

# What Can COVID-19 Tell Us About Evidence-Based Management?

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## Abstract

People worry that many COVID-19 decisions are not evidence based, but applying typical evidence-based management (EBM) in a pandemic seems difficult. A pandemic is characterized by uncertainty, high potential loss, time pressure, and competing values, all posing challenges to EBM. Drawing on events in government responses to COVID-19, this essay focuses on three issues: What should be considered as evidence in pandemic-like situations? How can we make evidence more accessible to decision makers in such situations? And, does evidence have a role in ethical judgments in a pandemic? The essay argues that EBM must be extended to address pandemic-like situations. The evidentiary standard should take into consideration “appropriateness,” “reasonableness,” and “intuition,” paying attention to the stages of a pandemic and the type of errors we want to avoid. In addition, the essay calls for building policy capacity in terms of coproducing and applying evidence in and outside government, as well as strengthening public managers’ capacity in evidence-based ethical analysis.

## Keywords

COVID-19, evidence-based management, pandemic, evidence

“In a time of uncertainty, facts provide clarity. In a time of anxiety, facts comfort. In a time of misinformation, facts correct. In a time of division, facts unite. In a time of crisis, facts matter most.” The CNN coronavirus ad says it beautifully about the importance of facts in fighting the COVID-19 pandemic. To some degree, this relates to the clash between President Trump and the media over information and misinformation regarding COVID-19, as well as the network’s worry that many of the COVID-19 decisions are not based on facts, or not evidence based.<sup>1</sup>

The worry, that many COVID-19 decisions are not evidence based, is particularly agonizing for many public administration scholars, who have seen evidence-based management (EBM) becoming an important area of research and practice (Haskins & Margolis, 2015; Heinrich, 2007; Jennings & Hall, 2012; Maynard, 2006; Parkhurst, 2017; Shillabeer et al., 2011; Vanlandingham & Drake, 2012). Countries such as Australia, New Zealand, United Kingdom, and the United States have made steady progress on EBM. In the United States, the Evidence-Based Policymaking Commission Act of 2006 established a bipartisan commission to facilitate EBM in federal government, and more concrete steps were formulated in the Foundations for Evidence-Based Policymaking Act of 2018. The Obama administration pushed this agenda in its executive orders, Office of Management and Budget (OMB) guidelines, budget decisions, and exemplary initiatives (Haskins & Margolis, 2015). Many nonprofits such as the MacArthur Foundation and the Pew Center for the States joined the chorus.

However, the worry is not surprising, given many have questioned the utility and feasibility of EBM in a political world (Hammersley, 2013; Pfeffer & Sutton, 2006; Smith, 2013). Nevertheless, with some exceptions (e.g., European Center for Disease Prevention and Control, 2019; Lipsitch et al., 2011; Smith, 2013), much less attention has been paid to EBM in emergency management and particularly public health emergencies. Government responses to COVID-19 provide a great opportunity to rethink EBM in situations such as a pandemic, which are characterized by uncertainty, high potential loss, time pressure, and competing values.

Given the time constraint and the space limit, this essay is not a research-based article and does not follow a typical structure of literature review, research design, and findings.<sup>2</sup> Instead, it offers educated reflections on three issues that are of particular interest: They are salient during this pandemic and they embody dimensions of EBM that have often been neglected. The three issues are as follows: What should be considered evidence in pandemic-like situations? How can we make evidence more accessible to decision makers in

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such situations? And, does evidence have a role in ethical judgments in a pandemic?

## What Is Evidence for Pandemic Decision Making?

As Davies et al. (2000) writes, evidence refers to the results of “systematic investigation towards increasing the sum of knowledge” (p. 3). Typically EBM considers the randomized controlled trials (RCTs) as the golden standard for evidence. Results from RCTs and other experiment and quasi-experiment studies are preferred in a hierarchy of evidence despite the protest from experts who place equal weight on qualitative data, storytelling, and understanding (Buss & Buss, 2011; Smith, 2013; Stoker & Evans, 2016). Because a single experiment study faces external validity (generalizability) problems, EBM advocates embrace systematic reviewing and meta-analysis to consider a large number of such studies. Still, systematic reviewing and meta-analysis cannot uncover the mechanisms of action or theories of change behind the observed outcome (Pawson, 2006). For example, the existing evidence about the relative effects of pandemic interventions, such as wearing masks, school closure, and household quarantine, is highly limited: Every pandemic was different, and there were only a handful pandemics in recent decades. Moreover, the available studies on those interventions were bounded by culture and context (Jamison et al., 2018), and they tell little about the mechanism behind the effects.

During a pandemic, the evidentiary standard of EBM needs to be adjusted. A case in point is the Chinese city of Wuhan and Hubei Province’s reaction to the early signs of COVID-19. As widely reported, the local authorities were informed of the cases of severe acute respiratory syndrome (SARS)-like pneumonia, but they did not treat them as evidence of an epidemic in the forming. From publicly available information, three cases of unexplained pneumonia were reported to a district branch of the Wuhan Center for Disease Prevention and Control (CDC) on December 27. The Wuhan CDC conducted epidemic testing and investigation the same day. Four more cases were reported on the December 29, and on December 30, the Wuhan Health Commission issued emergency notices to hospitals regarding the reporting and treatment of unexplained pneumonia. On December 30, a young doctor from the Central Hospital of Wuhan, Wenliang Li, posted texts, pictures, and video clips about the diagnoses in a WeChat group consisting of his medical school classmates. He used terms such as “SARS-like” and “Coronavirus” to warn his professional peers. On December 31, he was summoned and admonished by the local police and his hospital leaders for “spreading the rumors.”<sup>3</sup>

Rumors are fabricated statements not grounded in facts—or not backed by known authority for their truth. The local authorities treated medical professionals’ informed judgment based on solid but incomplete information—incomplete as cases were few and the virus had not been determined scientifically—as

rumors. Therefore, the local authorities decided to continue their way of life: Everything went on as planned and normal until the central government decided to lock down the city on January 23. In retrospect, if the local authorities took seriously medical experts’ educated judgments and used them as evidence in the decisions, the epidemic development in Wuhan would have been different, more lives would have been saved, and the pandemic would have been in a different shape.

This does not mean we should blindly trust educated judgments in public health emergencies. Traditionally, EBM in health emergencies is not satisfied with educated judgments; rather, it emphasizes scientific efforts in finding the vaccine and medicine, which may take years because the vaccine cannot be put in use unless it is proved safe based on sufficient evidence from RCTs. This is fine in normal situations. The Food and Drug Administration (FDA) indeed must adhere to the golden standard in its decisions on new drugs. Nevertheless, what if a drug, although still going through RCTs, is found effective on a particular group of patients? It may have no negative or minor negative effects. Should FDA authorize its use in a pandemic or crisis? The Oscar-winning movie, *Dallas Buyers Club*, tells a story that demonstrates the tension between scientific requirements of FDA and critical needs of patients. Interestingly there is a similar Chinese movie, *Dying to Survive*, which exposed the tension to the Chinese public. Both movies are not framed in a pandemic situation, but the tension is vivid. This seems to suggest that whether a piece of information should be considered as evidence is not entirely an “objective” matter when there are uncertainties, but dependent on other factors.

One such factor is the stage of pandemic development and the type of error we want to avoid. A pandemic has typically six stages: preparedness, surveillance, response, treatment, recovery, and learning. Perhaps different stages require different types of evidence and evidentiary standards. For example, in the preparedness stage, one needs explanatory and evaluative evidence of past pandemics and the efficacy of various interventions. In the surveillance stage, one needs descriptive and predictive evidence based on early signs.

In the preparedness and surveillance stages, we should primarily be concerned with Type I error: Rejecting a signal when it is true. Rejecting the early cases in Wuhan as signals of an epidemic was a Type I error. In comparison, Type II error means accepting a signal when it is false. Getting local communities ready for a false-alarm signal may cost some resources but it is better than regretting for not responding to a true pandemic. That is, in the preparedness and surveillance stages, we should err on the caution side for a potential pandemic and accept “less scientific” information as evidence. After all, facts are not “objective things” out there, but usually are “recognized patterns” in the environment. They are probabilistic, and we have to be clear about the type of errors we particularly want to prevent. This is the essence of the disagreement between Ioannidis (2020) and Lipsitch (2020). John Ioannidis, a Stanford University professor and a leader in the “meta-research”

movement, wrote on March 17 that the data collection so far could not justify long-term countermeasures such as school closure, referring to it as an “evidence fiasco.” Firmly disagreeing, Marc Lipsitch, director of Harvard University’s Center for Communicable Disease Dynamics, argued on March 18 that “we know enough now to act decisively.”

The educated judgments that should be valued are those of professional experts, as opposed to an ordinary person, a public administration scholar, or a politician who has no public health-related background. Wenliang Li and his colleagues were medical professionals who had at least 7 years of medical school training and years of practice. Some of the doctors experienced the fight against SARS 17 years ago. They have learned capacity from the past. They have formed tacit knowledge and intuition based on professional training and practical experience. Coronaviruses are a large family of viruses and we have studied it for decades. Although COVID-19 caught us in surprise, it shares some characteristics of similar viruses in the past, which could serve as a reasonable guide. If something can be a reasonable guide, can it be viewed as a type of evidence? World Health Organization’s (WHO) Regional Office for Europe once used a broad definition of evidence: “findings from research and other knowledge that may serve as a useful basis for decision-making in public health and health care.” (EACHR, 2003).

The use of tacit knowledge and educated judgment relate to intuitive decision making, which has been emphasized in crisis situations (Miller, 2018). Intuition appears to be antithetical to EBM, perhaps because much of the EBM literature is grounded in normal situations or normal emergencies, not unprecedented new challenges or crises such as COVID-19. COVID-19 belongs to the family of coronaviruses on which the medical profession has accumulated some knowledge. What if we are dealing with an entirely new virus on which the medical profession has no prior knowledge at all? In a pandemic with high levels of novelty, uncertainty, intensity, and spread, EBM may be more important than ever, but available “scientific” evidence is extremely limited. That would force us to accept “other” types of evidence, even when this requires experts making informed jumps from past knowledge to an unfamiliar situation—however creative and imaginary that might be. This does not mean we should discard or devalue the scientific evidence based on RCTs. Whenever we have that type of scientific evidence, we should take advantage of it. Perhaps we are better off not worrying about what should be considered evidence, but concentrating on the role of professional expertise and those who can apply it to a novel and urgent situation.

### **How Can Reasonable Evidence Be Available for a Pandemic**

Following the discussion above, an important question is as follows: In an unprecedented pandemic, where does reasonable evidence come from for decision makers? Bogenschneider

and Corbett (2010) identify three criteria for an evidence to meet policymakers’ standards for usefulness: (a) credibility—high scientific quality and unbiased, (b) accessibility—easily understandable, and (c) timeliness—available when the decisions are being made. As I have indicated, in a sudden pandemic such as COVID-19, particularly in its forming and spreading stages, credible, accessible, and timely evidence may be simply nonexistent in many areas, such as the origin of the virus, the transmission mechanisms, the vitality rate, and the mutation pattern. And, we may want to change the definition of credibility to “reasonable, based on unbiased professional judgement.”

How can such judgments be formed for responding to a pandemic? Certainly, it requires efforts from both policymakers and researchers. The literature blames both the evidence suppliers (researchers) and consumers (policymakers) for the failure of EBM (Cairney, 2016; Hammersley, 2013; Smith, 2013). There are communicative, institutional, and cultural gaps between the two sides. In this pandemic, the public’s anger has been mostly raged against the policymakers in countries such as the United Kingdom and the United States. The sentiment seems familiar: Politicians are closed-minded, committed to their ideology and electoral interest, incapable to understand research, and unmotivated to seek evidence. These might be true, but to be fair to policymakers, they are not necessarily surrounded by timely scientific evidence or reasonable evidence in the initial stages of a pandemic. Political decision making is a garbage can process where the best evidence may not be at hand when it is needed (Cohen et al., 1972). Politicians are usually surrounded by competing evidences and politics.

The literature has offered many recommendations for increasing the use and effectiveness of EBM (Cairney, 2016; Davies et al., 2000; Smith, 2013). One solution is to develop “bridges” between the research community and the policymaker community by creating “knowledge broker” organizations and positions in government (Smith, 2013). They are policy professionals in government who are the backbone of a government’s policy capacity (Wu et al., 2018). In the first section, I have argued that we should shift our attention away from evidence and move onto the role of professional experts. This does not mean researchers should replace politicians to make policy decisions. Taking politics or politicians out of policy making is not possible, nor is it democratic or legitimate (Cairney, 2016; Weiss, 1999). A democratic society “has no more obligation to accept the data and dicta of social scientists than it does to listen to shamans, astrologers, or television commentators” (Weiss, 1978, p. 61). Instead, it means building institutionalized government capacity in searching, coproducing, using, and evaluating appropriate evidence, as well as learning from the use of evidence in various situations.

The early problems encountered by China and the United States in fighting COVID-19 reveal weaknesses in the infrastructure of policy capacity in addressing pandemics. In

China, the then Hubei Provincial Health Commissioner had no health-related background, whereas the Commission's Chinese Communist Party (CCP) secretary had mainly worked in universities and the Youth League before joining the commission. In Huanggang, another hotspot not far away from Wuhan, the city health commissioner was completely unaware of the city's response status in front of a central government inspection team, which was caught on camera. She had no health-related background either. The lack of public health expertise, particularly infectious disease prevention and control expertise, has been a chronic problem in China. The lead scientist of Chinese National CDC said in a 2019 meeting that the national CDC had lost more than 100 young talents in the preceding 3 years.<sup>4</sup> Many local CDCs were downgraded or absorbed by other health-related institutions during the 2018 to 2019 government reorganization.

Similarly, the United States faced the policy capacity challenge in the area of pandemic response. In May 2018, Rear Admiral Timothy Ziemer from the National Security Council was pushed out of job by the administration, and the global health security team he oversaw was disbanded under a reorganization. Ziemer was the top White House official responsible for the U.S. response in the event of a pandemic. Before joining in the National Security Council, he had been a well-respected public health professional in leading the President's Malaria Initiative under George W. Bush and Barack Obama.<sup>5</sup> When a reporter asked President Trump about his consistently calling for enormous cuts to the CDC, the National Institutes of Health (NIH) and the WHO, the President's response revealed a clear lack of interest in maintaining institutionalized capacity on pandemic responses:

We can get money, we can increase staff—we know all the people. This is a question I asked the doctors before. Some of the people we cut, they haven't used for many, many years, and if we have ever need them we can get them very, very quickly. And rather than spending the money—I'm a business person. I don't like having thousands of people around when you don't need them. When we need them, we can get them back very quickly. (Friedersdorf, 2020)

However, both China and the United States benefited from high-profile disease control professionals in their COVID-19 response. In China, Dr. Zhong Nanshan became the public face of its efforts in fighting the coronavirus. He is a fellow of China's Academy of Engineering and director of the National Clinical Research Center for Respiratory Disease. It was he who led the National Health Commission expert group to Wuhan and announced that the virus can spread between people. He has long been a household name in China as he contributed greatly in curbing SARS in 2003. In the United States, an expert with similar status is Dr. Anthony Fauci, who was appointed director of National Institute of Allergy and Infectious Diseases in 1984 and has advised six presidents on many domestic and global health

issues. Although he has been criticized by President Trump for their disagreements, he has remained on the White House coronavirus task force and has been candid in sharing his professional judgment in press conferences and senate hearings.<sup>6</sup> A National Public Radio (NPR) report actually compared Dr. Zhong with Dr. Fauci.<sup>7</sup>

China's coronavirus response also suggests another solution: relying on technology to make available, and take advantage of, evidence from frontline health workers. China's slow response in the initial stage of the pandemic was often related to the failure of its reporting system: the China Infectious Disease Automated-Alert and Response System. The system was built after SARS and started to operate in 2008. It enables all disease prevention and control institutes, all medical institutions at and above the county level, and nearly all township clinics, to upload information about 39 legally defined infectious disease and public health emergencies in real time. The purpose was to let the National Health Commission have instant surveillance over the whole country. Back in December, 2019, the reporting system did not work because the local authorities in Hubei and Wuhan interfered. New experiments are now being conducted to incorporate machine learning, data mining, crowdsourcing, and community-level governance into the reporting system so that political interference will be avoided. The updated system will have the potential to deliver evidence—when and wherever it emerges—to the central policymaker.

The third solution is to mobilize capacity in institutions such as international organizations and nonprofit organizations. Many universities and think tanks have created their own systematic reviews or repertoire of evidence relating to COVID-19 responses. For example, the Center for Evidence-Based Medicine of the Oxford University created Oxford COVID-19 Evidence Service to provide rapid evidence reviews, data analysis, and thought-provoking writing relating to the pandemic.<sup>8</sup> The U.S. National Academies of Sciences, Engineering, and Medicine has convened an ad hoc committee to conduct a comprehensive review of grading of evidence for public health emergency preparedness and response practices, based on literature generated since September 11, 2001.<sup>9</sup>

Admittedly, having an echelon of professional experts, utilizing technology to increase capacity in generating and delivering evidence, and having reputable nongovernment organizations to create evidence repertoires, do not guarantee effective EBM. Politicians may still engage in the fabrication, stigmatization, misinterpretation, and politicization of evidence. Evidence, regardless of how scientific or reasonable it is, cannot replace the integrity of public leadership. Nevertheless, when reasonable evidence is made available from multiple sources, the likelihood of being heard by policymakers will be increased. To some extent, multiple sources of evidence create pressures unto politicians—although they are primarily concerned with electoral accountability, they are shaped by professional accountability, social accountability, and public accountability.

## Does Evidence Have a Role in Pandemic Ethics?

The relationship between evidence and politics often relates to the relationship between facts and values. The common view in EBM is that facts on their own cannot determine what the ends should be and what actions are appropriate; instead, values do (Hammersley, 2013). Many EBM advocates seem to recede from the realm of values and ethics, implicitly accepting an evidence–value dichotomy. Even when a nondichotomy view is taken, it is usually in one direction where the evidence cannot escape the influence of values. Indeed, the generation and interpretation of evidence is always shaped by values. But we should not downplay the other direction where sound value decisions cannot be done without evidence and facts, which is why EBM arose in the first place.

The COVID-19 response involves many ethical judgments that are rooted in competing values. For example, how to balance individual freedom with collective welfare when decisions of forced quarantine are made? How to balance people's health and safety with economic development when making reopening decisions? How to balance individuals' constitutional rights of free speech with there is a need to prevent rumors during a pandemic? China quickly adopted nationwide quarantine and social distancing in curbing the virus spread and then slowly and cautiously moved to reopening. In contrast, President Trump slowly and reluctantly announced national emergency and then hastily pushed for reopening. Regardless of the backstage dynamics and institutional differences of the two countries, the choices reflect different prioritization of values.

In recent years, particularly after the 2008 global financial crisis, the ideological polarization and narrow nationalism have been on the rise. As a result, addressing competing values becomes even more important for public administration scholars. This is part of the reason why the public value of governance literature has burgeoned (Bryson et al., 2014). So far, the evidence–value relation has not been an important concern for the public value literature.

Many events in this pandemic suggest that we need be more assertive about the role of evidence in even ethical and value judgments. This is not only about how politicians lie, make accusations, or blame other countries, but also about how public managers and citizens make judgments in a pandemic. Addressing the latter is important because preventing chaos, panic, hatred, and xenophobia is key to pandemic responses. More than often, people in a pandemic make judgments at the expressive level and simply vent their feelings and emotions. Drawing from Aiken (1962), Cooper (2012) identifies four levels of ethical reflection: the expressive level, the moral rules level, the ethical analysis level, and the postethical level. At the expressive level, people do not “attempt to persuade others” (p. 19). “They provide neither evidence nor detailed descriptions of a state of affairs” (p. 19). Some people may go on to the second level, using certain rules, maxims,

and proverbs as a moral guide, but “rationality and systematic reflection” are involved only in a “limited, piecemeal fashion” (p. 21). At the second level, one may cover up a COVID-19 incident following the moral rule of patriotism or “don't air dirty linen outside the organization.”

A case in point is the Fang Fang Diary. Fang Fang is a famous Chinese writer, who once was the chairwoman of the Hubei Writers Association. During the Wuhan lockdown, as a Wuhan resident, Fang Fang posted an online diary about her fears, frustrations, anger, and hope. Although many people appreciated it, some were unhappy about her paying too much attention to “the dark side” of the pandemic response. When the English version of the diary went on presale on Amazon, the disagreement erupted into a clear social and ideational division. Should she be praised for recording the experiences of ordinal individuals in a pandemic? Should she be supported for exercising her constitutional right of free expression? Should she be despised because she is not patriotic in giving materials for other countries to hold China accountable? Few people on social media went to the ethical analysis level or the postethical level, which requires careful reexamination and prioritization of values and worldviews.<sup>10</sup>

To be fair, if one asks a group of public administration faculty members on the Fang Fang Diary, one will surely receive different judgments. I am less concerned with exactly whether it is right or wrong. Rather, I am worried about the lack of ethical analysis capacity and the unwillingness to hear different voices and to reason together with people of dissent. Public managers always face competing interests and values. Instead of quickly taking sides, they have to develop solutions in a democratic way. Evidence and facts are essential to the ethical analysis capacity and effective dialogue (Cooper, 2012; Lewis & Gilman, 2005). Svava (1997) synthesizes the bases on administrative ethics and proposes an ethics triangle: principle (justice, fairness, equity), consequences (greatest good), and virtue/intuition (character). In understanding the consequences or potential consequences, one must possess evidence and facts. In applying principles such as justice, one must have information about who will be affected and how.

Usually people agree on abstract values and norms but disagree on concrete judgments and solutions. Without evidence and a keen understanding of local contexts and situations, frame reflection is impossible (Schon, 1995). WHO (2016) issued the *Guidance for Managing Ethical Issues in Infectious Disease Outbreaks*, outlining the principles in addressing issues such as government obligations, community involvement, protecting the vulnerable, resource allocation, surveillance, freedom of movement, emergency use of unproven interventions, and data sharing. These ethical principles seem generally agreed upon, but how to apply them in specific cultural, institutional, and situational contexts is uncertain and requires ethical reasoning based on appropriate evidence. EBM should play a role in such reasoning. If not “speaking truth to power,” it can still mean “dialogue with evidence.”

## Conclusion

As government responses to COVID-19 demonstrate, on one hand, in a pandemic situation, EBM matters more than ever, but on the other hand, it is more difficult to achieve than in normal situations. It is clear that we need more evidence and we want our leaders to make policies based on the evidence instead of prejudices, ideologies, or narrow interests. But a pandemic means uncertainty, high potential loss, time pressure, and competing values, which pose questions such as what could and should be counted as evidence, where can we get the evidence, and how should we deal with using the evidence amid competing values. In other words, we need to rethink EBM in crisis situations or pandemics. In developing a good governance of evidence, we need to be conscious about the normal situations versus pandemic-like situations.

In this short essay, I argue that EBM in pandemic-like situations must use different evidentiary standards. The hierarchies of evidence that emphasize its scientific quality are still relevant, but “appropriateness,” “reasonableness,” and “trained intuition” must be taken into consideration. Especially in the preparedness, surveillance, and initial response stages, avoiding Type I error is more critical. We may want to more systematically incorporate behavioral economics and decision-making models under uncertainty (Kahneman, 2013) into EBM. Second, it is important to have EBM capacity in and outside government. Trained policy professionals and organizations play a crucial role in coproducing, interpreting, evaluating, and applying evidence. Third, in a democratic society, policies should be based on both evidence and values, but we should strengthen our leaders’ and public managers’ capacity in using evidence in reasoned ethical analysis.

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## Notes

1. This essay does not differentiate between evidence-based management from evidence-based decision or evidence-based policy. Public management is considered as a broad term that includes decision making or policy making. The management of a country or state, after all, involves both public policy and organizational management.
2. Although the essay tries to be fair and facts based, some caveats are in order. The pandemic is still evolving and it is impossible to put a definite word on the relative performance of countries. The study of the virus is still ongoing and it is too early to judge what the facts are regarding things such as the

origin of the virus. The information regarding the inner workings of governments is restricted and limited, so what we can rely on are mostly publicly available materials.

3. Wenliang Li was infected of COVID-19 on his job fighting against the pandemic. He passed away on February 7. Later on, he was named “Outstanding Individual in Preventing and Controlling COVID-19” by the National Health Commission and awarded “May Fourth Medal” by the National Youth League.
4. According to Dr. Guang Zeng’s speech at the Seminar on Ten-Year Health Care Reform in China, at the China Development Research Center, June 15, Beijing.
5. Sun, L. Top White House official in charge of pandemic response exits abruptly. *Washington Post*, May 11, 2018.
6. Based on a CNBC report. <https://www.cnbc.com/2020/05/13/coronavirus-trump-says-faucis-warnings-about-reopening-are-not-acceptable.html>
7. “They Call Him A Hero: Dr. Zhong Is The Public Face Of China’s War Against Coronavirus,” <https://www.npr.org/sections/goatsandsoda/2020/04/02/825957192/dr-zhong-is-the-supreme-commander-in-china-s-war-against-coronavirus>
8. <https://www.cebm.net/oxford-covid-19-evidence-service/>
9. <https://www.nationalacademies.org/our-work/evidence-based-practices-for-public-health-emergency-preparedness-and-response-assessment-of-and-recommendations-for-the-field>
10. I surveyed a group of undergraduate public administration students regarding their opinion on Fang Fang. Almost all of them had a one-sided answer. Further inquiring their reasoning indicated that they did not go beyond the second level and some even were at the first level.

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