushing aside the previously established wisdom that it was impossible to implement severely coercive disease containment measures in democratic societies, nonauthoritarian governments from Italy to the United States locked down their own societies for months on end, with decidedly mixed results.

DISEASE POLITICS

Despite the similarities in their virus names and clinical presentations, SARS and COVID-19 are two very different diseases. SARS had a higher fatality

rate, killing around 10 percent of those it infected. COVID-19 kills somewhere between 1 percent and 2 percent, but it is much more contagious and difficult to control. Whereas SARS generally only passed from symptomatic people, who could be relatively easily identified and isolated, COVID-19 appears to pass both from symptomatic people and from those with no symptoms at all, meaning that every person on the street is a potential carrier. As a result, although SARS killed a total of 800 people worldwide, COVID-19 has already killed more than half a million—and many epidemiologists think it has barely gotten started.

The different trajectories of these two diseases were shaped by more than just biology. Both SARS and COVID-19 proved to be intensely political diseases as well. Nowhere is this more evident than in the varying impact of US–China political dynamics on Chinese disease preparedness efforts.

The younger, well-educated staff of China's new CDCs, hired after SARS, at first were enamored with the US scientific establishment. Some of my interlocutors in 2008–9 revered the US CDC with an almost religious fervor, and took every opportunity for training offered by the American institution at its Atlanta headquarters or elsewhere, including in China—for doing so became a marker of high prestige. They saw US science as neutral, apolitical, rigorous, and of the highest possible quality. These ideals—however unrealistic—were incorporated into my interlocutors' own value systems, leading to notable reductions in problems like corruption in science, and to increasing professionalism.

In the past several years, however, as US science has become increasingly politicized, and as Chinese nationalism has intensified, this dynamic has shifted. US President Donald Trump's general antipathy toward China, his suspicion of American–Chinese scientific cooperation efforts, and his determination to blame Chinese President Xi Jinping for America's own economic woes have run up against Xi's defensive nationalism, increasingly aggressive assertions of Chinese strength, and determination to position China as a superpower rival of the United States. The clashing of these two strong personalities created a toxic brew that has made it hard for the two countries to work together to contain COVID-19. It did not help that each blamed the other's nation for the COVID-19

disaster, even promoting conspiracy theories that the disease had been deliberately released to harm their people.

The Trump administration's hostility toward scientific cooperation with China has had a particularly pernicious effect. Peter Beinart reported in *The Atlantic* in March that after George W. Bush and Hu Jintao began expanding scientific cooperation on disease control between the United States and China in 2003, officials from their respective CDCs went on to work productively together in responding to H1N1, H7N9, and even Ebola. Beinart notes that “many of the health experts whom China dispatched to fight Ebola [in West Africa in 2014–15] had been trained by the Americans whom the Bush administration had sent to Beijing a decade earlier.” After over a decade of teacher-student relationships, the scientists of the US and Chinese CDCs had, by the time of the Ebola outbreak, become close colleagues.

Much of this goodwill was squandered over the next several years. Trump dramatically reduced the presence of CDC and National Institutes of Health scientists in China, shut down the National

Science Foundation office in Beijing, and severely damaged diplomatic ties. He cast all US–China cooperation in a suspicious light, deterring experts from maintaining the kinds of close professional and personal relationships that had made productive

scientific collaboration possible. As Beinart and others have pointed out, this tension likely hampered cooperation early in the pandemic. It may well have contributed to China's reduced transparency and delays in data sharing with the international community, which many have blamed for allowing COVID-19 to escape Wuhan and spin out of control.

AT THE SOURCE

In the first weeks of the epidemic in China, local officials blamed the COVID-19 outbreak on the Huanan Seafood Wholesale Market in Wuhan. Among many other, more ordinary food items, this market sold small quantities of “exotic” fare, including pangolins and other wild animals. Since the initial cluster of coronavirus cases they identified was found among people associated with this market, Wuhan officials suggested that the virus must have passed to humans from a wild animal on sale there.

This time, the rest of the world attempted to mimic what China had done.

This claim, in turn, supported local officials' false assertions that the disease was not transmissible between humans.

Virus watchers around the world jumped on the "wet market" theory as an obvious explanation for the new disease. So did the US media, which immediately blamed strange Chinese diets and the illegal wildlife trade for the outbreak. It all made sense: SARS had supposedly spread from wild animals in a wet market in Guangdong, so this new disease could easily have spread from wild animals in a wet market in Wuhan. The Huanan market was quickly shut down.

This easy credulity blinded observers to what epidemiologists now tell us was a more probable scenario. The disease had likely been circulating among humans for weeks or even months before the revelation of the cluster of cases found to be associated with the market—and that cluster itself likely resulted from human-to-human spread. Although scientists now believe that SARS-CoV-2, like SARS-CoV, originated in bats, it remains a mystery how exactly it made its way into humans. In any case, they agree it was unlikely that the Huanan market had anything to do with the origins of COVID-19. In a rush to embrace the "exotic animals" storyline, both scientists and the larger public missed the scope of the outbreak in Wuhan in the early days of the epidemic and failed to question a key assertion: that the virus was not transmissible between humans.

The wet market debacle points to a broader problem with the goals and scope of containment. After SARS, a singular fixation emerged among Western members of the global health community: to stop a pandemic, new viruses needed to be stopped "at their source"—that is, in the non-Western regions where they usually emerged. The international community set a high priority on training Chinese public health officials to identify and corral new viruses before they could spread outside China. Many world leaders seemed at a loss for what to do once that effort failed with COVID-19.

The focus on identifying and containing new viruses at their source assumes that the source can be found—and that a new virus can be contained. But epidemiologists have warned since the first

cases of COVID-19 were reported in Wuhan that this disease likely could not be fully contained. What happens after containment fails—and what is needed to keep billions of people alive and functioning during a protracted battle with a relentless pandemic over a period of months or years—is something that the proponents of preparedness at the source did not sufficiently imagine.

A MOMENT OF TRUTH

For a brief period after the death of Li Wenliang, it seemed that the drive to increase transparency and information sharing in China might be at a turning point. The change appeared to be coming not from the international scientific community, but from ordinary Chinese citizens.

As Wuhan's case count exploded and the entire country locked down, hundreds of millions of Chinese were confined to their homes. Many became angry. They were angry that their government had failed to tell them about this disease earlier, they were angry that it was still failing to report accurately on the toll the virus was taking in Wuhan, and they were angry that they were not being allowed to freely express their anger.

Self-appointed citizen-journalists posted horrific photos of dead bodies in the hallways of hospitals in Wuhan, even as officials insisted that the situation was under control. Bold, scathing critiques of the government's response were uploaded and shared faster than the government could take them down. The drive toward transparency appeared, however briefly, to be overtaking the entrenchment of authoritarian rule.

That moment has long since been quashed under heavy censorship and a wave of intensified nationalism. Xi's storyline—that China's bold actions and powerful government controls rendered it uniquely capable of controlling a virus that laid waste to the rest of the world—has gained the upper hand. As life more or less normalizes in China—recent sporadic outbreaks notwithstanding—what happened in Wuhan has not been forgotten so much as forgiven. Or, at the very least, buried alongside the annals of other unfortunate incidents that Chinese citizens have learned to live with in the name of safety and prosperity. ■