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**Comparing the H1N1 Crises and
Responses in the US and China**



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Abstract

Both the US and China responded to the 2009 H1N1 pandemic in a decisive and swift manner. However, they handled the crisis with fundamentally different strategies. From the start of the crisis, the US approach was mitigation, focusing on minimising the impact by maximising surge capacity. By contrast, China's response until September 2009 was characterised by an aggressive containment approach that sought to establish barriers against the spread of the disease. In doing so, emphasis was placed on reducing the surge. While the divergent policy responses can be attributed to the differences in the pattern of spread of the virus and policy learning experiences, Chinese leaders had strong political incentives to pursue an excessive approach not informed by science and epidemiology. A comparison of the effectiveness of the two strategies clearly points to the inferiority of the containment strategy in handling the H1N1 pandemic. It is true that decision-makers tend to err on the side of caution when encountering an unpredictable and potentially disastrous novel disease, but that is no justification for allowing risk assessment and risk communication be dominated by worst-case scenarios, or allowing domestic political concerns to prevail over science in decision-making. A comparison between the US and China also suggests the importance of beefing up core surveillance and response capabilities in a coherent and sustainable manner.

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Biography

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Introduction

The 2009 flu pandemic, popularly known as ‘swine flu’, was a global outbreak of a new strain of the H1N1 influenza virus. First confirmed in Mexico in April 2009, the new influenza virus spread rapidly across the world. Within a week, the World Health Organization (WHO) alert level was raised to Phase 5, indicating a pandemic was ‘imminent’. By early May, the criteria for moving to the highest alert level had already been met, although the WHO did not announce a full-blown pandemic until 11 June 2009. By that time, a total of 74 countries and territories in almost all WHO regions had reported laboratory-confirmed infections. The pandemic began tapering off in November, but the transmission of the virus remained active and geographically widespread in certain countries of Southeast Asia, West Africa and Central America until spring 2010.¹ Based on the advice of an Emergency Committee meeting on 1 June 2010, the WHO Director-General maintained that H1N1 is a pandemic, even though the most intense pandemic activity had passed.²

Responses

The global spread of the H1N1 influenza virus has prompted countries worldwide to intensify their efforts to protect people’s health and minimise its impact on society and the economy. The concept of surge response capability (SRC) formed the cornerstone of some of their pandemic control efforts. According to Kelen and McCarthy, SRC is ‘the ability of surge capacity (i.e., the resources that can be made available) to accommodate the surge (demand for resources)’.³ Hence SRC is a function of both surge (on the demand side) and surge capacity (on the supply side). A major disease outbreak naturally triggers a surge, leading to a rise in demand for medical and non-medical services compared to a baseline demand. Maximising SRC therefore entails swift and effective measures to reduce the surge. While certain factors, such as the epidemiological behaviour of the disease and the characteristics of circulating viruses, are beyond human control, the surge might be reduced by a functioning disease surveillance and reporting system, well-developed laboratory and epidemiological capacities, prompt and accurate risk communication, and effective prophylactic and non-prophylactic measures (e.g., vaccination, closure of schools and selected businesses, and cancellation of public gatherings). These measures are held to increase SRC by reducing fear and panic, limiting the geographical and temporal spread of the disease, and reducing the need for more costly pharmaceutical treatments.

On the supply side, surge capacity is defined as ‘a health care system’s ability to expand quickly beyond normal services to meet an increased demand for medical care’.⁴ The US Government Accountability Office (GAO) identified four key components of preparing for medical surge: increasing hospital capacity, identifying alternative care sites, registering

¹ World Health Organization (WHO), ‘Pandemic (H1N1) 2009 – Update 93’, 26 March 2009. http://www.who.int/csr/don/2010_03_26/en/index.html

² World Health Organization (WHO), ‘Director-General Statement Following the Eighth Meeting of the Emergency Committee’, 3 June 2010. http://www.who.int/csr/disease/swineflu/8th_meeting_ihr/en/index.html

³ Gabor D. Kelen and Melissa L. McCarthy, ‘The Science of Surge’, *Acad Emerg Med.*, Vol. 13, No. 11 (November 2006): p. 1089.

⁴ Agency for Healthcare Research and Quality (AHRQ), ‘Developing Alternative Approaches to Mass Casualty Care’. <http://archive.ahrq.gov/news/ulp/btbriefs/btbrief11.htm>

medical volunteers and planning for altering established standards of care.⁵ In other words, surge capacity consists of components that pertain to patient care, such as treatment space (hospitals, hospital beds, ERs, ICUs), regulatory and voluntary medical staff, supplies and equipment (e.g., ventilators, pharmaceuticals and oxygen), and systems and processes (in place to identify the resource needs, mobilise standby resources and rationalise their use, and maximise and sustain such abilities).

An area of differing policy response between the US and China has been how to manage the initial cases and transmissions of the virus. Based on the phases of pandemic alert, two policy responses stand out: containment and mitigation.⁶ According to the WHO, during worldwide preparedness for an epidemic (phases 1–3), a containment approach is expected to prevent spread of an infection into chains of transmission and outbreaks through energetic case finding and confirmation (including detection of imported infections), vigorous contact tracing, extensive treatment and/or quarantine of contacts. By contrast, beyond phase 4 a mitigation strategy aims at minimising the impact of the virus through early detection and early treatment. In doing so, the emphasis is not on treating the majority of cases that experience a mild illness, but those who are severely ill or those in high risk groups (e.g., pregnant women, people with certain health conditions). The rapid spread of the virus therefore raised questions on the relevance of the containment strategy. When announcing pandemic phase 4 on 27 April 2009, the WHO indicated that the epidemic had already started to spread to a level that no longer justified containment. Instead, the WHO advised member states to implement a mitigation strategy, focusing on the early detection and treatment of those in risk groups. In effect then, many countries either failed to understand, ignored, or even contradicted in their actions, the advice of the WHO.

A less complete form of containment is the ‘delaying’ strategy, which does not aim to contain the pandemic but rather to slow down transmission.⁷ The delaying strategy is appealing when a pandemic starts in the spring or early summer, at a time influenza transmission is low, because an aggressive approach is expected to decrease the effective reproduction number (R) and delay the inevitable acceleration of the pandemic until fall, allowing more time for preparations and for vaccines to be developed and licensed. The delaying strategy is different from the mitigation approach because of the former’s focus on vigorous case-finding, tracing of and quarantining of contact persons.⁸

In view of the apparently rising death toll in Mexico, both the US and China swung into action at the beginning of the outbreak. On 26 April 2009, the US Health and Human Services (HHS) declared a health emergency situation over the outbreak.⁹ Two days later, US

⁵ United States Government Accountability Office (GAO), *Emergency Preparedness: States are Planning for Medical Surge, but could Benefit from Shared Guidance for Allocating Scarce Medical Resources*, GAO-08-668, June 2008.

⁶ A. Nicoll and D. Coulombier, ‘Europe’s Initial Experience with Pandemic (H1N1) 2009 – Mitigation and Delaying Policies and Practices’, *Eurosurveillance*, Vol. 14, No. 29, 23 July 2009.
<http://www.eurosurveillance.org/viewarticle.aspx?articleid=19279>

⁷ Ibid.

⁸ Ibid.

⁹ US Department of Homeland Security, ‘Press Briefing on Swine Influenza with Department of Homeland Security, Centers for Disease Control and Prevention, and White House’, 26 April 2009.
http://www.dhs.gov/ynews/releases/pr_1240773850207.shtm

Secretary of Homeland Security Janet Napolitano announced that the US was establishing an operations coordination task force to deal with the H1N1 outbreak.¹⁰ At the same time, President Barack Obama requested US\$1.5 billion from the Congress to respond to the health crisis.¹¹ The government issued new guidelines for schools with confirmed cases. As a rule of thumb, schools with one or more confirmed H1N1 cases would be closed for at least 14 days (because children could be contagious for 7 to 10 days from when they get sick). By 30 April, 433 schools had shut down, affecting 245,000 children in 17 states.¹² While the State Department moved on to issue a travel advisory for Mexico, major US airlines announced plans to curtail flights into Mexico.

Similar swift and decisive response measures were also taken by China at the outset of the crisis. On the night of 25 April 2009, the very day it received reports from the WHO about the outbreak, China activated its national pandemic preparedness and response plan. Hospitals were required to report the H1N1 situation on a daily basis, in an effort to achieve 'early detection, early reporting, early diagnosis, early quarantine, and early treatment'.¹³ Like the US, China emphasised the importance of interagency coordination. Under the leadership of Vice Premier Li Keqiang, eight working groups and one expert committee were formed to coordinate and consolidate response measures related to border screening, medical treatment, propaganda and international cooperation. Similar interdepartmental joint disease-control work mechanisms were also constructed at the sub-national level. In addition, the central government earmarked 5 billion yuan to H1N1 prevention and control, which was more than twice the amount it spent on SARS in 2003. As we shall see, the SARS episode in effect considerably shaped this agenda.

Despite these similarities, the two countries handled the crisis with fundamentally different strategies. In the United States the approach from the start was of mitigation – essentially following the WHO's advice. This included applying standard guidance on the management of influenza cases and outbreaks similar to those for seasonal influenza. Despite pressure from some members of the Congress, the US did not close its border with Mexico. Customs and Border Protection handed out the Centers for Disease Control and Prevention (CDC) 'Traveler's Health Alert' notices to all travellers from Mexico,¹⁴ but the government chose not to install thermal scanners to test travellers for any flu-like symptoms. As a matter of fact, few people presenting symptoms or reporting illness were isolated for any secondary screenings before they entered the States.¹⁵ As Secretary of Homeland Security Janet

¹⁰ US Department of Homeland Security, 'Remarks by Secretary Napolitano at the Media Briefing on the H1N1 Flu Outbreak – April 28, 2009'. http://www.dhs.gov/ynews/releases/pr_1240965057737.shtm

¹¹ Ibid.

¹² 'CDC: 141 Confirmed Cases of H1N1 in U.S', *Associated Press*, 30 April 2009. <http://cbs3.com/national/h1n1.swine.flu.2.999159.html>

¹³ Ministry of Health, 'Ministry of Health Communications on H1N1/A Prevention and Control' (in Chinese), 8 May 2009. <http://www.jdxx.net.cn/article/40288ce4062bb60401062bb60cef0014%5C2009%5C5%5C2c90818b20e5ba8801211eb66fcc0063.html>

¹⁴ Department of Homeland Security, 'Remarks by Secretary Napolitano at the Media Briefing on the H1N1 Flu Outbreak – April 28, 2009'. http://www.dhs.gov/ynews/releases/pr_1240965057737.shtm

¹⁵ Ibid.

Napolitano admitted, none of the 19 quarantine stations in the US airports have been used since the outbreak.¹⁶

Rather than seek to contain the spread of the virus, the US government and health authorities focused their energy and resources on strengthening surge capacity to treat the increasing number of cases and diminish the virus spread. According to a report of the President's Council of Advisors on Science and Technology (PCAST), there were four critical pillars to the mitigation effort: vaccines, antivirals, medical care and non-medical interventions.¹⁷ Particular attention was focused on 'decisions that could reduce instances of severe disease and death by accelerating the delivery and use of vaccines; developing integrated plans to protect especially vulnerable populations; and ensuring access to intensive care facilities'.¹⁸ As Secretary Napolitano put it, the declaration of the emergency was necessary to 'clear the way to move resources around to meet needs that might arise, and to coordinate actions across government to address the outbreak'.¹⁹ To that end, 12 million courses of antivirals (Tamiflu and Relenza), about 25 per cent of the 50 million courses in the national stockpile, would be allocated from the Federal Reserve to the most affected states. On 26 October 2009, President Obama declared the H1N1 flu outbreak a national emergency, allowing hospitals and local governments to set up alternate sites speedily for the treatment and triage of any surge of patients. On the demand side, the mitigation approach also sought to reduce the surge. In addition to the advice against non-essential travel to Mexico and social distancing measures, the CDC made efforts to reduce fear and uncertainty by setting up flu.gov, a website to provide tips, information, and a self-check list for flu symptoms. Rather than aggressively locate, confirm and treat every H1N1 case, it recommended only that people with influenza-like illness remain at home until the end of the exclusion period, which was reduced to at least 24 hours after they were free of fever (37.8°C [100°F]) or signs of a fever without the use of fever-reducing medications.²⁰ It also recommended not to treat those with milder cases of H1N1, hoping that supplies could be saved for the seriously ill and in an effort to mitigate the effects of resistance to Tamiflu. In the summer of 2009, it began to make a concerted effort to reduce the surge by preparing for mass vaccination. The HHS and its agencies, along with commercial flu vaccine makers, rushed to ramp up vaccine production. Advised by a 15-member committee of experts, the CDC designated certain groups to be vaccinated first. They included, in the order to be vaccinated, pregnant women, the caretakers of infants, children and young adults, older people with chronic illness and healthcare workers.²¹ Vaccines began to be available in October and the US eventually ordered 229 million doses from its five licensed makers –

¹⁶ Ibid.

¹⁷ President's Council of Advisors on Science and Technology (PCAST), *Report to the President on U.S. Preparations for 2009–H1N1 Influenza* (hereafter PCAST Report), 7 August 2009, p. ix.
http://www.whitehouse.gov/assets/documents/PCAST_H1N1_Report.pdf

¹⁸ Ibid.

¹⁹ Department of Homeland Security, 'Remarks by Secretary Napolitano at the Media Briefing on the H1N1 Flu Outbreak – April 28, 2009'. http://www.dhs.gov/ynews/releases/pr_1240965057737.shtm

²⁰ Centers for Disease Control and Prevention (CDC), 'CDC Recommendations for the Amount of Time Persons with Influenza-Like Illness should be Away from Others', 23 October 2009.
<http://www.cdc.gov/h1n1flu/guidance/exclusion.htm>

²¹ David Brown, 'Flu Vaccine Panel Creates Priority List; Pregnant Women, Caregivers are First', *The Washington Post*, 30 July 2009, p. A01.

Novartis, MedImmune (a unit of AstraZeneca), Sanofi Aventis, GlaxoSmithKline and Australia's CSL.²²

By contrast, until September 2009, China focused on a containment approach that sought to establish barriers to the spread of the disease. Between late April and through to the end of June, the official objective was to 'contain the importation of H1N1 externally and prevent the spread internally' (*waidu shuru neifang kuosan*).²³ Unlike their US counterparts, Chinese health authorities seemed to take the illness much more seriously. Although the H1N1 flu was officially categorised as a Group B infectious disease, it was actually treated as if it was a Group A disease, which under China's Law on Disease Prevention and Control is reserved only for two of the most dangerous acute infections: plague and cholera. Also, unlike the US, China's response measures went beyond pure public health issues. Despite the call from the WHO and the US for countries not to impose trade restrictions, China's Ministry of Agriculture on 27 April instituted a ban on pork and pork products from Mexico and three US states. It extended the ban to Canada after pigs in Alberta tested positive for the H1N1 flu virus. Perhaps more significantly, unlike the 'passive surveillance' methods in the US, China took aggressive, even dramatic surveillance and quarantine measures in containing the spread of the H1N1 virus. The government ordered airports to stringently screen inbound passengers from Mexico and other countries that had reported confirmed H1N1 cases. On 1 May, it suspended direct flights from Mexico after a Mexican passenger who made a transit through Shanghai was confirmed in Hong Kong to have H1N1 flu. The authorities then embarked on a nationwide manhunt, rounding up all travellers aboard the flight. The report of the first confirmed H1N1 case in the mainland on 11 May only provided further impetus to gear up efforts in containing the virus. Top leaders called for enhanced vigilance and stricter steps against the influenza. President Hu Jintao urged that governments at all levels should 'spare no effort to put all emergency response measures in place in order to curb further spread of the disease'.²⁴ This was echoed by Vice Premier Li Keqiang, who asked that further measures be taken to enhance border inspection and quarantine. As containing the spread of H1N1 became a top national priority, a torrent of state action was unleashed. China on 22 May began tests on every inbound international flight, making it one of the few countries that conducted on-board temperature checks and quarantined groups of passengers. Until the end of May, if a passenger on board was found to have a temperature higher than 37.5°C, the entire flight would be quarantined, and passengers would be moved to reserved places for further medical observation; suspected cases would end up being transported by negative-pressure ambulances to government-designated hotels or hospitals.²⁵ Each confirmed case would then be treated free of charge in government-

²² Maggie Fox, 'US has 71 million Unused Flu Vaccine Doses', *Reuters*, 4 May 2010.

<http://tsameer.wordpress.com/2010/05/08/u-s-has-71-million-unused-flu-vaccine-doses-reuters/>

²³ 'Ministry of Health: China Continues to Implement a Strategy of Containment and Prevention of Internal Spread in Combating H1N1' (in Chinese), *Zhongguo xinwen wang* (China News Network), 29 June 2009.

<http://finance.eastmoney.com/090629,1117338.html>

²⁴ Hu Jintao: Stopping the Spread of H1N1/A in Our Country Using All Means' (in Chinese), *Xinhua News*, 11 May 2009. http://news.xinhuanet.com/newscenter/2009-05/11/content_11355083.htm

²⁵ China stepped up its efforts to contain the spread of H1N1, and beginning on 3 June the government lowered the criteria for 'normal' body temperature from 37.5 to 37°C, so that anyone with a temperature of 37°C (98.6°F) or higher was subject to further tests. There were stories of borderline cases, such as individuals whose temperature was a mere 0.3°F above the benchmark, being deemed a public health threat and quarantined (Ariana Cha, 'Caught in China's Aggressive Swine Flu Net', *The Washington Post*, 29 May 2009, p. A01).

designated hospitals. For those who had cleared customs, they could still be tracked down and locked up in government-designated facilities if found to have had close contact with even a suspect case.²⁶ In a move reminiscent of a Foucaultian disciplinary state, by early July China had thrown tens of thousands people into government quarantine facilities.

On 12 June, after the WHO's pandemic announcement, the Chinese health authorities reiterated the containment strategy, although it slightly shifted the objective to 'reducing secondary cases, stringently preventing community outbreaks, strengthening the treatment of severe cases'.²⁷ Despite the stringent containment measures, community-level outbreaks began to be observed in China in late June. By that time, it had become evident that the virus was a relatively benign one and a growing number of countries and territories, including Singapore and Hong Kong, had scaled down their response measures. In July, H1N1 flu was no longer treated as if it was a Group A disease in China. Those who had close contact with confirmed cases were placed in home quarantine instead of being confined at government-designated facilities. The government also expanded its flu surveillance network to now cover entire Chinese cities and prefectures. Preparation for mass vaccination was well underway. On 22 July 2009, the Ministry of Health conducted clinical trials for the first batch of H1N1 vaccines. In recognition of the sheer population size and the non-existent likelihood of importing large amounts of vaccine, China relied primarily on its own vaccine development capacities. The strategy was to encourage different small laboratories to develop vaccines of different kinds – indeed, 10 out of the 25 labs approved by the WHO for H1N1 vaccine development are located in China.²⁸ In designating the priority groups to receive the vaccine, China differed from the US in giving more discretionary power to provincial health authorities. Many localities placed emphasis on occupational groups that are crucial for maintaining the supply of basic services, including water, electricity, gas, transportation, healthcare workers and key civil services. Given that SRC is not just about medical services, including these groups in the priority list can be viewed as an important step toward effective crisis management. But interestingly, until 11 December 2009 the government list failed to include at-risk groups such as pregnant women and migrant workers. Both groups are considered susceptible to the H1N1 virus: pregnant women, once infected, are nine times more likely to develop serious symptoms than ordinary people;²⁹ further, migrant workers (150 million in total), because of the very nature of their employment, are at risk too as they do not have easy access to medical services and it is difficult to monitor their health status.

Additionally, however, the government continued implementing some of the 'extremely stringent' containment measures; on-board temperature screening was still in use until the

²⁶ One day after his arrival in Shanghai in early June, for instance, New Orleans Mayor Ray Nagin was held in quarantine simply because a passenger in the row ahead of him had exhibited flu-like symptoms.

²⁷ 'Objectives of Prevention and Control at the Current Stage: Reducing Secondary Cases and Strictly Preventing Community-Level Spread' (in Chinese), *Xinhua News*, 12 June 2009. http://news.xinhuanet.com/politics/2009-06/12/content_11532464.htm

²⁸ 'French Newspapers Praise China's Work on H1N1 Vaccine' (in Chinese), *Keji ribao* (Science and Technology Daily), 16 September 2009. http://61.135.129.207/kjrb/content/2009-09/16/content_104706.htm

²⁹ Tara Parker-Pope, 'As Flu Vaccine Arrives for the Season, Some Questions and Answers', *The New York Times*, 9 October 2009. http://www.nytimes.com/2009/10/10/health/10primer.html?_r=1

end of July 2009.³⁰ The containment strategy was not formally abandoned until after September 2009. By that time, China had stockpiled only enough Tamiflu to cover 1 per cent of the population.³¹ This means that the antivirals were reserved primarily for severe cases and chronic disease patients showing flu-like symptoms. As schools reopened and National Day celebrations drew closer, the strategy was shifted to effectively preventing and controlling large-scale community outbreaks, and reducing severe cases and fatalities.³² The new measures took a more differential approach in treating H1N1 patients and maximising SRC. Rather than treat every H1N1 case, the government applied home quarantine measures to the mild cases and only treated those who needed hospitalisation in designated hospitals. Similar to the United States, the government contingency plan envisioned the use of back-up hospitals, even local hotels and schools, if the number of patients exceeded the surge capacity of local infectious disease hospitals. Different from the US approach, however, only a very small number of large urban health centres were allowed to treat severe cases. The latter approach was summarised as ‘concentrating patients, concentrating medical experts, concentrating resources, and concentrating treatment’.³³ The Ministry of Health then asked provincial governments to stockpile more Tamiflu to cover 2 per cent of the population in their jurisdiction.

In short, both countries responded to the crisis in a decisive and swift manner. However, they handled the crisis with fundamentally different strategies. From the start of the crisis, the US approach was mitigation, focusing on minimising the impact by maximising surge capacity. By contrast, China’s response until September 2009 was characterised by an aggressive containment approach that sought to establish barriers against the spread of the disease. In doing so, emphasis was placed on reducing the surge. It was not until the fall of 2009 that the government shifted to a mitigation-centred approach and placed more emphasis on building surge capacity.

Explaining the Divergent Responses

Why did the two countries adopt such different strategies when handling the spread of the H1N1 virus? One theory would attribute the divergence to the pattern of spread of the virus. According to the WHO, early outbreaks of the virus were first observed in North America. By 24 April 2009, confirmed H1N1 cases had been reported in California and Texas. As of 26 April, the United States had reported 20 laboratory-confirmed human cases in five states (8 in New York, 7 in California, 2 in Texas, 2 in Kansas and 1 in Ohio). By the end of April, the airborne virus had been diagnosed in at least nine countries and was spreading on its own. A consensus among medical experts was that any containment measures, such as a freeze on cross-border traffic, would be impractical and ineffective. The US government quickly deferred to the expert opinions in responding to the crisis. Singling out Mexico for travel

³⁰ Donald G. McNeil and Sharon Lafraniere, ‘China Presses Quarantine against Flu’, *The New York Times*, 28 July 2009, p. D8.

³¹ ‘Completion of the Stockpiling of 13 Million Courses of Tamiflu’ (in Chinese), 23 September 2009, Sohu Health, <http://health.sohu.com/20090923/n266935746.shtml>

³² ‘80 Per Cent of Flu Viruses are H1N1/A’ (in Chinese), *Beijing shangbao* (Beijing Commercial Daily), 30 October 2009. <http://news.163.com/09/1030/01/5MRARGG2000120GR.html>

³³ Ministry of Health, ‘Directive on Treatment Preparation for H1N1 Pandemic’ (in Chinese), 8 September 2009. <http://www.moh.gov.cn/publicfiles/business/htmlfiles/mohyzs/s3585/200909/42731.htm>

quarantine, in the words of President Obama, would be 'akin to closing the barn door after the horses are out'.³⁴ Because the virus was already in the United States, Secretary Napolitano contended, the real focus should be on 'what do we do to reduce the spread of the disease within our borders'.³⁵

This willingness on the part of US politicians to make decisions informed by science and epidemiology does not imply that politics played no role in the US response to the H1N1 crisis. Believing that the Obama administration had not done enough to halt the spread of the virus, Representative Eric Massa (Democrat–New York) called for the 'immediate and complete' closing of the Mexican border with the United States until the swine flu was contained.³⁶ He was echoed by California anti-immigration groups. Republican Senator John McCain said that border closure should remain under consideration 'if it would prevent further transmission of this deadly virus'. But overall there was little high-level support for sealing the border. This is so not only because of the futility of border closure measures, but also because of the tremendous opportunity cost of shutting down all ports of entry – air, sea and land. In part because of the huge cost to businesses and families in the two countries, the US and Mexican governments were both strongly opposed to sealing the border. For the same reason, South Texas business groups were rallying against any talk of border closure.³⁷

While the genie was let out of the bottle in the US in late April, confirmed cases of H1N1 were not observed in mainland China until 11 May 2009. The absence of the pandemic virus in China raised the hope that the H1N1 virus was containable there. Even after cases of H1N1 were identified in China, policymakers were convinced that the containment strategy could help slow down the transmission of the virus, thereby buying more time for China to prepare for a second, potentially more lethal, viral wave in the fall.³⁸ The seemingly high fatality rate reported in Mexico during the early outbreak, whipped up by various media outlets and alarmist reports, only raised the social, economic and political stakes on responding to the outbreak, prompting politicians to err on the side of caution (although others have pointed to wider cultural trends encouraging such action).³⁹ According to Vice Premier Li Keqiang: 'With a 1.3 billion population, high population density and mobility,

³⁴ 'WHO Raises Flu Threat Level, Warns Pandemic Imminent', *Reuters*, 30 April 2010.

<http://www.alertnet.org/thenews/newsdesk/N29472619.htm>

³⁵ Richard S. Dunham, 'Officials Dismiss Calls to Close Border', *Houston Chronicle*, 30 April 2009.

<http://www.chron.com/disp/story.mpl/front/6402241.html>

³⁶ David Goodhue, 'New York Congressman Wants Border Closed to Contain Swine Flu', *All Headline News*, 28 April 2009. <http://www.allheadlinenews.com/articles/7014957253>

³⁷ Richard S. Dunham, 'Officials Dismiss Calls to Close Border', *Houston Chronicle*, 30 April 2009.

<http://www.chron.com/disp/story.mpl/front/6402241.html>

<http://www.chron.com/disp/story.mpl/front/6402241.html>

³⁸ This 'delaying' strategy is a less complete form of containment. See A. Nicoll and D. Coulombier, 'Europe's Initial Experience with Pandemic (H1N1) 2009 – Mitigation and Delaying Policies and Practices', *Eurosurveillance* Vol. 14, No. 29, 23 July 2009.

<http://www.eurosurveillance.org/viewarticle.aspx?articleid=19279>

³⁹ See, for example, Frank Furedi, *Culture of Fear: Risk-Taking and the Morality of Low Expectation*, London: Cassell, 1997.

China has to secure its borders to prevent the spread of the disease.⁴⁰ In hindsight, Chinese leaders in 2009 were no different from Gerald Ford in 1976: they were so overwhelmed by the consequences of being wrong that they were unable to tell the difference between consequences and likelihood, which led them to overreact to the H1N1 outbreaks.

The divergent policy responses toward H1N1 also suggested different policy learning experiences in the US and China. The last time the US had a similar experience was when it dealt with a potential pandemic in 1976, when one swine flu case triggered a mass immunisation campaign before the episode ended up being recognised as having been a false alarm. US policymakers drew at least two lessons from the 1976 episode. First, a public health response should not be premised only on the worst-case scenario. Second, it would be a mistake to bundle all response measures into a single 'go' or 'no-go' decision, 'with no provision for the monitoring of the situation and continual reconsideration of policy directions based on new evidence'.⁴¹ In handling the 2009 H1N1 outbreak, the US, from the very beginning, avoided giving the public the impression that the outbreak was comparable to the dreaded 1918–19 Spanish Flu, and took each policy step based on new available evidence. In recognition of the mildness of the virus and the disturbing effects of school closure, for example, the CDC adopted less drastic measures on 7 August 2009, recommending that schools remain open, even during outbreaks of flu.⁴²

But, for the decision-makers in Beijing, previous policy experience served as additional reasons to warrant an aggressive government response. This indicates that China was still gripped by the memory of the 2003 SARS outbreak (from which the US was largely spared) – indeed, the official guidelines on H1N1 prevention and control unveiled by the Ministry of Health on 1 May 2000 clearly targeted a SARS-like virus. SARS had played a crucial role in policy learning in at least three aspects. First, the risk assessment and communication tended to be dominated by the worst-case scenario (and the apocalyptic pronouncements of the WHO Director-General, Margaret Chan, no doubt encouraged this). Invoking the spectre of SARS to justify its draconian approach, a Ministry of Health spokesman stated that '[a] large-scale breakout would be fatal for China'.⁴³ Second, having been criticised for its belated and lackadaisical response during the initial SARS outbreak, China was sensitive to allegations that it was not reacting responsibly to public health crises. A more visible and high-profile approach, as the containment strategy would entail, would present an image that the government was acting differently this time. Third, the successful 'containment' of the SARS virus encouraged the use of anti-SARS measures as the 'natural' response to the H1N1 outbreak. It was reported that many anti-H1N1 measures were similar to those implemented during the SARS outbreak simply because 'SARS [and H1N1] were both

⁴⁰ 'Li Keqiang Attended International Scientific Symposium on Influenza A (H1N1) Pandemic Response and Preparedness' (in Chinese), 21 August 2009. http://news.xinhuanet.com/politics/2009-08/21/content_11924075.htm

⁴¹ President's Council of Advisors on Science and Technology (PCAST), *Report to the President on U.S. Preparations for 2009–H1N1 Influenza (hereafter PCAST Report)*, 7 August 2009, p. 9. http://www.whitehouse.gov/assets/documents/PCAST_H1N1_Report.pdf

⁴² Alice Park, 'CDC Says H1N1 Outbreak Shouldn't Close Schools', *Time*, 7 August 2009. <http://www.time.com/time/health/article/0,8599,1915244,00.html>

⁴³ Simeon Bennett, 'They Shoot Frequent Fliers, Don't They? Only in China's Flu Era', *Bloomberg*, 21 June 2009. <http://www.bloomberg.com/apps/news?pid=newsarchive&sid=a3hHFvo8NN1k>

respiratory infections'.⁴⁴ Similar to SARS, H1N1 flu was categorised as a Group B infectious disease but was dealt with as if it was a Group A one. Also, since forceful measures such as enforced quarantine and travel restrictions were credited with having helped stop the spread of SARS, they were considered the silver bullet for the H1N1 virus.

The pattern of H1N1 spread and previous experience nevertheless cannot explain why China sustained the 'extremely stringent' (Minister Chen Zhu's words)⁴⁵ containment strategy when growing evidence in May 2009 clearly pointed to the impracticality of the approach. According to *Caijing* (then the most influential magazine in China), Chinese scientists confirmed that H1N1 is a mild virus unlikely to evolve into a 1918-type pandemic, and they shared their research results with government leaders as early as 9 May.⁴⁶ To be sure, decision-makers, when overwhelmed by the uncertainty and complexity of the problems they confront, tend to lean heavily on existing or pre-existing policy frameworks, adjusting only at the margins to accommodate distinctive features of new situations. But it remains puzzling that China stuck to the containment approach when many countries (and regions) had scaled down their response measures. For example, Singapore, after mid-May 2009, no longer required passengers returning from North America to be subject to enforced self-quarantine. By mid-June 2009, Hong Kong, also known for its drastic containment approach, had ceased the practice of tracking down people that had close contact with confirmed cases and had placed priority on treating severe cases instead.

While the heavy-handed approach was not scientifically grounded, it made perfect political sense. Chinese leaders had strong political incentives to pursue an excessive approach not informed by science and epidemiology. Given the initial mismanagement of the SARS crisis, they were more interested in creating an impression that the government was acting differently this time around, that they indeed cared about the people's health and wellbeing. On the eve of the 20th anniversary of the Tiananmen crackdown on the democracy movement, and in the months leading up to the celebration of the 60th anniversary of the People's Republic, forceful government action against H1N1 was shown to have helped shore up its legitimacy. Indeed, a survey conducted by the *China Youth Daily* found that 85 per cent of Chinese people supported the draconian government measures.⁴⁷ As *Caijing* magazine noted, the cost borne by public health personnel, H1N1 patients and those who had close contact with them were secondary to the issue of social and economic stability.⁴⁸ True, Party leaders emphasised 'science' and the 'rule by law' in undertaking the anti-H1N1 measures. Yet, when they made H1N1 prevention and control a top priority, and warned that it would punish any failures to contain the spread of the disease, non-scientific and heavy-handed measures became more appealing to local government officials, who found it safer to be overzealous than to be seen as 'soft'. In early May 2009, health authorities in Jilin Province placed in quarantine a group of Canadian university students who had been

⁴⁴ Xu Huiyun and Ren Shaoming, 'Two Days and Nights of Fighting' (in Chinese), *Diye caijing ribao* (First Financial Daily), 4 May 2009. <http://news.carnoc.com/list/132/132612.html>.

⁴⁵ 'Minister of Health Chen Zhu: Our Country has Gained Experience in Six Areas in Addressing H1N1' (in Chinese), *Xinhua News*, 21 August 2009. http://www.gdemo.gov.cn/zt/zlg/cs/gj/200908/t20090821_100929.htm

⁴⁶ 'Coexist with H1N1/A' (in Chinese), *Caijing*, 6 July 2009.

⁴⁷ 'Survey Shows 85 Per Cent of the Public were Satisfied with China's Anti-H1N1 Measures' (in Chinese), *China Youth Daily*, 26 May 2009. <http://news.anhuinews.com/system/2009/05/26/002261874.shtml>

⁴⁸ 'Coexist with H1N1/A' (in Chinese), *Caijing*, 6 July 2009.

cleared through customs in Beijing, none of whom had been exposed to the virus or were experiencing any flu-like symptoms. In late June, the Beijing municipal government issued a warning that it would prosecute individuals who flouted prevention rules.

Interestingly, with the discourse dominated by government bureaucrats and alarmist health experts, dissenting voices were either marginalised or silenced in China's handling of the pandemic. An epidemiologist in Wuhan, for example, dared not reveal his name when he indicated his disagreement with the government's anti-H1N1 strategy in the *South China Morning Post*.⁴⁹ Criticism against the containment approach was not heard in the official media until early July 2009. In the absence of critical civil society participation, the science-politics dynamic in China was dependent on the logic of domestic politics – which is not based on science and not subject to public deliberation, but rather on the instincts of those in power.

Assessing Policy Effectiveness

Objective–Outcome Congruence

How effective were the respective policy responses? In assessing the effectiveness of government response measures, one approach would examine the congruence between the stated policy objectives and actual policy outcomes. The US implemented mitigation measures from April 2009 in order to reduce the impact of the virus. In the health sector, the aims included reducing the overall number of people affected, reducing transmission, and ensuring healthcare for those who might be infected. As far as this was concerned, the US mitigation strategy appears to have accomplished its objective. Between April 2009 and March 2010, 60 million people, or 20 per cent of the US population, are thought to have become infected with the pandemic virus, leading to an estimated 270,000 hospitalisations and 12,270 deaths. The fatality level is far lower than that of the 1957 Asian flu pandemic (70,000 deaths) and the 1968 Hong Kong flu (34,000 deaths), even though the population then was lower than today. The total fatality is about one-third of the annual deaths caused by the seasonal flu-related illness (36,000). The percentage of people infected with H1N1 was higher than that of a typical seasonal influenza, but did not exceed the upper limit of infection by seasonal influenza (on average, 5 to 20 per cent of the population get the flu). After mid-October 2009, H1N1 flu activity declined quickly, to below baseline levels by January 2010. The consistent emphasis on surge capacity building appeared to have paid off. Compared to the average level of people hospitalised from seasonal flu-related complications (200,000), there was an unusually higher hospitalisation level for the H1N1 virus (possibly driven by exaggerated concerns), but the existing medical surge capacity (as indicated by the number of hospital beds, ICU beds and ventilators) proved adequate to meet the demand.

This was so even when H1N1 activity peaked during the second week of October 2009. The success in minimising the impact of the virus can also be attributed to the measures implemented to reduce the 'demand' by building 'herd immunity' (i.e., a contagious disease will less easily take hold in a population if the majority is immune). As of the end of February

⁴⁹ Stephen Chen, 'Beijing Bans All Direct Flights from Mexico', *South China Morning Post*, 3 May 2009, p. 3.

2010, an estimated 72–81 million people had been vaccinated against the 2009 H1N1.⁵⁰ When this number is combined with the number of people previously infected with the flu (59 million as of 13 February 2010),⁵¹ around 45 per cent of the population of the United States are likely to have had immunity to the virus by the end of February 2010.

On the surface, China's virus-containment efforts appear to have been an amazing success. By 6 July 2009, of a total of 94,512 confirmed infections worldwide, only 2,040, or 2.2 per cent, had been reported in China, even though nearly a fifth of the world's population live within its borders. By the end of March 2010, a total of 127,000 confirmed cases nationwide had been reported, resulting in 800 deaths.⁵² The problem is that laboratory-confirmed data on the infection and the fatalities reported to the Ministry of Health are a significant undercount of the true number that occurred, due to incomplete testing, inaccurate test results, or diagnosis that attributed fatalities to other causes such as secondary complications of influenza. The problem of underestimation was implied by the head of Beijing Municipal Bureau of Health, who admitted that by mid-December 2009, 14 per cent of the city's residents, or 2.8 million people in Beijing, had been infected with H1N1, which was 280 times higher than the number of confirmed cases in the city.⁵³ Perhaps more importantly, the containment strategy failed to achieve its primary objective, that is, to prevent the spread of the virus across the community. Community-level outbreaks began to be observed in Guangdong Province on 19 June 2009. After a few days of hesitation, Ministry of Health officials accepted that the spread of H1N1 was no longer containable.⁵⁴ This was followed by a spike of group infections. Between late June and early September, 128 community-level outbreaks were reported in China, so much so that by the end of August 2009, domestic cases accounted for 95 per cent of total H1N1 cases in China.⁵⁵

What about border screening and quarantine measures? Because asymptomatic carriers of the H1N1 virus can still shed virus, border screening measures were generally not effective in identifying cases or preventing transmission. Of the 35.7 million visitors checked between 25 April and 15 July, only 12,835 visitors (0.036 per cent) were found to have signs of flu, and 455 people (about 1 per 100,000 visitors) were confirmed to have H1N1 flu.⁵⁶ Similarly, there is no indication that rounding up apparently healthy individuals and confining them to government-designated facilities worked as an effective method of disease control. By 18 June 2009, only 23 confirmed cases had been identified through involuntary quarantine. If

⁵⁰ Centers for Disease Control and Prevention (CDC), *Morbidity and Mortality Weekly Report (MMWR)* issued on 2 April 2010.

⁵¹ Centers for Disease Control and Prevention (CDC), 'CDC Estimates of 2009 H1N1 Influenza Cases, Hospitalizations and Deaths in the United States, April 2009 – February 13, 2010', 12 March 2010. http://www.cdc.gov/H1N1flu/estimates/April_February_13.htm

⁵² Ministry of Health, 'Situation of National Anti-H1N1 Work, March 2010' (in Chinese), 2 April 2010. <http://www.moh.gov.cn/publicfiles/business/htmlfiles/mohwsyjbg/s3578/201004/46480.htm>

⁵³ 'H1N1 Primarily Infects Three Groups in Beijing' (in Chinese), *Yixue Jiaoyu wang* (Medical Education Net), 21 December 2009. <http://www.51test.net/show/1047585.html>

⁵⁴ 'Mainland Officials Concede They Can't Contain Swine Flu', *South China Morning Post*, 30 June 2009, p. 6.

⁵⁵ 'Chen Zhu: 128 Group H1N1 Infections Occurred from Late June' (in Chinese), 8 September 2009. <http://medicine.people.com.cn/GB/10013089.html>

⁵⁶ Yanzhong Huang, 'Pursuing Health as Foreign Policy: The Case of China', *Indiana Journal of Global Legal Studies*, Vol. 17, No. 1(Winter 2010), p. 143.

cases identified through border screening are also taken into account, it turns out that in fact more than 60 per cent of the cases were actually identified through self-reporting.⁵⁷

That being said, if the aggressive approach was viewed as a 'delaying' strategy, epidemiological data appears to support the effectiveness of government intervention in slowing down transmission. The significant increase of cases occurred only after September 2009, when China abandoned its containment strategy.⁵⁸ The relatively low level of H1N1 flu activity in the spring/summer of 2009 had bought the government more time to prepare for the next viral wave. In September 2009, China became the first country to mass produce the H1N1 vaccine. But instead of *reducing* the total H1N1 cases, the delaying strategy simply *postponed* the cases that should have appeared in spring/summer to fall. That would have been acceptable if the vaccine and antivirals had been produced in sufficient quantity and had been distributed to meet the needs of a substantial number of people in China. But, according to the Ministry of Health, China had only stockpiled enough Tamiflu to cover less than 2 per cent of its population, and by 19 February 2010, it had manufactured and distributed only 122 million doses of vaccine, barely enough to cover 10 per cent of its population. In countries that had switched to a mitigation-based strategy earlier, vaccine access problems were alleviated by the build-up of natural immunity in the population (as a large percentage of the population was exposed to the mild virus in the spring). The story in China was different. While the very limited vaccination programme failed to act as any sort of firewall to the spread of H1N1, the containment strategy might have had the unintended effect of having a larger percentage of people shielded from this relatively benign virus. In consequence, a significant portion of the population was susceptible to it. Chinese experts estimated that by January 2010, only about 23 per cent of the people in mainland China were immune to the virus (compared to 45 per cent in the US).⁵⁹ In other words, the delayed spread of the virus in the spring/summer of 2009 was probably responsible for the dramatic increase of H1N1 cases in the fall. By threatening to exceed, even overwhelm the country's medical surge capacity (which was certainly problematic, given the low antiviral coverage rate), the 'delaying' strategy effectively worked against the objective of the mitigation strategy pursued after September 2009.

Procedure Approach

Instead of examining the congruence between intention and actual policy outcomes, the second approach for assessing policy effectiveness would examine whether declarative policy was implemented efficiently and in ways consistent with the procedures called for by policy statements. This 'procedure approach' can be applied to three aspects of H1N1 prevention and control: risk communication, mass vaccination, and programme sustainability.

⁵⁷ Ibid., p. 144.

⁵⁸ Yanzhong Huang and Christopher J. Smith, 'China's Response to Pandemics: From Inaction to Overreaction', *Eurasian Geography and Economics*, Vol. 51, No. 2 (March–April 2010), p. 178.

⁵⁹ 'There is a Slight Increase in the Percentage of Pregnant Women who Developed Severe Symptoms or Died after being Infected with H1N1' (in Chinese), *China News Service*, 3 February 2010.
<http://www.chinanews.com.cn/jk/jk-jkyf/news/2010/02-03/2107911.shtml>

Risk communication focuses on horizontal and vertical ‘connectivity’ in SRC building. Horizontally, a nation’s capacity to respond to disease outbreak requires open and effective communication between multidisciplinary groups (clinicians, researchers, epidemiologists and public health officials) in multiple sectors (civilian vs. military, prevention vs. treatment, government vs. non-government). Vertically, effective crisis management depends in part on the ability of clinicians and public health officials to utilise available technologies and information systems to formulate reports to local, state and federal agencies in a timely and accurate manner. But vertical communication is not just a bottom-up process, it also entails the need to publicise the presence of a disease outbreak through media outlets (newspapers, television, radio and the internet) in a way that reduces potential panic and fear and minimises disturbing effects.

As far as horizontal communication is concerned, both the US and China have made important upgrades to existing national surveillance and reporting systems. Coordination between different actors in multiple sectors was strengthened with the establishment of interdepartmental anti-flu task forces in both countries. In a way, the coordination of the policy actors was more effectively orchestrated in China as an executive vice premier was assigned the responsibility of clarifying decision-making authorities and processes and ascertaining that all important issues are resolved in a timely fashion.⁶⁰

In terms of vertical communication, both countries faced the problems of under-reporting in confirming, counting and reporting individual cases of H1N1 influenza. On 12 May 2009, the US CDC transitioned from reporting individual confirmed and probable cases to reporting aggregate counts of cases, hospitalisations and deaths. It further ceased reporting the number of cases after 23 July 2009.⁶¹ The CDC instead provided an estimated range for the total number of H1N1 cases, hospitalisations and deaths in 2009 through a nationwide surveillance system and statistical modelling.⁶²

China took a different approach in risk communication. From May 2009 through April 2010, it maintained the practice of counting and reporting individual cases of H1N1 influenza. The Chinese CDC officials were aware of the underestimation problems inherent in this practice, but they failed to develop an alternative methodology to estimate the prevalence of the 2009 H1N1. This was not a major concern in the initial stage of the outbreak, when the number of cases was small and dominated by imported cases. But, with the rapid spread of the virus in the fall of 2009, the gap between confirmed cases and actual ones expanded dramatically. To make matters worse, deliberate cover-up again became a major concern. In November 2009, Dr. Zhong Nanshan, a leading public health expert in China, suggested that some local governments had deliberately concealed suspected cases by not testing severe

⁶⁰ ‘H1N1 Prevention and Control and the Social Administration Capabilities of Chinese Government’ (in Chinese), National Earthquake Response Support Service, 29 October 2009.
<http://www.nerss.cn/bencandy.php?fid=60&id=471>

⁶¹ On CDC’s response measures, see Centers for Disease Control and Prevention (CDC), ‘The 2009 H1N1 Pandemic: Summary Highlights, April 2009–April 2010’, 16 June 2010.
<http://www.cdc.gov/h1n1flu/cdcresponse.htm>

⁶² C. Reed, F.J. Angulo, D.L. Swerdlow, M. Lipsitch, M.I. Meltzer, D. Jernigan et al., ‘Estimates of the Prevalence of Pandemic (H1N1) 2009, United States, April–July 2009’.
<http://www.cdc.gov/eid/content/15/12/pdfs/09-1413.pdf>

pneumonia deaths to see if they were actually H1N1 deaths.⁶³ The systematic under-reporting was implied by a directive issued by the Ministry of Health in early November which warned against 'cover-up, under-reporting, and delayed reporting'. The directive also asked local health authorities to adopt 'international standards' in counting H1N1 fatalities by including any H1N1-related fatality, suggesting that many H1N1 deaths were not reported as such by local health authorities.⁶⁴ This deliberate cover-up can be attributed to political and policy reasons. Politically, there were strong bureaucratic incentives not to become a 'party spoiler' as the country was poised to celebrate the 60th anniversary of the founding of the People's Republic. Beijing municipal government, for example, concealed the community-level outbreaks in the city by ceasing the practice of updating the H1N1 situation for the two weeks of the celebration. Similarly, the Ministry of Health failed to update the disease situation between 30 September and 9 October 2009. Poor policy design constituted another challenge for disease reporting. The government only allowed certain major urban health centres to admit severe H1N1 cases. Undesignated hospitals would be fined if they were found to have treated severe cases. To avoid being punished, these hospitals would choose not to report such cases. Also, according to a directive issued by the Ministry of Health on 24 October 2009, health workers were not allowed to confirm H1N1 deaths without being authorised by provincial health authorities. As a result, there was no confirming of diagnoses or reporting of deaths from H1N1.

In addition to the problems of under-reporting and cover-up, there were other communication challenges in China. Once policymakers adopt containment or delaying as a formal policy rather than an operational practice, it can be especially difficult to change it in a timely manner.⁶⁵ A containment strategy presumes the presence of a highly lethal virus. Yet, the H1N1 virus proved to be a relatively benign one.⁶⁶ Most patients had recovered without needing medical treatment. The containment strategy had committed huge resources, including treating everyone who was infected or suspected of being infected, to addressing what seemed to be a very mild disease. When a containment strategy fails to work or is no longer sustainable, it has to be moved back to mitigation with only the offering of antivirals or vaccines to at-risk groups. Explaining this to certain professionals and the public may not be easy. In part because of this, China did not have a clear exit strategy: it simply moved away from containment without sufficiently communicating it to the public. To paraphrase Harry Truman, this is an old political trick: 'If you can't convince 'em, confuse 'em'. Chinese people were indeed confused. On the one hand, as if to ease public concern, the government told the people that H1N1 flu was 'preventable, controllable and treatable'. On the other hand, it invoked the spectre of SARS to justify its draconian anti-flu measures. The risk

⁶³ 'I Do Not Believe in the Reported National H1N1 Death Toll At All' (in Chinese), *Guangzhou ribao*, 19 November 2009.

⁶⁴ Ministry of Health, 'Ministry of Health Asked that a Good Job be Done in Reporting H1N1 Fatalities' (in Chinese), 9 November 2009. http://www.gov.cn/gzdt/2009-11/09/content_1459887.htm

⁶⁵ A. Nicoll and D. Coulombier, 'Europe's Initial Experience with Pandemic (H1N1) 2009 – Mitigation and Delaying Policies and Practices', *Eurosurveillance*, Vol. 14, No. 29, 23 July 2009. <http://www.eurosurveillance.org/viewarticle.aspx?articleid=19279>

⁶⁶ We still do not know exactly how many people are infected, but the virulence of H1N1, measured by case fatality ratio (CFR), is lower than that of the routine seasonal influenza, and well below that of the dreaded 1918 pandemic virus and SARS. Its transmissibility, measured by the mean number of secondary cases a typical single infected case will cause in an immunity-naive population, is higher than the seasonal influenza, but not a terrifying level of contagion compared to the 2003 SARS.

communication problems, and the rapid spread of H1N1 nurtured panic that further strained SRCs in China. In Chongqing municipality, mass panic caused by H1N1 led many parents whose children had flu symptoms to pour in to major health centres, overwhelming the hospital system. For a time, the Children's Hospital in the city received more than 5,300 patients each day (a record high).⁶⁷

Vaccination is considered crucial to reducing the transmission of H1N1 virus. Indeed, the US CDC recommends vaccination as 'the first and most important step in protecting against the flu'.⁶⁸ In order to build an effective 'firewall' against the virus, speedy production and distribution of sufficient amount of vaccines is the key. Both the US and China kicked off the vaccine development process in a timely fashion. It turned out that China was the first to finish clinical trials and the first in the world to administer the vaccination. The manufacturing of the vaccine in the US was delayed by the slow reproduction of H1N1 in eggs and production problems on some new manufacturing lines. As of 21 October 2009, only 12.8 million doses had become available, which was 14 per cent of the predicted amount.⁶⁹ People waited in line for hours at community clinics, many of which reportedly ran out of the vaccine before demand was met.

The quality and safety of the H1N1 vaccines seemed to be assured in both countries, despite the recall of a paediatric H1N1 vaccine by Sanofi Pasteur in the US and the rabies vaccine scandal that involved one H1N1 vaccine manufacturer in China.⁷⁰ When the vaccine was finally ready to be administered, however, public health authorities in both countries had to address widespread suspicion on the necessity and safety of the vaccine. Polls show that 40 per cent of American parents refused to allow their kids to be vaccinated.⁷¹ Similarly, according to a survey by *China Daily* and major portal Sohu.com in late October, more than 54 per cent of Chinese people did not plan to receive the H1N1 flu vaccine.⁷² Because of the problems in vaccine manufacturing and administration, by the end of the season the US government ended up discarding millions of doses of H1N1 vaccine.

When prioritising the groups to be vaccinated, China did a good job by emphasising the groups providing essential non-medical services, but its failure to include pregnant women and migrant workers in the priority list did not help mitigate the impact of the virus. By 10 December 2009, for example, China had vaccinated more than 30 million people, but

⁶⁷ 'Children's Hospital in Chongqing was Visited by 5,300 patients in One Day' (in Chinese), *Chongqing Wanbao* (Chongqing Evening News), 28 October 2009. <http://www.fx120.net/kuaixun/200910/519102.html>

⁶⁸ Centers for Disease Control and Prevention (CDC), '2009 H1N1 Flu –Situation Update, 15 July 2010'. <http://www.cdc.gov/h1n1flu/>

⁶⁹ Maryn McKenna, 'H1N1 Lessons Learned: Vaccine Production Foiled, Confirmed Experts' Predictions', *CIDRAP News*, 26 April 2010.

<http://www.cidrap.umn.edu/cidrap/content/influenza/panflu/news/apr2610h1n1vax.html>

⁷⁰ According to the State Food and Drug Administration (SFDA), a total of 215,800 units of rabies vaccines made by two drug makers from July to October 2008 had quality problems. One of them, Ealong Biotech, took orders from the Chinese government for 6.3 million doses of H1N1 flu vaccine in 2009. See 'Criminal Actions behind Rabies Vaccine Scandal', *Xinhua News*, 3 April 2010. http://www.china.org.cn/china/2010-04/03/content_19741606.htm

⁷¹ Gary Langer, 'Poll: Swine Flu Vaccine, Parents Doubt Safety', *ABC News*, 22 October 2009.

<http://abcnews.go.com/PollingUnit/SwineFlu/swine-flu-abc-news-washington-post-poll/story?id=8879819>

⁷² 'Public Cringes at Vaccine Shot,' *China Daily*, 26 October 2009. http://www.chinadaily.com.cn/china/2009-10/26/content_8845667.htm

pregnant women and children under three were not included, in part because the government failed to conduct clinical trials for this group in its rush to develop the vaccine. This placed at least 20 million pregnant women in China at risk of catching H1N1. Official data suggests that pregnant women made up around 19 per cent of the total number of reported deaths from H1N1 flu over the period December 2009 – January 2010.⁷³ This percentage is much higher than that in the US, where pregnant women accounted for only 5 per cent of deaths.⁷⁴

Combating the pandemic was a costly business. The US government spent between US\$4.3 billion and US\$8.5 billion on H1N1 drugs and its public information campaigns.⁷⁵ In addition, it spent more than US\$6 billion on purchasing the H1N1 vaccines and ancillary supplies (such as syringes, needles and alcohol swabs) as well as campaigns to promote the vaccine.⁷⁶ The question here is not just whether it is worthwhile to spend the money, but also which anti-flu strategy is more sustainable given the direct and indirect costs associated with each strategy. It is true that in general, by the end of June 2009 signs of fatigue, resource depletion and a political ‘they cried wolf’ backlash had already set in.⁷⁷ But overall, the US avoided much of the cost associated with the containment strategy pursued by China. The cost of sustaining the containment strategy was extremely high in China. This included direct financial spending: in addition to the central government funding (5 billion yuan), sub-national governments also had to chip in. Beijing municipal government, for example, spent 73 million yuan on fighting the virus. It was estimated that by early July 2009, at least tens of millions of yuan had already been spent on enforcing quarantine measures alone.⁷⁸ Fear mongering and self-serving protectionism hurt China’s domestic pork industry, discouraged tourism and international trade, and even spoiled China’s relations with other countries (e.g., Mexico).

Finally, there are concerns about the opportunity costs of the containment strategy. The questions are whether there is staff available to pursue the official response around the clock, seven days a week; and what else is overlooked because human and material resources are fully engaged on case-finding, contact-tracing, testing and treating.⁷⁹ As an editorial in a Canadian newspaper observed, China’s practice of containing the spread of H1N1 was like ‘[isolating] every strand in the haystack to find the needle’.⁸⁰ During the implementation of the strategy, every level of China’s CDC was on 24-hour call. Their

⁷³ ‘There is a Slight Increase in the Percentage of Pregnant Women who Developed Severe Symptoms or Died after being Infected with H1N1’ (in Chinese), *China News Service*, 3 February 2010.

<http://www.chinanews.com.cn/jk/jk-jkyf/news/2010/02-03/2107911.shtml>

⁷⁴ JAMA and Archives Journals, ‘Among Deaths from H1N1, Pregnant Women Appear to Have High Risk’, *ScienceDaily*, 21 April 2010. <http://www.sciencedaily.com/releases/2010/04/100420161750.htm>

⁷⁵ Jeff Levy, ‘Did the World Health Organization Exaggerate the H1N1 Flu Threat?’, *newjerseynewsroom.com*, 10 June 2010. <http://www.newjerseynewsroom.com/healthquest/did-the-world-health-organization-exaggerate-the-h1n1-flu-threat>

⁷⁶ Mitchel L. Zoler, ‘U.S. Government Pays the H1N1 Vaccination Bill’, *Elsevier Global Medical News*, 12 October 2009. <http://www.thelancet.com/H1N1-flu/egmn/0c03bfca>

⁷⁷ Laurie Garrett, *Newsletter of the Global Health Program*, Council on Foreign Relations, 30 June 2009.

⁷⁸ ‘Coexist with H1N1’ (in Chinese), *Caijing*, 6 July 2009.

⁷⁹ A. Nicoll and D. Coulombier, ‘Europe’s Initial Experience with Pandemic (H1N1) 2009 – Mitigation and Delaying Policies and Practices’, *Eurosurveillance*, Vol. 14, No. 29, 23 July 2009.

<http://www.eurosurveillance.org/viewarticle.aspx?articleid=19279>

⁸⁰ ‘China Overreacts’, *The Globe and Mail*, 6 May 2009, p. A14

workload was doubled when taking into account the responsibilities of inspecting quarantined people and conducting epidemiological studies. The quarantine authorities did not have enough manpower to do all the temperature checking, so the government transferred military personnel to do the work. Also, when most public health resources were diverted to H1N1 prevention and control, it led to the neglect of other public health challenges, such as hand, foot and mouth disease (HFMD). Between March and May 2009, a HFMD outbreak resulted in 400,000 cases and 155 deaths in China, while no fatalities were reported from H1N1 prior to October.

By July 2009, although China had only been engaged in combating H1N1 for eight weeks, it became increasingly clear that the containment strategy was not sustainable. A senior health official admitted that the free treatment and strict quarantine policy had put a strain on the government's economic and human resources. Not surprisingly, on 6 July 2009, the Ministry of Health announced that H1N1 patients would soon stop receiving free treatment from the government. Two days later, the ministry issued a directive allowing mild cases to be treated at home. At the end of July, it abandoned stringent border screening and temperature check measures. It is worth considering just how much more fatigue, financial pain, and organisational energy would have been expended were this virus to have transformed into a more lethal, yet still highly contagious, form.

Policy Recommendations

What can we learn from these two countries' responses to the H1N1 pandemic? A comparison of the effectiveness of the two strategies clearly points to the inferiority of the containment strategy in handling the H1N1 pandemic. The containment approach is costly, unsustainable, inflexible and impractical. When adopted at the very beginning of the outbreak, it may help slow down the transmission of the virus. But, against the backdrop of globalisation, it is impossible to institute barriers against such spread. Moreover, it may complicate efforts of surge capacity building when a shift to mitigation becomes necessary. Interestingly, China looked to a centuries-old approach to contain the rapid spread of the H1N1 flu pandemic, even though both scientific data and historical evidence suggested the limits of this approach.

China was not the only country that adopted a containment strategy. Compared with countries in Europe and North America, and against the WHO recommendations, many Asian countries, especially those in Northeast and Southeast Asia, pursued a containment strategy in responding to the spread of the virus. Policymakers therefore need to update their thinking on disease threats and the strategies aimed at resolving such threats. It is true that decision-makers tend to err on the side of caution when encountering an unpredictable and potentially disastrous novel disease, but that is no justification for allowing risk assessment and risk communication to be dominated by worst-case scenarios, or allowing domestic political concerns to prevail over science in decision-making. This is especially important when more information about the virus becomes available. One solution is to broaden participation in policymaking by engaging all stakeholders, especially critical civil society groups (e.g., independent researchers, media outlets and NGOs).

A comparison between the US and China also suggests the importance of beefing up core surveillance and response capabilities in a coherent and sustainable manner. Learning from SARS and the avian flu outbreaks, most countries in Asia, including China, have improved their surveillance capabilities. Their experience with the H1N1 pandemic nevertheless suggests that this is far from enough. The inadequacy and deficiency of the surveillance capacity building is demonstrated by the way Asian countries identify, confirm, and count cases of H1N1. Counting every individual case is not only costly, but also unreliable in gauging the actual disease situation. Without dependable epidemiological models in estimating the impact of the virus, the number of confirmed cases and fatalities is of little policy relevance. Of course, for countries such as China, effective risk communication and policymaking has to address the root cause of cover-up and under-reporting, which has been overlooked in the post-SARS surveillance capacity building. Equally important, human and material resources should be consistently devoted to surge capacity building in addressing future disease outbreaks. A robust medical surge capacity is not only crucial in implementing a mitigation-based strategy, but also instrumental in discouraging the adoption of a strategy that is based on worst-case scenarios. In fact, an argument could be made that it is precisely the poor surge capacity and the lack of policy tools that drove many Asian countries to pursue the largely ineffective containment strategy.⁸¹

While surge capacity building is important, effective response also hinges upon prophylactic and non-prophylactic interventions aimed at reducing the demand for medical services. Both China and the US took the right step of investing in the development of vaccines for mass immunisation. They should make sure that production is state of the art, given the unreliability of the egg-based approach in making large doses in a short time frame. Countries that do not have vaccine production capacities should consider either developing their own capacities to avoid dependence upon foreign firms or making arrangements within the regional institutional framework to ensure adequate supply of vaccines in times of public health emergencies. Unless there are sufficient amounts of vaccine to meet everyone's demands, prioritisation would be inevitable in administration of the vaccine. While it is important to include those most susceptible to the virus (e.g., pregnant women, people suffering chronic conditions, healthcare workers), effective mitigation also entails the prioritisation of certain occupations that are essential for the provision of basic non-medical services, such as power supply, food and fuel. To ensure efficient vaccine distribution, governments should also develop a communication plan that would deliver appropriate and effective messages about the safety and necessity of vaccination to the public in a timely fashion, as well as have the political courage to adapt and alter their actions and messages as the situation evolves.

⁸¹ Yanzhong Huang, 'The H1N1 Flu Pandemic and the Policy Response in Asia', presentation made at *Asia Policy Assembly*, National Asia Research Program (NARP), National Bureau of Asian Research (NBR) and the Woodrow Wilson International Center for Scholars, Washington, DC, 17–18 June 2010.