

## SARS and China's Health-Care Response

### *Better to Be Both Red and Expert!*

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The SARS epidemic of 2002–2003 was a wake-up call to the world about the threat of new, emerging infectious diseases. Ironically, SARS, a deadly atypical pneumonia from southern China, emerged around the same time that the Institute of Medicine of the National Academy of Sciences in Washington, D.C., issued *Microbial Threats to Health: Emergence, Detection, Response*, a report noting that “in the highly inter-connected and readily traversed ‘global village’ of our time, one nation’s problems soon become every nation’s problems.”<sup>1</sup> The rapid global response to SARS was impressive and fortunately succeeded in averting a catastrophic pandemic. Post-9/11 investments in global health-information systems, surveillance, and rapid response alerted the world to a new epidemic at the end of 2002. Travel bans and bold action by the World Health Organization (WHO) limited the spread of SARS. International scientific collaboration helped define the virus and sequence its genome. Strategies for infection control, as well as therapeutic information were shared worldwide.<sup>2</sup>

Set against this impressive show of global cooperation are the events that unfolded in China from November 2002, when the outbreak began, to the summer of 2003 when, to the surprise and relief of the international community, the WHO declared China SARS-free. The Chinese

government went from being a global pariah because of its initial failure to alert the world about the outbreak, which resulted in a worldwide epidemic, to being a global hero because of the disease's successful containment. Many believed in April 2003 that China's health-care system, weakened by years of underinvestment, was not up to the task. This chapter reviews China's health-care system's response to SARS and highlights its unique features that accomplished what many thought was the impossible task of bringing the SARS epidemic under control.

### **Background and Timeline**

The SARS epidemic began in Foshan city, Guangzhou province, in November 2002 as an outbreak of atypical pneumonia.<sup>2,3</sup> Since animals, especially pigs and chickens, live in close proximity to humans, southern China long has been a breeding ground for new viruses. Recently, several new strains of flu have emerged from the area and moved quickly from southern China to Hong Kong with the massive movements of people across relaxed borders. Between November 16, 2002, and mid January 2003, the outbreak gained momentum in Guangdong, spread to the city of Heyang, 200 miles away, and finally reached Guangzhou, the provincial capital. During this period, misdiagnosed patients were not isolated and were transferred between hospitals, infecting other patients and health-care providers. In late January 2003, a local Center for Disease Control notified the Provincial Health Bureau, which then notified the Ministry of Health in Beijing, just as the week-long Chinese New Year holiday was beginning.<sup>4</sup> Pneumonia, atypical or otherwise, is not a mandatory reportable infectious disease in China and therefore did not fall under the requirements for surveillance and reporting set up for other communicable diseases,<sup>5</sup> allowing the initial outbreak to be kept from the public in Guangdong until February 11.<sup>4</sup> Moreover, the cluster of cases of this severe and deadly new pneumonia were at first mistakenly believed to be a new outbreak of avian flu virus, and the situation

was further confused because of a separate cluster of deaths of confirmed avian flu during the same period in Foshan. Rumors of the “killer pneumonia” were flying in Guangzhou during the winter of 2002–3, accompanied by panic buying of white vinegar, which was believed to kill the virus, by the public. The outbreak was finally confirmed by a Guangdong Provincial Health Bureau news conference on February 11.<sup>4</sup>

The epidemic was reported to the WHO on February 11, 2003, only after the organization initiated an inquiry based upon reports received from Hong Kong's Global Outbreak Alert and Response Network (GOARN), and Global Public Health Intelligence Network (GPHIN). GOARN was established in 2001 (post 9/11) by the WHO to link 112 existing disease outbreak networks into an early alert system. Since its inception, GOARN has identified 538 outbreaks in 132 countries for investigation by the WHO and its partners. The GPHIN is a multilanguage, text-mining computer application developed by HealthCanada and launched in 1997. The WHO conducts keyword searches of GPHIN to locate unusual health events. Worldwide news articles and electronic discussion groups identify items for further analysis by the WHO.<sup>2</sup> A WHO team was dispatched from Geneva to investigate the Guangdong outbreak on February 19, but was stonewalled in Beijing. The team was not granted permission to travel to Guangdong until April 2.<sup>3</sup>

The failings of the Beijing authorities, either by intent or carelessness, to acknowledge and appropriately respond to the Guangzhou epidemic allowed the outbreak to spread to Hong Kong, and from there to elsewhere in the world. An infected doctor who had cared for SARS patients in a Guangzhou hospital flew to Hong Kong on February 21 to attend a wedding and transmitted the virus to numerous guests at the Metropole Hotel. These guests set off a serious epidemic in Hong Kong, and some of them further dispersed the virus when they flew to their homes in Singapore, Toronto, and Vietnam. Epidemics began in those places as well, and on March 12, for the first time in its history, the

WHO issued a global health alert, strengthened on March 15, and recommended against travel to all affected countries.<sup>3</sup>

Meanwhile, the Beijing epidemic gained momentum as infected travelers to Guangzhou infected co-passengers on airplanes and health workers in Beijing's military hospitals. Beijing authorities downplayed the extent of the epidemic in the capital, going so far as to conceal patients from visiting WHO teams.<sup>6</sup> A full analysis of the politics of SARS and the failures of governance associated with China's early response to the epidemic are described elsewhere in this volume.<sup>7</sup> Important to note, however, is that these failures in early acknowledgement and appropriate response in the capital during March and April set the stage for China's massive SARS epidemic in the following months.

In early April, as rumors in Beijing increased about unreported SARS cases in military hospitals, the Ministry of Health reported to China's State Council that "SARS was effectively under control," and that there were only 12 cases in all in the capital. By April 9, the official number of SARS cases had increased to only 22, with four deaths. Finally, however, an outraged doctor from a Beijing military hospital reported to the media that there were over 120 cases at the Number 301 PLA hospital and two other military hospitals in Beijing.<sup>9</sup>

In a move that surprised the world, the Chinese government fired the minister of health, Zhang Wenkang, and the deputy mayor of Beijing, Meng Xuenong, on April 20. The government dramatically changed course, instituting a rarely seen transparency and honesty in reporting, and allocating two billion yuan in emergency funding for national SARS control. Following the April 20 sacking of Zhang and Meng, the government revised the capital's SARS case number to 339, ten times that reported one week earlier. Despite the firing of senior officials and the government's admission of the full extent of Beijing's SARS epidemic, public panic resulted. With millions of economic migrants fleeing the city out of fear of being detained and quarantined, Beijing's west railway station was packed. Migrants have a history of

maltreatment at the hands of Beijing police, and their civil rights are usually ignored in times of crisis for reasons of political expediency. During this period, everyone from the WHO representative in Beijing to Premier Wen Jiabao expressed deep concern that SARS might spread to the countryside, where China's rural health system had "collapsed." Worldwide focus shifted to whether China's rural health system would be able to handle large numbers of SARS cases. As cases appeared outside of Beijing and Guangdong, in Inner Mongolia, Tianjin, Shanxi, Hubei, and twenty-five other provinces, these worries increased. By May 20, there were 5,248 cases of SARS in China.<sup>10</sup> Toward the end of the worldwide epidemic (August 7, 2003), of the total 8,422 cases and 916 deaths in thirty countries and Hong Kong, 5,327 and 349 deaths were in China, or a full 63 percent of all SARS cases worldwide.<sup>10</sup>

### **China's Health-Care System: Twenty Years of Deterioration in Public Health Preparedness**

Concerns about China's health-care system are well-founded. The past twenty years have witnessed the dismantling of China's socialist rural medical care system and its transformation into a privatized one, where poverty is closely associated with poor care and lack of access to care, and medical expenses have become a major cause of falling into poverty.<sup>11</sup> In 1978, China's rural, community-based primary health-care system was extolled as a model for the world at the WHO's Alma Ata conference, where the slogan "Health for all by the year 2000" was adopted.<sup>12</sup> By the year 2000, in its yearly World Health Report, the same organization ranked China number 188 out of 191 countries in terms of fairness in financial contribution to health.<sup>13</sup> In a survey conducted in 2001, 21.6 percent of rural households had fallen below the poverty line due to their medical expenses. The average cost of hospitalization is equal to an entire year of the average rural family's income (1,500 yuan, or about \$175).<sup>14</sup> Rural Chinese seek health care based upon what they

can afford, and care is often provided by traditional or minimally trained and supervised rural doctors in local clinics with poor infection-control practices.

While few would glorify the sophistication and quality of China's rural medical care system in the 1970s, many long for a return to its equity and emphasis on prevention. The care, while basic, was available to all at little cost and was combined with health education and public investments in a healthy environment. By the end of the 1970s, over 90 percent of rural citizens were covered by a medical insurance system.<sup>14</sup> The cooperative medical system (CMS), was based upon a referral system that began at the community level and was supported by increasingly sophisticated medical care at township and county levels. The community level curative health system of basic care provided by minimally trained health workers ("barefoot doctors") was supported by investments in preventive health care through "patriotic health campaigns" consisting of public works (like mosquito control and clean water projects) and educating the public about the prevention of disease (hand-washing, prenatal care, etc.).

After the breakup of the commune system in the late 1970s, the rural CMS was dismantled, and health-care financing was delegated to provinces and local areas, which turned to the market economy to provide the necessary money. As public finances decreased, the unregulated market (especially for drugs) steadily increased the price of care. Limited public finances were diverted to cover staff salaries at county- and township-level facilities and for other recurrent costs. Rural citizens who could afford to do so bypassed expensive township facilities for county-level care, undermining the three-tiered referral chain and distorting the value of manpower investments and training in rural health care. By 1992, only 10 percent of rural residents were still covered by rural health insurance.<sup>14</sup> The current system, with its focus on fee-based financing of curative care, has shifted attention and investments away from vital public health education and public works that prevent both

chronic and infectious diseases. In fact, the level of curative care in rural China has greatly improved by contrast with earlier years. Most essential drugs are available in the most remote parts of the country, and staff are trained in their use; but the cost of care and the breakdown in the government's preventive public health functions have created serious inequities and distortions in the rural health system.

Of particular concern for a SARS response, the training of rural health workers is weakly financed, and standard infection-control procedures are hardly standard practice outside urban hospitals, as evidenced by high rates of hepatitis B and other blood-borne infections transmitted by improperly sterilized needles. Key public health responsibilities like surveillance and health education have been weakened over the past twenty years. Economic development goals have taken precedence over investments in public health. Poor communities invest their limited local resources to build roads to the county town or city rather than in maintaining public health systems.

Recently, rural health-care weaknesses have received attention from the national government. In 2001, "Guidance for Reforming and Developing Rural Health" was issued.<sup>15</sup> Jointly developed by the State Council's System Reform Office, the Ministries of Health, Agriculture, Finance, and the State Planning Commission, this document signaled the government's intention to invest heavily in rural health reform. In 2002, the central government convened a national conference to tackle issues of public financing for rural health care, the breakdown of public health systems, and maintaining quality and standards of care. The document and conference produced specific plans to rebuild infrastructures, improve surveillance of infectious diseases, revitalize maternal and child health, increase public health education and health personnel training, institute an affordable and equitable rural health insurance system, and devise a mechanism for medical financial aid to poor families.

However, twenty years of fiscal and political devolution have also made the provincial governments increasingly independent of Beijing.

Thus national-level solutions to the rural health system crisis, no matter how well intended, will be hard to carry out. China's national ministries may set policy and program guidelines, but real control over decisions and budgets rests with provincial and local governments. The Health Ministry is an especially weak player on the national, provincial, and local levels, where political and economic priorities are of greater perceived importance than public health. This has been evident in China's response to its escalating AIDS epidemic. Officials in Henan province, one of the AIDS epicenters, have blocked accurate reporting, research and prevention efforts. Despite pressure from Beijing, Henan officials have engaged in a cover-up for years and remained in their jobs.<sup>16</sup>

Guangdong authorities may also have concealed the gravity of the early SARS epidemic. Anxious to avoid criticism for their mishandling of earlier outbreaks, and in an effort to maintain Guangdong as the hotbed of Chinese business dynamism and economic growth, they minimized the situation. Yet barely anyone attended the annual Canton Trade Fair because of concern about SARS. Only when SARS became a political issue, an embarrassment for Beijing, did the central government impose its authority on Guangdong.

The international loss of face and China's dramatic policy reversal after April 20, 2003, set in motion the actions that brought SARS under control. What happened next is a global lesson in how political will and national mobilization are required for tackling serious threats to public health and provides important lessons for China's long-overdue response to its growing epidemics of AIDS, tuberculosis, and hepatitis. China's extensive health infrastructure, albeit weakened by years of underinvestment, rose to the occasion once national leadership provided the mandate for action. Few countries in the world have China's capacity for national mobilization, which extends to the remotest corners of this large and increasingly decentralized nation.



### **China's National SARS Response: Mass Mobilization for Prevention**

Once the government acknowledged the full extent of the Beijing epidemic in late April, it instituted preventive measures to minimize the spread of SARS within the capital and beyond. These measures were aimed at early identification and isolation of cases and reducing public crowding and the opportunities for transmission. A national SARS headquarters was set up in Beijing under the direction of Wu Yi, acting minister of health and a vice premier. SARS was finally classified as an infectious disease, subject to the reporting requirements specified under the Law on Prevention and Control of Contagious Disease,<sup>5</sup> and additional legislation in the form of regulations dealing with SARS prevention and control was enacted, which required daily reporting and control measures. After April 20, daily reports of new or suspected SARS cases and deaths were required from all provinces and were reported to the WHO. The government announced free treatment for all cases of SARS as a way to encourage poorer citizens to seek care promptly.

In the early stages of the Beijing epidemic, SARS patients were hospitalized in infectious disease wards or transferred to the main infectious disease hospitals in Beijing, the Ditan and You'an hospitals. After many health-care providers fell ill due to inadequate infection control measures, a SARS hospital, Xiaotangshan, was constructed in a rural county outside Beijing. National infection-control guidelines for health-care workers were developed and proper medical waste disposal was instituted. In Beijing, suspected and confirmed SARS patients were quarantined. Sometimes all those who worked or lived in the same building were required to quarantine themselves for twelve days even if they did not have direct contact with the suspected case. This approach met with much criticism and did not conform to WHO quarantine guidelines, whereby only those directly exposed to a confirmed or sus-

pected case of SARS are isolated. Fears of quarantine and the possibility of being sent to a SARS facility, where exposure to patients who were actually infected was likely, were major factors contributing to the exodus of Beijing residents in the early stages of the epidemic.

The Beijing government also instituted morning fever checks for all students and established fever clinics to isolate and observe febrile persons, students and otherwise. Beijing cancelled most public gatherings and closed elementary schools. The national government cancelled the annual week-long May Day holiday to minimize travel to and from Beijing, and instituted fever checks for travelers at major transportation points such as airports and bus and train stations.<sup>17</sup> Beijing instituted routine disinfection of public places, including taxis and buses. Finally, stricter control of live animal markets in southern China, where the virus likely originated, was imposed. Despite recent articles suggesting that some controls may be loosened, there appears to be a genuine effort to monitor emerging infectious diseases from these markets more closely.

### **A Case Study of SARS Control in One Poor Rural County**

Despite the dismal state of the rural health system and the increasing independence of China's thirty provinces, the country controlled the spread of SARS to rural areas. High-level political accountability for the spread of SARS and national funding helped limit the epidemic. Local leaders applied impressive organizational skills to protect the public's health by quickly identifying and isolating cases, using provincial government and Beijing funding. Such a national mobilization for public health had not been seen in decades.

The story of how one poor rural county in China's south organized itself to deal with the SARS threat provides a window into the local actions that collectively contributed to national success. This county is the

home to 80,000 migrants, many of whom work in Beijing and fled back to their homes in April and May. I visited it in the summer of 2003 and learned about the local response to SARS. Up to the time of my visit, the county had had no SARS cases. Two migrants had been isolated as suspected cases but were later found to have other illnesses.

This county, a designated poor county in one of China's southern provinces, is typical of many in rural China. Among the population of 900,000 rural citizens, 80,000 have abandoned farming and become economic migrants to China's booming cities, mainly Guangzhou and Beijing. Their remittances home have increased their families' household wealth, providing the impetus for more migration. Like many other counties in China's rural hinterland, they have been left behind in the country's booming economy. The annual per capita county income ranges from 977 to 1,389 yuan, or from U.S.\$130 to \$170. Geographically isolated, the county government has allocated the funds available to it to road construction and other infrastructure that has a direct impact on its economic development. There has been little investment in health over the past twenty years. The limited funds earmarked for health are used entirely to cover county and township salaries (supplying only 60 percent of the amount necessary; fees have to make up the remaining 40 percent). Recent rural health financing improvements are the direct result of participation in an international donor-financed project in thirty-seven poor counties nationwide.

Prior to April 20, 2003, the county leadership seemed barely aware of the SARS threat. After the health minister and Beijing deputy mayor were fired, the province and county prepared for the potential threat. With funds provided by the provincial government and donations from a national political party (a 100,000-yuan contribution given as part of an existing work unit—"sister" relationship), an existing building on the town's outskirts was converted into a SARS hospital and opened in June. (Prior to June, the county hospital had had a designated SARS

ward). This local "Xiaotangshan," named after Beijing's suburban SARS hospital, was staffed by twenty-two temporarily reassigned county health workers (from the county hospital, maternal and child health hospital, etc.). These workers were trained for one week by the provincial health bureau and further trained by the district and county health bureaus in SARS prevention, clinical care, infection control, surveillance, and reporting requirements. Medical staff were housed in a separate building close to the hospital. The hospital itself had three fully separated sections: five rooms with individual beds for quarantined patients, five rooms with individual beds for suspected cases, and twenty rooms with single beds for definite SARS cases on a separate floor of the building. On the walls of the main hall of the staff building were fifteen sets of regulations concerning SARS, most produced by the provincial health bureau, dealing with reporting requirements, waste disposal, protocols for isolation and treatment of cases, quarantine procedures, prevention, and so on. Medical equipment, including respirators, was temporarily moved to the SARS hospital from other facilities in the county.

Before the SARS epidemic, the county administration did not know how many migrants there were in the county. But one of the first actions after April 20 was to conduct a complete county census to identify numbers of, and households with, migrant workers. The county now has information on all of its 80,000 migrants. In one township I visited, there were 1,700 migrants out of a population of 28,000, or about 6 percent of the population, half of whom were women. Village residents throughout the county were aware of the SARS problem. Nearly every household in this county (over 90 percent), and in most of rural China, has a television set, and after April 20, the public heard constant calls for vigilance to prevent further spread of the SARS virus. Villagers were also locally instructed to report any returning migrants to village and township authorities. Migrants returning from an infected area were required to quarantine themselves at home for twelve days. Health work-

ers from township hospitals and health centers were dispatched to monitor the temperatures of all returned migrants on a daily basis. The health worker was required to notify the township health bureau of any febrile persons. The township would then dispatch a team to transfer the individual to Xiaotangshan for an additional twelve days of observation and quarantine. Two suspected cases were identified and transferred in this manner but did not have SARS.

During a visit to a health clinic at the level of an "administrative village" (a grouping of about ten natural villages), staffed by a former barefoot doctor who had been practicing there for over twenty years, I tried to ascertain the level of preparedness to receive a potentially SARS-infected patient. This type of clinic is the most typical first "port of call" for a villager sick with flu. There were a large number of prescription drugs available at the clinic, and the doctor was very knowledgeable about their proper use. The sale of these drugs contributes a substantial part of her income. The doctor, a woman in her fifties, readily admitted that she was unprepared, but also noted that the township had set up a system (described above) whereby no one who suspected they might have SARS would come to this clinic. Instead, they would be identified at their homes by township health workers and transferred to Xiaotangshan. She had, however, sold her entire supply of *banlangen*, the traditional Chinese medicine used for "cooling," which is believed to boost the immune system and prevent SARS if taken daily. She had to pay double the price from her supplier for the medicine during this period and thus sold it for a higher price. She also noted that it had been difficult to buy white vinegar in the county, as vinegar is also believed to prevent SARS.

This county's approach to SARS control was duplicated in almost all of China's 3,000 rural counties. SARS control became a political issue as well as a health issue, and because local officials believed their political careers were on the line, they devoted resources, their organizational skills, and their authority to instituting effective measures. Although

this rural county did not have a single case of SARS, it will be better prepared in the future to identify and isolate SARS cases rapidly.

There are many lessons to be learned from China's SARS epidemic, for both China and the world. For China, the SARS epidemic was a painful lesson that integration with the global economy that has fueled China's recent unparalleled economic growth also requires better global citizenship. For the world, easy, large-scale air travel for both business and tourism can also be a rapid conduit for spreading what were once local and isolated disease outbreaks. Since infectious diseases do not respect international borders, China must do a better job of surveillance and honest, early admission and reporting of emerging infectious diseases. In fact, post-SARS China has been cooperating with the WHO to improve disease surveillance and reporting.<sup>17,18</sup> The SARS epidemic was also a wake-up call for China's government on the deterioration of the public health capacity and equity of China's rural health system. Twenty years of privatization have created a distorted and inequitable rural health system. Without the political mobilization and financing put in place for SARS prevention, it is unlikely the rural health system would have been able to deal with the burden of SARS care.

Fortunately for the world, the major weapon for SARS prevention did not require sophisticated technology or complicated clinical protocols, neither of which China's rural health system could have mustered. Nineteenth-century infection-control measures for identification, isolation, quarantine, and disinfection were the means used to break the person-to-person chain of disease transmission. In China, where individual civil liberties are rarely prioritized over issues of public safety or order, the government apparatus was able to detain and isolate citizens even when they had had no direct exposure to a confirmed SARS patient. In fact, it was this fear of being unreasonably quarantined that led migrants to flee Beijing in late April. Here, also, China was able to fall back on traditions of public health mobilization from the 1960s and

1970s. This mobilization was precisely what was required to put in place the series of preventive measures that broke the chain of transmission.

Another SARS lesson was the recognition of the crucial role the media can play in calming public fears by providing accurate information. For a short while, the media were allowed to honestly report about SARS and the massive government efforts to control the epidemic, thus helping the government regain control over public information about the disease. Prior to April 20, rumors spread by mobile phone text messages and the Internet were the main sources of public information. This contributed to public panic and anger with the government. Even in China, information control is impossible in the electronic age. The role of the media must, therefore, be seen in relation to other sources of public information; and misinformation or concealment will be judged harshly. China's leaders appear to have recognized that they were quickly losing the SARS battle in the court of public opinion, and in response media controls were loosened, at least temporarily.

Finally, many hope that China's experience with SARS will be translated into a more transparent and open response to China's mounting AIDS epidemic. The same issues of transparency, media control, concealment, government leadership, and the accountability of public officials can all be applied to the way China has dealt with its AIDS epidemic over the past decade. AIDS is spread less easily than SARS, and its slow progression from infection to illness makes it less immediately frightening. However, the stigma and embarrassment associated with its two main routes of transmission, sex and drugs, makes AIDS much harder to openly discuss and address. Nonetheless, there is no question that if it is not controlled, AIDS will have a serious economic and social impact in China, as tragically evidenced by several sub-Saharan African countries. Unlike SARS, the government has not held officials responsible or accountable for transparency and action in AIDS control. National political leadership and financing have not occurred (two billion yuan was devoted to the SARS battle, but only 100 million yuan has

been allocated for all national AIDS-prevention effort at the time this chapter was written—it was substantially increased in 2004). AIDS surveillance has been inadequate, making it nearly impossible to understand the full extent of the epidemic in the general population. Furthermore, China's weakened rural health system is finding it hard to handle the increasing burden of AIDS patients without the necessary resources, training, and medicines. China's response to SARS succeeded because of an infusion of financing and political will from Beijing, which focused local officials on the public health emergency. These lessons should be extended to China's battle against AIDS before it is too late.