

Confronting Global Pandemics: Lessons from China and the U.S.

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The 2003 outbreak of SARS and its subsequent spread raised awareness about the global threat of emerging infectious diseases. The Chinese response to this disease, though initially slow, led to important changes in the Chinese public health system which informed its later response to diseases like H1N1. Despite differences between the U.S. and Chinese public health, political and legal systems, many lessons can be drawn by the U.S., while lessons learned in the U.S. from its response to H1N1 as well as WHO research should be applied in China. Such sharing of pandemic response experiences and strategies will strengthen not only individual country responses but also those of the global community as a whole.

INTRODUCTION

Scientists have long argued that epidemics and pandemics caused by emerging infectious diseases, like the 1918-1919 Spanish Influenza which killed 20-40 million worldwide and the Asian flu of 1957-1958 which caused 2 million deaths worldwide, are not rare exceptions, but rather can be expected to arise at least once per generation. Moreover, some of them will be severe. Over the past 10 years, outbreaks of SARS, H5N1 (Avian Influenza), and the current H1N1 (Swine Influenza) pandemic have raised awareness among health providers, public health officials and the public in general regarding the need for global and local pandemic preparedness. Yet, while each outbreak brings lessons for response to future outbreaks, experts continue to warn that preparedness levels are too low worldwide, though they vary between countries. This article will examine preparedness and response to the SARS epidemic and later adaptations to pandemic response, comparing Chinese and American responses and how each was affected by political, social, and legislative variables. The authors will present actionable recommendations for preparedness efforts for current emerging infections like H1N1 and H5N1, and those we can expect in the future.

For the purposes of this article, we will focus primarily on the public health infrastructure and response of China and the United States. We define public health (PH) as the organized efforts of society to protect, promote, and restore peoples' health with a focus on reducing health risks for entire populations. For example, overseeing sanitation, vaccination, and similar measures aimed at improving the health status of society. In China, PH is inherently a government responsibility and employs what Turnock calls a "command-and-control" approach, where government focuses on using its own resources to improve health, placing greater emphasis on broad social policies. In contrast, in the U.S., the government strategy is "to ensure access to health care services through public financing (Medicare, Medicaid)... or specialized delivery systems (VA hospitals) ," but the government itself does not have the top-down authority to enforce or mandate public health actions the Chinese government has. ¹

The concept of health policy, as applied in this paper, is usefully described by Gauld as "the courses of action proposed or taken by government that impact on the

financing and/or provision of health services” as well as decisions *not* to act. These are influenced by public opinion, international issues, and ideology, as well as changing social, economic, and technological trends.²

THE GENESIS OF SARS

The first documented case of SARS occurred in Foshan, Guangdong province on November 16, 2002. By mid-December of that year, a local doctor who treated patients from Foshan reported the disease to a local epidemic prevention station (later transformed into regional Centers for Disease Control) – the bottom rung of China’s epidemic response bureaucracy (see figure 2).³ The disease soon spread to other regions across the country. By March 31, 2003, 1,190 cases had been reported. SARS numbers peaked on May 23 with 5,285 cumulative cases and 303 SARS-related deaths.^{4 5} As no new cases were reported for the following two incubation periods,⁶ the Chinese government and international organizations declared the epidemic over by June 4, 2003.

Globally, the spread of SARS was ultimately stopped with the help of WHO emergency travel advisories, global alerts, and cooperation within a global lab network which worked to quickly determine the genetic makeup of the disease. However, the response could arguably have been faster and more effective had China reported its first case to the WHO in November 2002 instead of waiting until February 2003. By that time air travel had spread SARS to multiple countries. Ultimately, 95 percent of SARS cases occurred in the WHO’s Western Pacific region. Yet the disease killed fewer than one thousand people out of a total of over 8,000 cases. Despite its relatively low morbidity and mortality, the economic cost of SARS has been estimated at \$40 billion, \$18 billion in East Asia (equivalent to 0.6 percent of GDP growth) and in Ontario, Canada alone over \$1 billion in economic losses.⁷

SARS IN THE U.S.

While China, Taiwan, and countries as geographically proximate to the U.S. as Canada battled SARS, struggling with containment and treatment, the U.S. managed to avoid even a single SARS death. In fact, though many more cases were originally suspected, only 8 US SARS cases were ultimately confirmed, with 27 cases labeled as probable.

In seeking to understand why the outbreak was relatively limited in the U.S., scientists and disaster preparedness and response experts have suggested a number of possible reasons – some more plausible than others. Among them: the disease began in Asia, allowing the U.S. time to prepare for it by setting emergency response plans in motion; the CDC chose to cast a very broad net in its definition of SARS, thus catching the ill (along with many who were not sick) and being able to treat them quickly⁸; the relatively good state of health in the U.S., as compared to developing countries which suffered heavier morbidity and mortality, and availability of cutting edge treatments and supportive care to improve health outcomes for the sick.

The Secretary of Health and Human Services during the SARS outbreak, Tommy Thompson, argued that the anthrax attacks of 2001 had led to improved responsiveness and communications between the CDC and public health agencies, medical, and media agencies. This, in turn, allowed more accurate and timely SARS information to reach

responders and the public. The information thus helped lessen confusion about SARS and ease fears, and gave hospitals the opportunity to institute stricter infectious disease prevention measures.

Clearly, however, these explanations are insufficient, as we know that the disease spread quickly from Asia to Canada, and could just as easily have spread to the U.S.. CDC definitions did not change the fact that there was no real treatment for SARS. It is possible to argue that US cases benefited from better medical care than those in less developed countries, but this would not explain the Canadian situation, where treatment was equivalent to that available in the U.S..

A more plausible reason for the failure of SARS to become a serious threat to the U.S. health system was a total lack of “super-spreaders” (defined by the CDC as people who themselves infected over 10 others). Singapore, Canada, Taiwan, and Hong Kong all had super-spreaders. In one case, a man admitted to a Hong Kong hospital with SARS was ultimately found to be responsible for infecting dozens of health care workers. However, as noted public health scientist Michael Osterholm argued, the fact that no super-spreaders made it to the U.S. was a matter of luck, more than effective emergency response or border control.⁹

The CDC, spearheading the U.S. response, relied largely on early detection of the onset of possible symptoms, followed by rapid infection control measures which included isolation and quarantine as the situation warranted. However, quarantine was only recommended in situations considered “high risk,” such as when people aboard a plane had been exposed to a person with SARS, or in health care settings. In addition, information was disseminated to the public via the CDC Web site, satellite broadcasts, and hotlines for clinicians and members of the public. Also, health alert notices in multiple languages were distributed at airports, and travel advisories were issued regarding countries where the disease was more prevalent.¹⁰

Interestingly, and in contrast to the case in China, quarantine was not viewed by the CDC as an “impermeable *cordon sanitaire*,” but rather as a “scalable, self-protective measure” which could be adapted to the environment.¹¹ This more flexible type of approach to quarantine is likely to have made it much more palatable to the U.S. populace, though it was never used. Ultimately, however, research indicated that fully 94 percent of Americans would agree to a two to three week period of isolation if they had SARS¹² – a surprisingly high number. The authors believe that this result was in large part due to exaggerated fear of the disease. Four in ten Americans surveyed indicated that the mortality rate of SARS was 25 percent, when it was, in fact, between six and ten percent. Moreover, one in four believed that they or a family member were likely to contract the disease within the year.¹³

Because the U.S. outbreak was so limited and mild, conclusions regarding US preparedness for future epidemic and pandemic emergencies should not be based solely upon the SARS response. Instead, they must incorporate expert opinion on US readiness, as well as information from US response to non-infectious disease disasters like Hurricane Katrina, and to emerging infections like H5N1 and the current H1N1 pandemic.

SARS IN CHINA

By the beginning of the SARS outbreak in China in 2002, the Chinese health system had moved away from the preventive care approach practiced under Mao.¹⁴ As a result, control over the key actors in pandemic response, the sub-national public health and government officials, as well as hospitals, were in steady decline. The new policy was aimed at expanding wealth and productivity, and ending subsidies and support for what were once state-provided services. Thus, by the time of the SARS outbreak, it was clear that what remained of the health care network was incapable of an effective response to SARS. The response was further compromised when local and central leaders chose to suppress news of the outbreak, fearing the economic and political consequences of a novel epidemic.

As the disease spread across the country, the leadership became aware that China lacked the capacity to contain and control it without external assistance. Ultimately, the decision to share information about the outbreak with the international community derived from the leadership's recognition that failure to do so would damage China's international status. However, this realization was reached only after the disease had spread to Hong Kong, making it impossible for China's leadership to continue suppressing news of the outbreak.

In order to mount a successful response, the Party-controlled central government acted to reestablish control over sub-national actors. Key among these actors were local governments, hospitals, and health care officials.

Thus, despite a structural lack of preparedness, when in mid-April 2003 the Party/State decided to engage in combating SARS, it was able to mobilize relevant actors in both the Party and State bureaucracies. The decision to re-centralize power and direct resources to addressing the SARS outbreak reflects the political nature of the SARS threat. As was noted in numerous interviews with Chinese public health officials, the SARS epidemic was not so much a public health challenge as a political one.¹⁵ Once the government decided action was needed, it allocated massive resources, established and activated a clear and effective hierarchy, and mobilized numerous actors including police, neighborhood committees, and hospitals at the national and sub-national levels.

PUBLIC HEALTH CHALLENGES IN THE U.S.

The fact that the U.S. PH system did not have to contend with SARS was fortunate on many levels. Most importantly, while the Chinese system was ultimately able to centralize and ramp up to battle the disease, the U.S. system would have had great difficulty doing the same. The problem lies in the fact that the U.S. public health system is complex and problematic. Initially established to deal with the outbreak of multiple typhoid epidemics in 1910-1911, federal efforts would repeatedly expand the responsibilities of the PH system, tasking it with developing public health agencies that would specifically deal with epidemics and their prevention. Currently, however, its resources are limited and responsibilities often unclear. Increasingly, the U.S. public health system offers medical services, acting as a largely unsatisfactory "safety net" for the disadvantaged and uninsured, as well as treating for TB and sexually transmitted diseases. This strains the PH budget and personnel pool, and blurs the lines between

public health and the medical establishment, which receives payment for treatment, adding to tension between the two.

Additional stressors on public health operations include federal programs established for specific health-related projects deemed crucial by the government, such as tobacco cessation, obesity prevention, and maternal and infant care. Because these programs are usually operated by community agencies which receive funding directly from the federal government, public health is left out of the loop. Even health planning, a central function of public health, has become, for the most part, the bailiwick not of public health, but of the comprehensive health planning and regional medical planning agencies.¹⁶ Tension over already tight funds and confusion over lines of authority further weaken and fragment local public health agencies, who continue to lose control over aspects of PH that they had initially been tasked with providing.

As we have seen, political will played a significant role in the Chinese response to SARS. In the U.S., however, no single organization or political entity sets mandatory health policy. Public health decisions are constrained by the constitution and the political and historical record of tension between federal, state, and local authorities. These often militate against any strict enforcement of health laws from the federal level upon the state and local authorities, leaving the U.S. public health system basically decentralized. Each state and local health department sets its own policies. Even the CDC – the federal government’s public health arm – has no actual power to enforce or require actions, but can, instead, only recommend and present guidelines to state and local authorities, who use this information as they see fit.

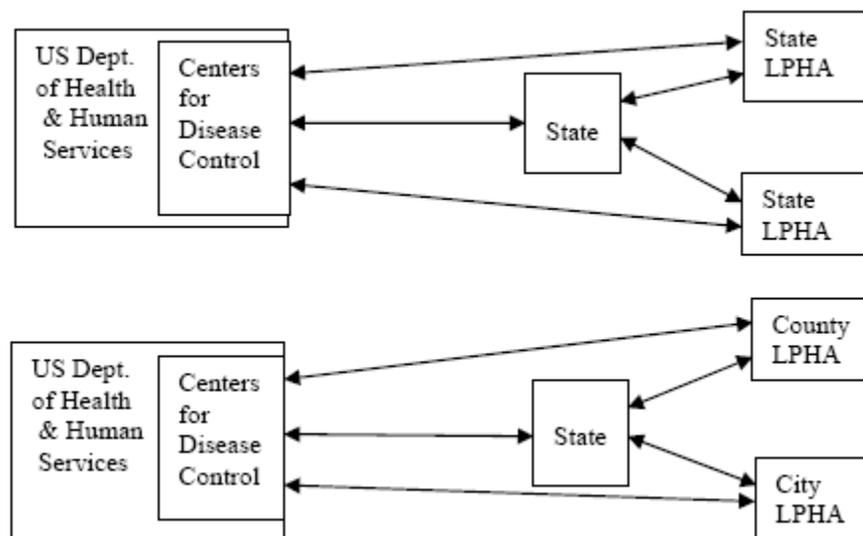
Indeed, the current public health system is so fragmented and lacking in leadership that it has grown unwieldy, redundant, and sometimes internally contradictory. In the event of an emerging infection pandemic, “it is possible for federal, state, and local health authorities simultaneously to have separate but concurrent legal quarantine power...”¹⁷ This is a result of a PH system which includes a vertical structure, i.e., federal, state, local, as well as a horizontal structure, public health, law enforcement, emergency management, and traditional medical care, and a geographical or regional system – all of which often overlap and vary from state to state and even between cities and counties (see Figure 1). This makes mounting an effective, focused and coordinated response to any kind of disease or disaster extremely difficult, and feeds confusion about authority, leadership, and decision-making (fact sheet)¹⁸.

The highly simplified figures below (Figure 1) only hint at the complexities of inter and intra-agency PH relations. They cannot be applied directly to all states or regions, as different jurisdictions have their own legal requirements and statutes. They do, however, show the two most common general structures within which local public health operates (excluding non-governmental and parallel services). Readers should note that relations at all levels in these charts are anything but unidirectional or consistent. Indeed, while the charts might initially suggest a top-down system that is more or less hierarchical, the contrary is the case, as indicated by the dual-direction arrows.

It is also important to note that non-State actors like the Red Cross and other volunteer organizations play an important part in any disaster response through their local and national presences in communities. Yet it is difficult to place them within the regular response system, as their approaches vary widely, as do their roles depending on

the disaster, the agency requesting assistance, and numerous other political and social factors.

Figure 1: Simplified Structure of U.S. Federal, State, Local Public Health System Operation

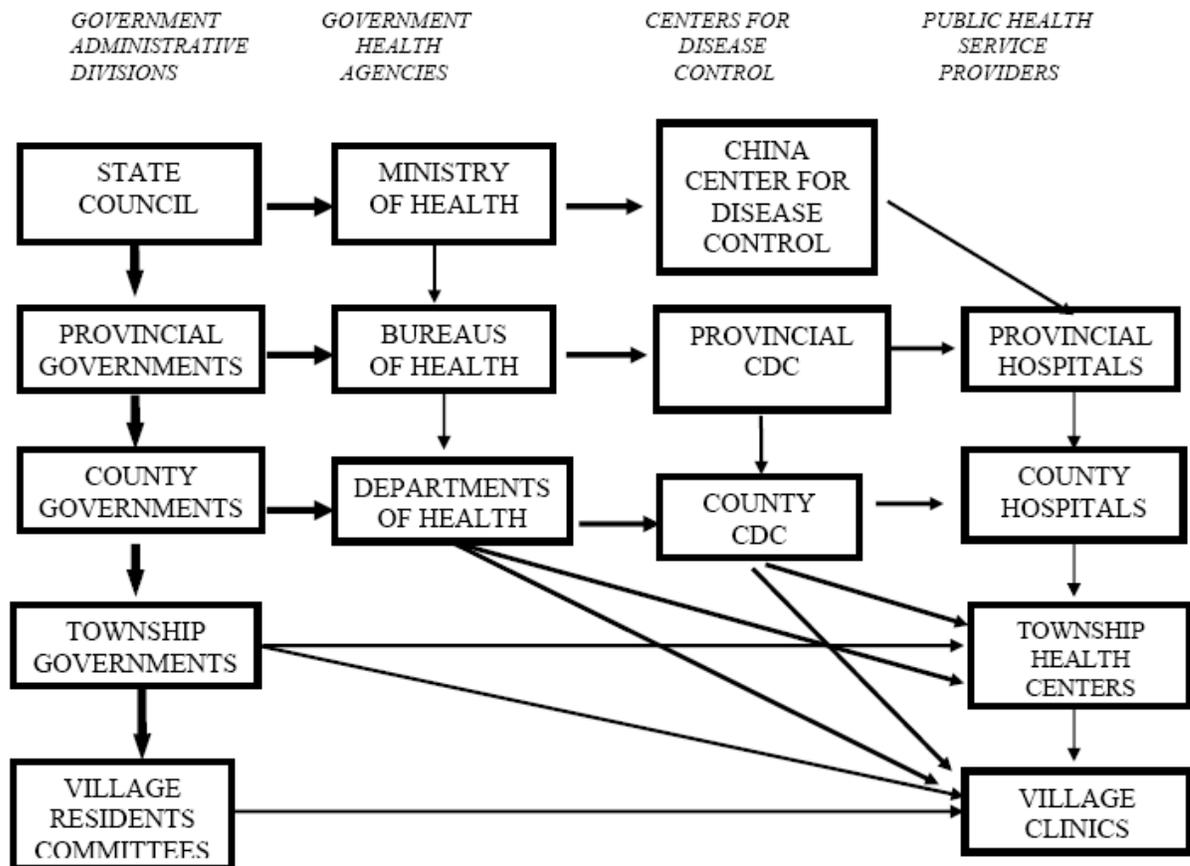


For a more detailed description of the DHHS and where public health fits into it visit:
<http://www.hhs.gov/about/orgchart/>

In contrast to the figure describing the U.S. PH network, the Chinese network very clearly identifies the relationships and relative powers of both the government administrative divisions and their subordinate public health and CDC offices (see figure 2). Additional bureaucratic units such as the police or even environmental protection offices (both of which have a role in disease response) can be inserted as well. The lines of control describing their bureaucratic relationships would mirror the relationship with the public health bureaucracy, again reflecting the clarity of relationships and responsibilities

Though it appears to be at the top of the public health hierarchy, the U.S. federal level (Figure 1, top box) exercises little or no legal power over the state and local public health agencies except when it is asked to intervene by a state governor, for example in the event of a massive disaster. It may also legally intervene in an event that includes some element of interstate commerce, which has often been very broadly construed, but may also require authorizations at several levels (federal, state and local) which can slow responses in the event of an emergency.

Figure 2: The Chinese Disease Prevention System



Arrows (→) indicate bureaucratic lines of control. Thickness of arrow implies strength of relationship.

Source: Jonathan Schwartz, R. Gregory Evans, and Sarah Greenberg, "Evolution of Health Provision in Pre-SARS China: The Changing Nature of Disease Prevention" *The China Review* vol. 7, no. 1 (September 2007): 94.

In China, while there is fragmentation, the system is basically authoritarian. As seen in figure 2, the public health system runs as a line of control from the central government level down to the village level. The Chinese CDC network exists as part of the Ministry of Health bureaucracy, running from the national level (the national CDC in Beijing) to the township level. The National level CDC has no bureaucratic power over lower level CDCs. Rather it can provide information and recommendations. The lower CDCs are dominated by lower level public health departments. These CDC units are akin to past Epidemic Prevention Stations, which provided basic public health services during the Maoist period. The CDCs are also under the bureaucratic control of the relevant level of the public health bureaucracy. Local CDC responsibilities can be compared to responsibilities generally, but not necessarily, found at the local public health agency level in the U.S.. These include reporting disease outbreaks, taking local disease control measures, providing vaccinations, and training on public health.

Thus, on the one hand, the Chinese central government has encouraged decentralization of decision-making and funding control to the provincial levels of government (see figure 2), leading to a shift in policy making powers much as we see in

the U.S.. In both countries, authority tends to be held by the funding body. On the other hand, and in contrast to the U.S., the authoritarian component of the Chinese system allows the central government to recentralize powers to itself when faced with a set of challenges it prioritizes highly. As a result, in a health crisis, the central government is in a position to focus resources and pressure, reflecting the political nature of crisis response.

The closest parallel to China's centralized power in the U.S. is executive power. But while the president, as head of the executive branch, has the authority to issue executive orders with the force of laws, he is constrained by statute and constitutional authority. In the case of a national emergency such as a pandemic, any executive order that might restrict civil liberties by requiring quarantine, isolation, or vaccination would likely be viewed as illegal, or, at the very least, have to go through the legal process to balance it against constitutional rights to due process.¹⁹ Moreover, whereas in China quarantine and isolation were important and successful tools in containing the spread of SARS, research from the U.S. CDC indicates that the U.S. population would have high levels of non-compliance in the event of compulsory quarantine. This would be in part because of lack of experience but it is also important to note the high level of distrust among US citizens for government public health authorities (only 40 percent trust them in the U.S.)²⁰. Not only would this distrust significantly slow response in contrast to the Chinese response, it could potentially cause serious political damage to the president/executive branch.

Such tensions were relatively easily overcome in China when in mid-April 2003, the Party chose to focus on combating SARS and was able to mobilize both Party and State bureaucracies. The central distinction here is between the general capabilities of the public health system, and the ability of the central government to "ramp up" the response capabilities of the pandemic response system by concentrating the resources of a variety of bureaucracies, organizing them effectively and expanding their capabilities in the face of a crisis. Thus the question is not if the public health network is capable of responding to a pandemic but rather does the central government have both the capacity and the will to activate a broad coalition of forces while investing significant resources in response to a pandemic? Clearly, the Chinese leadership was willing to do so when faced with SARS.

If the U.S. government chooses to focus on combating a disease (like a pandemic) which falls outside the usual parameters of federal programs, it relies upon the CDC (see Figure 1), an agency of the Department of Health and Human Services (DHHS), to spearhead the effort. The CDC collaborates with academic, scientific, local, state, federal, and other agencies to provide expertise, information, and various resources to protect the health of individuals and communities. Their primary tools are educational health promotion, prevention of disease, injury, and disability, and preparedness for new health threats. CDC scientists provide information, research data, lab facilities, and guidance to all public health agencies at every level.²¹ But, despite the broad scope of CDC work, and the stated willingness of the DHHS to provide assistance when it is requested, the U.S. system, unlike the Chinese system, does not "ramp up" quickly. This is in large part because the CDC has no authority to require or enforce the recommendations and guidelines it sets out. As a result, responders at the local level are told that they can expect to wait 72 hours to receive federal resources (vaccines, equipment, etc.) or longer if the disaster is widespread. One need only look at the

confusion around lines of authority and the federal response to Hurricane Katrina to see how complex federal response can become even in a relatively limited situation.

Furthermore, because of chronic lack of funding, the CDC could be easily overwhelmed in a pandemic event. This is exacerbated by the fact that the CDC may be approached directly by private agencies or institutions without reference to the local or state level PH system. Thus, for example, during the initial stages of the H1N1 outbreak in summer 2009, the CDC was fielding daily and even hourly calls from individual summer camps dealing with campers who had contracted H1N1, even as it tried to cope with the spreading pandemic in the rest of the country. In China, such matters would be referred to the appropriate provincial CDC, never rising to the level where they pressured the very core of the public health system.

U.S. STATE LEVEL/CHINESE PROVINCIAL LEVEL

Perhaps the most confusing element of US local public health agencies is their immense variety. Where in China the public health bureaucracy is similarly structured across all the provinces and provincial level units, in the U.S., each State has its own system, usually based on historical and political precedent. States and, by delegation from the state, local governments base their authority to regulate and provide for the protection of public health on the police power to provide for the health, safety, and welfare of the people.²² However, each state applies powers differently. In contrast, as on the federal level, these powers are restricted by the constitution's rights to privacy (including medical), and 4th amendment rights against "unreasonable" search and seizure, 5th and 14th amendment rights requiring due process and just compensation, and many others. In most states (though not all) invoking police powers may require executive orders by the governor, as well as a lengthy legal process, varying according to state statute and according to what actions the police powers are meant to cover.

In general, while the State is responsible for disbursing certain federally provided funds, often in the form of mandates for specific programs to local public health agencies (LPHAs), those which have very specific requirements for expenditures may be ignored by LPHAs. For example, billions of dollars were given to states by the federal government in 2005 to pass directly on to LPHAs for the sole purpose of pandemic preparedness planning. These funds were so strictly regulated (for example, they could not be used to hire new people to write plans, nor could they be used to pay for overall expenses of LPHAs in order to free up additional time for workers), that some LPHAs with limited personnel refused them outright. They argued that the way the funds were to be used meant that planning would come at the expense of vital services to the community. Instead they chose to rely on whatever disaster plans they already had, however inadequate.

State assistance in dealing with a disaster can be requested by local authorities and/or triggered by jurisdictional authority that depends upon situations and state and local laws, which vary by jurisdiction. When needed during a disaster, the National Guard²³ has been the traditional response body for state governors (50,000 were deployed during Hurricane Katrina) who may deploy them on a state and local level as needed.²⁴ However, as Hargan convincingly argues, the military are not trained for this purpose, and lack cooperative relations with local authorities.²⁵ Moreover, there is no certainty that military personnel or law enforcement will willingly expose themselves to

pandemic illness given US cultural approaches to “individuality, due process, and skepticism of government.”²⁶ The states usually also provide information and guidance to the LPHAs, such as templates for disaster plans to be filled out as appropriate by the locals, or the LPHAs may receive the information directly from the CDC (federal agency). There is no hard and fast rule which applies here, and following this guidance is not mandatory.

In contrast to the U.S. system’s lack of consistency, in China, when the central government, under the leadership of the State Council (Cabinet), identifies a high priority, it can convey this prioritization effectively and directly to provincial governments. Once the priority has been clearly identified, the central government can activate a variety of bureaucracies and require the provincial governments to take action and invest in addressing that priority. This is what happened with SARS. The central government made SARS response a top priority, required the provincial governments to act on this priority and in parallel invested budgetary resources and activated other bureaucracies to respond. It also rapidly developed new regulations and policies and laws to shape the SARS response (see below).

While different provinces may have different funding levels for public health offices (thus, richer provinces may invest more in public health), all share the same responsibilities, and depending on conditions, less well endowed provinces will receive additional funding from the center. Thus, during the SARS outbreak, the central government promised to cover the hospitalization cost for any person who might be ill with SARS and who lacked health insurance. Interviews with hospital officials in a variety of locations across the country supported the assertion that sufficient funding had been allocated by the center to meet this commitment.²⁷

CHINESE CENTERS FOR DISEASE CONTROL AND US LOCAL PUBLIC HEALTH AGENCIES

At the level of the township in China the quality of CDC staff can be mixed, especially in less wealthy regions of the country. One reason for this is that local governments are required to find employment for recently released military personnel. These personnel are normally placed within the government bureaucracy, and in some cases, this includes local CDCs. Although such officials arrive untrained, they are provided with regular and ongoing training by CDC officials at higher levels of the bureaucracy.²⁸ The situation at local public health agencies in the U.S. is, in some ways, comparable. LPHAs are often staffed by underpaid personnel with limited training in public health, making it difficult for them to meet their regular responsibilities, much less respond to disasters and pandemics. But while some post-hire training may be provided in the U.S., it is not as systematic as that provided to Chinese CDC workers. Moreover, instead of working within a system that supports a centralized government body, LPHAs in the U.S. actually operate as autonomous entities, diluting the powers of the state, and working independently of each other and the state and federal public health agencies.

China’s response capabilities are strengthened by clear and consistent guidelines that are provided to CDCs for each type of outbreak situation. For example, in the case of a disease outbreak in a village, the village head will mobilize the local village committee, possibly representative and/or local organizations such as the All China Women’s Federation (a quasi-non-governmental organization) while also informing township level officials of the outbreak. The township will dispatch public health/CDC

experts from the township level to investigate and may call on the county level CDC for additional assistance if this is viewed as necessary.²⁹

In contrast, U.S. LPHAs have the primary responsibility for disaster and emergency response, with the general understanding that “all response is local.” And while this makes sense given that they are usually first on the scene, know the population and environment, and have local contacts and an understanding of the unique needs of their communities, unclear lines of authority, inconsistency, and fragmentation undermine successful response. This is especially problematic when there is no clear sense of when and how additional aid will be received since it depends as much on local legislation, politics, social attitudes, and LPHAs own resources as on the actual requirements for dealing with the disease itself.³⁰

A very few US States, like Florida and Rhode Island, have no actual LPHAs. Instead, the state itself provides the services of LPHAs. This is arguably a more sensible system as there is less room for confusion about authorities and coordination, but it is more difficult for a state entity to fully understand the needs of locals if they are not on the ground in the specific area. Whether this version of PH delivery is better or worse, adaptation of this model cannot be legislated in other states because of the strong states’ rights approach of US government, and the resistance of local agencies to losing funding and influence.

Legal and Policy Issues

Until SARS broke out, the U.S. CDC’s legal authority to apprehend, detain, or conditionally release seriously ill and contagious persons was limited to seven diseases – not including SARS. Indeed, no change had been made to the disease list since 1983, at which point it included cholera, diphtheria, infectious tuberculosis, plague, smallpox, yellow fever, and viral hemorrhagic fevers like Marburg, Ebola, and Congo-Crimean. To add a reportable disease to that list required a presidential executive order based on the recommendation of the Secretary of the U.S. Dept. of Health and Human Services, and an amendment to CDC quarantine regulation. This long and tedious process took up crucial response time.

In China, in response to SARS, the central government via the Ministry of Health, swiftly updated or developed new policies and regulations relating to infectious disease response. According to Hu Yonghua, Dean of the School of Public Health, Beijing University (May 31, 2005), the 1998 Infectious Disease Law was revised within 20 days in response to SARS. The revised law and attendant regulations and legislation, including the Food and Drug Safety Law and the People’s Republic of China regulations on Public Health Emergencies (2003)³¹, were then sent to each province across the country. Regulations and policies focused on reporting and control methods and what could be considered a reportable disease and how to incorporate novel diseases (for which a specific category exists).

Each provincial bureau of health was then responsible for developing its own policies and regulations based on those from the central government. Sub-provincial governments then adapted provincial protocols and regulations to their own conditions. Henk Bekedam notes that 20-30% of the population was told to shelter in place (2-3 weeks).³² This response was implemented by local street committees, whose members

kept track of anyone entering or leaving the neighborhood. Similar oversight occurred in the rural areas under the auspices of village committees.

In recognition of the danger of legal delays in the U.S., President Bush signed into law the Public Health Security and Bioterrorism Preparedness and Response Act which eliminated the need to convene an advisory committee to amend the list of diseases, and clarified that federal isolation and quarantine measures apply not just to persons who are infectious but also to those exposed to a communicable disease who might become infected. However, states include a judicial review in such cases which further slows matters and would be unworkable in a pandemic. The federal government is not able to require any changes to this review requirement.³³ Ultimately, however, because the U.S. is a “heterogeneous society with a strong tradition of individualism and skepticism about government”³⁴, it is highly likely that legislation that limited movement of citizens would be difficult to enforce and politically unpopular.

Additional concerns arise out of the potential for litigation and liability growing out of response to disaster. Laws prohibiting discrimination on the basis of age, race, gender, religion, national origin, and disability may all prove sources of litigation, even during a disaster. It will be possible to sue health care personnel and hospitals for negligent or intentional injury, or even for a failure to plan adequately, or to implement a plan correctly. These and other avenues for litigation contribute to a general unwillingness to make decisions, take leadership roles, or even to create anything beyond the most general of plans.³⁵

China’s response to SARS was more flexible and suited to a relatively homogenous system. When SARS struck, the central government via the Ministry of Health, was thus able to address public health needs quickly and comprehensively.

These clear lines of authority and responsibility are augmented by the fact that Chinese hospitals and physicians are required to accept patients and treat them on pain of losing their licenses, facing fines, and/or criminal charges. This is not the case in the U.S.. Since US physicians and hospitals are often private, there is little control over their response. Debate continues in medical and legal circles regarding what can be required of medical facilities and personnel. At the very least, however, the U.S. might benefit from trying to adopt clearer lines of communication and interaction with the CDC and public health officials, as well as a clear legal structure adapted to dealing with such emergency situations using China as a model.

CURRENT STATE OF US PREPAREDNESS

There have been some improvements in US public health preparedness since the 2001 anthrax attack. Assisted by funding from a \$4.9 billion allocation by the CDC between 2002-2007, all 50 states have adopted all-hazards emergency response plans (up from 11 percent in 2002); over 80 percent of local health departments have developed comprehensive emergency plans (up from 20 percent in 2002) which include protocols for incident command systems and communications; and nearly two thirds of state health agencies have implemented workforce planning programs. Moreover, 86 percent of LHD workforces reported completion of National Incident Management System (NIMS) training and became NIMS compliant. (NIMS is a standardized approach to incident management and response, with uniform communications and chain-of-command practices for emergency responders in government). In 2007 nearly all states

participated in at least one simulation exercise in contrast to 80 percent in 2002. All these measures should improve integration between multiple information systems, and enhance response efficiency. Also important, before 2002, few full-time employees worked in preparedness at the local level. As of 2008, large local health departments (serving 500,000 people or more) reported an average of seven to eight dedicated staff.³⁶

The December 2009 Rand report “*Ready or Not? Protecting the Public’s Health from Diseases, Disasters, and Bioterrorism*” also noted some improvement in US capacity to respond to disasters, noting that “investments made in pandemic and public health preparedness over the past several years dramatically improved [US] readiness for the H1N1 outbreak.”³⁷ Among these improvements were the development by all states of plans to receive medical supplies from the federal stockpile, a growth in lab capacity, and an improvement in the electronic reporting and syndromic surveillance of most states. Moreover, some states have enacted legal protections for health care volunteers during public health emergencies.

At the same time, however, the report reveals *significant gaps in US disease response capabilities*. It repeats the already familiar message that core public health infrastructure is underfunded and overextended, and that ongoing layoffs at state and local health departments must not only cease, but be reversed if the country is to be able to respond to a health emergency. In fact, According to the Robert Wood Johnson Foundation, over half the states have seen cuts of 27 percent in public health funding and preparedness funds since fiscal year 2005.³⁸ The March 2009 edition of Trust for America’s Health³⁹ “Shortchanging America’s Health 2009,” reports that at least 46 states will suffer gaps in their funding in 2009 which will lead to cuts in bioterrorism and health emergency preparedness. Moreover, they estimate that 21,000 public health positions are likely to be cut from already severely understaffed and undersupported agencies. Furthermore, failures in surveillance, and inadequate laboratory facilities, outdated vaccine production capabilities, and poor hospital surge capacity continue to weaken capacity.

COMPARING SARS RESPONSE AND H1N1 RESPONSE IN CHINA AND THE U.S.

As we reach what may be the second peak of the H1N1 (swine flu) pandemic, it is informative to briefly examine how the SARS response has influenced Chinese PH’s response to H1N1. Having experienced the fallout from their initially poor response to SARS, especially the attempt to underplay its threat, the Chinese leadership has taken a very different tack with H1N1. In fact, the response to H1N1 is likened to China’s response to the 2008 Sichuan earthquake in terms of massive mobilization and top leadership involvement. The main distinction being that during the Sichuan earthquake the leadership was represented by Premier Wen Jiabao whereas the response to H1N1 has seen active involvement by a range of top figures. Thus, two weeks before the pandemic reached China, President Hu Jintao convened the Chinese Communist Party Politburo Standing Committee to discuss the threat and Premier Wen Jiabao held cabinet meetings to initiate an inter-agency response.

Whereas when responding to SARS China at first underplayed the seriousness of the disease, China’s response to H1N1 often exceeded WHO recommendations, in particular as relates to quarantines. In comparison to the U.S., where neither

government nor public health officials utilized quarantine or isolation, China's response included risk-averse strategies such as airport screening of incoming passengers, quarantining potentially-ill patients, and contact tracing. These actions were supplemented with on-board airplane temperature checks and suspending all flights from Mexico in the early stages of the outbreak. By early July 2009, tens of thousands of people were being held in quarantine in government-designated facilities.⁴⁰

To further draw attention to the leadership's investment in preparing for the pandemic threat, Vice Premier Li Keqiang took a public tour of the Chinese National CDC.⁴¹ The seriousness of the effort to be open with the public about the status of the disease can be seen in the way that the Minister of Health, Chen Zhu, informed the press that the "H1N1 situation in China was grim" and that vaccination efforts would fall short of demand.⁴² Furthermore, whereas during the initial phases of the SARS outbreak few incentives existed for health officials to publicize SARS cases, during H1N1 the government quickly and publicly warned that it would punish any institution or individual who covered up cases of, or deaths attributed to, H1N1.⁴³

The decision by China's top leadership to become so involved reflects a conscious effort to take the pandemic seriously and, perhaps more importantly, be seen to take it seriously in both the domestic and international arenas.⁴⁴ As part of this effort China was also the first country to mass produce an H1N1 vaccine which it has targeted at priority groups including the military, the People's Armed Police, the police, medical staff, teachers, students, public service workers, and patients with chronic disease (though as of November 2009 there is recognition that supplies are insufficient).⁴⁵ Reflecting the leadership's success at gaining the public's confidence, a China Youth Daily survey found that 85 percent of Chinese were satisfied with the government's response to the outbreak.⁴⁶

The H1N1 pandemic was the virtual geographic opposite of SARS. While the SARS outbreak is believed to have begun in China, catching the Chinese off guard and allowing the U.S. some time to take whatever measures it chose, by the time H1N1 was recognized - probably having initially sickened humans in Mexico - it was already in the U.S.. This time the U.S. was caught off guard while China had the opportunity to take protective measures. This, as we have seen, it did, working from the highest levels of government with relatively draconian methods and speed. In contrast, the U.S. response was much more muted. Unlike China, the U.S. did not close the border with Mexico, or limit travel in any way despite significant public pressure. The U.S. CDC argued alongside the WHO, that this would be an ineffectual response, even as actual tourist and business travel to Mexico dropped to almost zero.

Nevertheless, partly as a result of media attention to a few dramatic, severe cases, and the WHO and US pandemic phases which climbed to their highest levels, many schools did close, self-quarantine and isolation were undertaken at universities and businesses, and panic over availability of vaccine was widespread. Many hospitals required healthcare workers to receive vaccinations if they were to continue work, raising questions of personal freedom.⁴⁷ During this entire period, however, response was left primarily at the local level, with the U.S. CDC scrambling to update guidelines and information which were passed down to LPHAs and made available to the media. Once the pandemic became well-established, the U.S. CDC limited testing for H1N1 to cases that met very specific criteria, and focused instead upon surveillance.⁴⁸ Many US states, in an effort to further calm fears, stopped reporting case numbers altogether.

Whether this was a useful exercise or merely fed the feeling that information was being withheld, is yet to be determined.

By the time the H1N1 vaccine became available in the U.S., there was a mixed and often uninformed response. Despite prioritized vaccination lists developed by the CDC on the basis of disease epidemiology, actual distribution of vaccine was anything but orderly or logical. It remained unclear to many what groups were actually most vulnerable, and at times, such as when it became clear that pregnant women were especially vulnerable, the priority list changed. In some areas, fears that vaccine supplies would be inadequate were realized at least initially and lines formed where they were offered. Often, LPHAs and hospitals had no vaccine, or ran out, while private companies in the same area, like Walgreens and supermarket chains, sold them to those who could pay. The message that certain groups needed the vaccine more than others appears to have been unclear to much of the population. Despite widespread dissemination of the vaccine priority list, an AP poll indicated that 62 percent of people 65 years of age and older wanted vaccines – though they were not among the population targeted for vaccine. Moreover, only half of Americans planned to receive the injection, whether they were in high risk categories or not.⁴⁹ Ultimately, a growing conviction among the population that the dangers of the disease had been overstated left an oversupply of vaccine. As of February 2010, the CDC reports that approximately 23.4 percent of US citizens have received the vaccine, and continues to push for the entire population of approximately 300 million to be vaccinated

LOOKING TO THE FUTURE, LEARNING FROM THE PAST

Experts are uncertain whether the H1N1 influenza of 2009/2010 has reached its peak and will soon die out, however, they agree that additional influenza viruses – some much more dangerous than H1N1 and SARS have been – are bound to develop in the near future. What lessons can be drawn from the very different responses of the U.S. and China to these diseases?

It is clear that the different political structures of the two countries dictate much of their preparedness and response capabilities. China's top-down system allows for more swift and effective control over everything from media messaging through policies on quarantine and isolation than is the case in the U.S.. Indeed, the very freedom of the U.S. media and the lack of a centralized authority to dictate public health actions can be seen as a cause of confusion and relatively ineffective response. At the same time, however, the U.S. system is more transparent, and in its openness to WHO and evidence-based public health recommendations, avoids many of the more repressive actions of the Chinese system like enforced quarantine and isolation which, in the case of H1N1, were probably not effective in limiting disease transmission.

- 1) The Chinese experiences in the relatively secretive approach to the SARS outbreak clearly led to a more transparent approach to H1N1. The positive reaction of the Chinese people to the H1N1 response is at least partly due to this transparency, which helped the population understand and accept measures taken to contain the disease. Such transparency should be the rule regardless of country or disease. In countries like the U.S., transparency is even more important because of the socio-cultural environment.

- 2) Though China's response to H1N1 was more transparent than to SARS, it did not follow WHO suggestions closely when it came to containment and response. Based on previous cases, it is reasonable to assume that more economic and social upheaval were caused by Chinese decisions to drastically limit transportation and make wide use of quarantine than necessary given the spread patterns of H1N1 and its low levels of mortality. Though definitive information may not be available for several years, China will need to reexamine its response in light of WHO recommendations and actual epidemiological evidence from H1N1. Certainly, it will be crucial for China to understand that political boundaries are not barriers to infection, and that therefore, drastic limitations on travel and trade are probably counterproductive.⁵⁰
- 3) As we have seen, the political and social climate of the U.S. severely limits its ability to centralize and streamline preparedness and response authority. As a result, efforts to coordinate and standardize public health response at all levels of the federal, state, and local system are all the more important. This requires not only a significant investment in joint training, but political will to enforce public health measures whether they are popular or not. The fact that during peak periods of H1N1, private organizations and individuals took it upon themselves to voluntarily observe and/or require measures like quarantine and vaccination could be an indicator that, if approached correctly, such measures might be used if they are voluntary and well-explained.
- 4) The U.S. has tried to strengthen coordination between federal, state, and local public health partners through the implementation of the Incident Command System (ICS) structure under the National Incident Management System (NIMS). However, while this approach has been helpful in some circumstances, experts argue that ICS is little more than a framework, and that it is not designed to handle large networks of responders. Dr. D. Moynihan notes that the design of the ICS is "based on the hierarchy of a single organization rather than a network of many," making it less useful in the event of large-scale public health challenges.⁵¹ Finally, attempts are being made to pool not only the resources of state, local, and federal entities, but territorial and tribal bodies as well, in the hopes of expanding the public health infrastructure to incorporate groups that are often marginalized in health care settings.⁵²
- 5) In the event of a pandemic, communication systems are crucial to successful response. As a result of their SARS experience, the Chinese invested in a web-based reporting infrastructure utilizing new computer software that meets the requirement of timely information transfers via the internet from the lowest level CDC up the bureaucratic hierarchy, where it is then rapidly disseminated throughout the public health system. This approach replaced an earlier system that was based solely on top-down reporting. To ensure effective dissemination, public health officials are trained in the use of the software and know to check the public health warning system for updates of potential epidemic diseases. In

addition, national hotlines for reporting suspected cases of SARS were established.

As with most of pandemic preparedness and response activities, the U.S. public health communication system is based on the local level. And while the plan laid out by the Department of Health and Human Services⁵³ is detailed regarding what the roles of public health workers are, the specifics of how to carry out these roles are often lacking, as is the funding and training. Moreover, while local and state hotlines are frequently used to answer health questions, there is no unified software or web-based infrastructure comparable to that used by the Chinese. Efforts by the current US administration to create computerized health records for all citizens may be a step in this direction, however, and should be encouraged.

- 6) Both China and the U.S. suffer from a lack of trained public health workers at the local level. Much of this is due to funding shortfalls and cutbacks. The solution is again one of political will, with governments prioritizing preparedness and response alongside the development of basic public health infrastructure. This is not a new recommendation. Indeed, it is an ongoing battle in the U.S., and reports and research from private and public organizations have long called for such change. The question is, what will it take for it to happen? The fact that many in the U.S. feel that we “dodged a bullet” with H1N1 may merely put off the changes needed to prepare for the next health disaster.

The Chinese government is currently investing heavily in improving its local level public health response capabilities. Among the steps it is taking is expansion of health care access to the rural Chinese population.

- 7) The Chinese system’s top-down mobilization with clear penalties side by side with assurances of compensation where necessary may at least be partly adaptable to the U.S.. In China the system ensures that officials are aware of their responsibilities and the existence of sufficient resources to meet them. In the U.S., state and federal commitments of additional resources and assurances to cover the cost of hospitalization for victims of novel infections (as was the policy in New York City, which was struck relatively hard by H1N1), could clarify authority, responsibility, and lines of support. This could ease fears about legal problems and uncertainty about their roles, making them more willing to be part of pandemic response efforts.
- 8) SARS and H1N1 have made it clear that health agencies must be able to mobilize quickly and provide preventive medications and vaccines during a disease disaster, as well as exercise detailed plans for mass distribution. Speed and effectiveness of response is improved when, as in the Chinese system, protocols are already in place and lines of control are clearly established. Thus, depending on the severity of the outbreak, expert groups are established at different bureaucratic levels (i.e. central, provincial) to provide recommendations for response and treatment to any outbreak within a compressed timeframe. During

- the SARS outbreak, the Chinese Ministry of Health (national level) established a national expert group that was required to provide reports within 24 hours of receiving information regarding potential SARS cases from lower level officials. Provincial level governments also established expert groups that were required to report within 12 hours.
- 9) Another Chinese strategy for dealing with pandemics is to mobilize other participants in public health, including quasi-NGOs, such as neighborhood committees, which take responsibility for providing supplies to people in quarantine, observing people who may seek to evade quarantine, and providing thermometers and masks as needed. For the most part, such neighborhood organizations do not exist in the U.S.. However, efforts could be made to work through faith-based organizations, neighborhood watch groups, Red Cross volunteers, volunteer firemen, and schools. Participants could be trained to provide basic services, disseminate necessary information, and serve as an additional health “work force,” as seen in China.
 - 10) While fragmentation in the U.S. system continues to be a problem, some lessons have been learned. Federal, state, and local plans exist for multiple types of disasters (though on the state and local level these can vary widely). Moreover, the U.S. response to H1N1 is seen by some experts as a sort of “dry run” for a more serious pandemic. Even now, different approaches to response are being compared with an eye to developing evidence-based best practices that will speed treatment to those who need it. Thus, for example, vaccination clinics were carried out as “drive throughs” where car occupants were vaccinated without leaving their vehicles for the first time in public health history.⁵⁴ The results, both positive and negative, are being reviewed for use in future disease outbreaks. In addition, memorandums of understanding (MOUs) are increasingly in use between organizations that handle direct medical care, transportation, first responder services, and public and private organizations. These will help overcome some of the fragmentation inherent in the U.S. system.
 - 11) Control over the media as a mode of controlling public response, mitigating concerns, and educating the general population with consistent messaging is difficult in the U.S. with its strong freedom of the press protections. Nevertheless, significant efforts were made to coordinate media and CDC messages during H1N1 so they were consistent and regularly delivered. This met with some success, though it is unclear whether levels of distrust in government were lowered by these efforts. Certainly, some population groups felt they were being lied to about the safety of the vaccines, and at different times, the press was accused of both over and underplaying the danger of the pandemic, as was the government. CDC attempts to create a pandemic severity index to go alongside the standard pandemic stage charts may assist in tailoring response to need and in educating the public in the U.S..⁵⁵ However it is impossible in the U.S. to prevent the media from questioning government messages and recommendations. Assessment of success in this matter will have to await research conducted after the pandemic is over.

CONCLUSION

The SARS outbreak of 2003 was instrumental in teaching the Chinese where weaknesses in their legal and public health system could worsen the effects of pandemics on all levels of Chinese society, as well as internationally. Perhaps the most important lesson was that transparency and international cooperation early in the development of a pandemic are crucial to successful containment and response. While the U.S. did not experience SARS as a pandemic, it has much to learn from China's response to SARS and especially from the clarity of lines of authority, responsibility, and accountability of the Chinese public health system. However, even with improvements made to the U.S. system as a result of the Sept. 11 attacks and fears of emerging infections like Avian Influenza (H5N1), the political and social environment of the country make it difficult to emulate many of China's successes. Neither public health system is ideal, though in their differences, they have much to teach each other about open communications, centralization of authority in disaster situations, and development of disease-specific planning and training. Moreover, both countries share similar challenges with staffing, training and funding of their public health systems, and responding flexibly to new and emerging infections like H1N1.

The reality of a world in which any one country's disease is just one plane ride away from any other country makes it vital that lessons for preparedness and response be shared globally. And while it is tempting to argue for wholesale adoption of successful strategies from other countries, we must be aware that socio-cultural and political issues require more of an adaptive approach. Thus, we must be open to learning from each other, sharing information about successful and failed initiatives, and preparing for the inevitable future pandemics with an eye to global rather than national response.

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