

Crisis Coordination and the Role of Social Media in Response to COVID-19 in Wuhan, China

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Abstract: The commentary addresses the government's role in mitigating information asymmetry problems during pandemic crisis response. We use the outbreak of COVID-19 in Wuhan, China, as a case to show the use of social media as a key mechanism in shaping the actions of the central government in its coordination with the local governments during the pandemic response. The Chinese government not only effectively collaborated with a social media platform to create a dedicated channel to allow citizens to post information about the pandemic to accelerate the speed of relief, but also to mobilize citizens and nonprofit organizations to support government response and recovery efforts. This suggests that social media can not only provide a venue for the government to tackle the information overload but also to mitigate the friction among levels of governments.

Introduction

Exogenous shocks such as disasters often adversely affect regime stability and the welfare of communities. Emergency and crisis management literature suggests that disasters magnify the pre-existing sources of political and societal instability (Drury & Olson, 1998; Pelling & Dill, 2009). In recent years, emergency management systems have been established worldwide in response to and in anticipation of disasters. Most of the research in this domain paid much attention to the communication and coordination within traditional hierarchical and horizontal systems and their interactions with nonprofit and private sector organizations (Comfort, 2007; Kapucu, 2006). The research also indicates that a successful emergency management system requires the public administrators' ability to aggregate and make sense of massive amounts of information during disasters (Jones, 1999; Walgrave & Dejaeghere, 2017). During a major health crisis such as the recent COVID-19 outbreak, it is expected that different levels of government have access to different types and amount of information at the ground level (for example, local governments access local situations better than the central government), and this creates the problem of information asymmetry among public administrators and prevents them from making timely decisions and taking appropriate actions. This then leads to an important question that we seek to address in this commentary: How does a central government mitigate information asymmetry problems during pandemic crises?

Conventional theory casts that bounded rationality and institutional friction highly affect government information processing (Birkland, 1997; Simon, 1997) and thereby affect government's response to crises. Life-threatening pandemics require rapid actions, and this may paralyze routine operation of administration and the regular policymaking process. Bureaucrats are often at the crossroads between maintaining administrative tradition versus taking swift and critical actions to curb a disease outbreak.

A growing literature has emerged around governments' use of information and communication technology (ICT) tools and social media in emergency management (Hu & Kapucu, 2016; Mergel, 2012; Wukich, Hu, & Siciliano, 2019). Unfortunately, little research has explored the interactions between central-and-local governments during crisis response and how the central government's emergency management action is influenced by the social media. An emerging trend during COVID-19 pandemic is the governments' use of ICT tools as the means to assist citizens who need immediate help as well as to collect information at the ground level. For instance, the Singaporean government launched a mobile app called TraceTogether, which uses Bluetooth signals and big data, to help support and supplement contact tracing efforts to curb the spread of COVID-19 (Koh, 2020). The Hong Kong SAR government launched a mobile app called StaySafeHome to monitor infected citizens during home quarantine (HKSAR Government, 2020). Although social media is a big part of everyday citizens' lives, little is known about the role and the use of social media during the COVID-19 pandemic among countries that are labelled by critics as practicing censorship and repression towards the media (Freedom House, 2020; He, 2008). China, for example, performs media censorship (King, Pan, & Roberts, 2013, 2014; Lorentzen, 2014), while simultaneously being responsive and accountable towards citizens' demands and complaints in social media (Chen, Pan, & Xu, 2016; Li, 2018; Su & Meng, 2016).

In this commentary article, we use secondary data analysis, qualitative content analysis, and Latent Dirichlet Allocation (LDA) topic modeling analysis of citizens' posting in Weibo (the largest short messaging social media platform in China) to show that 1) social media plays a key role in influencing or shaping the action and policies of the central government in their coordination with (and at times, monitoring of) the local government; 2) the central government has coordinated with a social media company to create a dedicated channel and increase capacity to allow citizens to post information about the pandemic. This can be seen

as a form of intelligence gathering performed by the central government to solve information asymmetry problems. Accordingly, local governments cooperate with the central-government-backed social media company Weibo to search for information on who needs what type of assistance during the pandemic crisis and to search for online criticisms towards the government. Although we know little about how social media eventually influences the central government's responses or policies during COVID-19 pandemic, our observation reveals that social media indeed works as an effective platform to mitigate information asymmetry. The remainder of this article provides the background of China's emergency system, analyses the Wuhan lockdown, and the role of social media during pandemic crisis with concluding observations.

Background of China's Emergency Management System

As the largest developing country in the world, China has a long history of disasters such as floods, earthquakes, and famines (Will, Wong, & Lee, 1991; Wong & Perdue, 1983). Recently, like many other countries, China reformed its disaster-response institutions and established a new National Emergency Management System to improve its capacity to deal with the threats of disasters (Lu & Xue, 2016). In dealing with public health crises, the National Health Commission is in charge for controlling health diseases and coordinating the utilization of resources and expertise in providing healthcare services. At a subordinate level, the Chinese Center for Disease Control and Prevention (CCDC) is tasked to protect public health and safety by providing information to enhance health decisions, and to promote health through partnerships with provincial health departments and other organizations. At the local level, based on the *tiao-kuai* system,¹ various local governments set up their own health commissions and departments. Vertically, the National Health Commission only has a

¹ *Tiao-kuai* system describes the administrative arrangement in China. The former coordinates according to function; the latter coordinates according to the needs of the locality that it governs (Lieberthal, 1995).

professional leadership relationship with local health departments while at the horizontal level, the local health departments and their personnel are under the direct control and leadership of the local government authorities. Local governments generally prefer not to report negative information that might reveal their lack of capacity to deal with crises as this may erode promotion opportunities for the local officials (Cai, 2004; Lieberthal & Lampton, 1992; Zhou, 2010). Such institutional arrangements hamper the effectiveness of the emergency management system, its accountability and information reporting mechanisms. Ultimately, cover-ups are not unusual. Therefore, the information asymmetry problem not only exists during the ‘business as usual’ period but also during pandemic crisis. We summarize the institutional structure of China’s emergency management system in dealing with public health emergency in Figure 1.

[Figure 1 about here]

Wuhan Lockdown and The Role of Social Media During Pandemic Crisis

The biggest challenge encountered by the national emergency management system since its establishment would be the outbreak of COVID-19 in Wuhan, Hubei Province in China. COVID-19 is a highly infectious disease caused by a form of novel coronavirus. Its outbreak triggered a series of emergency management measures in which rapid response was required to prevent the spread of the virus. On January 23, 2020, Wuhan municipal government announced “lockdown” measures and implemented quarantine across the city. Since then, Wuhan has become well known as the ground zero of COVID-19 pandemic. Appendix provides the information on how different functional ministries coordinated against COVID-19.

At the beginning of COVID-19 in Wuhan, only confirmed patients were admitted into quarantine facilities. However, due to the limited ability to detect and diagnose patients and the limited number of hospital beds, many suspected (symptomatic and asymptomatic) patients received delayed treatment. These patients were only able to travel between their homes and different hospitals, causing them to miss the opportunity to treat COVID-19 and consequently causing further outbreak. Some patients were not diagnosed until after they died at home. In order to solve the problems of heavy surge and medical workloads and insufficient numbers of beds in the hospitals and clinics, Wuhan Municipal Health Commission began to issue the list of designated fever clinics and designated hospitals on January 20, 2020. A few days later, Wuhan began to build Huoshenshan Hospital and Leishenshan Hospital to increase the number of beds to treat patients. The number of hospital beds, however, was still insufficient because of the rapid surge of the confirmed cases. This resulted in many patients with mild symptoms from receiving treatment. To address these shortcomings, Wuhan province began to build “makeshift hospitals” on February 3 to treat patients with mild symptoms, aiming to prevent the patients from becoming the source of transmission to the broader population. By February 5, the designated hospitals took up the roles in the diagnosis of severe, critical, and suspected patients and became the “main battlefield” for diagnosis and treatment.

During the pandemic, the most prominent measure taken by the government was “grid-style social management.” The grid-style social management process consisted of subdividing counties or districts into smaller zones and assigning each zone to a person (grid manager) who reported ground level activities to the local government (Cai, 2018). According to the directive document from the central government (XihuanNet, 2020; Ministry of Civil Affairs, 2020), the grid-style social manager was expected to report the health status of residents, and

to perform monitoring, disinfection, ventilation, and sanitation improvement. Their role was not just to report the ground level situation to the upper level government but also to promote prevention and control measures such as encouraging residents to stay at home. This was a unique COVID-19 social arrangement that is not seen outside of China.

In our analysis, we argue that the period between January 23 and February 14 was the worst period for the residents seeking medical assistance because of the interrupted routine government operations and lack of capacity. Numerous residents had no way to go to the hospitals. Even the grid-style social managers could not help them due to the lack of testers and beds. Consequently, they tried to seek help on social media platforms. On January 26, the State Council held a meeting and announced that the local governments should release timely and transparent information on pandemic prevention and control. The Council announced that those who postpone, conceal, or miss reports will be held accountable. Moreover, the local governments were required to actively respond to social concerns especially those expressed online. Therefore, on February 3, Weibo began to coordinate with the local governments and set up a dedicated channel for residents to seek help, called “super topic for COVID-19 patient asking for help.”

On February 4, Weibo community management official released an announcement that the channel has to be verified by the government. In order to ensure the authenticity and timeliness of information, COVID-19 patients and their families seeking help could receive information in two ways. First, they could publish the help-seeking information through the Weibo’s COVID-19 patients’ help super topic page, which would include the following information of the (suspected) patient (if there is a related diagnosis, they can upload a picture): name, age, location, home community, time of illness, simple description of health conditions (e.g., fever, cough, describe in as much detail as possible, relevant medical

certificate, CT scan photos if any etc.), contact number, and emergency contact person.

Second, they can publish help-seeking information directly through the social media, but two conditions needed to be met: to perform real-name authentication, and the information should include the same content as the first channel.

Figure 2 describes the number of cases in the super topic for help seeking and shows that the peak of the channel appeared to be from February 4 to February 10. Although the data are nationwide, most COVID-19 infection cases during this period was from Wuhan. Thus, the figures speak strongly about what happened in Wuhan rather than the whole of China. The main request was for seeking information about COVID-19 or seeking treatment from hospitals. About 81.9% of the help seekers were above 50-year old. 47.8% were above 60. Only 3.4% of the help-seeking information was posted by the patients themselves through Weibo, and 95.3% of the help-seeking information was sent by non-patients (e.g., patients' relatives such as grandchildren, sons, and daughters).

[Figure 2 about here]

Figure 3 plots the average wait time to get help on Weibo per day. 1,055 (after removing duplicate data total 638 cases) help-seeking posts in Weibo's "super topic for COVID-19 patient asking for help" and traced whether these patients making the posts received help. The overall average wait time to get help was 2.79 days. It is difficult to draw conclusions whether the wait time was short or not. For the government, this wait time was already the shortest time to strive for, but for the help-seekers, especially for the middle-aged and elderly patients who have critical illnesses, it can be considered long. There is no precise information

as to why the response time reduced over time. However, the increase in the number of hospital beds in Wuhan with establishment of Leishenshan Hospital on February 8, which accommodates 1,500 beds, significantly reduced tension at that time.

[Figure 3 about here]

According to the collaboration agreement between Weibo and the government, Weibo hosted a “super topic for COVID-19 patient asking for help” to enable citizens to seek help and for patients’ families to provide patients’ updated information. It is required for patients’ families to provide the update. This information allows us to calculate the average wait time to get treatment. Based on the statistics, from February 4 to February 7, the Wuhan government helped 318 cases reported in social media. The social media platform effectively complemented the grid managers’ work.

During the pandemic media briefings, the government leaders continued to respond to social media requests. For instance, on February 6, on the sixteenth media briefings on COVID-19, the vice governor of Hubei province, Yang Yanyun, responded to citizens’ concerns about help-seeking information. He stated that Wuhan had taken various emergency measures to increase the hospital bed capacity. The government would treat patients with mild symptom by setting up centralized isolation points and releasing the pressure of hospital beds at designated points. During the treatment at the centralized isolation point, if the patient’s symptoms worsened, they could be transferred to a designated hospital for treatment as needed. Moreover, the government invested quickly to increase the provision of hospital beds, which reached 8,895 for designated hospitals and the number of beds in makeshift hospitals reached 6,960 bed capacity.

In addition to the help-seeking channels in social media, the central government also emphasized that the local government need to respond timely to concerns expressed online. Based on LDA topic modeling analysis (Blei, Ng, & Jordan, 2003) of about 403,200 Weibo posts from January 23 to February 15, we found that most discussions on the Wuhan lockdown were about five types of topics including 1) latest situation of COVID-19 cases in Wuhan, 2) disaster relief-donation proposed by NGOs and fan clubs and the implementation information, 3) call for resource support (e.g., mask, ventilator, ambulance etc.), 4) pray for Wuhan and the country, and 5) medical team support from other provinces.

The Weibo data in this study were based on public discussions on Wuhan rather than the discussion in “COVID-19 asking for help” super topic. We used a software called “Octopus” to crawl the posts that mentioned “Wuhan” in real time. Our data cover some (but not all) of the discussions that were not censored by the government. Table 1 lists the keywords of the dominant topic on certain days based on the topic modeling analysis. From February 2 to February 10, the dominant topics were about donation and medical support to Wuhan. Keywords like donation, medical team, medical supplies, ambulances, and masks appeared repeatedly. As a response to the public opinion, in one month since the Wuhan lockdown, the Wuhan government published 11 documents on the donation methods and channels including how to donate medical materials from overseas.

[Table 1 about here]

In terms of citizens’ complaints on the complicated online system to make donations and poor government logistics management, Wuhan government responded repeatedly on January

30, 31, February 1, and February 10. More importantly, on February 4, the provincial Discipline Commission responded to the complaints and reported their investigation results (People.cn, 2020). The investigation demonstrated that officials at the Hubei branch of the Red Cross Society of China (RCSC) failed to take responsibility when receiving and distributing donations and relief goods and should be responsible for information disclosure failures. Consequently, the top leaders at the Hubei branch of RCSC received punishment for negligence in fight against the pandemic. The RCSC is a government-controlled and sponsored non-profit organization or “quasi-government agency” which is directly supervised by the State Council (Law of the People’s Republic of China on the Red Cross Society, 2017). After the RCSC failure in response to the citizens’ requests for medical supplies, the government disclosed the resource distribution arrangement timely on February 12, 15, 22, and 24. The government took citizens’ help requests in the social media seriously and used them to coordinate the material supplies during the pandemic response.

Conclusion

Nations globally have established their emergency management systems in response to and in anticipation for increased disaster risks. Prior research and emergency management practice focused more on the communication, coordination, and preparedness of the government during emergencies. Yet, limited attention has been given to the information asymmetry and overload problems when a health crisis occurs and disturbs the routine operation of public bureaucracy. Based on the COVID-19 outbreak in Wuhan, China, we demonstrate the coordination between the various agencies in central government such as NHC, ministry of transportation, ministry of education, and ministry of civil affairs has enhanced the effectiveness of the “lockdown” measure. The grid-style social management also had significant impact on taking the disease under control. While in terms of the information asymmetry and overload issue during the emergency, social media outlet provided critical

and timely information for government response in dealing with pandemic and serving the citizens' needs. It not only helped the central government to monitor the local government's work but also helped the local government identify residents' needs in a timely manner and provide critical assistance.

This commentary contributes to the practice of emergency management in several ways. First, information sharing and coordination issues are inherently embedded in the hierarchy of public bureaucracy. When a disaster happens, the information sharing problem may be magnified due to the massive amount, time pressure, and conflicting information. Existing studies on the use of ICT focus more on the emergency preparedness rather than their implementation to tackle information asymmetry and overload problems. In this article, we highlighted the timely information sharing and dissemination by social media for the government to deal with the information asymmetry and overload during a large-scale pandemic crisis. Second, China's strategy in response to COVID-19 can be seen as a form of a government innovation. Unlike the experience of governments in other countries with social media, the Chinese government employs a more convenient and pragmatic approach by collaborating with a large social media platform not only to accelerate the speed of relief efforts, but also to easily mobilize citizens and nonprofit organizations to support government response and recovery efforts. Third, studies on China usually assume China is a centralized and monolithic regime. From the lens of public administration, a centralized government appears to function more efficient and face less institutional friction during the pandemic crisis response. However, this article highlighted otherwise. It shows that friction between the central and local governments during pandemic crisis can occur. Such friction can be mitigated by the strategic use of social media, in a way that differs from the conventional claim on the role of the social media in a country where censorship and repressive measures exist.

This commentary article focuses on what happened during COVID-19 outbreak in Wuhan and, as such, the findings are not generalizable across other health pandemics, disasters or other countries. SARS in 2003 and MERS in 2012 offered valuable lessons about significant coordination problems between cities and regions in China (Comfort and Zhang 2020; Kim 2017) but limited data is available to enable comparisons. Future research can examine the experience in China and other countries in their use of social media, by the government and civil society, to tackle information asymmetry problems during a pandemic crisis. Secondly, this article does not appraise the morality or cultural appropriateness regarding a lockdown policy nor the use of social media by any parties during a pandemic surrounding a lockdown situation. Future research can examine the perceptions and attitudes of citizens, businesses, and public administrators towards appropriate policies to tackle major health crises, including social media use policies, and ways to anticipate them. Finally, the findings presented were based primarily on data from citizen social media postings and other secondary data such as government policy documents and therefore they do not allow us to claim for causality. This opens avenues for future research to use online field experiment as well as laboratory or choice experiment to verify the interactions between citizens posting behavior and bureaucrats' responses in social media platform in the context of a health crisis and possible desirable outcomes.

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Figures and Tables

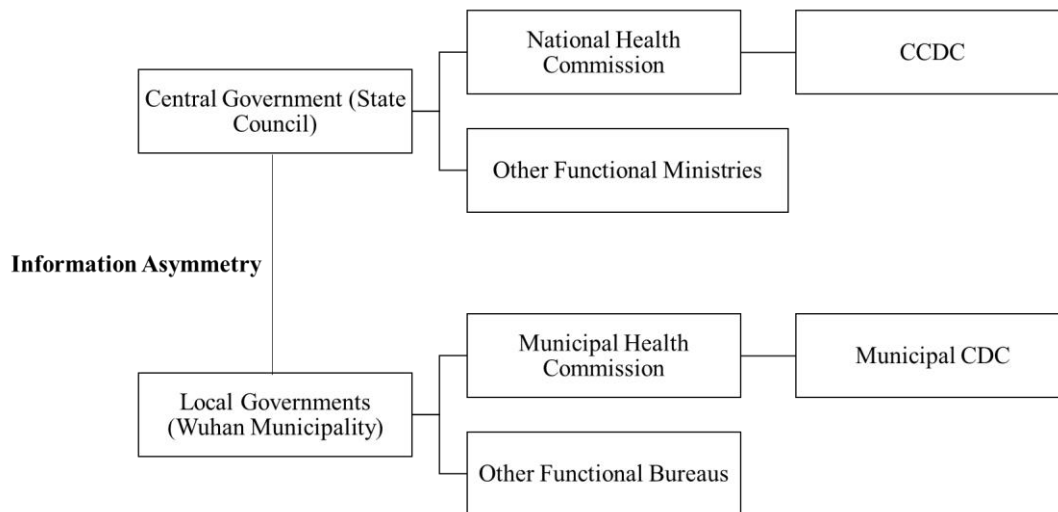


Figure 1: The Institutional Structure of China's Public Health Emergency Response

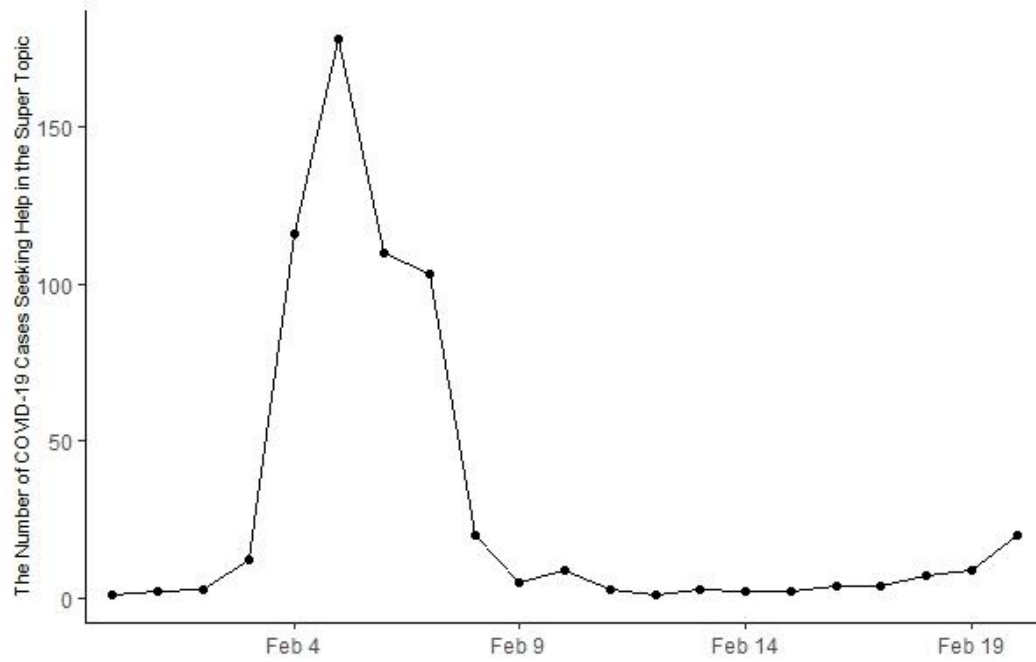


Figure 2: The Number of Cases in Weibo Super Topic for Help Seeking

Source: Alfred Data Lab 2020.

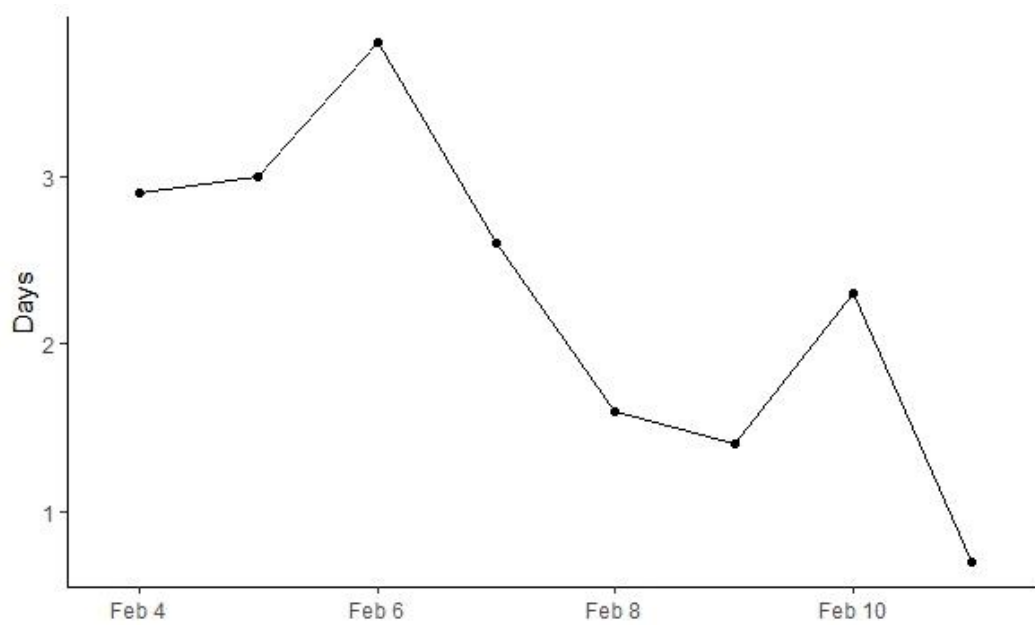


Figure 3: The Average Wait Time to Get Help on Weibo per Day

Source: Alfred Data Lab 2020.

Table 1: Keywords of the Dominant Topics of Citizens Help-Seeking Posts in Weibo

Date	Keywords based on LDA modeling					
January 23-24	pneumonia	new type	diagnose	case	coronavirus	infection
January 25-26	Wuhan	pandemic	coronavirus	open the window	information	transfer
January 27-28	Wuhan	isolation	coronavirus	Hubei	report	pandemic
January 29-30	Wuhan	prevention	pandemic	go out	wear mask	wash your hands
January 31-February 1	Wuhan	together	refuel	familiar with	fight and win	prevention
February 2-3	Wuhan	angel	ordinary	people	wind and rain	countermeasure
February 4-5	Wuhan	China	military aircraft	Huoshen Mountain	medical supplies	person pandemic
February 6-7	Wuhan	pandemic	female	volunteer	masks	healthcare
February 8-9	Wuhan	Lantern festival	thank	bless	success	festival
February 10-11	Wuhan	ambulance	examination	take on	competence	medical team
February 12-13	Refuel	Wuhan	Zhu Yilong	positive energy	public service	fight the epidemic
February 14-15	Wuhan	hospital	Hubei	medical team	patient	thank

Note: The keywords are arranged in order of importance, from left to the right.

Appendix: Key Dates and Events of the Wuhan Lockdown and COVID-19 Response

Date	Key Events
January 23	The Wuhan Lockdown
January 24	China Railway and Civil Aviation Administration of China announced that citizens can cancel their railway tickets or air tickets without extra charge.
January 26	Wuhan government started to build hospitals of Leishenshan and Huoshenshan. State Council extends of the Spring Festival holidays.
January 27	Ministry of Education postponed the start of the spring semester.
January 30	Municipal Health Commission disclosed the donation standards of medical supplies. Ministry of Civil Affairs released an announcement on social relief assistance work during COVID-19.
January 31	Wuhan Charity Federation disclosed information on donations and resources distribution.
February 1	Wuhan Charity Federation disclosed information on donations and resources distribution.
February 2	Huoshenshan Hospital with 1,500 bed capacity was established.
February 3	Three makeshift hospitals were established with 3,800 bed capacity.
February 4	Weibo cooperated with the local governments and set up a dedicated channel for residents to seek help, called “super topic for COVID-19 patient asking for help.” Wuhan government responded that they helped 135 cases from sources found in Weibo. Hubei Provincial Discipline Commission responded to the netizens’ complaints and reported their investigation results on the Hubei branch of RCSC. Three top leaders received severe punishment for dereliction of duty in fight against the pandemic.
February 5	Wuhan government responded that they helped 53 cases from sources found in Weibo.
February 6	Wuhan government responded that they helped 33 cases from sources found in Weibo. On the sixteenth media briefings on COVID-19, the vice governor of Hubei province, Yang Yanyun, responded to netizens’ concern about help-seeking information.
February 7	Wuhan government responded that they helped 97 cases from sources found in Weibo.
February 8	Leishenshan Hospital with 1,500 bed capacity was established.
February 10	Wuhan government disclosed the donation channels from overseas.
February 12	Wuhan Charity Federation disclosed information on donations allocation.
February 15	Wuhan government disclosed the allocation on government relief.
February 22	Hubei Branch of RCSC disclosed information on fund and resources distribution. Wuhan government disclosed the allocation on donations received from the citizens.
February 24	Hubei government disclosed the information on donations and resources distribution.