

Research Article

Scientific and Technological Innovation and Public Awareness on the Control of a Major Epidemic of Complex and High-Risk Spreading Infectious Diseases

Tang Z^{1*} and Yao Y²¹Social Governance and Innovation Research Center, Tsinghua University, China²School of Computer Science & Informatics, Cardiff University, UK***Corresponding author:** Zhicheng Tang, Social Governance and Innovation Research Center, Tsinghua University, Shenzhen International Graduate School, China

The copyright of this article belongs to the author

Received: July 24, 2020; **Accepted:** August 12, 2020;**Published:** August 19, 2020**Abstract**

The handling of public crises and public safety are important measures and guarantees of state governance, which are the support for the stable development of the country and the health and harmony of people's lives. This article analyzes the situation of China's Novel Corona virus pneumonia (COVID-19) infectious disease control in 2020. From the perspective of scientific and technological innovation, public awareness, and system complexity, the scientific rationality of national governance is used as a clue to scientifically analyze the major epidemic of infectious diseases. Discussion on sexual prevention and control. This article uses the scientific theory of national emergency management and the practice of epidemic prevention and control to study the public management and countermeasures for the control of major epidemics of infectious diseases. The article states that China has established a scientific paradigm for the management of high-risk infectious diseases for major epidemics of infectious diseases, and provides a model for national crisis management for the world.

Keywords: Novel corona virus pneumonia (COVID-19); Epidemic control; Scientific and technological innovation; Public awareness; System complexity**Introduction**

Judging from the control of Novel corona virus pneumonia (COVID-19) infectious diseases in 2020, the changes in infectious diseases are complex, and the diversity and spread of infectious diseases are increasing. The rapid development of infectious disease epidemic has caused great difficulties for the country's infectious disease control, wasting state resources, consuming a large amount of human, material and financial resources, and brought great inconvenience and life crisis to people's lives. Therefore, for national governance, a scientific governance method must be adopted to cope with major social crises. General Secretary Xi Jinping proposed: "Put the safety and health of the people first" [1]. As a long-term strategy for national security and stability governance, it is necessary to formulate and respond to the emergency treatment of high-risk spreading infectious diseases.

High-risk spreading infectious diseases refer to infectious diseases that endanger people's lives and are difficult to be cured by the current scientific and technological level. This disease has a strong spread and contagiousness in a very short period of time. Great panic in society. It seriously affects people's social work and lifestyle, greatly weakens the productivity of society, and ultimately affects the security and stability of the country.

The world today is an age of rapid technological innovation. The advancement and innovation of science and technology has made society develop rapidly. At the same time, the development of science and technology is a double-edged sword. The development of science and technology will bring rapid information dissemination and

greater convenience for transportation. Human interaction is more frequent, closer and faster. In such a society of close communication, if there is the spread of high-risk spreading infectious diseases, its transmission channels will be more diverse, the speed will be faster, the damage will be greater, and human civilization will face a major crisis.

China has experienced SARS infectious disease control operations in 2003 and 2020's COVID-19 infectious diseases control operations. Both of these strongly infectious diseases encountered weak governance by local governments at the beginning stage. In the subsequent governance phase, the central government adopted scientific, rational, rapid, and efficient governance strategies and measures. In particular, the control of the COVID-19 infectious disease in 2020, and the decision and leadership of General Secretary Xi Jinping showed China's speed, scale, and efficiency in China, which have attracted worldwide attention.

Under the leadership of the Chinese government, the people of the whole country have jointly prevented and controlled this major epidemic, which has led to a gradual decline in new cases of infectious diseases. As shown below (Statistics on March 1, 2020) [2] Figure 1.

As can be seen from the chart, until March 1, 2020, the major epidemic of the COVID-19 infectious disease was effectively controlled. As a big country with huge influence in the world, China not only wants national security and stable development, but also promotes world-wide security and stable development. We should demonstrate exemplary role in national governance strategies for the prevention and control of high-risk spreading infectious diseases and

contribute to sustainable development worldwide.

Applying Scientific and Technological Innovation to Overcome Major Epidemics of High-Risk Spreading Infectious Diseases

The concept of technological innovation comes from the innovative concept proposed by management scientist Schumpeter (JA) in the early 20th century. He believes that “innovation is to establish a new production function, which is the recombination of production factors” [3]. Scientific and technological innovation means that science and technology have created new technologies on the basis of the original, and a new revolution has occurred in technology. New technologies have replaced old technologies. As a result, people’s productivity has been greatly improved, and the goals of human activities have been easier to achieve. Scientific and technological innovation is not only the primary productive force, but also an important factor that has changed people’s lives. In the 21st century today, the world has entered a science and technology competition. Countries around the world regard technological innovation as an important strategy for developing the national economy, improving people’s living standards, and improving the status of the country. Today, countries around the world are engaged in fierce competition in the fields of information technology, biotechnology, space technology, national defense technology, medical technology, new materials technology, energy development technology, and so on. China’s General Secretary Xi Jinping proposed: “Science and technology innovation is a strategic support for improving social productivity and comprehensive national strength, and must be placed at the core of the country’s overall development” [4]. Science and technology innovation has become China’s long-term strategy to realize the dream of a strong country.

It is of great significance that we apply the strategic ideas of scientific and technological innovation to the control of major epidemics of high-risk spreading infectious diseases. The natural environment on which human beings live is complex and complicated. In fact, the history of human development is also a history of humans fighting against various diseases. From the historical development dating back to the past 6,000 years, it seems that humans have countless records of fighting against diseases. From these resistance records, the medical technology revolution led by scientific and technological innovation has enabled humanity to overcome disease again and again.

Since the European Renaissance, mankind has restored rational thinking, advocated the use of scientific methods and scientific experiments, and used scientific evidence to seek scientific truth. The scientific community has proposed that “knowledge is power”, the rapid development of human science and technology, and continuous technological innovation. From the development of medical technology in the world over the past century to today, every medical technology innovation can make a major breakthrough for human beings in fighting diseases. For example, in 1895, Roentgen discovered X-rays, innovating the perspective function of medical technology; in 1928, the German scientist Fleming discovered penicillin, which fought humans and bacteria for thousands of years and finally won; in 1956, the first The manufacture of an artificial heart has become a milestone in human medical technology. In 2000, the United States led the formation of the Human Genome Project to allow

human medical technology to achieve epoch-making technological innovation. In 2020 of the world today, medical technology has reached the level of biomolecules. The global competition for medical technology innovation has been fully launched.

Medical science and technology innovation will inevitably cause a change in the paradigm of medical technology, and the change in the paradigm of technology will inevitably lead to a revolution in medical technology. Due to the wide range of medical technology applications and the close attention of people, it creates are very significant and have a great impact on human lifestyles and social activities. Therefore, medical science and technology innovation has a great effect on the development of human society. Countries around the world regard medical technology innovation as a long-term strategy for national development.

Judging from the epidemic situation of COVID-19 in 2020, this is the largest infectious disease prevention and control war since the founding of the People’s Republic of China. China’s economic growth, people’s lives and property, social stability, and quality of life have been greatly impacted and hurt. The human world, both in the past, now and in the future, will be plagued and harmed by the epidemic of major spreading infectious diseases. So from the long-term strategy of national governance, how should we face these major epidemic attacks? We must set scientific and reasonable response measures and management strategies.

From the recent history of human beings fighting major epidemic diseases of spreading infectious diseases: black death infection in Europe, Ebola virus infection in Africa, malaria virus infection, plague virus infection, smallpox virus infection and so on. Faced with the attack of these major infectious diseases, human medical technology has produced scientific and technological innovation and technological revolution. Humans produce antibiotics to fight the damage of bacteria, smallpox vaccines, and anti-malarial drugs. The virus is constantly mutating, and humans are producing endless drugs. Each time a major epidemic situation of a spreading infectious disease is controlled, scientific and technological innovations using medical technology can achieve a major breakthrough against infectious diseases, and save countless human lives. Therefore, scientific and technological innovation in medical technology is the core weapon against the major epidemic of infectious spreading diseases. It is the key factor to victory in a major epidemic and the simplest and most effective method. As long as medical technology is available to kill the infectious disease virus or prevent the spread of the infectious virus, a major epidemic can be effectively controlled. If we can use scientific and technological innovation in medical technology to combat the current major epidemic, then the entire social governance, national governance, and people’s lifestyles will be minimally affected. Effective medical technology innovation can save a lot of human, material, financial and operating capital in the country, and it can also maintain the country’s prosperity and stable development.

Scientific and technological innovation of medical technology is the key factor for mankind to overcome the major epidemic of proliferative infectious diseases. It should be regarded as a powerful weapon for national security and stable development worldwide, and as an important strategic measure for global sustainable development.

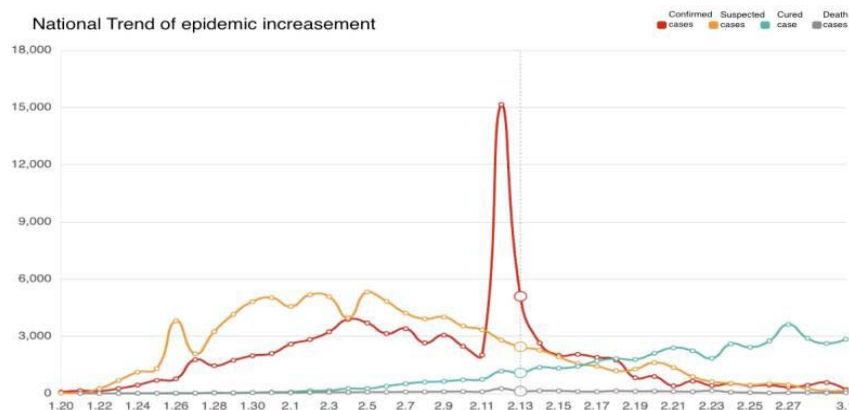


Figure 1: (Source of chart: <https://news.ifeng.com/c/special/7tPIDSzDgVk>, March 1, 2020).

(Chart description: March 1, 2020, the national epidemic situation is real-time dynamic. The abscissa represents the date and the ordinate represents the number of newly diagnosed, suspected, cured, and dead cases).

Therefore, we must speed up the scientific and technological innovation research and development of medical technology and put it at the top of national security development. The world should pay close attention to R & D and applications in this regard. Judging from the current scientific and technological research and application of prevention and control of spreading infectious diseases, China's investment in this area is not strong enough. We should increase national scientific research institutions in this field, increase scientific research personnel, increase investment in scientific research funding, strengthen international scientific research cooperation and exchanges, and increase research results rewards for scientific researchers. The state must place research on the prevention and control of proliferative infectious diseases into an important position in national scientific research and regard it as a long-term strategy for the stable and secure development of the country.

Public Awareness and Public Management of Major Epidemics

According to the major epidemic situation of China's COVID-19 in 2020, there is currently no mature level of medical technology in the world that can cope with virus mutations and rapid infection and spread to harm human health and even endanger life. Faced with great harm to human life, human beings have caused great panic psychologically, severely affected people's lives and work, and formed a special public awareness in the event of a major epidemic.

The so-called public awareness is: "A mass-based organization group forms common beliefs based on the same economic, cultural and custom, lifestyle, religion and other factors, and has the same or similar social, scientific, and moral issues. Common perceptions, and have the same or similar life ideas and ideal pursuits. Public awareness usually manifests as a collective psychology, and an organizational group with public awareness is regarded as a psychological group" [5].

The general public is facing a major epidemic of spreading infectious diseases in 2020, and their public understanding is: physically, they realize that their lives and health are seriously endangered, and they are even threatened with death. In terms of mainstream consciousness, there has been a cross-spreading of

various officials and media information on major epidemic control and public awareness tends to be mainstream. In terms of public perception and choice, in the face of complex information and control measures, it is difficult to distinguish between right and wrong, and it is easy to appear blind or resist. With regard to the sensitivity of public perception, people are easily caught in the butterfly effect of being too sensitive to information. In terms of the dynamics of public perception, the public has fallen into a stage of psychological change that is extremely easy to change, and information and countermeasures for disease control will form a dynamic choice. In terms of the public's awareness of sympathy, it is common for the public to show great sympathy for individuals in distress in the group. In terms of self-protection against public awareness, there is a high degree of vigilance and strong self-protection. In terms of the trust of individuals recognized by the general public, individuals in the group generally expressed fear of the other party being potentially infected with the virus, and the trust among individuals decreased.

Mass groups are not good at logical reasoning. Gustave Le Bon, a well-known French mass psychologist, believes: "We have proven that groups do not reason, and they accept ideas or reject them completely. The implications of their influence will completely conquer their understanding and make them inclined to turn into action immediately" [6]. The general public is logical about the major epidemic of spreading infectious diseases that are exceptionally difficult to control. Lack of thinking, fear and clutter transcended ordinary reason, and formed a special public perception.

We are faced with the fierce new crown virus pneumonia and the special public awareness of the disease. How can we respond to these idiosyncratic state governance crises with scientifically sound public management methods?

This requires us to use scientific and rational national governance methods to respond to these idiosyncratic national public crises, and to use scientific cognitive methods to balance and guide people's special public awareness. Strengthen the dissemination and publicity of science, strengthen the popularization of scientific knowledge, strengthen the strength of scientific education, guide and lead the masses, unite, obey orders, and jointly defeat the major epidemic

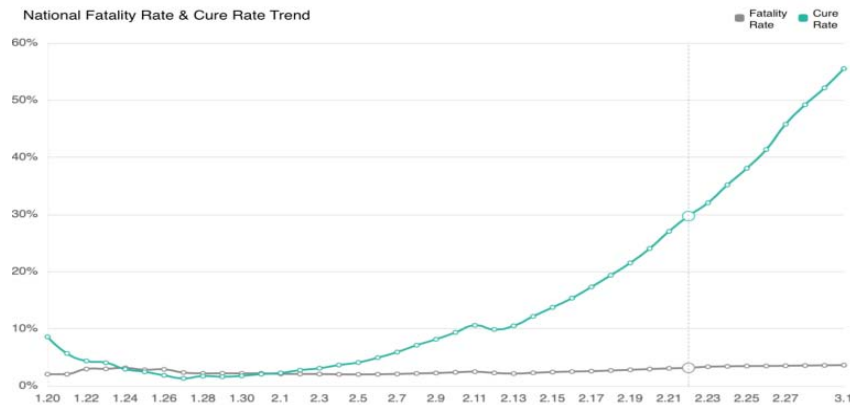


Figure 2: (Source of chart: <https://news.ifeng.com/c/special/7tPIDSzDgVk>, March 1, 2020).

(Chart description: March 1, 2020, the national epidemic situation is real-time dynamic. The abscissa represents the date and the ordinate represents the mortality and cure rate).

of spreading infectious diseases. We must use public management methods to respond to public awareness during a special period of a major epidemic. Scientific public management methods generally have methods of regulation and guidance. Regulation generally refers to “persistent and clear management and control of socially beneficial activities carried out by public institutions” [7]. Guiding measures for public management mean that state management agencies do not use mandatory means but use guidance, guidance, and hints, Education, and propaganda, etc.

In order to control the spread of major communicable diseases, we must implement practical management actions in terms of social management. But for the general public’s awareness, we should take a guided approach. Because the subject of public management is the public, the public awareness of the public has an important role in the prevention and control of the entire major epidemic. We not only need the people to cooperate with the implementation of management measures, but also need the people to obey the unified command of public management with practical actions. Only in this way can the public management achieve the maximum efficiency, finally achieve the management goals, and defeat the major epidemic of infectious diseases. Therefore, we must not adopt the means of regulation and control, and we should adopt a guided public management method. Efforts should be made to make people’s cognition have scientific cognition level, and try to eliminate people’s fear, anxiety, selfishness, resistance, sensitivity and other psychological phenomena.

The historical experience of national crisis management tells us that whenever people are in crisis, it is most easy for people to get lost. If the public receives asymmetric information from society, encounters opaque government information, hears false news from the media, etc., the public’s public understanding will easily enter a state of chaos. For example, from the major epidemic of the COVID-19 in 2020, people have also flocked to pharmacies to buy masks, packed supermarkets together, and packed pharmacies to buy Shuanghuanglian (TCM) oral solution. These large-scale crowds make it easier to spread infectious diseases and make it more difficult to prevent and control infectious diseases.

Therefore, modern national scientific public governance should

use the current advanced technology of information dissemination, based on scientific knowledge publicity and dissemination agencies, to publish scientific knowledge of major epidemic prevention and control of spreading infectious diseases, scientific self-protection methods, and scientific life. Guidelines and health counseling. Vigorously improve the scientific cognition level of the people, allow the people to use the right methods to prevent and control the spread of infectious diseases, and keep the public awareness of the people at a stable and healthy level. We need to use scientific methods to guide the general public, so that the broad masses of the people can unite and obey orders. Only in this way can we achieve group defense and group control, and maximize public management goals. In addition, the grassroots government: each township office, sub-district office, and neighborhood committee office shall conduct publicity and education on the prevention and control of infectious diseases among the people in its management area. Each unit conducts science popularization and teaching for the prevention and control of infectious diseases to its employees. We must let the general public strengthen their knowledge of the prevention and control of proliferative infectious diseases. Under the leadership of the central government, the entire population is united in one effort to prevent and control groups, and to use scientific and rational public awareness and public management methods to prevent and control the spread of infectious diseases.

Systematic Complexity and Countermeasures of Major Epidemic Prevention and Control of High-Risk Spreading Infectious Diseases

Judging from the control of SARS infectious diseases in China in 2003 and the control of the major epidemic of COVID-19 in 2020, the entire control management and action implementation is an operating mechanism of an engineering system. It has the characteristics of system complexity for large-scale engineering operations. These controls have a large scope and cover the whole of China; there are many affected people, and the Chinese people fight for the whole people; consume a lot of manpower, material and financial resources; directly affect medical care, technology, finance,

services, transportation, tourism, food, education, etc. Numerous industries.

The control process of the new crown virus pneumonia epidemic has profoundly affected the normal life and communication of the people. It characterizes the complexity of the system.

System complexity is a concept in system science, and complexity is an important feature of system science. The system scientist Klir GJ described the system as “a system is a holistic combination of multiple elements or units that affect each other” [8]. Complexity represents the system the interconnectedness and diversity of the various elements makes it difficult to clearly describe the relationship between systems and elements. Klir GJ believes: “The elements of the complex performance system are interconnected. These connections are difficult to express clearly, and must be carefully understood and explored to truly understand” [9].

The prevention and control of major outbreaks of high-risk spreading infectious diseases have the chaotic characteristics of system complexity. The so-called chaos refers to the ambiguity and ambiguity in the complexity of the system, making it difficult to understand the true nature of things. “Chaos exhibits surprisingly complex and dynamic behaviors” [10]. The COVID-19 epidemic has exhibited chaos from the beginning to the present. At the beginning of the epidemic, whether the infectious disease has the possibility of being transmitted from person to person. This problem also caused experts to test and authenticate multiple times. It took more than two months to confirm that the new crown virus can pass from person to person. This chaotic state of system complexity has affected the entire major epidemic prevention and control campaign, missed the opportunity to control the source of infectious diseases, allowed the rapid spread of major epidemics, and plunged the country into a major dilemma of governance crisis.

How to deal with the chaos of this major epidemic?. We usually use contingency management methods. If the chaos before us becomes a key element in the development of things, we must attach great importance to it. We need to develop the corresponding management measures based on the worst results caused by chaos. For example, in the face of this outbreak of the new crown virus pneumonia infectious disease. When we have not confirmed whether the virus has the chaos phenomenon of human-to-human transmission, we assume it exists, and make corresponding management measures according to the status of this existence assumption. This way we will not miss important opportunities for prevention and control.

The dynamics of the system complexity of major epidemic prevention and control of high-risk spreading infectious diseases is another characteristic. This kind of dynamic performance is that the major epidemic situation system has different changes at different times, and the dynamic changes make it difficult for management measures to adapt. Changes in major epidemics are sometimes stable and sometimes radical. Judging from the epidemic situation of the COVID-19 infectious disease, the new cases have dynamic changes. Therefore, dynamic adjustments should also be made when mobilizing medical staff and reserving beds. In order to fit the strong dynamic changes of complex systems of major epidemics.

The dynamics of the complexity of the system for the prevention

and control of major outbreaks of high-risk spreading infectious diseases are shown in the figure below (Statistics on March 1, 2020) [11] Figure 2.

It should be noted that the control process of the COVID-19 epidemic is a dynamic and complex systematic project. However, this system engineering is different from the ordinary construction projects in the country. Because bridge construction, power system construction, subway construction and other projects are some projects with clear goals. The management measures for these projects are usually clear and constant. However, the dynamic change of infectious disease epidemic control is usually difficult to determine the target, so prevention and control work is very difficult. We must use scientific and rational public management methods. In the face of specific issues, we need different specific analyses to try to control the negative impact of dynamic changes in major epidemics.

The unpredictability of the system complexity of the prevention and control of the major epidemic of high-risk spreading infectious diseases is a feature that has a great impact. Because of this unpredictability, this major disease prevention and control work has brought about difficulties. In the face of an epidemic of infectious diseases, the most difficult thing is that it is unpredictable whether apparently healthy humans carry the new crown virus and whether there is a potential for transmission of the virus. Because at the current level of medical technology, we cannot test these two possibilities in a simple and fast way. This is also the core factor causing the virus transmission from person to person. In daily life, there is constant communication between people. Due to the unpredictability of these two possibilities, it is difficult to infer whether a person is potentially infected with a virus. As a result, rapid spread of infectious diseases has occurred. Without restrictive action, we could easily use a series model to infer that the number of people infected with the virus is increasing rapidly.

Based on the unpredictability of this major epidemic situation, this prevention and control work has brought great distress and difficult prevention and control management actions. First, the Chinese government has adopted a number of measures including factory shutdowns, school closures, tourist attraction closures, and hotel shutdowns. Regarding the origin of infectious diseases, Wuhan has also adopted management measures for closed urban areas. Secondly, the people are required to stay at home as much as possible, wear masks when going out, and implement closed management for residential quarters and work units. These measures are intended to reduce the gathering and contact between people. Make every effort to reduce the spread of virus from person to person in order to facilitate the control of a major epidemic of infectious diseases.

This shows that scientific and technological innovation in medical technology plays an extremely important role in preventing and controlling major epidemics of infectious diseases. If we have a major breakthrough in medical technology, we can have simple and fast detection technology to quickly detect whether there is an infectious virus in the human body and whether there is a possibility of infectiousness. In this way, we can reduce the complexity of prevention and control measures, overcome the unpredictability of infectiousness, and achieve the best results in the prevention and control of major infectious diseases.

The relevance of the complexity of the major epidemic prevention and control system for high-risk spreading infectious diseases is an important feature of prevention and control. Social communication is a universal activity of human society, and human beings are inseparable from the close relationship between people in production activities, daily life, entertainment activities, and emotional communication. Human society is a large system, and it shows the relevance of the system. The outbreak of the COVID-19, not only in terms of health and medical care, but also in all aspects of human activities have been significantly affected. A major epidemic not only shows the complexity of the system, but also more importantly reflects its relevance to other aspects of society. From the theory of respiratory disease treatment, the direct correlation between infectious diseases is that it will lead to chronic respiratory diseases. Academician Zhong Nanshan, a world-renowned expert in the treatment of respiratory diseases, believes that: "In China, there are three obvious causes of chronic respiratory diseases: severe air pollution, a large number of smokers, and major acute respiratory diseases" [12]. Control is based on the prevention and control of diseases. It requires the close management of all aspects of society to cooperate closely. The management method of overall thinking is used to practically advance the interrelated social management measures. Only in this way can the complex interrelated effects of the new crown pneumonia virus outbreak be overcome.

Judging from the relevance of major epidemics, on the one hand we do a good job of prevention and control of epidemics; on the other hand we must strengthen economic production. Because there is no economic foundation and no material support, all medical prevention and control work cannot be carried out. Therefore, scientific public crisis management must strengthen economic production as a powerful guarantee for major epidemics. At the same time, on the premise of preventing the spread of infectious diseases, we are slowly returning to school, opening restaurants, and gradually opening tourist attractions. The scientific management of a major epidemic situation must be to prevent and control the epidemic situation while restoring economic production and people's normal study, work, and entertainment activities. Only in this way, we value the relevance of the complex system of infectious disease epidemics, do a long-term prevention and control of infectious diseases, and use systemic and integrated prevention and control strategies to respond to major epidemics of infectious diseases.

Conclusion

The article analyzes the control of the major epidemic situation of the Novel corona virus pneumonia (COVID-19) infectious disease in 2020, and applies the actual work of the major epidemic situation in combination with the scientific and technological innovation theory, public awareness theory and system complexity theory of national governance to study the epidemic control of infectious diseases. Based on the scientific rationality of national governance as a clue, the public management and countermeasures against major epidemics of infectious diseases were studied. It fully affirmed China's scientific governance paradigm for major epidemic situations of disseminated infectious diseases. From the prevention and control of this major epidemic, we can see that China's speed, China's scale, and China's efficiency have provided the world with a model and model for crisis management of national infectious diseases.

China is a big country with very powerful economic and military power in the world, and it can influence the pattern of the world. China's national governance norms have Chinese characteristics. Administrative agencies at all levels across the country fully obey the leadership of the central government and act in accordance with the central government's policies. They can implement the central government's instructions quickly and effectively, and militarize operations. China's national governance has priority over the world in terms of the implementation of central government orders, speed and efficiency. Because of this advantage of state governance, it is only under the leadership of the central government that the whole people can work together to prevent and control groups. China's various local governments and industries are united. The central government has mobilized excellent medical teams to systematically and comprehensively coordinate the major epidemic of the COVID-19, effectively controlling the spread and spread of the infectious virus.

For the prevention and control of the epidemic, the Chinese government used the method of closing the city for the first time, restricting the entry and exit of personnel in Wuhan, the primary epidemic area, and then restricting the entry and exit of personnel throughout Hubei Province. This method of isolation played a big role, and the new crown virus pneumonia infectious diseases in other cities and regions of China were quickly controlled. The epidemic situation in Hubei Province has also been well controlled. Following this trend, it is entirely possible for China to succeed in controlling this major infectious disease epidemic.

However, we are seeing the achievements in the control of this major infectious disease, and we should also see the inadequacy of some infectious disease control and management in China. Infectious disease prevention and control centers in various places in China have insufficient rights. Because they are directly under the leadership of local governments, reports on the possibility of infectious disease outbreaks are often interfered by local governments. In this way, an unreasonable intervention by a non-professional government on a professional prevention and control team is formed, which is not a scientific method for disease prevention and control management. In addition, grassroots government managers have insufficient expertise in the prevention and control of infectious diseases. In some places, the prevention and control is not in place, and in some places, the prevention and control is excessive, affecting the recovery of economic production. These deficiencies in prevention and control work require gradual improvement in crisis management measures that require major epidemic control.

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