Theory article

Wicked problems of early-COVID-19 response: A content analysis of public emergent norms

Lisa Wier[1], Xiangyu (Dale) Li[1,*], Tony McAleavy[1], Byunggi Choi[2] and Lukas Urbane[1]

[1] Division of Engineering Technology, Oklahoma State University, 570 Engineering North, Stillwater, OK 74078, USA
[2] Incheon Metropolitan City Fire Department, Incheon Metropolitan City, South Korea

* **Correspondence:** Email: Dale.Li@okstate.edu; Tel: +14057445508.

Abstract: COVID-19 acted as a "Disease X", challenging governments around the world in early 2020. Rightly or wrongly, a local government in China handled the pandemic response with great uncertainty, triggering immediate consequences. While the world has entered the post-COVID era, it is still unknown how residents perceived the governmental responses in aligning policies to the public needs under such a great level of uncertainty. This study reevaluated the public's perception of the earliest Chinese government response to the COVID-19 pandemic using the interpretivist paradigm and content analysis. The qualitative and inductive research design used a snowball sampling method and collected 111 semi-structured questionnaire responses in February 2020. A framework of three themes, eight categories, and forty-five codes was developed from the findings, covering knowledge of the virus, information sources, information reliability, quarantine communication, quarantine support, needs during quarantine, improvement recommendations, and hopes and questions. Built from the lived experiences of the Chinese public during the first COVID-19 lockdowns, the posited framework encapsulated the public's perception of the government's response to this pandemic. To conclude, we drew three policy recommendations based on the three key themes to improve preparedness for future health crises and pandemics—disaster communication, integrated pandemic preparedness system, and hope and uncertainty. In particular, (1) a government-developed public information system can promote two-way communication and reduce information asymmetry; (2) an integrated system can better coordinate resource allocation; (3) the warning messages can correspond to the hope and positive feelings in the public norms.

Keywords: emergent norms; pandemic; government response; public perception; content analysis

1. Introduction

A pandemic is a challenging disaster that can significantly impair the public health and economic conditions of populations around the world [1]. The globalization and development of transportation, information, and technologies make the transmission of infectious diseases across communities and even countries more likely to occur, regardless of political and economic institutions. According to the World Health Organization (WHO) guidelines, national governments are supposed to develop intergovernmental crisis management institutions to manage these emergencies across the hierarchies from the national to the local levels, as the risks are shared by individuals, organizations, communities, and cultures [2,3]. However, the international efforts in building this multi-level collaboration may not be as effective as their goals depicted at the local level [4]. For example, Sach et al. (2022) mentioned inadequate timely communication, poor coordination and implementation, and difficulties in rumor control, among others [4].

In December 2019, the novel coronavirus disease 2019 (COVID-19) was first reported in Wuhan city, Hubei province in China. The disease spread quickly, triggering a WHO pandemic declaration on March 11, 2020. Even though the central government of China had developed a comprehensive reporting and response framework after the 2003 SARS outbreak, several local and provincial governments' initial reactions were not perfectly effective in developing appropriate risk communication and pandemic-containment strategies under this framework. Notably, a study conducted in Nanjing, China found widespread public dissatisfaction with government stakeholders in the early stages of the pandemic [5]. Local governments around the world exhibited signs of denial and reluctance to admit to the growing emergency, which delayed their actions to develop broader and stronger collaborations with other jurisdictions and hierarchies [4]. Consequently, residents were left frustrated by the inactivity and confused by the controversial information and later protective measures related to the pandemic [6,7].

From the public authority's perspective, a pandemic such as COVID-19 can become a wicked problem due to its rapidly changing nature, incomplete information, and "glocal" [8] nature, consisting of global impact confronting local solutions. Interestingly, Unruh et al. [9] noted these problems across regional, national, and cultural boundaries during the COVID-19 pandemic. Hence, COVID-19 provided an opportunity to better understand the loopholes in emergency management institutions at different levels and to develop broadly applicable yet feasible solutions. So far, studies of COVID-19 response tended to focus on the later stages, in which professional responders, government authorities, and residents were swamped by politicized debates and information [4,6,9,10]. The initial period, with uncertainties in the scale and consequences of the pandemic and available responses, offered a narrow window of opportunity to mitigate the pandemic but remained inadequately examined [10,11]. Accordingly, this study aims to critically evaluate the emergent norms through a qualitative content analysis of the public perception of the Chinese government's early-stage response to the COVID-19 pandemic.

1.1. Background and literature

Rittel and Webber (1973) first coined the phrase *wicked problem,* describing them as problems with unclear answers that are not clearly understood, meaning that effective solutions are difficult, if not impossible, to determine [12]. Wicked problems are public policy issues where there are good or

bad solutions, rather than true or false, with actions that have lasting consequences and are interconnected with other problems [12]. Wicked problems inhibit the creation of effective systems of governance because there is no right answer [12]. A pandemic at its early stage demonstrates several of the characteristics of a wicked problem, such as no definitive formulation (e.g., the origin of the virus and Patient Zero), no stopping rule (e.g., whether and when herd immunity can occur), no immediate test of solution (e.g., diagnosis takes days or even longer), uniqueness (e.g., occurrence is rare), and embeddedness in other problems (e.g., political norms and biases), among others [12]. Recent studies on wicked problems demonstrated a consensus of adopting a collaborative approach in an attempt to engage all stakeholders while navigating through the problem [13–16]. These approaches can involve citizens or citizen groups in the policy process, establishing and maintaining network structures across jurisdictional boundaries, and enhancing intra-regional and inter-regional government collaborations [13–16].

Pandemic responses are notable, as extensive collaboration between the government and the public is necessary to provide critical information, volunteer and medical resources, and appropriate protective actions [17–19]. For example, public perceptions of their government or community leaders can influence their willingness to adopt protective actions, such as washing hands more frequently and social distancing [17]. Cross-sectional and government-citizen collaborations can help enhance citizen compliance [18,19]. This state-citizen collaboration is often established via institutionalization before the onset or during the response phase of a pandemic [20]. However, the related debate is often misguided, as traditional and hierarchical government structures can suffer from rigidity when faced with a wicked problem [14,21]. Pandemic responses are notable due to the need to switch from the routine tasks of government and society to a collective understanding of the emergency situation in a timely manner. There is also a need to promote effective citizen-government collaboration and communication across multiple levels of jurisdictions [14]. Similarly, the complexity of a wicked problem determines that finding and implementing a solution is much easier said than done.

For example, China has experienced several outbreaks of infectious diseases, such as SARS in 2003, influenza H1N1 in 2009, and influenza H7N9 in 2013. Following these outbreaks, the central government assessed the public health capacities in response to the critiques of its lack of transparency and timely communications. Frost et al. [16,22] determined that the Chinese government has improved its overall emergency management capability. However, several other studies also show that critical response elements, such as local governments' preparedness and risk communication with the citizens, remain in need of improvement [1,23]. Additionally, several municipalities struggled with the demand for accurate and timely multi-channel information, open communication and people-oriented public services, and limited resource allocations [9]. Consequently, not only is a timely switch to emergent norms a major challenge, but establishing a functional collaboration between the government and the public remains an improbable mission. Furthermore, risk communication is vital to understand how people make decisions. Risk is multidimensional, as the same risk can foster different perspectives amongst decision-makers and the public [24]. Kunreuther and Slovic (1996) describe trust as a significant component of risk perception [24]. How risk information is presented is, therefore, critical to decision-makers, as omitting or including certain information influences the subsequent decision [24,25].

The protection motivation theory (PMT) was developed to understand how fear informs response, particularly in how the perceptions of the severity of a threat and an individual's response and self-efficacies prompt behavior [26]. Various studies on PMT have been conducted on medical and health behavioral interventions [26], being commonly used to analyze residents' preparedness for a variety

of disasters including wildfires, typhoons, and earthquakes [27–29]. Yoo et al. [30] analyzed PMT through SMS-based disaster alerts and found that accurate, timely, relevant, credible, and compelling messages increased residents' adaptive coping. Messages with detailed information and credible sources amplified a message's argumentative and persuasive qualities [30]. However, these theories are less impactful in the case of wicked problems, where there is no right answer and solutions are often as muddled as the questions themselves. In the case of the early stages of the COVID-19 pandemic, information about the disease was still emerging. While residents were eager for information, it was often outdated and limited. Risk communication in an emergent norm is complicated by the unique characteristics of the early days of the pandemic. As a collective understanding of the emergency situation, an emergent norm among the people who are impacted is a product of information milling, rumor development and refutation, and selecting the response activities [31]. The milling process, a period of time when individuals try to find meaning after a disrupting event, was defined by the quarantine when residents isolated themselves for an unknown amount of time [31]. The widespread quarantine, combined with a lack of reliable information and uncertainty, allowed the COVID-19 pandemic to become a wicked problem.

The People's Republic of China (PRC) did not have an overarching framework to guide all types and phases of emergency management when COVID-19 hit. The State Council supervises two ministry-level agencies, the Ministry of Emergency Management (MEM) and the National Health Commission (NHC), which are responsible for disaster management and public health, respectively. Both agencies were established in 2018 and were announced in the first session of the 13th National People's Congress [32]. The national MEM does not manage public health emergencies by design. Rather, the leading agency for epidemics is the Chinese Center for Disease Control and Prevention (CCDC). Established in 2002, the CCDC is a "state-owned public organization" ("shi ye dan wei", in Chinese) directly under the NHC [33]. Public organizations are not public authorities and do not possess administrative powers equal to government agencies. The CCDC's response activities are supposed to follow the 2003 Regulation on the Urgent Handling of Public Health Emergencies (revised in 2011), the 2004 Law of the People's Republic of China on the Prevention and Treatment of Infectious Diseases, and the 2007 Emergency Response Law of the People's Republic of China [33]. These regulations define the roles of the different bureaucracies and medical services, establish procedures and tasks before and after a disaster, and clarify the legal responsibilities of all stakeholders involved, and were established considering the lessons learned from the 2003 SARS pandemic [34–36]. However, the implementation and enforcement of these regulations have been criticized as inadequate due to infrequent updates, lack of in-depth research, and ineffective program implementation [37,38]. It is noticeable that the national response systems in China have been established and maintained based on a top-down configuration. On the other hand, a pandemic like COVID-19 has its origins, victims, agents, and responders greatly overlapping the public and, therefore, requires a close collaboration between the authorities and citizens. Hence, it is not surprising that the national emergency management system was stretched by COVID-19. Following the rationale explained at the beginning of this section, the absence of effective institutions would demand full-scale participation across governmental hierarchies and sectors during a pandemic. The vast uncertainty of COVID-19 as a wicked problem suggests that timely risk communication is at the center of the solutions to a pandemic [20]. Recent studies on COVID-19 confirmed that transparent and timely communication from governments to citizens can bring both sides closer to each other, promote more accurate sensemaking, and encourage order and advice compliance [15,17,39,40]. As was seen during the COVID-19 pandemic,

tradition, political natures, and public perceptions can lead to differing and undesirable results. Accordingly, this study adopts an inductive, qualitative approach to answer the following research questions: (1) In the absence of an overarching national response institution, what can the local government stakeholders and citizens do to promote protective actions? (2) What are the positive and negative feedback citizens would offer to assist government stakeholders in the later stages of disastrous disturbances?

2. Materials and methods

This exploratory qualitative study utilized interpretivism, an inductive system of logic, a semi-structured questionnaire methodology, and computer-assisted content analysis [41]. The underpinning interpretivist epistemological approach is grounded in the subjective perceptions and beliefs of individuals, rejecting the idea of an objective natural world [42]. This viewpoint provided the theoretical lens to construct a tentative theory drawn from the collated data. The relationships between the findings are illustrated in a comprehensive network diagram in the results section that ensures the interpretive validity of the results.

2.1. Questionnaire development

A questionnaire consisting of 12 questions, 2 closed demographic and 10 thematic open questions, was developed by reviewing pertinent literature, considering the nature of the intended sample frame, and reflecting on the needs of the research question [42]. The questions (see supplement) focused on the perceptions of governmental risk information, basic support, and care provision during the early stages of the COVID-19 outbreak in China (February 2020). This included: (1) what, if any, sources of information about the novel coronavirus did you use? (2) what, if any, sources of information about the novel coronavirus did you use? (3) how useful/reliable was the information you located or received? (4) what care and/or support were/are you provided during quarantine? (5) could your quarantine experience be improved and, if so, how? The Institutional Review Board approval was secured in January 2020 (IRB-20-275, Oklahoma State University).

The questionnaire was subsequently translated from English to Chinese (simplified) using a three-step process [43,44]. First, the bilingual second author (a native Chinese and fluent English speaker with a PhD from the United States) translated the English to Chinese (simplified). Second, a bilingual faculty member at a Chinese academic institution (a full professor and holder of a PhD from the United Kingdom, who requested anonymity) then translated the Chinese (simplified) into English. Third, the returned English translation was then compared (by the third author, a native English speaker) with the original English to ensure the intended meanings were retained [42,44].

2.2. Sampling and questionnaire dissemination

China was purposively selected for two reasons. First, the outbreak of COVID-19 was initially reported in Wuhan, China, making its responses clear from any influences from the successful or failing experiences of other polities. Second, the relatively simple and unified command hierarchy in its government institution helps to control the partisan politics that have subsequently become a major confounding variable in examining the factors and consequences of pandemic responses. We concede

that China is a large geographic area, but its relatively homogenous ethnicity and culture can help lower the potential issues caused by the selection bias in a non-random sample.

The questionnaire was then disseminated via the WeChat platform by an academic institution in Wuhan, China. WeChat is a very popular (over 1 billion users) social media platform for individual and group chats, organizational announcements, and content sharing [45]. This institution administered the online questionnaire using a snowball sampling approach to 15 academic institutions across China during a two-week period in February 2020, which resulted in 111 completed, de-identified responses. A summary table of the respondent locations is in Table 1. Among the total 32 provincial-level jurisdictions, the respondents were from 22, showing a wide regional distribution. This qualitative and semi-structured approach enabled respondents to freely articulate their perspectives in their own natural language, which aligned with the inductive and interpretivist research design [42].

2.3. Computer-assisted content analysis

The qualitative data, consisting of 111 responses, were translated from Chinese (simplified) into English by a paid translation service. The corpus of data was reviewed by the second author to ensure additional accuracy in the translations [44]. The data was analyzed using content analysis, a qualitative methodological approach that identifies patterns and themes through the identification of codes, grouping into categories, and the emergence of the underlying meaning represented in themes [42]. The questionnaire responses were uploaded to Atlas.ti for computer-assisted qualitative content analysis, which streamlined the organization and management of the qualitative data. The software helped to track the manual coding and categorization processes, which informed the creation of a comprehensive network diagram (Figure 1) that overtly connected the questionnaire responses to the emergent codes, categories, and themes. This provided significant transparency [46] while also assuring the descriptive, interpretative, and theoretical validity of the results and posited recommendations [47]. As per qualitative norms, this study aimed to achieve theoretical saturation whereby no new data emerged from the analysis, which was noted during the analysis of responses 71–73; the remaining 38 responses were subsequently analyzed to provide further assurance and rigor [48].

The analysis process incorporated a three-sweep inductive coding process [49]. First, familiarization with the data establishes the essence of each response. Second, a primary analysis is conducted through a secondary sweep through the identification of relevant quotes and units of meaning, which are condensed into single-word explanatory codes. The codes are grouped into explanatory categories, which are described with themes, or explanatory statements. These themes contribute to the tentative theory. A third sweep is conducted to ensure a thorough analysis of the data. This rigorous qualitative approach allows for a deeper understanding of the hidden meanings within the data [49].

Table 1. Geographic distribution of respondents.

| Province	# of responses	Cities (# of responses)								
Anhui	29	Anqing (1)	Bozhou (4)	Chizhou (1)	Chuzhou (1)	Fuyang (4)	Hefei (13)	Huainan (3)	Suzhou (1)	Wuhu (1)
Beijing	1	N/A								
Chongqing	2	N/A								
Fujian	5	Fuzhou (2)	Longyan (1)	Ningde (1)	Zhangzhou (1)					
Gansu	1	Jiuquan (1)								
Guangdong	5	Guangzhou (2)	Shenzhen (2)	Zhanjiang (1)						
Guangxi	2	Guilin (1)	Hezhou (1)							
Guizhou	2	Anshun (1)	Tongren (1)							
Hebei	1	Handan (1)								
Henan	8	Anyang (1)	Jiaozuo (1)	Luohe (1)	Nanyang (1)	Xinxiang (1)	Xinyang (1)	Zhengzhou (1)	unknown (1)	
Hubei	21	Huanggang (1)	Jingmen (2)	Tianmen (1)	Wuhan (13)	Xianning (1)	Xiaogan (2)	Yichang (1)		
Hunan	3	Chenzhou (2)	Hengyang (1)							
Jiangsu	3	Nanjing (1)	Suzhou (1)	Yangzhou (1)						
Jiangxi	2	Jingdezhen (1)	Jiujiang (1)							
Shaanxi	2	Xi'an (2)								
Shandong	6	Dongying (1)	Jinan (1)	Linyi (3)	Zaozhuang (1)					
Shanghai	1	N/A								
Sichuan	2	Chengdu (1)	Zigong (1)							
Tianjin	1	N/A								
Xinjiang	2	Shihezi (1)	unknown (1)							
Yunnan	7	Dali (1)	Kunming (3)	Pu'er (1)	Yuxi (1)	unknown (1)				
Zhejiang	4	Hangzhou (1)	Jiaxing (1)	Lishui (1)	Ningbo (1)					
Oversea	1	Amsterdam, Netherlands (1)								
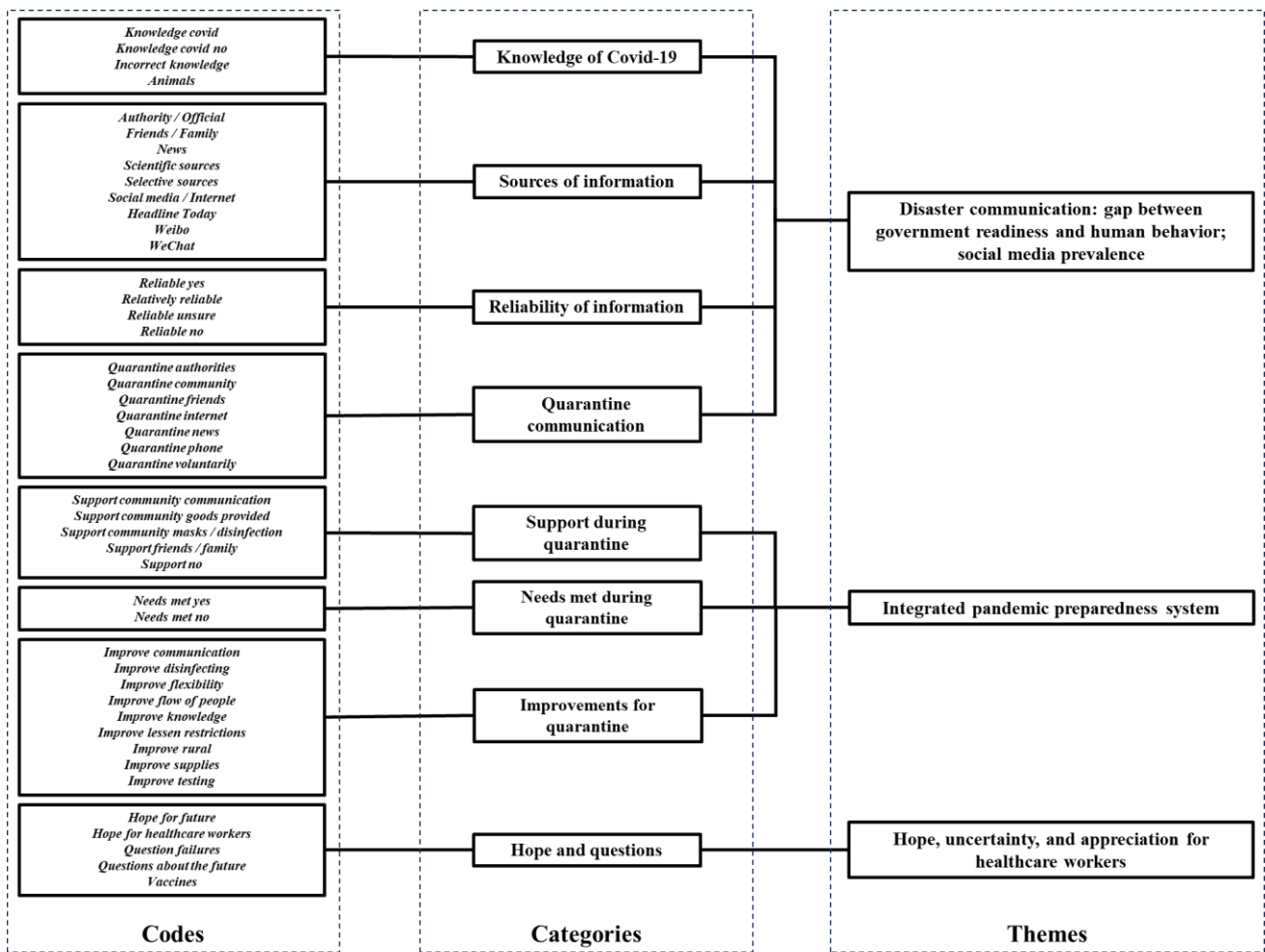
Figure 1. Comprehensive network diagram.

Due to the non-random, snowball sampling procedure, the age distribution of the participants is clustered at relatively young groups (Figure 2). More than 60 out of the 111 respondents were between 26 and 40 years old; over 40 of the participants were younger than 25 years old.
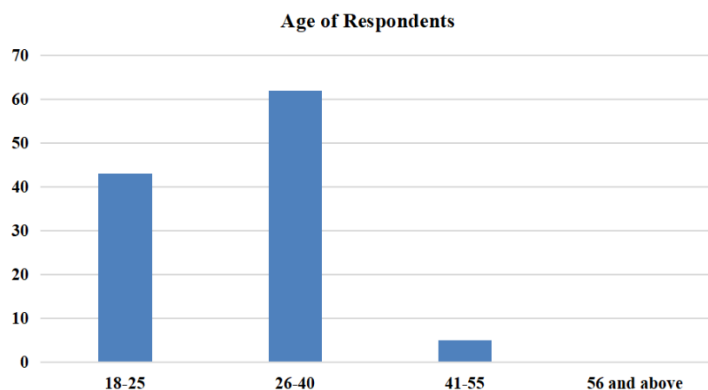

Figure 2. Age groups of respondents.

3. Results

The resultant 45 codes, 8 categories, and 3 core themes offer the necessary foundation to address the stated aim and research questions. The results are organized using the three core themes (disaster communication, integrated preparedness system, and hope and uncertainty) with constituent categories and codes with example quotations in both English and Chinese (simplified) to ensure readability and transparency [47].

3.1. Comprehensive network diagram

The comprehensive network diagram (Figure 1) illustrates the analytical abstraction process and the relationships between (from left to right) the 45 codes, 8 categories, and 3 themes [50]. Example quotations are provided in the narrative below.

3.2. Theme 1: Disaster communication: gap between government readiness and human behavior; social media prevalence

The first theme identified was disaster communication, which was derived from four categories: the participants' responses about their prior knowledge of COVID-19, their sources of information, their perceived reliability of said sources, and how they were communicated to quarantine. These categories represent how respondents were informed to quarantine and the gap between government readiness and public communication.

The category *participants' responses about their prior knowledge of COVID-19* was informed by four codes (*knowledge covid, knowledge covid no, incorrect knowledge*, and *animals*), which describe the limited public knowledge about the virus in February 2020. Few respondents self-reported what was then commonly accepted knowledge but has since been determined to be factually incorrect. This includes information such as limited to no person-to-person transmission and reports that there was a vaccine available at that time. Incorrect knowledge is typical during an emergent norm [31].

- *R18: I read news of the initial outbreak of pneumonia in the Huanan Seafood Market, but I didn't know it was the new coronavirus.*
- *R32: Initially learned that it was similar to SARS. Later, the government said that it was not infectious, so I didn't pay much attention to it.*
- *R1: Don't know.*
- *R1: In the future we should avoid wild animals, pay more attention to self-protection, exercise more, and earn more money.*

The category *sources of information* was informed by nine codes (*authority/official, friends/family, news, scientific sources, selective sources, social media/Internet, Headline Today, Weibo*, and *WeChat*), which described the resources sought out by the participants. Various types of social media (e.g., WeChat, Weibo, and TikTok) were the most common form of communication, followed by state-sponsored news and official forums. Most respondents gathered information from more than one source, though there were differing opinions on which sources were more accurate.

- *R108: Early February, through official accounts and propaganda broadcasts.*
- *R36: Almost all are reliable (receive information selectively).*
- *R104: Be suspicious of official information and believe the information collected by myself.*

- *R2: News, Tik Tok, headlines, browsers, etc.*
- *R7: I only read on the official platform and believe in the reliability of the platform.*

The category *perceived reliability for said sources* was informed by four codes (*reliable yes, relatively reliable, reliable unsure,* and *reliable no*), which define the uncertainty respondents had in the accuracy of various resources.

- *R59: It's hard to say. There's a lot of news. Rumors and refuting rumors come one after another.*
- *R5: News not reliable, suspicious.*
- *R4: It's relatively reliable. Don't go out to save your life.*
- *R39: Only believe information from CCTV news, People's Daily, and other official reports.*

The category *how they were communicated to quarantine* was informed by seven codes (*quarantine authorities, quarantine community, quarantine friends, quarantine internet, quarantine news, quarantine phone*, and *quarantine voluntarily*), which describe how respondents were instructed to self-quarantine in response to the pandemic. Participants were requested to quarantine from a variety of sources, though most were informed by their communities or did so voluntarily upon hearing about the rate of infections.

- *R7: Around the seventh of January in lunar calendar, the community was isolated, and the security guard informed us to fetch the pass at the entrance.*
- *R108: In early February, the government announced online.*
- *R8: The news of the blockade in Wuhan communities was released by the official press around February 12.*
- *R51: On Feb. 23, the relevant department informed by telephone.*
- *R83: On January 26, started to voluntarily isolate.*
- *R16: New Year's Eve, self-awareness.*

3.3. Theme 2: Integrated preparedness system

The second theme, integrated preparedness system, was derived from three categories (support during quarantine, needs met during quarantine, and improvements for quarantine), which described the unmet support that was lacking during the self-quarantine process.

The *support during quarantine* category was informed by five codes (*support community communication, support community goods provided, support community masks/disinfection, support friends/family*, and *support no*). It is important to note that out of the 111 responses, 98 reported that they did not receive any kind of support during their quarantine.

- *R1: Help to buy daily necessities and communicate the epidemic situation.*
- *R94: The village distributed masks and undertook disinfection every day.*
- *R43: Friends and neighbors offered help.*
- *R104: Did not request for help and was not aware of the help.*

The *needs met during quarantine* category was defined by two codes (*needs met yet* and *needs met no*), which describe the respondents' satisfaction or dissatisfaction with the support they were provided during quarantine. While many participants reported not receiving aid, most respondents stated that their basic needs were essentially met, though some were dissatisfied.

- *R3: Satisfied.*
- *R101: We requested our community to announce the community epidemic situation every day. Currently, other communities release it. However, our community has no actions at all. All the residents*

here have requested it, but no response from the community.

The *improvements for quarantine* category consisted of nine codes (*improve communication, improve disinfecting, improve flexibility, improve flow of people, improve knowledge, improve lessen restrictions, improve rural, improve supplies*, and *improve testing*), which describe the respondents' suggestions for corrections and enhancements during future quarantines.

- *R7: Yes, I'd like to discuss why the initial measures to control the novel coronavirus were not powerful enough? Why wasn't the information made public and no actions were taken until it was unable to control later.*
- *R61: Yes. During the epidemic prevention and control period, the price of daily necessities increased, and it was difficult to purchase medical supplies such as masks.*
- *R84: The occurrence of the coronavirus epidemic has caused many industries to stagnate completely, so we need to reflect on the role of urban planning in the prevention and treatment of infectious diseases. The concept of a healthy city has not been fully implemented and it is actually fragile. We should think about how to make our city healthier, and how to implement public health into the construction of cities. In addition, how to use the internet to make life and work more convenient and quick in the event that the new coronavirus prevents people from going out.*
- *R1: Yes, disinfect the whole village.*

3.4. Theme 3: Hope and uncertainty

The third theme, hope and uncertainty, was informed by one category (*hope and questions*) and highlighted the hopes, worries, and fears of respondents during quarantine. The *hope and questions* category consisted of five codes (*hope for future, hope for healthcare workers, question failures, questions about the future*, and *vaccines*). Despite the uncertainty of the early days of the pandemic, respondents still had unwavering hope that things would get better and proud faith in healthcare workers for assisting on the frontlines. In contrast, others questioned the failures of the government's response and when vaccines would be developed.

- *R14: ...I hope the epidemic will be stopped soon! Go China! Go Wuhan! Go Fuyang!*
- *R37: ...I hope the epidemic can be controlled and stopped as soon as possible, and we can all be safe and healthy, especially the frontline medical staff. I salute them.*
- *R43: The government should seriously reflect on itself.*
- *R4: When will it be over? At first, I didn't think it would be a serious problem, but now I'm a little anxious. After all, so many people have been infected.*
- *R25: I hope that the vaccine against the new virus can be developed as soon as possible. More people can recover and return to school and work as early as possible.*

4. Discussion

The findings of the communication theme confirm the wickedness of the pandemic response, such as the rumors, government and expert (stakeholders) efforts to refute rumors, inconsistent responses between regions and over time, and unclear self-protection methods [12]. On the positive side, residents realized that they demanded effective communication between government authorities and citizens and that stakeholders were making efforts to enhance mutual trust [24]. Residents did have complaints about the lack of adequate supplies and flexibility in policy implementation. However,

many still remained hopeful within the uncertain environment, particularly when they had effective communication channels or had opportunities to participate in the responses [30]. It is also noticeable that the fear of the pandemic, such as perceived threats, did not necessarily lead to better response or compliance as the PMT suggests [26]. This phenomenon can be due to unclear information about protective methods and the lockdown/travel control, which limited residents' choices of protective actions.

The archive data shared with us provided more than adequate responses to help us identify the codes, categories, and themes with content validity. The wide geographic distribution of the respondents allowed us to take a peek at multiple localities' pandemic responses and resident attitudes. Hence, we are confident about the theoretical contributions of the findings, which have confirmed or rebutted relevant principles in such an uncertain and extended response phase.

Based on the analytical results, we can identify the following theory, policy, and practice implications and recommendations.

4.1. Disaster communication

The importance of disaster communication was demonstrated through previous experience with severe infectious diseases such as SARS and H7N9 [51]. Despite the improvements made following those diseases, disaster communication still needs to improve [1,23]. During the early days of the COVID-19 pandemic, there was limited information about the nature of the virus. Consequently, officials and citizens were often working with conflicting information. Because of the wicked problem of the pandemic creating a mass amount of uncertainty, a gap was created between government readiness and human behavior [31].

Respondents highlighted a lack of transparency of information received by the government regarding the status of the pandemic, when to quarantine, and how to receive support. The findings demonstrated that the government did not transmit the virus information and pandemic status quo to the public and media as citizens expected at the very early stage of COVID-19. Such a deficiency resulted in public dissatisfaction and inadequate awareness of the government's responses, even after the official announcement of the pandemic [52,53]. Therefore, the government is obligated to develop its public information system during the pandemic preparedness phase to enable timely and accurate information distribution. This process may also increase respondents' reliability in the information.

While respondents gathered information from multiple sources, most used several forms of social media such as Weibo and WeChat. Social media has proven to be a valuable warning channel for risk communication, as it provides two-way communication, and its widespread use allows for residents to pass along the communication messages to their social networks [25]. This is especially useful during the milling process, where residents communicated how they felt about the pandemic through social media during the high-uncertainty period. Due to the widespread popularity of WeChat and Weibo [54,55] and their prevalence as an information source by the respondents, it is imperative to continue developing risk communication through social media.

4.2. Integrated pandemic preparedness system

During the COVID-19 pandemic, many China residents experienced strict social distancing and lockdown conditions. The findings revealed imbalanced governmental service provisions across

provinces, particularly in rural areas. Each local government has a duty of care; however, the range and quality of services provided varied from jurisdiction to jurisdiction due to differing socio-economic conditions and policies. Several respondents noted the lack of and poor quality of the supplies in general. The upper levels of the government could, therefore, standardize their public assistance systems by integrating policies and provisions across local jurisdictions to ensure equitable needs-based support to individual communities. This could also include ensuring restrictions are properly enforced in rural areas and increasing general pandemic awareness.

4.3. Hope and uncertainty

During the milling process where residents were quarantined, respondents expressed hope that things would get better and return to a level of normalcy and that vaccines would be developed. However, others expressed criticism of the government's handling of the pandemic, noting the facades in the communication, quality of supplies, and other resources from the government. These became important keynotes and eventual emergent norms during the early stages of the pandemic: prevailing hope being weighed down by skepticism. Government officials can, therefore, take advantage of the early emergent norm of hope in their warning messages as related risk communication can help to decrease negative emotions [56]. For example, a periodic update on the response strategies and vaccine research can help those who are experiencing the collective stress of the pandemic to cope with emotional challenges.

Healthcare workers are among the most at-risk individuals during a pandemic, and the respondents expressed great appreciation for the dedication of their frontline healthcare workers. To bolster this physical symbol of successful recovery and progress, government officials can repeatedly emphasize their efforts to secure and provide as many supplies and resources as possible to healthcare workers and scientists to further their advances in treatment and research. Training and support can help to protect health workers and the public from increased infection rates in two ways. WHO noted that the agency provided a variety of interactive training via its open platform to promote education on the safe usage of personal protective equipment (PPE) and containment-decontamination procedures [57]. Additionally, reliable logistics and supplies of PPE became critical due to global shortages, meaning it was extremely challenging to maintain the levels of protection for health workers. Government authorities need not only to establish clearer standards in terms of the supply of critical equipment, such as ventilators and oxygen concentrators, but also to inform the public about these efforts on a regular basis [58–60].

5. Conclusion

This study aims to critically evaluate the emergent norms during the early-stage response to COVID-19 in China through a qualitative content analysis of public perceptions. Pandemic responses typically deal with long-term disturbances that can last months or years, as opposed to severe weather and terrorist attack responses that can end within a much shorter period. This uniqueness presents a significant challenge to government responses, as their core resource (personnel) decreases as the pandemic develops. Facing such a wicked problem, national and global coordination has not yet developed an effective framework to streamline local efforts and public demands. To address the local issues and potential opportunities, the posited findings inform three policy recommendations for

governmental pandemic preparedness: disaster communication, an integrated pandemic response system, and the prevalence of hope and uncertainty. The public views and perceptions that informed these arguments were drawn from those who endured the COVID-19 lockdowns in China; however, the recommendations can be applicable to other governmental authorities with rigid, hierarchical institutions.

5.1. Limitations and future research

The study's limitations include data collection methodology, sampling, and limited generalizability. A major limitation of this study is that the authors were not able to conduct the data collection, which limited the capability to ask follow-up questions. In addition, the use of qualitative questionnaire data is less rich and thick compared to interviews. We were also unable to implement purposive sampling methods when we detected the need for elaborating on a particular theme. A main criticism of qualitative methodology is the lack of generalizability; however, qualitative research, including this study, has epistemologies, ontologies, and methodologies that differ from positivist and quantitative research on a statistical basis. The value of qualitative research is the understanding of the phenomena being studied and its validity through descriptive, interpretive, and theoretical validity as defined by Maxwell (2012) [42,47].

There are several opportunities to develop these findings in future studies. First, a series of qualitative semi-structured interviews under a multi-national sample frame would enable the evaluation of the emergent themes in greater depth. Second, a mixed-methods study targeting multivariate analysis could develop and validate new scale items measuring the thematic concepts in such a unique situation. An international comparison building on the qualitative findings can also help promote the external validity of the findings. It is our hope that this study can highlight the need for rigorous research due to the time sensitivity and complexity of the COVID-19 pandemic.

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

Acknowledgments

Conflict of interest

The authors declare no conflict of interest.

References

1. Qiu W, Chu C, Mao A, et al. (2018) The impacts on health, society, and economy of SARS and H7N9 outbreaks in China: A case comparison study. *J Environ Public Health* 2018: 2710185. https://doi.org/10.1155/2018/2710185

2. French PE (2011) Enhancing the legitimacy of local government pandemic influenza planning through transparency and public engagement. *Public Adm Rev* 71: 253–264. https://doi.org/10.1111/j.1540-6210.2011.02336.x

3. Longstaff PH, Yang SU (2008) Communication management and trust: Their role in building resilience to "surprises" such as natural disasters, pandemic flu, and terrorism. *Ecol Soc* 13: 3. Available from: https://www.jstor.org/stable/26267909.

4. Sachs JD, Karim SSA, Aknin L, et al. (2022) The Lancet Commission on lessons for the future from the COVID-19 pandemic. *Lancet* 400: 1224–1280. https://doi.org/10.1016/S0140-6736(22)01585-9

5. Chen W, Shi Y, Fan L, et al. (2021) Influencing factors of public satisfaction with covid-19 prevention services based on structural equation modeling (Sem): A study of Nanjing, China. *Int J Environ Res Public Health* 18: 13281. https://doi.org/10.3390/ijerph182413281

6. Bigo D, Guild E, Kuskonmaz EM (2021) Obedience in times of COVID-19 pandemics: a renewed governmentality of unease? *Glob Discourse* 11: 471–489. https://doi.org/10.1332/204378921X16158113910675

7. Khosrawipour V, Lau H, Khosrawipour T, et al. (2020) A Failure in initial stage containment of global COVID-19 epicenters. *J Med Virol* 92: 863–867. https://doi.org/10.1002/jmv.25883

8. Kickbusch I (1999) Global + local = glocal public health. *J Epidemiol Community Health* 53: 451–452. https://doi.org/10.1136/jech.53.8.451

9. Unruh L, Allin S, Marchildon G, et al. (2022) A comparison of 2020 health policy responses to the COVID-19 pandemic in Canada, Ireland, the United Kingdom and the United States of America. *Health Policy* 126: 427–437. https://doi.org/10.1016/j.healthpol.2021.06.012

10. Haldane V, De Foo C, Abdalla SM, et al. (2021) Health systems resilience in managing the COVID-19 pandemic: Lessons from 28 countries. *Nat Med* 27: 964–980. https://doi.org/10.1038/s41591-021-01381-y

11. Habersaat KB, Betsch C, Danchin M, et al. (2020) Ten considerations for effectively managing the COVID-19 transition. *Nat Hum Behav* 4: 677–687. https://doi.org/10.1038/s41562-020-0906-x

12. Rittel HWJ, Webber MM (1973) Dilemmas in a general theory of planning. *Policy Sci* 4: 155–169. https://doi.org/10.1007/BF01405730

13. Conklin J (2005) *Dialogue Mapping: Building Shared Understanding of Wicked Problems*. Chichester: John Wiley and Sons.

14. Marcel Karré P, van der Steen M, van Twist M (2011) Chapter 5 steering societal resilience: An empirical exploration of trends and challenges in government–citizen collaboration, In: Groeneveld, S., Van De Walle, S. Author, *New Steering Concepts in Public Management (Research in Public Policy Analysis and Management)*, Emerald Group Publishing Limited, 21: 57–70. https://doi.org/10.1108/S0732-1317(2011)0000021009

15. Ferlie E, Fitzgerald L, McGivern G, et al. (2013) *Wicked Problems Governable? The Case of Managed Networks in Health Care*. Oxford, UK: Oxford University Press.

16. Zhao T, Wu Z (2020) Citizen–state collaboration in combating COVID-19 in China: Experiences and lessons from the perspective of co-production. *Am Rev Public Adm* 50: 777–783. https://doi.org/10.1177/0275074020942455

17. SteelFisher GK, Blendon RJ, Ward JRM, et al. (2012) Public response to the 2009 influenza A H1N1 pandemic: A polling study in five countries. *Lancet Infect Dis* 12: 845–850. https://doi.org/10.1016/S1473-3099(12)70206-2

18. Marston C, Renedo A, Miles S (2020) Community participation is crucial in a pandemic. *Lancet* 395: 1676–1678. https://doi.org/10.1016/S0140-6736(20)31054-0

19. Rosenfeld LA, Etkind P, Grasso A, et al. (2011) Extending the reach: Local health department collaboration with community pharmacies in Palm Beach County, Florida for H1N1 influenza pandemic response. *J Public Health Manage Pract* 17: 439–448. https://doi.org/10.1097/PHH.0b013e31821138ae

20. Newman J (2005) Bending bureaucracy: Leadership and multi-level governance, In: du Gay, P. Author, *The Values of Bureaucracy*, New York: Oxford University Press, 191–210. https://doi.org/10.1093/oso/9780199275458.003.0009

21. Versluis E, Asselt M, Kim J (2019) The multilevel regulation of complex policy problems: uncertainty and the swine flu pandemic. *Eur Policy Anal* 5: 80–98. https://doi.org/10.1002/epa2.1064

22. Frost M, Li R, Moolenaar R, et al. (2019) Progress in public health risk communication in China: Lessons learned from SARS to H7N9. *BMC Public Health* 19: 1–9. https://doi.org/10.1186/s12889-019-6778-1

23. Gao X, Yu J (2020) Public governance mechanism in the prevention and control of the COVID-19: Information, decision-making and execution. *J Chin Governance* 5: 178–197. https://doi.org/10.1080/23812346.2020.1744922

24. Kunreuther H, Slovic P (1996) Science, values, and risk. *Ann Am Acad Polit Soc Sci* 545: 116–125. https://doi.org/10.1177/0002716296545001012

25. Lindell MK (2018) Communicating imminent risk, In: Rodríguez, H., Donner, W., Trainor, J.E. Author, *Handbook of Disaster Research*, Cham: Springer International Publishing, 449–477. https://doi.org/10.1007/978-3-319-63254-4-22

26. Norman P, Boer H, Seydel ER, et al. (2015) Protection motivation theory, In: Conner, M., Norman, P. Author, *Predicting and Changing Health Behavior: Research and Practice with Social Cognition Models*, Berkshire: Open University Press, 3: 70–106.

27. Kurata YB, Prasetyo YT, Ong AKS, et al. (2022) Factors affecting perceived effectiveness of Typhoon Vamco (Ulysses) flood disaster response among Filipinos in Luzon, Philippines: An integration of protection motivation theory and extended theory of planned behavior. *Int J Disaster Risk Reduct* 67: 102670. https://doi.org/10.1016/j.ijdrr.2021.102670

28. Tang JS, Feng JY (2018) Residents' disaster preparedness after the Meinong Taiwan earthquake: A test of protection motivation theory. *Int J Environ Res Public Health* 15: 1434. https://doi.org/10.3390/ijerph15071434

29. Westcott R, Ronan K, Bambrick H, et al. (2017) Expanding protection motivation theory: Investigating an application to animal owners and emergency responders in bushfire emergencies. *BMC Psychol* 5: 13. https://doi.org/10.1186/s40359-017-0182-3

30. Yoo CW, Lee J, Yoo C, et al. (2021) Coping behaviors in short message service (SMS)-based disaster alert systems: From the lens of protection motivation theory as elaboration likelihood. *Inf Manage* 58: 103454. https://doi.org/10.1016/j.im.2021.103454

31. Schneider SK (1992) Governmental response to disasters: The conflict between bureaucratic procedures and emergent norms. *Public Adm Rev* 52: 135–145. https://doi.org/10.2307/976467

32. National People's Congress (2011) The first session of the 13th National People's Congress. Available from: http://www.npc.gov.cn/zgrdw/npc/dbdhhy/13_1/index.htm.

33. Chinese Center for Disease Control and Prevention (2002). Available from: http://www.chinacdc.cn/jgxx/zxjj/.

34. Li X, Huang J, Zhang H (2008) An analysis of hospital preparedness capacity for public health emergency in four regions of China: Beijing, Shandong, Guangxi, and Hainan. *BMC Public Health* 8: 319. https://doi.org/10.1186/1471-2458-8-319

35. Sun M, Xu N, Li C, et al. (2018) The public health emergency management system in China: Trends from 2002 to 2012. *BMC Public Health* 18: 474. https://doi.org/10.1186/s12889-018-5284-1

36. Gong ZY, Lin JF, He F, et al. (2009) Discussion of public health emergency response after natural disasters. *Chin J of Prev Med* 43: 4–7. https://doi.org/10.3760/cma.j.issn.0253-9624.2009.01.002

37. Wang J, Yuan B, Li Z, et al. (2019) Evaluation of public health emergency management in China: A systematic review. *Int J Environ Res Public Health* 16: 3478. https://doi.org/10.3390/ijerph16183478

38. Wang X, Zhang X, He J (2020) Challenges to the system of reserve medical supplies for public health emergencies: Reflections on the outbreak of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) epidemic in China. *Biosci Trends* 14: 3–8. https://doi.org/10.5582/bst.2020.01043

39. Stephens KK, Jahn JLS, Fox S, et al. (2020) Collective sensemaking around COVID-19: Experiences, concerns, and agendas for our rapidly changing organizational lives. *Manag Commun Q* 34: 426–457. https://doi.org/10.1177/0893318920934890

40. Moon MJ (2020) Fighting against COVID-19 with agility, transparency, and participation: Wicked policy problems and new governance challenges. *Public Adm Rev* 80: 651–656. https://doi.org/10.1111/puar.13214

41. Gregor S (2006) The nature of theory in information systems. *MIS Q* 30: 611–642. https://doi.org/10.2307/25148742

42. Bell E, Bryman A, Harley B (2019) *Business Research Methods.* UK: Oxford University Press.

43. Nida EA, Taber CR (1974) *The Theory and Practice of Translation.* Netherlands: Brill Archive.

44. Mayes BT, Finney TG, Johnson TW, et al. (2017) The effect of human resource practices on perceived organizational support in the People's Republic of China. *Int J Hum Resour Manage* 28: 1261–1290. https://doi.org/10.1080/09585192.2015.1114768

45. Iqbal M (2024) WeChat revenue and usage statistics. Available from: https://www.businessofapps.com/data/wechat-statistics/.

46. Silver C, Lewins A (2014) *Using Software in Qualitative Research: A Step-by-Step Guide.* London, UK: Sage.

47. Maxwell JA (2012) *Qualitative Research Design: An Interactive Approach.* Thousand Oaks, CA, USA: Sage.

48. Saunders B, Sim J, Kingstone T, et al. (2018) Saturation in qualitative research: exploring its conceptualization and operationalization. *Qual Quant* 52: 1893–1907. https://doi.org/10.1007/s11135-017-0574-8

49. McAleavy T, Dement C, Murphy H (2024) Inductive qualitative content analysis: From research design to presenting your findings, In: Cary, D.P. Author, *Content Analysis: Methods and Practices*, Nova Science Publishers, 1–30. Available from: https://novapublishers.com/shop/content-analysis-methods-and-practices/.

50. Erlingsson C, Brysiewicz P (2017) A Hands-on guide to doing content analysis. *Afr J Emerg Med* 7: 93–99. https://doi.org/10.1016/j.afjem.2017.08.001

51. Qiu W, Chu C, Hou X, et al. (2018) A comparison of China's risk communication in response to SARS and H7N9 using principles drawn from international practice. *Disaster Med Public Health Prep* 12: 587–598. https://doi.org/10.1017/dmp.2017.114

52. Di Gennaro F, Pizzol D, Marotta C, et al. (2020) Coronavirus diseases (COVID-19) current status and future perspectives: A narrative review. *Int J Environ Res Public Health* 17: 2690. https://doi.org/10.3390/ijerph17082690

53. Qi F, Hu L (2020) Including people with disability in the COVID-19 outbreak emergency preparedness and response in China. *Disabil Soc* 35: 848–853. https://doi.org/10.1080/09687599.2020.1752622

54. Tu F (2016) WeChat and civil society in China. *Commun Public* 1: 343–350. https://doi.org/10.1177/2057047316667518

55. Zhang Z, Negro G (2013) Weibo in China: Understanding its development through communication analysis and cultural studies. *Commun Polit Cult* 46: 199–216. Available from: https://www.sci-hub.ee/10.3316/ielapa.533304086986808.

56. Kimura AH (2018) Fukushima ETHOS: post-disaster risk communication, affect, and shifting risks. *Sci Cult* 27: 98–117. https://doi.org/10.1080/09505431.2017.1325458

57. What's Needed Now to Protect Health Workers: WHO COVID-19 Briefing. Cologny, Switzerland: World Economic Forum, 2020. Available from: https://www.weforum.org/agenda/2020/04/10-april-who-briefing-health-workers-covid-19-ppe-training/.

58. Ng K, Poon BH, Kiat Puar TH, et al. (2020) COVID-19 and the risk to health care workers: A case report. *Ann Intern Med* 172: 766–767. https://doi.org/10.7326/L20-0175

59. Lo D, De Angelis M (2020) COVID-19: Protecting health-care workers. *Lancet* 395: 922. https://doi.org/10.1016/S0140-6736(20)30645-0

60. U.S. Department of Labor (2020) Healthcare workers and employers. Available from: https://www.osha.gov/SLTC/covid-19/healthcare-workers.html.