CHINA’S HEALTH INITIATIVES IN THE COVID-19 OUTBREAK

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Executive Summary

1. In December 2019, the central Chinese city of Wuhan, Hubei province reported its first case of a novel coronavirus (COVID-19). On 20 January 2020, human-to-human transmission of COVID-19 was confirmed and further on 30 January 2020, the World Health Organisation (WHO) declared the coronavirus a global health emergency.

2. Since 23 January, an unprecedented lockdown was imposed on Wuhan city. All public transport including buses, trains, subways and ferries have been shut down in the city. In early February, more than 25 cities had taken similar measures to block public transport and put their residents under quarantine.

3. On 25 January, the central government established a leading group on the prevention and control of the outbreak of a new pneumonia caused by the novel coronavirus.

4. Up to 3 March, the total confirmed cases in China reached over 80,000. Such a large scale outbreak is unexpected given China’s heavy investment on infrastructure to collect and distribute information related to infectious diseases after SARS (Severe Acute Respiratory Syndrome).

5. The National Notifiable Infectious Disease Surveillance System was established as early as in 2004 to allow institutions at township level and beyond to submit reports in real time.

6. After the mid-2000s, a series of regulations for managing public health crisis has been released. The division of labour among government agencies has been stipulated in the contingency plans of a public crisis for central ministries and local government.

7. However, the coordination between the National Health Commission, Chinese Centre for Disease Control and Prevention (CCDC) and local governments have been proved to be inadequate. It took more than three weeks for the Hubei and
Wuhan governments to have significant intervention after CCDC sent experts to Wuhan to investigate the situation.

8. With the COVID-19, the health system in Hubei and in particular Wuhan is undergoing a stress test. The number of hospital beds and supply of medical equipment are vastly inadequate to handle infected cases in Wuhan.

9. Since early February, Wuhan has built two emergency hospitals. Three mobile cabin hospitals began operation from 4 February. By 28 February, over 40,000 health workers had been deployed from other provinces to support local health institutions in Hubei.

10. The situation seems to have improved since the second half of February: suspected cases reduced from 28,900 on 8 February to 520 on 3 March.

11. However, the concern is whether health resources in smaller cities or rural areas in Hubei can deal with similar outbreaks in the future.
Outbreak of COVID-19

1.1 China’s health care system was severely tested when the first few cases of a novel coronavirus (COVID-19) were reported in the central Chinese city of Wuhan in December 2019. The virus quickly spread to other provinces and abroad in the beginning of 2020, causing deaths and panic across the country and the world. The severity of the coronavirus is now placed on par with extremely dangerous pandemics such as Ebola and Swine flu (H1N1) when the World Health Organisation (WHO) declared it as a global health emergency on 30 January 2020.

1.2 The human-to-human transmission of COVID-19 was confirmed on 20 January 2020.\(^1\) It takes about five days, possibly up to 14 days for someone to show symptoms after being infected.

1.3 Compared to SARS, the transmissibility of COVID-19 is at a similar level but the mortality rate is lower (Table 1).

<table>
<thead>
<tr>
<th>Virus</th>
<th>Seasonal Influenza</th>
<th>SARS</th>
<th>H1N1</th>
<th>COVID-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0</td>
<td>1.1-1.2</td>
<td>2-5</td>
<td>1.4</td>
<td>2-2.5</td>
</tr>
<tr>
<td>Case Fatality Rate (%)</td>
<td>0.1-0.2</td>
<td>&gt;15</td>
<td>0.1-0.3</td>
<td>2</td>
</tr>
</tbody>
</table>

Note: R0 is used to measure transmissibility. It is the number of people every infected case could infect. Case Fatality rate is to measure clinical severity.

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1.4 However, the environment of the epidemic has changed. China has been much more connected by the railway and road system and Wuhan in particular is a transportation hub. Total number of passengers by railway in China increased from 0.97 billion in 2003 to over 3.6 billion in 2019, with an annual growth rate of 8.6% (Figure 1).

![Figure 1](image)

1.5 The number of people travelling by air has increased even more rapidly, at an annual growth rate of 13.4% between 2003 and 2019. The total number of passengers by air increased from 87 million in 2003 to about 660 million in 2019 (Figure 2).

1.6 Indeed, the transmission speed of the virus was rapid. By 11 February, 1,386 counties of 31 provinces had reported confirmed cases.² By 3 March, confirmed cases numbered over 80,000 in mainland China, with 2,981 deaths. The first death from the virus was reported on 11 January 2020 in Wuhan. Outside mainland China, the death toll was 169 and 10,717 infected cases were reported in 72 countries.³

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³ Confirmed cases here include those in Hong Kong Special Administrative Region (SAR), Macau SAR and Taiwan.
1.7 The most vulnerable group is the elderly. From a study of over 44,000 confirmed cases, the fatality rate (i.e. mortality rate) for the groups 70-79 and 80+ reached a respective eight per cent and 14.5% compared to the overall rate of 2.3%.⁴

1.8 On 21 January, the National Health Security Administration of China announced that the expenditure for treatment of the new pneumonia will be reimbursed fully by the health insurance fund or health assistance fund.⁵

1.9 Information on the epidemic was conveyed to the WHO on 3 January and whole genome sequences of the COVID-19 virus were shared with WHO on 10 January.⁶

1.10 By 25 January 2020, 30 out of 31 provinces in China had activated the highest-level emergency for public health (Grade 1). On 29 January, Tibet also upgraded to the highest-level emergency (Grade 1) after activating Grade 2 on 27 January 2020.⁷

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1.11 All public transport including buses, trains, subways and ferries have been shut down in Wuhan since 23 January. Major roads linking Wuhan have also been blocked. By early February, more than 25 cities had taken similar measures to block public transport and quarantine the city.\(^8\)

**Ineffective Coordination among Government Departments**

2.1 Even though China has invested in infrastructure to collect and distribute information related to infectious diseases after SARS, there was still a lack of coordination among government agencies and information flow at the beginning of the outbreak across departments was vastly ineffective.

2.2 The institutional arrangements for managing public health crises included first, the National Notifiable Infectious Disease Surveillance System established in 2004 to report on disease surveillance and events. Case-based data on notifiable diseases by health institutions including hospitals, primary care clinics and local branches of the Chinese Centre for Disease Control and Prevention (CCDC) at township level and beyond are submitted to the CCDC through a centralised, internet-based reporting network on a real-time basis.\(^9\) According to an official report, it takes about four hours for CCDC to receive a report submitted by a grass-root health institute.

2.3 Second, the *Regulation on Handling Public Health Emergencies* in May 2003 and the *Law on the Prevention and Control of Infectious Diseases* in 2004 spelt out the responsibility of local governments and the National Health Commission (i.e. the main government agency in China in charge of public health and health care) in infectious disease surveillance and reporting.

2.4 The National Health Commission has the authority to circulate the information about the prevalence of the pandemic, while the local government could circulate the information only after the National Health Commission delegates the authority.

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2.5 The National Health Commission decides on the categories of an infectious disease. The classification will directly decide the kind of measurement/responses from different levels of government to be taken in the next stage. On this, CCDC’s expertise is consulted.

2.6 The contingency plans during a public crisis for central ministries and local governments have been enacted after 2006. Hubei province has enacted an amended version of the contingency plan in 2010.

2.7 Based on the central government’s contingency plan during a public crisis, the National Health Commission will suggest the establishment of a task force to manage public health crisis to the higher authority and the National Health Commission will coordinate with different government agencies.

2.8 Even with these institutions and information infrastructure, the coordination among the National Health Commission, CCDC and local governments has proven to be inadequate.

2.9 The Wuhan branch of CCDC investigated the pneumonia after four cases were admitted to a local hospital on 29 December. CCDC was informed by the health authority of Hubei government on 30 December. On 31 December, CCDC sent experts to Wuhan to investigate the situation. On 8 January, the National Health Commission already identified the causative agent of the new SARS-like pneumonia, later officially called COVID-19. The commission was reported to have immediately reacted to contact local governments about the situation. On 6 January CCDC activated an internal level 2 alert.

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2.10 However, it was three weeks after the National Health Commission established a small leading group to handle this new type of pneumonia on 1 January\(^\text{12}\) that the Hubei and Wuhan governments took significant intervention. The Hubei provincial government activated Grade-2 alert on 22 January.

2.11 The information flow was problematic. It remains a black box as to why the Wuhan and Hubei governments did not react to this alert from the National Health Commission and CCDC.

2.12 The Health Commission of Wuhan has released the news on the prevention and development of the pandemic from 31 December 2019 as directed by the National Health Commission.\(^\text{13}\) However, on 11 January, it claimed that there was still no evidence of human-to-human transition and no new confirmed cases infected by the new pneumonia between 11 and 15 January.\(^\text{14}\) Subsequently for three consecutive days, it reported 4, 18 and 59 new infected cases.\(^\text{15}\)

2.13 One interpretation for the small numbers of confirmed cases is that the use of the test kits for COVID-19 involves time and labour. The test process will take three to five days as it has to go through four levels of the CCDC system (district-city-province-national).\(^\text{16}\)

2.14 On 21 January 2020, the National Health Commission classified the new pneumonia associated with COVID-19 as type B infectious diseases. According to Mayor Zhou Xianwang in an interview, only with this classification could the Wuhan local

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government have the discretion to intervene.\textsuperscript{17} The intervention took the form of a lockdown of the city since 23 January.

**Inefficient Resource Allocation in the Health-Care System**

3.1 After the outbreak took place, a major issue was in the allocation of resources, in particular resources of the health system.

3.2 In recent years, total resources allocated to health has increased dramatically compared to the period of SARS. The share of total health expenditure in GDP increased from 4.8\% in 2003 to 6.2\% in 2018.\textsuperscript{18} The problem arises when the resources have been largely allocated to hospitals rather than to primary care clinics and public health institutions. Figure 3 shows the growth rates of health workers in different health institutions. CCDC and its local branches have much lower growth compared to that in hospitals and primary care clinics.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure3.png}
\caption{GROWTH OF HEALTH WORKERS IN DIFFERENT HEALTH INSTITUTIONS (\%)}
\end{figure}

\begin{itemize}
\item \textbf{CCDC and local branches}
\item \textbf{Primary care clinics}
\item \textbf{Hospitals}
\end{itemize}

\textit{Source: Health Statistical Yearbooks and Statistic communiqué of health development in China in 2018.}

\begin{itemize}
\item \textsuperscript{17} http://www.bjnews.com.cn/feature/2020/01/28/680521.html, accessed 2 March 2020.
\item \textsuperscript{18} http://www.nhc.gov.cn/guihuaxxs/s10748/201905/9b8d52727cf346049de8acce25ffcb0.shtml, accessed 2 March 2020.
\end{itemize}
3.3 In most health care systems, primary care clinics are the major provider of most outpatient services and at the front-line of a health system. A person’s first contact with the health system when he or she falls sick in most countries is with a primary care provider.

3.4 Much of China’s success in improving its population’s health during central planning before the 1980s was due to the success of the authorities in attaining high standards of public health through immunisation campaigns and improved environmental standards; the personnel in charge of public health functions at the time were often the providers of regular primary care.

3.5 However, the role of primary care providers has been eroded in recent years. The share of outpatient service provided by primary care clinics had dipped from 61.8% in 2010 to 53.1% in 2018. The share of outpatient service provided by hospitals increased from 34.9% in 2010 to 42.4% in 2018.

3.6 Revenue from providing services in public hospitals as a share of total health expenditure increased from 21.7% in 2008 to 27.4% in 2017. In 2017 (the latest data available), public hospitals accounted for about 48% of China’s total health expenditure, a very high rate compared to the OECD average of 38%.

3.7 The health system in Hubei and in particular Wuhan is under a stress test as most cases are found in Hubei and in particular Wuhan. The two accounted for a respective 83.9% and 61.7% of total confirmed cases in China, up to 3 March. Figures 4 and 5 show that the two also have significantly larger incremental cases compared to the rest of China and the rest of Hubei respectively.

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20 *China Health Statistical Yearbooks*.

21 *China Health Statistical Yearbooks*.

22 *China Health Statistical Yearbooks*.

In this outbreak, the capacity of Wuhan’s health care system is evidently inadequate. For all levels of service providers in Wuhan particularly, the shortage is in the test kits, masks and other medical supplies. Wuhan Deputy Mayor Hu Yabo said in early February that the city faced a daily shortage of 56,000 N95 masks and 41,000 protective suits.

**FIGURE 4** (INCREMENTAL) INFECTED CASES IN HUBEI AND OTHER PROVINCES IN CHINA

Note: The numbers before 12 February are only for laboratory-confirmed cases.

**FIGURE 5** (INCREMENTAL) INFECTED CASES IN WUHAN AND OTHER CITIES IN HUBEI PROVINCE

Note: The numbers before 12 February are only for laboratory-confirmed cases.
Source: Health Commission of Hubei province.
3.9 Since 20 January, 61 hospitals in Wuhan have been providing outpatient service for fever round the clock. Hospital visits were four times higher than before the outbreak. There is evidently a lack of hospital beds in Wuhan. For example, on 27 January, there were 10,700 visits for outpatient service for fever in Wuhan, but only 600 were admitted (i.e. 5.6% admission rate) versus 2,866 out of 20,900 admissions for other cities in Hubei (i.e. 14.5%).

3.10 The bed occupation rate in Wuhan’s appointed hospitals was over 100% before early February due to the duration of hospital stay, which was an average of 20 days, compared to nine days for hospitals in other provinces.

3.11 The high proportion of severe cases is a factor. Figure 6 shows the proportion of severe cases in Wuhan, Hubei and the rest of the country, with Wuhan topping the chart. Figure 7 shows that the mortality rate is much higher in Wuhan than in other cities in Hubei and the rest of China.

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3.12 On 24 January 2020, the health authority in Wuhan implemented a referral system to take advantage of the capacity of 205 primary care providers. Rather than visit the hospitals directly, patients will be referred to hospitals from primary care clinics.

3.13 This initiative is to take advantage of resources from primary care clinics, which had been underutilised. Together, Wuhan’s clinics house over 11,000 beds, which registered a much lower bed occupation rate of about 49% in 2018.26

3.14 While primary care clinics have the facilities, they are short of resources to deal with the crisis. First, there are not enough health workers in primary care clinics. Doctors in primary care clinics were a mere 12,500, compared to the 76,000 doctors in hospitals in Wuhan in 2017.

3.15 Second, at the community level, the supply of medical equipment is grossly insufficient. There are not enough devices for diagnosis, with no isolation room like those in many community level hospitals/clinics.27

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The capacity for diagnosis is also low in general. A maximum of only 200 cases on a daily basis could be diagnosed with the nucleic acid test kits. Patients were largely asked to stay at home to wait for hospital beds and the test results.

Many patients have no access to proper medical intervention before they can be diagnosed. Many became infected during the clinic or hospital visit and many mild cases became severe cases while queuing for hospital beds.\(^{28}\)

The situation is aggravated by the fact that over 1,716 health workers in 422 medical facilities servicing COVID patients have themselves been infected. Health workers in Wuhan accounted for 64% of confirmed cases. In other cities in Hubei, the figure is 23.3%.\(^{29}\)

**Recent Government Interventions**

On 1 February, to relieve the pressure from hospitals and primary care clinics, the local government has demanded four categories of people in Wuhan to be put into mandatory isolation in quarantine stations: confirmed cases, suspected cases, people who have close contact with the former two, and those who have fever. In early February, Wuhan managed to set up 132 sites for quarantine and provided over 12,000 beds.\(^{30}\)

More hospital beds have been added on a daily basis in Wuhan to deal with the public health crisis, increasing from 6,754 in 1 February to 24,378 on 25 February (Figure 8).

Two emergency hospitals were set up, one with 1,000 beds and available after 3 February and the other 1,500-bed hospital opened on 8 February.

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\(^{30}\) [https://china.chinadaily.com.cn/a/202002/06/WS5c3ba3b0a3107bb6b579d903.html](https://china.chinadaily.com.cn/a/202002/06/WS5c3ba3b0a3107bb6b579d903.html), accessed 2 March 2020.
4.4 Three mobile cabin hospitals, supplying 3,400 beds, have begun operation from 4 February.\textsuperscript{31} This was supplemented by the 7,000 beds from student dormitories of local universities in Wuhan.\textsuperscript{32}

4.5 With this significant increase of beds, the bed occupancy rate in appointed hospitals in Wuhan saw a dip of below 100% for the first time on 8 February and further to around 80% on 25 February (Figure 8).

![Figure 8: Total number of beds and bed occupancy rate in Wuhan's appointed hospitals](image)

Source: Health Commission of Wuhan city.\textsuperscript{33}

4.6 By 28 February, over 40,000 health workers from other provinces had been deployed to Hubei province for this outbreak.\textsuperscript{34}

4.7 These new initiatives in Wuhan have contained the growth of infected cases in Wuhan, the epicentre of the outbreak. With the improvement in the capacity of diagnosis, suspected cases have decreased from early February (Figure 9).


\textsuperscript{33} The updates of the hospital beds in Wuhan after 25 February 2020 have yet to be publicised as at 3 March 2020.

4.8 The number of suspected cases witnessed a dip from 28,900 on 8 February to 520 on 3 March.

4.9 After 12 February, clinically diagnosed cases have been included in the official data of infected cases, which have seen a downward slide since (Figure 10). The increase in severe cases had fluctuated since early February and turned negative from 19 February.
4.10 Recoveries have surpassed the number of deaths since 1 February (Figure 11). The recovery rate (i.e. the ratio between recovered and total number of infected cases) reached about 0.62 on 3 March (up from 0.013 on 27 January) (Figure 12). Mortality rate had also stabilised at around two per cent.
4.11 Improvement is evident in the decreasing number of cases under medical observation, declining from about 190,000 on 7 February to 36,432 on 3 March. The ratio of daily discharged and cases under medical observations increased from less than 0.015 on 25 January to about 0.19 on 2 March (Figure 13).

![FIGURE 13 TOTAL NUMBER OF DISCHARGED CASES AND THOSE UNDER OBSERVATIONS (,000)](source)

Prospects and Long-term Impact

5.1 From 1 June 2020, a new law The Basic Health Care, Medicine and Health Promotion Law is to be enacted.\(^35\) With this law, more physical resources and human resources will be allocated to primary care and public health.

5.2 For the current public health crisis, the size of potential infected cases is still unknown. By 2 March, 20 provinces downgraded the alert level of public health emergency to Grade 2 or 3 from Grade 1.\(^36\)


5.3 However, based on a research published on *Lancet*, the total projected number of infected diseases reached 75,000 in Wuhan by 25 January 2020. There are also no vaccine for preventing COVID-19 infection and no specific antiviral treatment for the virus.

5.4 Moreover, information is lacking regarding the development of the public health crisis in other parts of Hubei. Figure 14 shows that most cities in Hubei had significant outmigration situation and many migrants worked in Wuhan in 2018. Whether health resources in smaller cities or rural areas in Hubei can deal with future shocks are also unknown.

5.5 Workers in most cities in China have returned to work since the second half of February, while those in Hubei will return to work after 10 March, according to the recent government guideline. It is still too early to gauge if the situation is under control as the risk of infection may increase with more people gathering in the workplace.

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