

*Public Health Track*

# Impact in Action Brief #3: Disease Prevention and Emergency Response

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## Executive Summary

The third working session of AmCham China's Social Impact Initiative (SII) public health track was held on November 13, 2020 in Beijing, China. The working session was attended by over 40 stakeholders from the public health ecosystem representing the private, public, and research sectors, including the Ministry of Foreign Affairs, China Center for Disease Control, Development Research Center of the State Council, World Health Organization China, the World Bank, the United Nations Children's Fund, Save the Children, Peking Union Medical College Foundation, Bell, Dell Technologies, GSK, Johnson & Johnson, Merck, MSD, NVIDIA, Viatris, United Family Healthcare, Silk Road Industry and Finance International Alliance, APCO Worldwide, and others.

The topic of the second working session was "Disease Prevention and Emergency Response," and focused primarily on the topics of vaccine development and emergency response and management. Disease prevention is defined broadly as clinical and non-clinical intervention strategies and measures that are meant to limit incidence, hinder progression, and reduce impact of diseases and other health-related conditions. Disease prevention strategies are often classified into three tiers – primary, secondary, and tertiary, according to common objectives.<sup>1</sup>

Despite this working session's focus on infectious disease prevention and response, it is important to point out that chronic diseases are the leading cause of death in China.<sup>2</sup> China's population has undergone a demographic shift and sustained period of economic development. Its disease burden has shifted from one characterized by communicable, maternal, and neonatal disease to one characterized by non-communicable (chronic) diseases (e.g., stroke, heart disease, lung cancer).<sup>3</sup> Communicable disease accounts for less than five percent of mortality, however, the current COVID-19 pandemic has reasserted infectious disease control and prevention at the forefront of healthcare priorities and reforms.

The spread of disease can have a significant impact on economic development and growth. The World Bank has estimated that the global economy could shrink by 5.2 percent in 2020 because of COVID-19, while global trade flows could decrease by anywhere from 13 to 32 percent.<sup>4</sup> China's economy is one of the few forecasted to grow in 2020 (1.9%).<sup>5</sup>

The shift in China's disease burden discussed above is in part due to the significant progress made with respect to disease prevention and control. This has been driven by a focus on modernizing the public health system through investments in primary health care, training of community healthcare workers, national immunization strategies, and public campaigns focused on sanitation and hygiene.<sup>6</sup> "Healthy China 2030," China's signature policy framework places health at the center of its socio-economic development, and disease prevention and control is very much at the forefront of this initiative.

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<sup>1</sup> Primary strategies include activities to avoid exposure, alter unhealthy behaviors, or increase resistance to disease through use of vaccines, or nutrition supplements. Secondary strategies involve the use of screening and testing programs for early detection, or emergency response systems to contend with outbreaks. Tertiary strategies involve chronic disease/self-management programs, peer support programs, or rehabilitation and recovery.

<sup>2</sup> "Crude death rate per 100 000 population by cause," GHE 2016, WHO

<sup>3</sup> Maigeng Zhou et al, "Mortality, morbidity, and risk factors in China and its provinces, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017," The Lancet 2019; 394:1145-58. Available [here](#).

<sup>4</sup> "Trade set to plunge as COVID-19 pandemic upends global economy," World Trade Organization, 8 April 2020.

<sup>5</sup> "World Economic Outlook, October 2020: A Long and Difficult Ascent," International Monetary Fund, 2020

<sup>6</sup> David Hipgrave, 2011, "Communicable Disease Control in China: From Mao to now," Journal of Global Health, 1(2):224-238.

Effective disease prevention and control strategies require coordination at local, national, and international levels, as well as a well-developed public health emergency response infrastructure. China effort to control COVID-19 has been commendable and sustained, although the COVID-19 situation exposed gaps in China's healthcare and emergency response systems and has led for calls to reforms to the public health system to improve capacity for disease monitoring and control.<sup>7</sup>

Given this context, this SII Working Session on disease prevention and emergency response took place at a timely moment. The objective of the SII is to foster discussion under the AmCham China platform among stakeholders across the spectrum to tackle issues in public health.

The SII working session focused on two topics: 1) vaccine development and 2) emergency response systems. Participants engaged in wide-ranging discussions across both topics. Following each session, participants developed a number of policy recommendations to improve disease prevention and control strategies and enable the private sector to support government-led initiatives to achieve mutual public health objectives. Some of the key recommendations include:

1. Redefining the nature of public-private partnerships for public health. This forum included participants from the business community, international organizations, non-profit sector, and government agencies. There is not an established consensus among participants on the expectations of the private sector when engaging in PPPs. Participants agree PPPs are a powerful mechanism to achieve socially beneficial outcomes. Therefore, we recommend that this platform work to redefine the concept of PPPs, and in particular define the benefits and expectations of the government. A good starting point for this is to engage the private sector in the development and distribution of the COVID-19 vaccine with respect to financing, development, transportation, and distribution to address gaps not easily met by the public sector;
2. Consider adopting this collaborative SII working session format into the government's official policy development process. This format allows many different stakeholders to come together and speak freely on challenging issues for which they share a vested interest in addressing. Dialogue is the first step towards identifying and enacting solutions. Such a format could help to break down silos across government agencies and support consensus-building efforts with respect to policy.
3. Reaffirming the importance of international collaboration across sectors. The business community demonstrated its value in the response to COVID-19 by donating supplies to affected communities in China and elsewhere and by its substantial contributions to vaccine R&D. Disease prevention and control can only be successful with sustained collaboration, and each stakeholder has their particular role to play. International collaboration is necessary because infectious diseases do not respect national borders. Sharing of information and resources across borders can only benefit efforts to stimulate solutions.
4. Connect hospitals across China by enhancing data sharing capabilities, policies, and platforms. During the COVID-19 outbreak in Wuhan, the private sector implemented data sharing technologies in Wuhan's hospitals that helped to contain spread of COVID-19 from moving beyond hospitals and into the broader community. This raises a broader

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<sup>7</sup> ["President Xi calls for reforming public health systems,"](#) National Health Commission of PRC, 2020

question of how to translate this success into sustained momentum for improved digitization and information sharing across hospitals in China in ways that improve the quality of patient evaluations and diagnosis. An initial step would be to enable healthcare data to flow more freely by integrating provincial health code apps with national health code apps that have been implemented to control COVID-19;

5. Promote education and training at primary schools to improve public health awareness. Schools make use of emergency fire drills in order to ensure teachers, students, and parents know what to do in the event of a fire emergency. Greater attention should be given to building awareness among children of their role in disease prevention and control through simple behaviors. These lessons will then be taken into the home and spread through the community. More should be done to integrate health education programs into the primary education curriculum and expand education among high-risk groups such as seniors and the elderly;
6. Disease prevention and control capacity-building programs should be implemented at the local level. In 2001 the WHO, UNICEF, and CDC organized professional trainings for China's Center for Disease Control. In the aftermath of COVID-19 it would be beneficial to continue these types of trainings for disease prevention and response personnel at the provincial level.

## Background

The SII aims to bring together a multidimensional set of stakeholders to develop practical, actionable recommendations for policymakers in China that support a more inclusive public health strategy and improve the health of the population. Stakeholders from the private and public sectors, research community, and civil society will come together for a series of four working sessions from July to December 2020 on key topics in public health. The group will produce a final report that summarizes key policy recommendations emanating from each session. The third Public Health working session was hosted on November 13, 2020 under the topic of "Disease Prevention and Emergency Response." Some of the overarching questions that guided the working session include:

- How can the private sector help support solutions and address current issues in disease prevention and control in China?
- What is the role of international collaboration in addressing domestic and international disease prevention and control objectives?
- What is the role of public education and awareness in emergency management and response?
- What key recommendations for policymakers can the private sector offer with respect to disease prevention and control to help improve public health in China?

## Understanding Disease Prevention and Emergency Response

According to the *International Encyclopedia of Public Health*, disease prevention refers to "measures that seek to avert the occurrence of disease, arrest its progress, and reduce its consequences once it is established,"<sup>8</sup> The WHO further refines this definition by including reference to actions that address health inequities: "specific, population-based and individual-based interventions that aim

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<sup>8</sup> "[Disease Prevention](#)," International Encyclopedia of Public Health, 2008

to minimize the burden of diseases and associated risk factors, and include actions to address social determinants and health inequity.”<sup>9</sup> The China Center for Disease Control (China CDC) ties disease prevention and control to social stability and national security, defining their mandate as “strategies and measures that create a safe and healthy environment, and promote the health of people through the prevention and control of disease, injury, and disability in the interest of social stability and national security.”<sup>10</sup>

In summary, disease prevention and control refers to strategies, actions, and clinical and non-clinical interventions that leverage the resources of both the healthcare and non-healthcare sectors to: 1) limit incidence, 2) hinder progression, and 3) reduce impact. These actions are commonly classified into three tiers in order to meet these objectives (see Figure 1).

*Figure 1. Three Tiers of Disease Prevention and Control*

<b>Primary</b>	
1.	Avoid exposure
2.	Alter unhealthy or unsafe behaviors
3.	Increase resistance to disease or injury
	<ul style="list-style-type: none"> <li>▪ Immunization, vaccination and prophylaxis</li> <li>▪ Ban or control the use of hazardous material</li> <li>▪ Nutrition and food supplementation programs</li> </ul>
<b>Secondary</b>	
1.	Detection and treatment of disease or injury as quickly as possible
2.	Prevention of reinjury or recurrence of disease
3.	Risk reduction
	<ul style="list-style-type: none"> <li>▪ Disease screening programs for early detection</li> <li>▪ Testing programs to minimize hazard exposure</li> <li>▪ Emergency response systems</li> </ul>
<b>Tertiary</b>	
1.	Eliminating or reducing disability
2.	Maximizing potential years of quality life
3.	Therapy and recovery
	<ul style="list-style-type: none"> <li>▪ Chronic disease self-management programs</li> <li>▪ Peer support programs</li> <li>▪ Rehabilitation and recovery programs</li> </ul>

Source: Compiled by AmCham China

It is important to acknowledge that China’s current disease burden is comprised primarily of non-communicable diseases. In 2016, non-communicable diseases, in particular cardiovascular disease, cancer, and respiratory diseases made up 89.2% of the leading causes of death.<sup>11</sup> While communicable diseases account for only about 3.8% of fatalities,<sup>12</sup> the COVID-19 pandemic has reasserted focus on these issues. In 2018, among communicable diseases, sexually transmitted and bloodborne diseases were recorded as the most fatal (81%),<sup>13</sup> while vaccine-preventable diseases (VPDs) ranked first in terms of their level of incidence (43%). Notably, the relatively

<sup>9</sup> “[Disease prevention](#)”, WHO, 2020

<sup>10</sup> “[About us](#),” China CDC, 2020

<sup>11</sup> GHE 2016, WHO

<sup>12</sup> Ibid.

<sup>13</sup> “[Reported Incidence and Death Rates of 28 Infectious Diseases \(2018\)](#),” National Bureau of Statistics China, 2019

high rate of incidence of VPDs did not translate into a significant fatality rate, accounting for only 2% of fatalities, due to China's laws on immunization and wide access to vaccines.

As has been underscored by the COVID-19 pandemic, diseases represent a threat to individuals, their communities, and have significant potential to inflict economic pain. According to the Institute of the Study of Labor (IZA), non-communicable diseases could be responsible for an estimated US\$ 443 trillion<sup>14</sup> in global economic losses between 2012-2030. China could lose an up to US \$27.9 trillion over the same timeframe.<sup>15</sup>

For context, the SARS epidemic in 2002/2003 resulted in a notable slump in the country's year-on-year GDP growth rate immediately following the outbreak.<sup>16</sup> Economic activity quickly recovered as the outbreak was contained. A similar pattern has been observed in the wake of the COVID-19 pandemic; however the impact has been even more widespread given the severity of the COVID-19 pandemic. China's year-on-year GDP growth contracted by 6.8 percent<sup>17</sup> in Q1 2020, when the outbreak was most severe. The effective containment of COVID-19 in China coupled with active government policy support yielded a return to economic growth of 3.2% year-on-year in Q2 2020.<sup>18</sup> The World Bank and International Monetary Fund have both projected that global GDP will contract in 2020, by 5.2 percent and 4.4 percent, respectively.<sup>19,20</sup> The IMF anticipates that GDP in the Asia Pacific will contract by 2.3 percent. China is one of the few countries globally whose economy is projected to grow in 2020, by an estimated 1.9 percent.<sup>21</sup>

Contending with the threat of infectious disease requires countries to continually assess, update, and implement disease control, prevention, and surveillance systems. China has long been focused on disease prevention and control. In the 1950s the government implemented quarantines and bans, vaccine campaigns, and campaigns to raise awareness about the importance of sanitation and hygiene. In 1955, the *Administrative Measures for Infectious Disease Control*<sup>22</sup> established an early reporting system to track and monitor the incidence of infectious diseases. In the 1970s, China implemented the Expanded Program on Immunization, which yielded as much as a 98 percent decrease in mortality and incidence of many infectious diseases including polio, measles, tetanus, and diphtheria between 1978 and 1995.<sup>23</sup> In 1987, the country established its first level 3 biosafety protection laboratory, part of China's growing emphasis on domestic research efforts with respect to disease prevention and control.<sup>24</sup> A research program dedicated to HIV/AIDS was launched soon after (1990).

The mid-2000s was characterized as a period of reform to the public health system, driven in large part by the experience of the SARS epidemic, the threat of new infectious diseases, and the

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<sup>14</sup> [“The Economic Impact of Non-communicable Disease in China and India: Estimates, Projections, and Comparisons,”](#) IZA, 2013

<sup>15</sup> Ibid.

<sup>16</sup> [“4 charts show how SARS hit China's economy nearly 20 years ago,”](#) CNBC, 2020

<sup>17</sup> [“Preliminary Accounting Results of GDP for the Second Quarter and the First Half Year of 2020,”](#) National Statistics Bureau, 2020

<sup>18</sup> Ibid.

<sup>19</sup> [“COVID-19 to Plunge Global Economy into Worst Recession Since World War II,”](#) World Bank, June 8, 2020.

<sup>20</sup> [World Economic Outlook, October 2020: A Long and Difficult Ascent,](#) “International Monetary Fund, 2020

<sup>21</sup> Ibid

<sup>22</sup> [“Trends in Notifiable Infectious Diseases in China: Implications for Surveillance and Population Health Policy,”](#) Plos One, 2012

<sup>23</sup> [“National Immunization Program,”](#) UNICEF, 2018.

<sup>24</sup> [“A brief history of the development of infectious disease prevention, control, and biosafety programs in China,”](#) Journal of Biosafety and Biosecurity, 2020



re-emergence of pulmonary tuberculosis, which had been previously under control through the application of modern preventative strategies and pharmaceutical interventions.<sup>25</sup> The SARS epidemic led to the establishment of electronic disease reporting systems at the national level and a significant increase in funding for the CDC. It prompted reforms with respect to the requirements for disease reporting and surveillance through revisions to China's legal framework including the *Law on Infectious Diseases*. China also has dedicated systems and plans to China's "Public Health Emergency Management System" (PHEMS) is overseen by the National Health Commission.<sup>26</sup> This system has five major functions namely: detection, management, treatment, R&D, and policy development. Specific government agencies hold a designated responsibility for carrying out specific action points in the event of public health emergency.<sup>27</sup> This system played a role in the government's COVID-19 pandemic response, including coordinating administrative regulations across ministries to marshal supplies and protective equipment, organize financial support for affected communities, companies, and industries, manage medical insurance reimbursements, and coordinate the release of COVID-19 response and control measures across multiple ministries and industries.<sup>28</sup>

Even prior to the COVID-19 pandemic, healthcare reform in China was underway, encapsulated by the launch of Healthy China 2030 first announced in October 2016, which places public health at the forefront of China's socioeconomic development (see Figure 2).<sup>29</sup>

Table 1. Healthy China 2030

Comprehensive Interventions to Address Health	Life-long Promotion of Health	Prevent and Control Major Diseases
<ul style="list-style-type: none"> <li>▪ Nutrition and exercise</li> <li>▪ Anti-tobacco</li> <li>▪ Mental health</li> <li>▪ Healthy environment</li> </ul>	<ul style="list-style-type: none"> <li>▪ Maternal and child health</li> <li>▪ Occupational health</li> <li>▪ School-based health education</li> <li>▪ Senior care</li> </ul>	<ul style="list-style-type: none"> <li>▪ Non-communicable disease prevention and treatment</li> <li>▪ Prevention and control of infectious diseases</li> <li>▪ Emergency Response</li> </ul>

Source: CGTN, 2019

China has overseen an effective response to COVID-19 and the outbreak is now largely under control. Nevertheless, events in 2020 provide an opportunity to reform and continue to improve public health in China domestically and internationally. Domestically, primary health care (PHC) infrastructure functions as the gatekeeper, acting as the first line of defense against infectious diseases as a product of its responsibility for routine disease screening and monitoring.<sup>30</sup> Primary health care is a key pillar of China's public health strategy, and the government has increased subsidies and funding for primary healthcare institutions significantly over the past decade.<sup>31</sup> Nevertheless, PHC in China continues to suffer from several challenges.<sup>32</sup> One challenge is around the quality of diagnosis, where studies have shown township and village health centers suffer from inaccurate diagnosis. Another challenge is related to a shortage of qualified healthcare workers with appropriate certifications or education backgrounds. The PHC system also suffers from low levels of patient trust as compared with the hospital system; as a result,

<sup>25</sup> ["Report of Notifiable Infectious Diseases,"](#) The Data Center of China Public Health Science, 2020

<sup>26</sup> ["COVID-19 Epidemic and Public Health Measures in China,"](#) Journal Epidemiology and Global Health, 2020

<sup>27</sup> ["China: Legal Responses to Health Emergencies,"](#) Library of Congress, 2015

<sup>28</sup> Tingting Xu, Ruoyu Xu, 2020, "COVID-19 Epidemic and Public Health Measures in China," *Journal of Epidemiology and Global Health*, 10(2):118-123.

<sup>29</sup> ["China issues new documents on implementing Healthy China initiative,"](#) CGTN, 2019

<sup>30</sup> ["The primary health-care system in China,"](#) The Lancet, 2017

<sup>31</sup> ["Quality of primary health care in China: challenges and recommendations,"](#) The Lancet, 2020

<sup>32</sup> Ibid.

patients tend to go to the hospital even for minor ailments.<sup>33</sup> The system also suffers from limited coordination between PHC centers and specialty care centers or hospitals, and the fact that PHC centers are often not the first point of contact for many patients. Electronic records are not often uniform or seldom shared between hospitals and PHC centers, further limiting the association between hospitals and PHCs.

China is also involved internationally to improve disease prevention and emergency response. As a member of the WHO, China is mandated by the International Health Regulations (IHR) to report and coordinate health emergency efforts with WHO's global response network.<sup>34</sup> China is also involved in bilateral and multilateral partnerships to accelerate disease prevention and control,<sup>35</sup> promote disaster resilience,<sup>36</sup> and support.<sup>37</sup> China is funding vaccine development and distribution efforts for AIDS, Tuberculosis, Malaria<sup>38</sup> and COVID-19.<sup>39</sup>

China has joined the Global Health Security Agenda, a multilateral partnership to manage and prevent infectious disease. In this regard, China's compliance with international health norms and reporting requirements could be improved. For instance, the Global Health Security Index, a global benchmarking effort of health security capabilities measuring prevention, detection and reporting, rapid response, health system, compliance with international norms and the risk environment, finds that China scores lowest on "compliance with international norms" and below the global average.<sup>40</sup> This dimension includes things like reporting to the IHR, commitments to share genetic and biological and genetic data, financing for international public health initiatives and other international commitments. Unlike most GHSA member countries, China has not completed a Joint External Evaluation (JEE) which monitors compliance with international health security.<sup>41</sup>

The COVID-19 pandemic exposed gaps in China's healthcare system and health emergency response systems<sup>42</sup> and is accelerating reforms to China's public health system to improve capacity for disease monitoring and control. Notable reform actions include 1) recalibrating disease prevention measures and streamlining disease surveillance networks,<sup>43</sup> boosting early-stage epidemic monitoring and reporting capacities at the local level,<sup>44</sup> 2) upgrading and expanding infrastructure for infectious disease treatment to better respond to public health emergencies,<sup>45,46</sup> 3) taking steps to expand professional training and capacity of health care professionals,<sup>47,48</sup> and 4) expanding health insurance coverage to include emerging infectious diseases and more holistic treatment options.

## Discussion Topic 1: Vaccine Development

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<sup>33</sup> "[Chinese vaccine scandal unlikely to dent childhood immunization rates](#)," Nature, 2018

<sup>34</sup> "[International Health Regulations](#)," WHO, 2020

<sup>35</sup> "[ASEAN, China to improve health in the region through technology](#)," asean.org, 2017

<sup>36</sup> "[Cooperation towards disaster risk reduction in the Belt and Road Region](#)," Prevention Web, 2020

<sup>37</sup> "[Global Health – China](#)," CDC, 2020

<sup>38</sup> "[Government Donors](#)," The Global Fund, 2020

<sup>39</sup> "[China joins COVAX, UN-backed global COVID-19 vaccine facility](#)," Al Jazeera, 2020

<sup>40</sup> "[Global Health Security Index 2019](#)," GHS Index, 2019

<sup>41</sup> China Power Team, "[How Robust is China's Health Security?](#)" China Power, May 13, 2020.

<sup>42</sup> "[President Xi calls for reforming public health systems](#)," National Health Commission of PRC, 2020

<sup>43</sup> "[China to accelerate improvement of monitoring system for infectious disease](#)," China Daily, 2020

<sup>44</sup> "[Public health gets boost in war on virus](#)," China Daily, 2020

<sup>45</sup> "[CPPCC member enhances medical center proposal](#)," National Health Commission of PRC, 2020

<sup>46</sup> "[China looks to improve public health system](#)," China Daily, 2020

<sup>47</sup> "[China to spur development of medical education](#)," National Health Commission of PRC, 2020

<sup>48</sup> "[Cabinet gives boost to medical training](#)," China Daily, 2020



Tackling disease prevention and control requires understanding the role of disease prevention and control and its place within China's broader public health system. Fundamentally, the question facing China (and many other countries), is how to construct a health system that is capable of meeting the needs of 1.4 billion citizens in a manner that delivers high-quality services while optimizing resource allocation and keeping costs for patients and other beneficiaries of the system as low as possible. In China, these questions are having to be answered against the backdrop of a rapidly aging demographic (around 11.5% of China's population was over 65 in 2019, forecasted to rise to 16.9% by 2030),<sup>49</sup> and changing needs with respect to public health emergency response, as epitomized by the COVID-19 outbreak. Disease control and prevention is a critical aspect of this process.

China's disease prevention and control systems have evolved significantly since the SARS outbreak in 2002/2003. The approach adopted by China to contend with COVID-19 has involved a powerful, whole-of-government response. Several trends over the past decade have enabled a response of this magnitude. First, substantial investments in technology have enabled China to become a leader in vaccine development and distribution, and also enabled the widespread adoption of digital medical applications, many of which were implemented in order to slow the spread of COVID-19.<sup>50</sup> Secondly, China's medical system has undergone significant reform, reflected in the following aspects:

- The launch of government-funded, universal basic medical coverage which extends across an estimated 95 percent of the population. This acts as a limited safety net and encourages citizens to seek medical attention when sick, rather than avoiding costly medical expenses. Such an ability to seek medical care across the population is helpful during a pandemic.
- Significant investments in China's Center for Disease Control (CDC) and the capacity of the healthcare system to effectively implement its disease control and prevention strategies.

Public health reform has also been accelerated by China's socio-economic development over the past several decades and a general rise in the standard of living. In 2003, China's GDP per capita was approximately US\$ 1,288. By 2019 it had reached \$10,262, an increase of over 600 percent.<sup>51</sup> As China's economy has grown and the standard of living improved, public health indicators have yielded a significant reduction in China's communicable disease burden, and a rapid increase in national life expectancy, and a decline in infant mortality rates.<sup>52</sup>

China's economic growth and development also presents challenges for the public health sector. Rapid growth has been accompanied by lifestyle changes including urbanization, declining physical activity and changing diets, and an increase in the smoking rate. Urban centers, which tend to be densely populated, creates a new set of challenges with respect to controlling and preventing the spread of disease. Therefore, China's public health system will have to continue to evolve to contend with a significant burden of non-communicable disease, while implementing effective disease prevention and control strategies like those deployed during the COVID-19 outbreak.

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<sup>49</sup> "[World Population Aging 2019](#)," UN Department of Economic and Social Affairs, 2019.

<sup>50</sup> For further discussion of digital health in China, see the Social Impact Initiative Impact in Action Brief [here](#).

<sup>51</sup> World Bank Data Catalogue, GDP 2020.

<sup>52</sup> Soeren Mattke et al, "[The Role of Health Care Transformation for the Chinese Dream](#)," RAND Health Quarterly, 2014; 4(3):4

In order to manage the changing nature of China's public health sector, China's public health system requires greater focus on both prevention and treatment activities. Doing so will demand improvements to China's primary healthcare offerings, in order to address the healthcare needs of an aging population, manage China's epidemiological transition, and improve the focus on disease prevention.<sup>53</sup> Whether China is able to more effectively incentivize community participation in and awareness of PHC will be essential. At the same time, China will also need to continue to improve the financing of its healthcare system by incentivizing efficiency and controlling costs, particularly for hospital care, and adopting new medical technologies. China could also consider the imposition of new taxes on certain products like tobacco and alcohol, to generate revenue while discouraging or reducing their use. Managing these changes will require effective governance, characterized by:

- Deepening coordination between government departments, agencies, and quasi-government groups, and ensuring that policies are implemented in a coordinated fashion,
- Improving information sharing and integration not only between government regulators, but also between government, the private sector, think tanks and academia, and the general public,
- Institutional support and space to test innovative reforms and products in support of improving China's healthcare delivery.

Finally, improving public health requires appreciation of the fact that health is global. COVID-19 has shown us that global solidarity and cooperation is essential to disease prevention and control, and that we cannot just focus on the China context. Healthcare is both a precondition for socioeconomic development and a global endeavor. People remain focused on their families and communities but maintaining high standards for public health requires us all to work together.

In that spirit, the first discussion session asked working session participants to explore the topic of vaccine development. Participants acknowledged that vaccines are public goods, and that public health should prioritize results and evidence grounded in science. The highest priority should be placed on vaccine safety and effectiveness. Finally, working session participants affirmed that because vaccines are public goods, vulnerable groups like children and the elderly should be prioritized to receive them. Vaccine development should involve a whole-of-society effort where government, the non-profit sector, and the business community come together to develop and distribute vaccines for COVID-19 such that the populations who are most in need get vaccinated first.

With respect to vaccine development, Chinese companies are at the forefront of vaccine development, including developing a vaccine for COVID-19. Between 2007 and 2015, China's domestic market produced between 666 million and 1.19 billion doses, with many produced domestically.<sup>54</sup> China's vaccine market is comprised of two tiers. The government's Expanded Program on Immunization offers vaccines for 12 VPDs to children under 14 (Tier 1). Other, non-obligatory vaccines can be administered at cost (under Tier 2) and paid for out-of-pocket or with supplemental commercial insurance. In 2019, China enacted a strict *Vaccine Administration Law* which introduced strict end-to-end supervision over vaccine R&D, including through the use of inspection teams, electronic tracking of vaccine development, tough penalties on

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<sup>53</sup> Li Xi et al, "[Quality of primary health care in China: challenges and recommendations](#)," Lancet 2020; 395: 1802–12

<sup>54</sup> Y Zheng et al. "[The landscape of vaccines in China: history, classification, supply, and price](#)," BMC Infect Dis 18, 502 (2018).

violators, and public funds that can be used to compensate individuals who suffer from an adverse vaccine event.<sup>55</sup> Development of Tier I vaccines is dominated by state-owned enterprises, while private companies (both foreign-invested and domestically-invested) account for the majority of revenues of Tier 2 vaccines.

China's vaccine sector has enjoyed a number of successes, including the development of a large domestic manufacturing base capable of producing large quantity of vaccines at low prices, efforts by the Chinese government to expand the number of diseases that can be prevented by vaccine in China, and stringent requirements that ensure high coverage of EPI vaccines through local CDCs and hundreds of thousands of vaccination clinics which helped China overcome geographic challenges related to its large and far-flung population.<sup>56</sup>

Working session participants also discussed challenges with respect to vaccine development. In China, SOEs tend to be the major recipients of government investment and financing for R&D. Innovative vaccines tend to be developed in the private sector, therefore the private sector should be given more space to conduct vaccine R&D. For instance, according to one estimate, by April 2020, 72% of active COVID-19 vaccine candidates under development were in the private sector, as compared with 28% in the public, academic, or non-profit sector.<sup>57</sup> The public sector cannot simply control vaccine R&D, as other health priorities compete for limited financing and resources.

China's domestic market could be further improved by streamlining the development process across R&D, approval and production, and by allowing market mechanisms to play a greater role, thus promoting competition in the marketplace and stimulating innovation, allowing a greater number of vaccines to reach Chinese citizens.

Beyond simply R&D, attention must be given to vaccine storage and distribution, a particularly challenging task for vaccines which often have extremely specific storage and transportation requirements. For instance, two current vaccines under development to fight COVID-19 require long-term storage at minus 20 degrees Celsius and minus 70 degrees Celsius in order to preserve their effectiveness.<sup>58</sup> Temperature control and a lack of logistics capacity to transport vaccines is already a serious global challenge; the WHO has estimated that up to 50 percent of vaccines are wasted every year.<sup>59</sup> In this regard, working session participants acknowledged the importance of quality supply chains and effective distribution, to ensure that vaccines can travel "the last five miles" in order to safely reach their intended individuals and communities.

Working session participants were particularly focused on answering how to promote international cooperation with respect to vaccine R&D, particularly given the urgency created by COVID-19. Strong international coordination between vaccine developers, regulators, policymakers, public health bodies, and governments will be required to develop, manufacture, and equitably distribute vaccines developed to combat COVID-19.<sup>60</sup> The World Bank and the Coalition for Epidemic Preparedness identified three goals for COVID-19 vaccine development

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<sup>55</sup> Laney Zhang, "[China: Vaccine Law Passed](#)," Library of Congress Global Legal Monitor, August 27, 2019.

<sup>56</sup> *ibid*

<sup>57</sup> Tung Than Le et al, "[The COVID-19 vaccine development landscape](#)," Nature Reviews Drug Discovery, May 2020.

<sup>58</sup> Umair Urfan, "[Why staying cold is so important to a Covid-19 vaccine](#)" Vox, November 16, 2020.

<sup>59</sup> "[Monitoring Vaccine Wastage at Country Level: Guidelines for Program Managers](#)," WHO Report, WHO/V&B/03.18. Rev.1, 2005.

<sup>60</sup> *ibid*

efforts, that they be addressed with speed, scale, and access.<sup>61</sup> In March 2016, the G7 also committed to supporting coordinated research and joint funding in support of the development of a COVID-19 vaccine.<sup>62</sup>

Participants reaffirmed the need for global cooperation in vaccine development. International organizations like the WHO will play an important role in many areas through the provision of technical support, vaccine approvals, and international coordination to support development of international standards for COVID-19 vaccines so that qualified vaccines can be circulated in emergency use as early as possible.<sup>63</sup> Other participants from the private sector discussed the importance of international cooperation with respect to supply chains and ensuring supply chain quality, a critically important element for global private sector companies involved in the development and testing of vaccines used internationally. International cooperation is also important for managing technical issues like clinical restrictions, arrangements for the use of genetic resources and materials, data protection and the cross-border transfer of data that is often necessary for international collaboration, conducting clinical trials, and obtaining approval.

In sum, safe and effective vaccine development relies on international collaboration and cooperation at all stages: vaccine development, manufacturing, and distribution. Collaboration will be required to support development and ensure that current and future vaccine candidates are safe, effective, and have undergone significant testing in a variety of jurisdictions. Vaccine manufacturers can collaborate domestically and across borders to accelerate the speed with which vaccines are brought to market. Countries and manufacturers will also have to collaborate to address issues of cost and ensure that vaccines are made available at affordable rates in both developing and developed countries. International cooperation is particularly critical to make sure that vaccines are distributed around the world in an equitable and coherent manner. Participants concluded that there is much work to do, but that they remain optimistic given the scale and speed of the vaccine development activities that have occurred in response to COVID-19.

## Discussion Topic 2: Public Health Emergency Response

COVID-19 has elevated the importance of public health emergency response planning and action in 2020. Public health emergencies constitute an imminent threat of an illness or health condition that poses significant risk to human life.<sup>64</sup> In particular public health events rise to the level of emergencies when they overwhelm routine community capabilities to handle them.<sup>65</sup> Public health emergency response (PHER) is often a process of planning, action, evaluation, and adjustment that is conducted both to prepare for and respond to public health emergencies.<sup>66</sup> It can involve a full range of prevention, mitigation, and recovery activities, including the operational capability to execute specific tasks related to preparedness.<sup>67</sup>

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<sup>61</sup> G Yamey et al, "[Funding the development and manufacturing of COVID-19 vaccines: Background paper for the World Bank/CEPI financing COVID-19 vaccine development consultation on February 20, 2020.](#)" The Center for Policy Impact in Global Health. Duke Global Working Paper Series: number 20, March 2020.

<sup>62</sup> G7 Leaders Statement, March 16, 2020, <https://www.whitehouse.gov/briefings-statements/g7-leaders-statement/>

<sup>63</sup> David Salisbury and Champa Patel, "[The Hurdles to Developing a COVID-19 Vaccine: Why International Cooperation is Needed](#)," Chatham House, April 23, 2020.

<sup>64</sup> [Definitions: Emergencies](#), WHO, November 2020.

<sup>65</sup> Christopher Nelson et al, "[Conceptualizing and Defining Public Health Emergency Preparedness](#)," Am J Public Health. 2007 April; 97(Suppl 1): S9–S11

<sup>66</sup> [Emergency response](#), Chapter 4 in Water, Sanitation, Health Hygiene, WHO, 2002.

<sup>67</sup> *ibid*

PHER requires continuous review, testing, improvement of response capabilities. Responsibility for PHER lies with stakeholders at all levels, from government agencies to communities and individuals, to the non-profit sector. Coordination is a key element of PHER and it requires that each entity understands its role within the system and how that role interacts with the roles of other stakeholders operating within that system. Stakeholders at the meeting reaffirmed this sentiment and shared several insights on their experiences providing air medical care and emergency response solutions in remote communities abroad. They acknowledged that disaster response is challenging because it often takes place with large-scale deployments and under a very dynamic environment. Effective response requires all levels of government and civil society organizations working together to mitigate and respond to such incidents.

Coordination also extends to the international level. For instance, the Global Health Security Agenda (of which China is a member), formed in 2014, brings together 69 countries as well as international organizations, and private sector companies to coordinate prevention, early detection and response to the risks posed by infectious disease.<sup>68</sup> Countries under the initiative have committed to undergoing a health security capacity evaluation and implementing reforms to address gaps and weaknesses by 2024.

China's own system defines public health emergencies as "major epidemic situations of infectious diseases, broad-spectrum diseases with an unknown cause, major food and occupational poisoning incidents, and other serious public health incidents that occur unexpectedly and cause or may cause grave harm to public health in society."<sup>69</sup> The National Emergency Management system and its "one plan plus three systems" framework provides for legislation, contingency planning at the national, provincial, and local level, and the development of capabilities focused on prevention and preparedness, surveillance and warning, response and rescue, and rehabilitation and reconstruction.

China's national emergency response framework has undergone significant reform since the SARS outbreak in 2002/3. China has promulgated or revised a number of laws and regulations that govern emergency response including the *Regulations on Public Health Emergencies* (2003), and the *National Emergency Plan for Public Health Emergencies* (2006).<sup>70</sup> Moreover, in 2007, China promulgated the *Law on Public Health Emergency Response* to develop procedures for response to natural disasters, industrial accidents, public health crises, and public security hazards.<sup>71</sup> The Emergency Response Law preceded the formulation of contingency plans to deal with emergencies at the national level and provincial level. Individual government departments are also required to draw up their plans. In the spring of 2018, in the midst of a wide-ranging government re-organization, China established a Ministry of Emergency Management for the first time, elevating emergency response efforts to the ministerial level and coordinating ministerial response under one ministerial agency.<sup>72</sup>

Since SARS, China's PHER has been strengthened through the introduction of multiple early warning and systems to detect and control infectious disease outbreaks including the National Notifiable Infectious Disease Surveillance System and the Public Health Emergency Event Surveillance System, which help make up a centralized infectious disease reporting and early detection system. China also significantly expanded its national reserves of personal protective

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<sup>68</sup> [Member Commitments](#), Global Health Security Agenda, November 2020.

<sup>69</sup> Larry Stacks, "China: Legal Responses to Health Emergencies," Library of Congress, 2010

<sup>70</sup> [National Plan for Public Health Emergencies](#), State Council, March 2006,

<sup>71</sup> Ibid

<sup>72</sup> State Council, "[China to form Ministry of Emergency Management](#)", March 13, 2018.



equipment (PPE) in the wake of the SARS outbreak. Although there was a shortage of critical PPE cited in various areas around the country in the immediate aftermath of the COVID-19 outbreak, China moved aggressively to address these gaps and to ramp up production of necessary materials.<sup>73</sup> As the world's largest producer of PPE, China was well-placed to direct manufacturers to ramp up production of supplies to reach areas of need. China also made effective use of Digital technologies to help in the spread of COVID-19, employed in population surveillance, case identification, contact tracing and evaluation of interventions on the basis of mobility data and communication with the public.<sup>74</sup> Technologies ranging from mobile apps, robotics, and wearable devices were used to enforce quarantines and self-isolation, conduct contract tracing, and measure patient temperatures.<sup>75</sup> PHER in China is not without challenges. China's system can improve by streamlining its operational decision making and command and control apparatus. China also suffers from a shortage of trained PHER workers and a shortage of funding for PHER. Improvements in these areas are likely to yield positive developments.<sup>76</sup>

As has been noted, effective PHER requires strong coordination across different segments of society, the public sector, private sector, and non-government sectors. The private sector has been an active stakeholder in PHER. Private sector participants shared their experiences in recent years with respect to developing a joint implementation plan with NHC and other departments to develop a regulatory framework in China around health services in emergency response. They hope that the private sector can work with public sector to jointly create standards, develop best practices, and establish operational standards in public safety and emergency response.

The private sector has played an active role in the COVID-19 response effort. Companies have:

- Donated significantly to national and international organizations supporting COVID-19 relief efforts,
- Led the development of technologies that support compliance with public health mandates and distancing regulations,
- Been at the forefront of medical developments to treat and cure COVID-19,
- Developed software solutions to help frontline healthcare workers.

During the working session discussion on PHER, participants focused their discussions on two areas: international collaboration and the need to build public awareness around emergency response activities. The discussion began from the premise that infectious diseases do not respect national borders, making infectious disease control an inherently global endeavor. Participants noted with some optimism that scientific collaboration can also easily cross-borders in today's digitalized workforce, enabling greater cooperation to prevent public health emergencies before an outbreak. Several discussants noted that international collaboration is necessary for emergency response and assistance efforts to support developing countries that may not be equipped or resourced to handle emergency outbreaks on their own. Effective collaboration requires three elements: identification and declaration of emergency conditions, investigation and analysis, and then execution of a successful response. The response should seek not only to contain/address the immediate threat, but also identify both medium-term and long-term solutions that enhance preparedness for the next emergency. Participants concurred

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<sup>73</sup> Talha Burkie, "[China's successful control of COVID-19](#)," *Lancet Newsdesk*, Vol 20 (November 2020)

<sup>74</sup> Jobie Budd, Benjamin S Miller, B.S., Erin M. Manning, et al. "Digital technologies in the public-health response to COVID-19," *Nature Medicine* 26, 1183–1192 (2020) Available [here](#).

<sup>75</sup> For a discussion of Emerging Technologies and Disease Prevention, see our previous Social Impact Initiative IIA [here](#).

<sup>76</sup> Yulong Cao et al, "[Status and Challenges of Public Health Emergency Management in China Related to COVID-19](#)," *Front Public Health*. 2020; 8: 250.



with the idea the emergency response is a continuous process, subject to preparation, review, and adjustment as relevant.

Several participants focused on the need to improve collaboration among domestic institutions, highlighting several challenges that have emerged alongside the widespread adoption of digital technologies to combat the COVID-19 outbreak. With these new tools, such as China's widespread use of national health code mobile apps to support contract tracing, correctly and safely administering the flow of personal information and health data has become very important. There is a need to integrate data from the national health code apps with provincial-level health codes to facilitate more seamless contract tracing and improve the response time needed to address the outbreak of new disease hotspots.

Additional efforts should also be made to continue to integrate data sharing between cities and hospitals in different locations. As policies are enacted that enable data to flow more freely, this raises new challenges, particularly with respect to data privacy. Who or which entities are ultimately responsible for holding and protecting health information and data? We recommend that a single government agency bear responsibility for managing this data but doing so in close consultation with industry specialists and private companies who can offer technology and best practices with respect to protecting and managing sensitive information.

Participants acknowledged the importance of education and public awareness campaigns for emergency response. Several respondents emphasized the need to expand health education in the primary school curriculum. Take, for example, mask wearing. Mask wearing is necessary to help contain an outbreak, but without the appropriate education, instruction, or information, communities will adopt various levels of adherence to mask wearing guidance. Educating students at school about the necessity of mask wearing means they can take those ideas home to educate their parents and grandparents. While China has been successful in containing COVID-19, the key in the aftermath of the outbreak is to promote resilience. This requires a focus on educating and protecting vulnerable groups, high-risk individuals, and people living alone.

## **Conclusion**

The working session was a useful opportunity to bring together China's experts and stakeholders for an important discussion about a timely public health topic. The discussion reaffirmed the importance of international collaboration with respect to public health, and the need for collaboration between public, private, NGO, and research sectors to expeditiously improve public health in China.