

Discussion and Countermeasures on the Application of Health Code in the Routine Prevention and Control of COVID-19

-- Take China as an Example

Shuangyue Jia^{1,*}, Ying Wang², Qingyu Li³, Yan Zhang¹

¹ School of Statistics and Applied Mathematics, Anhui University of Finance and Economics, Bengbu, 233000, China

² School of Business Administration, Anhui University of Finance and Economics, Bengbu, 233000, China

³ School of economics, Anhui University of Finance and Economics, Bengbu, 233000, China

* Correspondence should be addressed to Shuangyue Jia: 18954819239@163.com

ABSTRACT

From the previous SARS to the current novel coronavirus, major public health emergencies have occurred in China one after another. With the development of The Times and the progress of society and science and technology, people are more and more aware of the importance of effective prevention and control of such incidents, and what means to adopt effective prevention and control has gradually attracted global attention. In the context of the new coronavirus epidemic, the health code, an innovative young measure, can be said to have opened up a precedent and played an irreplaceable role in China's epidemic prevention and control. In the three years since the outbreak of COVID-19 from the beginning of 2020 to the end of 2022, health codes have been widely used and become an important means of epidemic prevention, but some problems have inevitably been exposed, especially in the period of normal epidemic prevention and control, such as: The problems of digital divide, information island, and abnormal color of health code have impacted the effective prevention and control of the epidemic in this period. After fully considering and demonstrating the application scenarios and promotion conditions of health code, combine and utilize existing technologies, such as: Bluetooth or GPS positioning, digital contact tracking technology, automatic identification technology, remote technology, etc., put forward the innovative concept of "health code chip", which can not only solve such problems, improve the technical level and practical application range of health code, so that health code has become an important tool and effective means to deal with major public health emergencies. Moreover, it can provide valuable reference opinions and experience for the handling of major public health emergencies in the world.

KEYWORDS

Health Code; Health Code Chip; COVID-19; Major Public Health Emergency.

1. INSTRUCTION

The new coronavirus, a major public health emergency in 2020, is ravaging the world, posing a serious threat to human life and health, and posing unprecedented challenges to all countries and fields. In the face of the rapid spread of the novel coronavirus, all countries are exploring and applying various means and technologies to effectively prevent and control it. China's epidemic prevention and control department has adopted a new type of prevention and control measure, the "health code"

program, which has undoubtedly played an irreplaceable role in the prevention and control of the novel coronavirus.

However, in the process of promotion and application of health code, especially in the period of normal epidemic prevention and control, the related problems exposed by it have not only attracted widespread attention, but also had a negative impact on the further promotion and application of health code and the effective prevention and control of similar epidemics. Based on the existing health code, this paper discusses the most prominent and urgent problems exposed by China's health code, and then studies how to adjust and improve the relevant applications of the problems existing in health code according to the existing technology. After fully considering and demonstrating the application scenarios and promotion conditions of health code, the improvement measure of "health code chip" is proposed. It can not only improve the technical level of health code, but also better cope with the normal prevention and control of similar outbreaks, which is of great significance for the future prevention and control of major public health emergencies in countries around the world.

2. RESEARCH STATUS OF HEALTH CODE

As the COVID-19 epidemic has entered a period of regular prevention and control, not only have countries around the world decided to implement epidemic prevention and control measures similar to "health code", such as: Chile, France and Italy's health pass, Australia's digital vaccine certificate, Kazakhstan's "Ashyq" health code mini program, etc., and Chinese scholars have found the relevant problems exposed in the promotion and application of "health code" and launched some studies, such as: Jiesqing Chen, Weiguo Zhu and Huizhen Jiang discussed the application and countermeasures of health code during the routine prevention and control of COVID-19 [1]; Siyang Yu and Bowen Zhao conducted an exploratory research on the cognitive model and existing problems of health code use in the context of digital governance based on rooted theories[2]; Yuyi Zhang analyzed the types of practices, social risks and legal regulations of digital contact tracking technology [3]; Jian Chen, Honglin Chen and Jianing Li conducted a study on the development of health code in China in the post-epidemic era [4]. Since China is the first country to adopt the new prevention and control measures of "health code" and successfully put them into practice, it is very likely that countries around the world will still face similar problems to China's "health code" in the process of subsequent promotion and application of epidemic prevention and control policies. For example, Jiayi Jiang and Zexing Zheng conducted research on scale development and content analysis of personal information protection and privacy policy compliance in health code App [5]; Dan Zhang and Yunjie Li conducted research and application of Paddle OCR based health code recognition in the context of epidemic prevention and control [6]; Xiaohan Zhang decoding China from the aspects of legal challenges "Covid - 19" health code App[7]; Jiaoliang Qin analyzed the collection of personal information and legal checks and balances after the "health code"[8]; Chengzhe Fu, Weijun Huang and Haolin OU conducted an empirical study on how "soft governance" can bridge the "digital divide" in the context of public crisis based on three policy tools[9]; Luyao Wang, Le Wang and Ziqiong Zhang studied the information technology avoidance behavior of the elderly under public health emergencies[10].

3. THE MOST URGENT PROBLEM OF HEALTH CODE

Since The State Council of China issued 10 epidemic prevention policies on December 7, 2022, announcing that China's three-year epidemic began to be fully released, the health code and travel code were officially offline on December 13, 2022. Therefore, this paper focuses on the relevant data before December 13, 2022. After a series of data and statistical analysis with the help of SPSSPRO data platform, this paper mainly discusses the following problems:

3.1. Digital Divide Problem

Digital divide refers to the differences in the mastery and application of digital technologies in the information age due to geographical, income, education level, race and other reasons, as well as the resulting social inequality faced by different groups. Such as: the elderly, young children and other vulnerable groups will not use smart phones to show the health code, the penetration rate of smart phones in remote areas is not enough, the signal and traffic network of mobile phones is not smooth, forget to bring mobile phones when going out or mobile phones have no power and accidental loss of emergencies, etc.

3.2. Information Island Problem

Information island refers to a computer application system in which all departments and links in a data system are not related to each other in function, information is not shared and exchanged, and information is disconnected from business processes and applications. Such as: one city for one code phenomenon, data sharing fragmentation, information is not synchronized, data update is not timely, etc.

3.3. Health Code Color Anomaly Problem

Health code color anomaly refers to the phenomenon of code assignment and transcoding anomaly caused by errors in accuracy and efficiency such as big data monitoring and base station signal transmission. Such as: nearly 14 days has not been from the epidemic area but suddenly become yellow or red code, health code color abnormal after a complaint is not recover in time, etc.

4. THE RELEVANT COUNTERMEASURES OF THE EXISTING PROBLEMS OF HEALTH CODE

In this paper, aiming at the problem of digital divide, information island and abnormal color of health code, reasonable technical means are adopted according to the existing technology, such as: Bluetooth or GPS, digital contact tracing technology, automatic identification technology, the remote technology, etc., at the same time, in full consideration and the demonstration of the application scenario and promotion health code, put forward can be binding and health codes, and a national network of real-time feedback and innovative measures of synchronous update - health code chip.

Consider adding a simple special health code chip to the legal documents that everyone has and can carry around, such as resident ID cards or passports, and the chip is uniformly manufactured, operated, supervised and controlled by the national government and relevant departments. In a major public health emergency such as COVID-19, the relevant location information, vaccination information and infectious disease infection of each resident can be legally retained for a short period of time, and specific health code chip identification devices will directly display the health code status of each resident (green, yellow or red code) accordingly, and once the outbreak is officially declared fully free, The national public security organ will immediately shut down the health code chip and delete any information retained in the chip, and will not re-activate the health code chip until a major public health emergency occurs again. In addition, the specific health code chip identification equipment only has the function of identifying the health code chip and displaying the status of the health code, and will not retain any information in the health code chip. This further effectively guarantees that the use of the health code chip and its identification equipment will not cause any impact, infringement and disclosure of the personal privacy of residents.

It can be said that health code chip is the simplest, controllable and reliable explicit form of health code program. First of all, because the health code chip has been added to the resident ID card or passport and other people have, can carry the legal documents, so it is very practical and portable,

and easy to promote and use, easy to manage. At the same time, only relying on a health code chip identification device can directly display the health code, and will not force the use of smart phones, mobile networks and other additional necessary conditions like the previous health code program, which can effectively avoid the emergence of the digital divide problem to the greatest extent. Secondly, because the health code chip is uniformly manufactured, operated, supervised and controlled by the national government and relevant departments, and implements real-time feedback and synchronous update of the national network, it can achieve information sharing and exchange, association and mutual assistance throughout the country as much as possible, thus effectively avoiding the emergence of information island problems. Finally, because the health code chip has a specific health code chip recognition device, the information stored in it is more accurate, efficient and correct when it is recognized, and the abnormal color problem of the health code can be effectively avoided to the greatest extent.

In addition, the health code chip is unified by the national government and relevant departments for manufacturing, operation, supervision and control, and once the epidemic is officially declared fully released, the national public security organs will immediately shut down the health code chip and delete any information retained in the chip until a major public health emergency occurs again. Moreover, the specific health code chip recognition device only has the function of identifying the health code chip and displaying the status of the health code chip, and does not retain any information of the health code chip, which can not only effectively prevent some lawbreakers from stealing the original data of relevant personal privacy, but also reduce the risk of personal information disclosure and illegal use or even being traded abroad. Moreover, it can break the principle of opaque algorithm and masking administrative openness in each health code program, so that the health code is completely owned by the country, used by the country, and serves the people in a true sense. The specific operating mechanism of the health code chip is as follows:

4.1. Get Information

For the relevant location information in the health code chip, it can be uploaded by the national public security department through satellite and using Bluetooth or GPS positioning technology and updated in real time through the national network; For the vaccination information and infectious disease infection in the health code chip, the hospital and the national epidemic prevention department can uniformly upload and update the national network in real time. At the same time, the information in the health code chip can be fed back and updated synchronously with the health code, and finally reflected in the relevant status of the health code.

4.2. Identify Information

The health code chip recognition device uses automatic recognition technology to identify and obtain the information in the health code chip, and then directly displays the health code status (green code, yellow code or red code) of each resident bound to the health code chip through pre-set specific algorithms and procedures. In large public places with large passenger flow, such as hospitals, stations, buses, etc., it is recommended to install a fixed gate similar to the card checking machine in high-speed rail stations and railway stations, which can quickly, efficiently and accurately identify the information in the health code chip, and then judge and display the health code status of each resident, and arrange the commissioner to take relevant epidemic prevention measures accordingly; In small public places with low foot traffic, such as: Stores, shops, etc., it is recommended to use portable devices such as POS machines, handheld card machines and other portable devices to identify the information in the health code chip, and judge and display the health code status of each resident, which on the one hand effectively ensures the implementation of epidemic prevention measures, on the other hand, also reduces a certain cost of use and alleviates economic pressure. According to the actual application scenario, the automatic identification equipment that comprehensively considers,

installs or adopts the health code chip can avoid resource redundancy and high cost, which will be more conducive to the future promotion and application of health code.

4.3. Analyze and Feedback Information

According to the health code status displayed by the health code chip identification device, if it is a red code or yellow code person, epidemic prevention personnel will immediately take prevention and control measures against it, and report the identity information and health code chip information on their resident ID card or passport and other legal documents to the national Center for Disease Control and Prevention, and then the national Center for Disease Control and Prevention will use computer software. Based on Brown motion and Markov chain, the movement status and nature of red-code or yellow-code personnel are analyzed, and their possible social networks, movement tracks and contacts are locked with the help of digital contact tracking technology and remote technology. Finally, the analysis and locking results are fed back to the information base of the health code chip. Then make corresponding adjustments to the health code status of people susceptible to suspicious infection, such as: green code to red code, green code to yellow code, etc., to achieve real-time feedback and synchronous update; If the person is a green code, the information and health code status of the health code chip need not be analyzed and adjusted unless the computer software of the National Center for Disease Control and Prevention determines that the person has been exposed to the red code or yellow code.

4.4. Protect Information

The national public security department will strictly protect and invoke the temporary information stored in the health code chip according to law. On the one hand, in the process of using the health code chip and the health code chip identification equipment, the national public security department will build a high-strength information firewall to protect the personal privacy of each resident; On the other hand, when the health code chip is officially announced to be closed, the national public security department will immediately delete any information retained in the health code chip, and will not leave any opportunity for lawbreakers.

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