

Research on Scientific and Precise Epidemic Prevention Early Warning Indicators Under the Background of "Double Overall Planning"

Xujun Zhang¹, Dan Li²

¹School of Management, Shanwei Institute of Technology, Shanwei, 516600, China

²Shanwei Institute of Innovation Industry Research, Shanwei, 516600, China

Abstract: The COVID-19 pandemic has been more than 30 months, caused more than 530 million cases and more than 6.3 million deaths worldwide, severely disrupting economies, Upsetting social order and crippling people's livelihoods. In the context of the normalization of epidemic prevention and control, the guiding ideology of "dual coordination" has increasingly highlighted its strategic vision and focus, providing a fundamental guideline for promoting the balance between epidemic prevention and control and economic and social development. In order to explore the establishment of universal lockdown, control and unlockdown standards, and realize the power transfer to improve the sensitivity and standardized implementation ability of grassroots response to the epidemic, this paper conducted a survey and analysis on the implementation of COVID-19 prevention and control related policies. Based on this, the author proposed the idea of establishing a standardized system of containment, control and unlocking on the basis of lethality, infectivity, treatment plan, cure cost, redundancy of medical resources, possibility of sequelae, vaccine and its effectiveness, so as to achieve more accurate epidemic prevention and reduce social costs.

Keywords: Coordinate COVID Response and Economic and Social Development, Precise epidemic prevention, Sealing Control and Unsealing, Standardization System, Isolation.

1. Introduction

After two and a half years of continuous transmission, Severe Acute Respiratory Syndrome coronavirus-2 (SARS-CoV-2) has caused more than 530 million infections and 6.3 million deaths globally (as of 31 May 2022), becoming the leading cause of COVID-19 in 2019. Table 1 and Table 2 illustrate this situation. Since the outbreak of COVID-19, different countries have adopted different prevention and control policies and measures. China's dynamic zero clearance policy plays a key role in reducing the number of laboratory confirmed cases and deaths [1]. On November 8, 2022, the National Health Commission stressed the need to adhere to the general policy of "dynamic zero elimination" and organize experts to continuously optimize and improve

the prevention and control measures according to the changing incubation period, transmissiveness and pathogenicity on the basis of summarizing the effect of prevention and control practices and policies in various regions, improve the scientific accuracy and further coordinate the fight against the epidemic with economic and social development [2]. However, in the long run, the social cost of "dynamic zeroing" is huge and difficult to sustain. Therefore, it is necessary to further improve the precision prevention ability and realize the "double coordination", so as to carry out a scientific balance between the low cost suppression of epidemic and the promotion of economic and social development in order to restore the normal life order to the greatest extent.

Table 1. Data sheet on new coronary pneumonia abroad Unit: persons

Project	digital
Newly Diagnosed	218,859
Cumulative diagnosis	528,720,915
New Deaths	380
Cumulative Deaths	6,295,057
Mortality rate	1.2%
Existing Diagnoses	20,082,911
Cumulative Cures	502,342,947
Cure Rate	95%

Table 2. Data sheet on new coronary pneumonia in the country Unit: persons

Project	digital
Newly Diagnosed	35
Cumulative diagnosis	224134
New Deaths	0
Cumulative deaths	5226
Mortality rate	2.33%
Existing Diagnoses	2296
Cumulative Cures	216612
Cure Rate	96.64%

2. Literature Research

A total of 73 articles, including 35 in journals and 31 in newspapers, were found in a search on CNKI under the theme of "precise epidemic prevention" (by May 31, 2022). Based on literature review, it can be seen that there are three main directions for precise epidemic prevention research: first, organizational innovation. For example, Liu Hanbin (2020) proposed to establish a temporary epidemic prevention and control organization of "rapid response - comprehensive dispatch", implement a wartime emergency system, shorten the information transmission chain as much as possible, and realize quick decision once suspected cases appear [3]. The second is to build a digital defense line. For example, Jiangsu Province established a spatio-temporal analysis model of the epidemic by combining map big data (Wang Peng, 2021), and pushed the data accurately to streets and towns, so as to exert the synergy of "communication + map" big data for fine prevention and control [4]. Third, institutional research. For example, He Lilong (2020) proposed to establish a long-term mechanism for coordinated promotion and collaborative governance of targeted epidemic prevention and poverty alleviation under the condition of normal epidemic situation, and to study institutional issues of effective resumption of work and production and recovery of economic momentum in key areas of people's livelihood. The continued spread of COVID-19 has severely damaged the economy, upended social order and restructured people's lives. At the industrial level, the epidemic has brought a huge impact on the global food supply and demand [6] and has a significant inhibitory effect on transnational import and export trade activities [7], leading to a significant decline in the GDP and total import and export volume of major economies in the short term [8]. Many small and medium-sized enterprises are overwhelmed and struggling, and the people lose their income security and have a hard time surviving. The world desperately needs to reopen. At present, the significant infectivity ($R_0 \approx 6$), upper airway tendency and low human infection rate of the Omicron variant are the basis for global reopening.

In this paper, we explore the establishment of a standardized system of lockdown, control and lockdown, transfer the authority of lockdown and lockdown to the lower level, improve the sensitivity of grass-roots response to the epidemic and the ability to implement standardization, and avoid such acts as "shutting down villages and cutting off roads" and "locking doors" without approval, so as to normalize social and economic development.

3. Investigation and Research

This study conducted an investigation on the COVID-19 prevention and control situation, including the implementation of the lockdown policy, the cost of lockdown and lockdown, lockdown and lockdown lifting standards and authority, with data mainly coming from the epidemic prevention and control command center of Shanwei City, Haifeng and Lufeng, the Health Commission, Women's Federation and other government agencies. The survey questions are as follows:

3.1. Sealing and control standards

1. What are the criteria for placing a place under lockdown due to an infectious disease of unknown cause or other public health emergency?

2. What are the monitoring indicators?
3. What are the thresholds for each indicator?
4. What are the regulations on the scope of sealing and control?
5. What are the sealing and control measures?

3.2. Sealing and control procedures

1. What are the standard procedures for sealing?
2. What are the specific provisions of the blocking authority?
3. If a lockdown standard is established, with the help of which the township (town, street) government can decide whether to seal off an area in order to improve the response speed of prevention and control of emergency public health events, what health indicators do you think are necessary?
4. Please rank these indicators in order of importance.
5. Do you think it is necessary to move the authority of sealing and unlocking major public health events to the township (town, subdistrict) level government?

3.3. Unsealing standards and procedures

1. What are the criteria for unsealing COVID-19?
2. What is the procedure for unsealing?
3. Compared with previous major public health events, how has the containment and de-containment of the COVID-19 outbreak changed?

3.4. Survey results

Interviews were conducted with relevant officials of the epidemic control command centers, Health Commission and Women's Federation in Shanwei City, Lufeng, Haifeng and other places. The results are summarized as follows:

Since the outbreak of COVID-19, local governments have strictly implemented the spirit of the latest central and provincial policy documents. At present, the Joint Prevention and Control Mechanism Comprehensive Group of The State Council has implemented the Notice on Issuing Guidelines for Handling COVID-19 Clusters (Revised Version) (Joint Prevention and Control Mechanism No. 75 [2021]) and the Local COVID-19 Emergency Response Plan of Guangdong Province (3rd version) (Prevention and Control Letter No. 39 [2022]). The documents have clear standards for dividing the "three zones", procedures for containment and uncontainment, authority, and measures for living during epidemic prevention and containment. Compared with SARS in 2003, the COVID-19 outbreak has lasted longer, become more contagious, spread more widely, repeated more often and there is no clear end in sight. Accordingly, epidemic prevention policies and measures are stricter and more demanding, and the responsibility for epidemic prevention is linked to the appointment and removal of key officials, which is of unprecedented importance.

Throughout the history of the People's Republic of China, the COVID-19 epidemic has had an unprecedented and profound impact on the economy and society. Infectious diseases such as the novel coronavirus pneumonia, which is spread across regions and even around the world, should be under the unified command of the central government, and policies should be formulated in a unified way, which should be followed by the grass-roots governments. Business difficulties, job losses and falling incomes caused by the epidemic are the price we have to pay. The results of the survey showed that the grass-roots government resolutely

implemented the relevant policies and the spirit of instructions and instructions from the superiors, and the results were good. In the face of the plague affecting the future and fate of the people, strict implementation of the superior policy or layer upon layer, to ensure that "no accident" is the biggest pursuit of the grass-roots government and the source of security, the social cost of epidemic prevention has little influence in the decision-making. This is the main reason for the frequent "lockdown".

4. Analysis of the Impact and Epidemic Trend of The Novel Coronavirus Outbreak

1. The impact of the COVID-19 epidemic

The COVID-19 pandemic has had a catastrophic impact on population health, economy, society, security and globalization in all countries around the world [9]. In China, the unemployment rate under the influence of COVID-19 shows a "W" shape, lasting for eight months, with a total loss of 1.23% of GDP. In the United States, COVID-19 affected the unemployment rate from April 2020 to December 2020, and the total loss was 10.51% of GDP [10]. In the short term, COVID-19 has a negative impact on the stock market and a positive impact on the bond market [11], exacerbating social inequality. For example, the epidemic has led to increased inequality in Germany, more obvious racial discrimination, escalating social conflicts and challenges to social security [12]. The epidemic has seriously affected people's livelihood, with catering and tourism bearing the brunt. During the epidemic, most provinces and cities in China closed down the catering industry, and the income of catering consumption fell off a cliff, and some restaurants went bankrupt. Tourism "hibernation", major tourist attractions in the country with few visitors, hotel occupancy rates dropped to the bottom. Cities, roads and residential communities have been closed in severely affected areas, severely restricting people's travel. Railways, airlines and highways have been severely affected, and the transport industry has suffered a great loss. The epidemic has had a significant positive impact on the demand willingness of commercial health insurance [13], caused a severe impact on the financial industry, intensified the risks in the financial market and produced risk spillover effect [14]. Import and export enterprises are greatly affected, and some export-oriented enterprises are in a state of suspension or half suspension. Many enterprises cut wages, coupled with rising unemployment, people's income level fell and even many people lost their source of living; The population turnover rate has dropped sharply, and the contradiction and problem of labor shortage in enterprises are more prominent. The epidemic has had a huge impact on science, education, culture and health. Affected by the epidemic, classes in affected areas have been suspended and switched to new routes, and the learning effect cannot be guaranteed. Sports and cultural events have been canceled or postponed, and scientific research exchanges are mostly online. Most of the performances were recorded instead of live; Most hospital wards in hard-hit areas have been converted into COVID-19 wards, making it more difficult for non-COVID-19 patients to get medical care, and a small number of them have not been admitted to hospital in a timely manner, leading to the deterioration of some patients' illness and even death.

2. Analysis of the epidemic trend of COVID-19

The occurrence, development and outcome of COVID-19

are closely related to the strength of the body's own immune system. Whether or not a person becomes ill after being infected with a pathogen and the severity of the illness depends on two factors: the number and virulence of the pathogen and autoimmune, which together determine the outcome of an individual's infection. After an individual is infected with a pathogen, the body needs to rely on its own immune system to clear the virus, and vaccination is an important means for the body to obtain immunity. Data from the National Health Commission showed that as of June 3, 2022, 31 provinces, autonomous regions and municipalities directly under the central government and Xinjiang Production and Construction Corps had reported receiving 33.82.998 million doses of COVID-19 vaccine, with more than 1 billion people having completed the full vaccination. People over 60 years old and children between 3 and 11 years old are being vaccinated against COVID-19. It is expected to soon become a reality for the elderly and children to be fully vaccinated, gaining herd immunity without the high human cost of social Darwinism in the West. As long as your physical condition permits, you can better prevent and control COVID-19 by actively cooperating with epidemic prevention and receiving COVID-19 vaccine, moderate physical exercise, strengthening your own immune system, keeping a peaceful mind, and strengthening the immune barrier. As the number of iterations of SARS-CoV-2 virus has increased, the severity of the disease caused by it has greatly decreased. At the same time, the research and development of special drugs is going on intensively. We believe that in the near future, with the advent of special drugs, diseases caused by the novel coronavirus will become routine infectious diseases.

5. Analysis of Policies, Measures, Effects and Costs Of COVID-19 Prevention and Control

To defeat the novel coronavirus, mankind needs three "weapons" : first, adequate vaccine injection; Second, the strong support of antiviral drugs and other drugs, including traditional Chinese medicine; Third, sufficient medical redundancy, namely hierarchical diagnosis and treatment, rational use of medical resources [15]. Even with these conditions, however, isolation is the most effective means of stopping the spread of the epidemic and reducing the loss of life and property. Since the outbreak of the novel coronavirus, the United States and Europe and other countries have taken lax prevention and control measures and placed their hopes on "herd immunity", so the epidemic continues to spread with heavy losses [16]. China, on the other hand, has successfully contained the epidemic with a community-based dynamic zeroing policy, becoming the only country in the world to maintain positive economic growth so far. There is a long history of quarantine and epidemic response.

For example, many methods to prevent and treat plague were recorded in ancient Chinese scriptures, history books, notes and local Chronicles, among which "isolation" was adopted by ancient people long ago.

According to the Records of the Grand Historian · Zhao Shijia, the main means of preventing infectious diseases in the Qin and Han dynasties was to set up quarantine houses. The Bamboo Slips of Qin Tomb in Sleeping Hudi, Legal Answer and Question, contains the provisions of the state of Qin that the lepers were sent to live in the Pen." The Book of Han · Emperor Ping Ji" volume 12 records: "people disease, the

house empty Di Di, for medicine." In the Jin Dynasty, the quarantine requirements for infectious diseases were more severe, and anyone who came into contact with the sick had to take quarantine measures. The Biography of Wang Biao, the Book of Jin, recorded: "At the end of eternity and peace, there were many diseases and epidemics. Under the old system, a courtier's family sometimes fell ill. If more than three people were infected, they could not enter the palace for a hundred days, even if they had no illness." During the Southern and Northern Dynasties, quarantine and epidemic prevention became a system. Xiao Qi, prince Changmao et al had set up a special patient isolation institution "six diseases museum", to isolate and treat people suffering from the plague. Sui and Xiao Qi similar, specialized for leprosy patients set up "hapen square". In the Tang Dynasty, government-run medical institutions were more developed. The imperial court had a hospital for the sick, and the local government also had similar institutions, which were responsible for the treatment and medical management of the people in peacetime. When the epidemic occurred, they undertook the task of temporary shelter and isolation treatment. During the reign of Emperor Shenzong of Song Dynasty, an epidemic occurred in Hangzhou with many infected people. After the outbreak of the epidemic, Su Shi, then the chief judge of Hangzhou, organized officers and soldiers to establish a center for refugees, which was similar to the makeshift hospital now. Patients were treated in a centralized manner, and black cloth warning was hung at the door to prohibit the entry of uninfected people. There was a little less plague in the Ming Dynasty, but plague occurred frequently in China after the Yuan, Qing, the Republic of China and the founding of New China. In previous epidemics, before the use of specific drugs in large quantities, the most effective prevention and control measure was still isolation.

The "Wuhan lockdown" was the largest quarantine event in human history. Although it was costly, it delayed the outbreak of the epidemic in other Chinese cities by an average of 2.91 days and reduced infections by 96%. As of mid-February 2020, this initiative has reduced international transmission by nearly 80% [17]. After that, many countries in Europe, Korea, Japan, and Iran sealed their cities. Since the outbreak of the virus in Shanghai in March 2022, many places in China have seen repeated outbreaks of the virus and lockdown of cities, all of which have paid a high price. For example, the British clothing and footwear market was the most severely affected by the epidemic, and the loss of this industry was up to 14 billion pounds due to lockdown [18].

Home isolation of workers leads to a decline in income, high living pressure and mental pressure, which brings serious social problems and huge social costs.

6. Establishment of An Early Warning Index System for Emergent Public Health Events

1. Questions about isolation

The basic logic of China's prevention and control of the COVID-19 epidemic is as follows: dynamic elimination of COVID-19 on a community-based basis, buying time at the minimum cost of health and life, rapidly and vigorously promoting vaccination, completing mass immunization of the whole society, and forming the foundation of "comprehensive opening up". But dynamic zeroing involves the whole city, the whole industry, the whole people, the scope is wide, the

cost is huge, is forced to adopt the expedient. The high social costs associated with isolation have been widely questioned in China, focusing on the following aspects: One is whether widespread isolation is advisable? Can we adopt a relatively open policy like the European and American countries and some regions, orderly resumption of production, so that ordinary people can return to normal life? Second, some countries and regions have issued medication guidelines, advising patients infected with the novel coronavirus to buy corresponding drugs according to their own symptoms for home treatment, which has achieved good results. Can similar treatment programs be used in China? Third, can we establish a general lockdown, control and unlockdown early warning system for public health emergencies, and enhance the prevention and control capacity and decision-making authority of local governments, so as to quickly stop the infection and minimize losses? Fourth, if an early warning system can be established, what key indicators should it include? How to set the threshold of the indicator?

2. Conception of establishing an early warning index system for emergent public health events

In April 2021, United Nations scientists warned that there may be 1.7 million undiscovered viruses in nature that spread widely, are highly contagious, spread quickly and are highly lethal, and that half of them could jump to humans and cause new pandemics. In the future, when we face new infectious viruses, what criteria will be used for "lockdown" or unlockdown? It is imperative to explore the establishment of a general "lockdown"/lockdown standard system to urgently stop the spread of the virus and minimize the social cost of prevention and control. The core of establishing standard system lies in key index and index value. The number one indicator of how much damage an infectious disease does to society is the fatality rate. Infectious diseases with low fatality rates are less harmful to society, such as seasonal influenza, which is highly contagious but rarely causes lockdown. The second indicator is whether treatment is available and how much it costs. If there is an infectious disease, the medical organization can develop a low-cost and effective treatment in a short time, then it will be much less harmful. The third indicator is the redundancy of medical resources, whether it will cause a run on medical resources due to certain infectious diseases. The fourth indicator is whether there will be sequelae, sequelae on the size of the impact of human function. The fifth index is infectivity, the more infectious, the more harmful. The sixth indicator is the speed of vaccine development and the level of antibodies produced. The COVID-19 vaccine, for example, has gone from development to clinical use at a record speed. If the level of antibodies produced is sufficient to destroy transient viruses, the basis for an orderly opening is in place. Based on the core indicators, an early warning indicator system for public health emergencies has been established, and the epidemic prevention system at the community level has been "automated".

7. Discussion

Since early 2020, the novel coronavirus pneumonia epidemic has hit the world hard. With the unremitting efforts of all countries and the reduction of the risk of the virus itself in the process of evolution, the global reopening has been the inevitable trend. In view of this, our country needs to reopen in order to normalize social economic development and adapt to the world reopening situation [19].

Under the guidance of "dual overall planning", the general policy of "dynamic zero clearing" should remain unchanged, a general "lockdown"/lockdown early warning and control system for infectious diseases should be established, and the authority of prevention and control decision-making should be moved down to the grassroots level, which is conducive to improving the response time of blocking the spread of the virus, effectively curbing the spread of the virus, and achieving the goal of fighting the virus at a lower social cost.

Acknowledgment

Fund Project: Shanwei Vocational and Technical College to introduce high-level talents research Project: Construction of Harmonious Labor relations: Situational Simulation and Behavior Modeling (SKQD2021B-026);

Characteristic Innovation Project of Guangdong Universities: Construction of Collaborative Education Platform with Deep Integration of Artificial Intelligence and Vocational Education (2021WTSCX247);

Education Reform Project of Guangdong Education Supervision Commission: Research on School-Enterprise Cooperation Development of Business Administration Teacher Competition Guidance Skills Course in Higher Vocational Colleges (12).

References

- [1] Weijie Guan, Nanshan Zhong. Strategies for reopening in the forthcoming COVID-19 era in China[J/OL].<https://academic.oup.com/nsr/article/9/3/nwac054/6564385>
- [2] Will the epidemic prevention and control policy be adjusted? Defense under the State Council from spreading: unswervingly adhere to the "dynamic reset" [N]. <https://finance.sina.cn/2022-11-08/detail-imqmmthc3711734.d.html>.
- [3] Liu Hanbin. How to make precise planning for epidemic prevention in industrial parks? [J]. China Ecological Civilization, 2020 (03):86-87.
- [4] Wang P. Advanced precision epidemic prevention technology [J]. Jiangsu Communication, 201,37(04):1. (in Chinese with English abstract)
- [5] He Lilong, Zhang Xian. Outbreaks in the contradiction of overall consideration and epidemic prevention of poverty change under normal and strategy adjustment [J]. Economic research reference, 2020 (12) : 10 to 17. DOI: 10.16110/j.carol carroll nki issn2095-3151.2020.12.003.
- [6] Cui Haiying, Lu Xinhai, Ke Shgan. New crown pneumonia outbreak's influence on China's grain price effect and mechanism of action [J]. The price issue, 2022 (01) : 44-51. DOI: 10.14076/j.i SSN. 1006-2025.2022.01.07.
- [7] Liu Hongduo, Zhang Nii, Lu Yang, et al. New crown pneumonia outbreak [J]. Journal of research on the effects of global trade statistics research, 2021, 20 (12) : 61-76. The DOI: 10.19343/j.carol carroll nki. 11-1302/c. 2021.12.005.
- [8] Sun Jia-ze, Li Hui-juan, Yang Jun. New crown pneumonia outbreak of global macro economy and the impact of the value chain structure [J]. Journal of financial research, 2022 (01) : 52-62. DOI: 10.19654/j.carol carroll nki cjwtyj. 2022.01.005.
- [9] Yang Chen, Wen Cheng, Xu Xiaoke. Impact of COVID-19 on population mobility in ethnic minority areas [J]. Journal of University of Electronic Science and Technology of China, 201, 50(06):938-946.
- [10] Chen Yunwei, Cao Lingjing, Zhang Zhiqiang. New crown pneumonia outbreak pandemic's impact on international science and technology development and its enlightenment [J]. Proceedings of the Chinese Academy of Sciences, 2021, 4 (11) : 1348-1358. The DOI: 10.16418/j.i SSN. 1000-3045.20210519004.
- [11] GUI Wenlin, Zhao Jiehui. New crown pneumonia outbreak to investigate the effect of unemployment of China and the United States [J]. Journal of research in the world, 2021 (11) : 15 to 26. DOI: 10.13778/j.carol carroll nki. 11-3705/c. 2021.11.003.
- [12] Chen Bo, Qian Huihui. Study on the impact of COVID-19 on Chinese stock and bond market [J]. Journal of Industrial Technical Economics,2021,40(11):53-60.
- [13] Xie Mingming, Li Qinying, Wu Guozhe. The impact of COVID-19 on demand willingness of commercial health insurance: A case study of Henan Province [J]. Finance Theory and Practice,2021(12):108-115. [1] Sichuan Unicom makes every effort to guarantee the epidemic prevention and control battle [J]. Communications and Information Technology, 2021 (06): 19.
- [14] Yang Xiepu. Manifestations, causes and effects of worsening social inequality in Germany under the COVID-19 epidemic [J]. World Socialist Research, 201,6(09):57-67+103.
- [15] wen-hong zhang: resistance to disease in the future will have three "weapons" [J/OL]. HTTP: / / <https://www.163.com/dy/article/H2PDIM0G0514IJ7L.html>
- [16] Zhang Dandan. Costs and benefits: health impact analysis of the outbreak of the new champions league [J/OL]. <https://baijiahao.baidu.com/s?id=1717121792593290147&wfr=spider&for=pc>
- [17] He P, "Science" reports the effect of emergency response in Wuhan lockdown: a 96% reduction in COVID-19 infections in China [J/OL]. Surging news, April 1, 2020, https://www.thepaper.cn/newsDetail_forward6788171.
- [18] Ran Fulin. British footwear industry is expected to lose 14 billion pounds due to COVID-19 [J]. Beijing Leather, 2020 (06):86.
- [19] Wei jie Guan, Nan shan Zhong. Strategies for reopening in the forthcoming COVID-19 era in China[J].National Science Review.