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# Paradigm Evolution and Development Trend of Medical and Health Informatization Policy in China-Based on the Analysis of Policy Changes since 1986

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## Abstract

**Based on Baumgartner and Jones' interrupted-equilibrium theory policy change analysis paradigm, this study identifies and analyzes the paradigm of health informatization policy change during 1986-2016 around the policy venues and landscape, and finds that China's health informatization policy has roughly gone through three policy paradigm phases during its 30 years of development: weak equilibrium stage (2001-2006), strong discontinuity (2007-2008) and strong equilibrium (2009-present). Combined with the analytical framework of intermittent-equilibrium theory, it is found that China's health informatization policy exhibits an intermittent-equilibrium nonlinear trend. The policy venues and policy landscape at different stages of the paradigm show great differences, and after 2009, health informatization policy has become more people-centered, highlighting the sharing of information and the enhancement of health service ability.**

## Keywords

**Medical and health informatization; Policy change; Interrupted equilibrium theory.**

## 1. Introduction

The development of medical and health care is an crucial aspect in the course of social development, and is an vital channel for citizens to access social resources. China's medical and health informatization policy has also been undergoing the process of formulation, amendment and reformulation in the course of more than 40 years of development. Especially since the reform and opening up, with the popularization and application of information technology and the pursuit of high efficiency of information technology management in health, the speed of change in China's health informatization policy has accelerated. Intermittent-equilibrium theory has been widely used in the explanation of policy change since the last century, especially to study and analyze the logic of stabilization and change of the policy process, which provides a new theoretical research perspective for policy formulation and understanding of the policy process. In either the development of health service systems or the modernization of hospital management, informatization has become increasingly indispensable. Particularly since the emergence of the novel coronavirus pneumonia epidemic, informatization has played a crucial role in epidemic prevention and control, significantly enhancing the quality and efficiency of the work. Whether it is regional health informatization or health emergency informatization, health informatization policy plays a crucial role in guiding development and policy support. Therefore, explaining the change process of China's health informatization development from a theoretical perspective is of great significance to our deeper understanding of the development process of China's health informatization policy and to the formulation of future health informatization policy as well as to the analysis of policy theories.

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## 2. Paradigm Analysis of Policy Change

### 2.1. Intermittent-Equilibrium Theory

Retrospective analysis of policy to capture the dynamic process of policy development is useful for further understanding of policy change. The real policy analysis was proposed by Charles E. Lindblom, who formally summarized "policy analysis" in "Policy Analysis" published in the American Economic Review in 1958 [1]. In his later related treatise, he established a dynamic theory of policy analysis [2]. In the history of research on policy change, there has been a great deal of research on policy change. The concept of "policy change" was mainly developed in the 1980s by Paul Sabatier, absorbing the components of the process from policy formation to the end of the policy cycle [3]. Policy change analysis has also garnered growing interest from academia. Since the 1980s, many scholars have proposed a number of frameworks for analyzing policy change by revising the traditional stage model of the policy process. The mainstream analytical frameworks include the initiative coalition framework, the multi-source flow analysis framework and the interrupted-equilibrium theory [4]. Among the explanatory modeling frameworks, the interrupted-equilibrium theory modeling framework, which matured in Baumgartner and Jones' 1993 book Agendas and Instability in American Politics, has been more widely influential. They attempted to explain both stabilization and change in the policy process from the agenda-setting theory, combined with the interaction of policy images and policy scenarios [5]. In recent years, interrupted-equilibrium theory is in the trend of conservative but positive development in the study of policy change in China. Conservative theory is that the interrupted-equilibrium theory was proposed by researchers after empirical studies in the unique institutional context of the West. The positive development is that with the pace of China's reform and development process and the complexity of China's policy-making environment. We believe that the application of any kind of theory in the process of policy analysis should be based on the reality of China's reform work, and do a good job of adapting to the localization of the theory. With the increase of complexity factors in the policy process, there is also an intermittent-equilibrium non-linear trend in the continuous process of policy in China.

### 2.2. Policy Process Paradigm Shift

Any theoretical model has a basic kernel and core structural elements, and interrupted-equilibrium theory is no exception. Policy analysis, particularly retrospective analysis, plays a crucial role in understanding the dynamics of policy change. The structural analysis of the policy process is also a research paradigm emphasized in interrupted-equilibrium theory. The political system and the policy picture constitute the structural basis of the policy process. The result of the interaction of political institutions and policy images leads to policy change [6]. The political system, that is, the institutional structure is supported by the policy venues as the subject of activity. Regarding the policy landscape, Baumgartner and Jones in their 1991 article "Agenda Dynamics and Policy Subsystems" attempted to explain this phenomenon in terms of the same process, and defined this process by calling the beliefs and values of a particular policy as the policy landscape [7]. So the value factor is the core of the policy picture and at the same time it is not static in the policy process, but always in a state of interaction with the institutional structure at specific points and changing in time.

## 3. The Shifting Policy Venues and Policy Landscape of Health Informatization

Since the reform and opening up of China, the cause of reform in various fields has been developing rapidly, and reform agendas in social, economic, cultural and health fields have been constantly put forward. With the continuous progress of China's science and technology,

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information technology has been greatly developed, and all reform undertakings have entered the era of information technology. China's medical and health care is also early to cater to the trend of information technology development, in China's disease prevention and control monitoring, hospital management, disease diagnosis and treatment of various aspects of assistance, the level of information technology continues to improve. However, due to the rapid development of China's medical and health care, medical and health care informatization and other related policies also need to be combined with China's medical and health care informatization of the specific development of the environment and the application of technology, to make the relevant policy innovation. Policy innovation process, as well as the power of policy transformation, China's health informatization policy change is actually a epitome of China's reform and opening up in various subsystem policy transformations. Especially in recent years, China's medical and health system reform into the "deep water zone", China's medical and health informatization policy frequently introduced. As China continues to deepen the reform of the medical and health system, the policy venues and policy landscape of medical and health informatization are constantly and dramatically changing.

## 3.1. Shifts in the Policy Arena

China's health informatization policy is gradually developed from China's reform and opening up, the application of health informatization tools first began in the 1980s, from the beginning of the use of single-chip computer to the application of regional health informatization is China's health informatization initial exploration and embryonic formation stage. In 1990, provinces, autonomous regions, municipalities directly under the central government around the establishment of a rapid and accurate disease reporting. The goal of the system, one after another to establish and improve the monitoring point, the monitoring information transmission, feedback, the initial formation of the earth, under the coherent reporting network [8]. China's health informatization policy in recent years, the gradual development to a higher level, the frequency of policy releases and calls for the introduction of the policy is also increasingly high. In the current Internet environment, China's health informatization policy is also a wind vane for industry management and development.

## 3.2. A Shift in the Policy Images

The changes in China's health informatization policy reflect the manifestation characteristics of the interrupted-equilibrium theory. In particular, it is the embodiment aspect of the core element structure of the interrupted-equilibrium theory. Whether from the micro or macro level, the change of China's medical health informatization policy embodies the characteristics of intermittent-equilibrium. On the micro level, during the equilibrium period in the process of policy change, the triggering event is induced to experience the positive feedback of the policy images, and then enter the evolution of the results of the field conversion and other links. For example, after the 1998 catastrophic flood, the construction of the National Health Information Network (NHIN) in April 2000, the reporting of national epidemics became more convenient and efficient, forming a positive feedback of the policy picture, and the subsequent informatization construction policies were gradually introduced. The CPC Central Committee on the formulation of national economic and social development of the tenth five-year plan of the proposal pointed out that: informatization is today's world economic and social development trend, but also China's industrial optimization and upgrading and the realization of industrialization and modernization of the key links. Priority should be given to promoting the informatization of the national economy and society. Vigorously promoting the informatization of the national economy and society is a strategic initiative covering the whole picture of modernization. To drive industrialization by informatization, to give full play to the advantage of latecomers, and to realize the leapfrog development of social productivity [9]. After 2000, the development of medical and health care in China has entered a period of great

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construction of informatization. The positive feedback formation of the policy picture of medical and health care informatization construction has formed a field of policy formulation that is conducive to the development of medical and health care informatization in China, and the informatization policy issues have entered a period of equilibrium.

## 4. Stages of Change in Health Informatization Policy Paradigms

China's health care informatization development has roughly gone through three stages of development: the first stage, the early 1980s-2003, is the initial development stage of health care informatization, this stage is mainly in order to improve the level of management of health institutions, in accordance with the workflow design of informatization software. The second stage from 2003 after the outbreak of SARS - 2009 years ago, the country's investment in public health information technology and business information management stage. The third stage is since the start of the new health care reform work in 2009, this stage is mainly based on health records of regional health care informatization and connectivity based on information sharing and common construction [10].

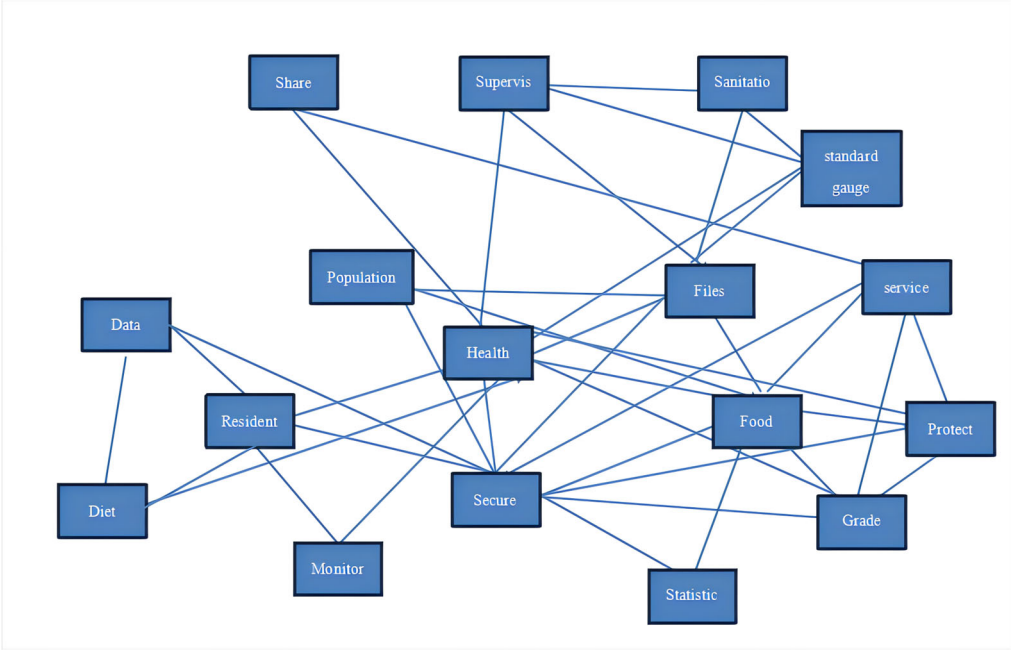


**Figure 1.** Analysis of health informatization policy theme co-words, 1986-2000

From the social network and semantic network analysis of the literature (Figure 1), since 1986, the themes of China's health informatization policy have mainly centered on several major aspects, such as population health, health services, and food safety. This is in line with the stage of development of China's medical and health care is at the same time pay more attention to the problem-oriented and social background factors of policy development. According to the stage of development of China's health informatization, combined with the policy literature query, it was found that between 1986 and 2000, China's health informatization was in the stage of practical groping, and the macro-policy of health informatization was not explicitly put on the policy agenda. However, from the 1998 mega-flood, based on the consideration of the timeliness of the information of epidemic reporting, the former State Ministry of Health issued "Notice on the Issuance of Relevant Provisions on the Construction Project of the National Health Information Network [11] in the beginning of 2001. Therefore, this study divides the intermittent-equilibrium period of China's health informatization policy change into three

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stages, but different stages show different strengths and weaknesses, which are analyzed as follows:

## 4.1. Weak Equilibrium Period: Exploration Stage of Health Informatization (1986-2006)

According to the empirical experience of intermittent-equilibrium theory, the initial period of the policy will relatively go through a continuous and stable (equilibrium) period. During this period, due to the 1998 flood, a wide range of post-disaster epidemics occurred, the timely reporting of epidemics on the health management at the time of the demand for information technology tools, so the 1998 flood as a trigger event for China's health care informatization, for the health care informatization policy formally introduced to lay the foundation of the institutional structure. 2003, the SARS outbreak was a reflection of the urgent need for the construction of China's health care information technology. The outbreak of SARS in 2003 reflected the urgent need for health informatization in China, and in 2003, the former Ministry of Health issued a notice on the issuance of the "Outline of the National Health Informatization Development Plan 2003-2010" (Health Office [2003] No. 74), and the development of health informatization was formally put forward in the form of a macro policy document at the national level [12]. In the three years of 2004, 2005 and 2006, the former National Health and Planning Commission issued policies from the construction of public health, new rural cooperative, national disaster relief informatization and other business management systems. This period was the period when China's National Informatization Leading Group approved the promulgation of the "Tenth Five-Year Plan for National Economic and Social Development: Key Special Planning for Informatization", and it was also the time to implement the spirit of the CPC Central Committee and the State Council on vigorously advancing the strategic deployment of the national economy and social informatization, and to comprehensively implement the "Tenth Five-Year Plan" for the period of the important period of health informatization work. Informatization work during the "Tenth Five-Year" period, an important period of good policy venues gradually formed. Therefore, during this period, China's health informatization policy revolves around the needs of health management, and fewer policy documents on health informatization have been issued, but in general, the framework is based on the Tenth Five-Year Economic and Social Informatization Development Plan and the National Health Informatization Development Outline for the Period of 2003-2010. Therefore, the overall performance of China's medical and health information policy in this period is a weak equilibrium period in the exploration stage.

## 4.2. Strong Intermittent Period: Learning and Summarizing Phase (2007-2008)

After the last period of business management needs information technology policy construction mapping and China's health care reform gradually entered the deep water, this stage of the macro-level health care information technology policy is lacking, more relevant notices to information technology training, e-government project management methods for trial, information technology to solicit comments on the letter, etc. as the main content. For example, the Leading Group of Informatization Work of the Ministry of Health issued notices related to the ninth, tenth and eleventh information technology training courses; the Office of the Leading Group of Informatization Work of the Ministry of Health on the results of the study of the Technical Guidelines for the Maternal and Child Health Care Information System Network Support Platform to solicit opinions (Letter of the Office of the Ministry of Health Information [2007] No. 12), and so on. Therefore, China's informatization after the previous period of groping for development, to this period is also an urgent need to strengthen China's health informatization talent team construction and health informatization development summary to improve. In this period, the policy picture has undergone a new transformation, and the policy agenda has also seen new changes. In this period, it is no longer a question of choosing the

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theme for the development of health informatization, but how to better develop China's health informatization.

### 4.3. Strong Equilibrium Period: Period of Great Development of Health Informatization (2009-present)

A search on the National Health Commission's official website revealed that during this period, health informatization was issued, as shown in Figure 2.

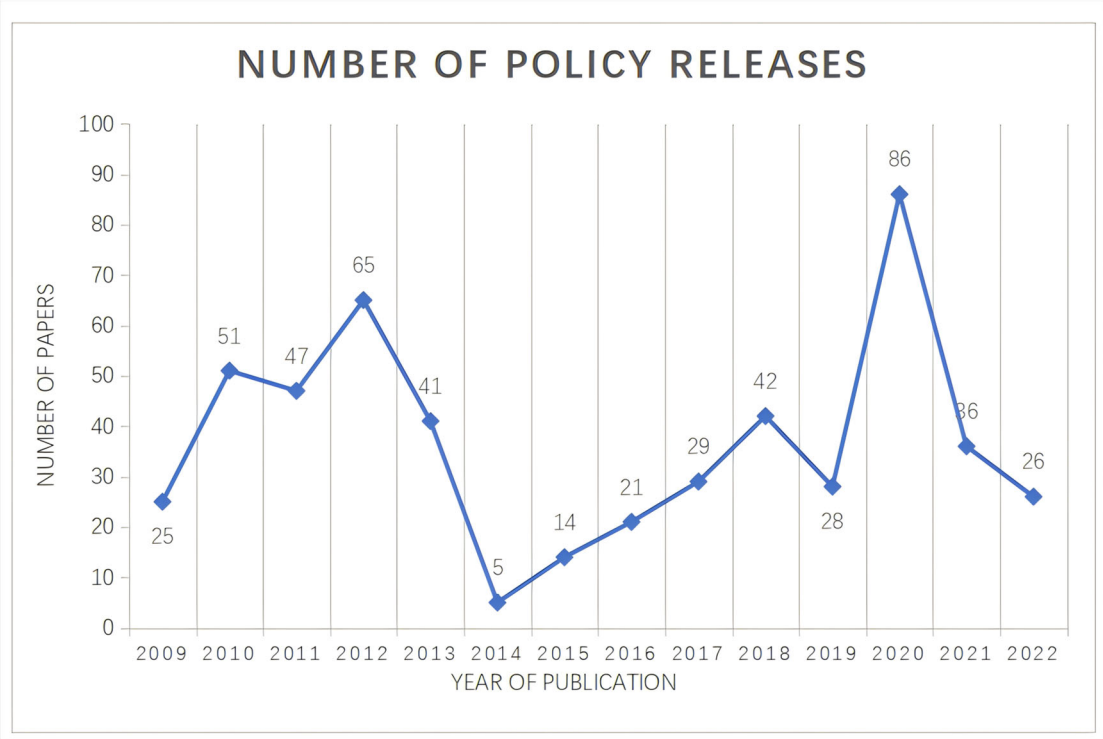


**Figure 2.** Policy publication trends

As can be seen from Figure 2, relevant informatization policy documents were frequently issued during this period. The reform of China's health system has entered a deep-water zone, and in the reform process, informatization has gradually embodied important application values. In addition, in the context of the social environment of Internet+, how to effectively guide and regulate medical institutions, the use of health informatization tools and the development of data security standards and so on are practically in front of the policy makers. During this period, China's medical and health informatization construction has been steadily advancing. The social environment reflects positive signals on the application and development of health informatization, and the policy landscape has been stabilized and consolidated at the level of value consciousness, and the institutional structure has been stabilized in terms of the policy venues. A series of medical and health informatization policies have been gradually improved, showing a balanced development and advancement.

## 5. Discussion and Recommendations

The interrupted-equilibrium theory starts from the structural basis of the policy process: policy images and policy venues maintain continuous stability and sudden changes in the interaction. In recent years the interrupted-equilibrium theory has been continuously applied to the analysis of policy change, and scholars are no longer satisfied with the characterization of policy change, but have gradually turned to the analysis of the drivers of policy change. However, how

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to make the theoretical framework in the context of the western political system better fit the logical characteristics of localized policy change is a practical problem we have to face. The logic of change in China's health informatization policy is characterized by an intermittent and balanced policy paradigm change. Changes in the policy environment bring about changes in the policy venues, and the overall trend of change in medical and health informatization policy since 1986 indicates that the interaction between the policy venues and the policy picture in a special social environment has promoted the paradigm change in China's medical and health informatization policy. Whether it is the subject of policy issuance or the policy content, the change is realized in the process of transformation of a certain policy venues. For example, the 1998 flood and the 2003 outbreak of atypical pneumonia, the occurrence of emergencies has stimulated the formation of social policy at the level of the social field of social policy often meets the formation of the policy picture, for the introduction of health care informatization policy to lay the foundation of social demand. Indubitably, according to the analytical framework of interrupted equilibrium theory, the opening of the policy window, the policy venues and the generation of the policy scene requires the joint action of various factors. However, from the perspective of China's actual social development, in addition to the analysis of the policy venues and policy picture, the changes in China's policy environment and the interactive power of the social network should be taken into account.

## 5.1. Emphasize the Internet Social Policy Environment

Frant Baumgartner and Brett Jones have been emphasizing that the policy environment is an important factor in policy change, but have not subdivided the policy influences of specific environments from specific contexts. Following the reform and opening up in China, science and technology experienced rapid growth, leading to a gradual diversification of society. With the popularization and application of Internet technology, China has gradually stepped into an information society under the background of the Internet. According to the 41st Statistical Report on the Development Status of the Internet in China released by the China Internet Network Information Center (CNNIC), as of December 2017, the number of Chinese Internet users reached 772 million, with a penetration rate of 55.8%, exceeding the global average level (51.7%) by 4.1 percentage points [13], and it can be said that China has entered the Internet society. Relative to the social environment of the United States in the 1990s as proposed by the interrupted-equilibrium theory, the Internet public opinion in China has an important influence on the policy agenda that cannot be ignored. The Internet has strengthened the interaction between the policy agenda, the media agenda and the public agenda. While the Internet conveys the voice for the government, it also brings a lot of public opinion pressure to the government [14]. Therefore, in our country is currently in the Internet society, the factors of policy change are more diversified and complicated, we must be based on the reality of our country, and comprehensively consider the impact of the social network environment, modern emerging technologies and other factors on policy change.

## 5.2. Scientific Analysis of Social Network Interactions in Transition

Our nation has undergone a period of reform and opening up, which has expedited social evolution. People's views on policy changes have become more diversified. Social networks have become more complex, and social relations have changed significantly with the acceleration of social transformation. In contemporary society, social networks influence the interactions and perceptions of social groups, and the interactions and transformations of social networks become important influences on policy change, as well as the transformation of the policy venues. Social (relational) network interaction affects the perception of the policy picture. In Chinese society in the process of transition, due to the underdevelopment of modern social security and the absence, inadequacy, or loopholes in the relevant legal system, relational operation becomes the main choice for people to obtain resources and attenuate uncertainty

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[15]. The analytical tradition of stage-heuristics in Western public policy, especially in the United States, is only one of the simpler schools of Western policy process theories, and to explain and study the more complex policy processes such as strategic change in China's social transformation, it is certainly not feasible to hold on to such simple theories alone [16]. In the process of social transformation, people are in an unstable social relationship network, and the analytical perspective and view of the "garbage can" problem stream of decision-making are also uncertain. Therefore, when analyzing the causes of policy change in the Chinese society in the process of transformation, we need to analyze the background of social transformation in China, and incorporate the complexity of social networks into the influencing factors of policy change. When we analyze the influencing factors of policy change, we should use the modified framework of discontinuous-equilibrium theory with more localized characteristics to deeply analyze the motives of policy change in China, which may be more pragmatic and scientific.

### 5.3. Focus on Social Demand Side Satisfaction and Rational Planning of Health Information Resources

In the new era, both the spectrum of diseases and the public's demand for high-quality and diversified medical and health services are in a constant state of flux. In particular, the aging social trend has created a demand for long-term continuous medical and health services. The development of informatization has led to more convenient interaction of information and more urgent social demand for access to information resources. Therefore, the overall planning of health informatization, especially the planning of regional health informatization, should start from the social demand at the realistic level, focusing on planning and designing the needs of high social demand, meeting the needs of the people in the region in terms of convenient access to health and accessibility of health resources. Reasonable planning and integration of regional medical and health information resources should be carried out to enhance the efficiency of medical and health resource utilization and to provide convenient and accessible medical and health information services for the public.

### 5.4. Strengthen the Standardized Construction of Health Emergency Information and Open Up Information Sharing Channels

For some time now, regional socio-economic development has been unbalanced, and the level of regional health care informatization has developed unevenly, resulting in the lack of a unified standard for health care informatization in each region, which has led to the existence of "information silos". Especially since the outbreak of the new crown epidemic, health emergency informatization construction also exists in acute construction, lack of standardization, health emergency data sharing information barriers. Therefore, in the future, we should do a good job of standardizing the construction of health emergency information from the level of policy design, establish a consultative mechanism for the common construction and sharing of health emergency information, open up the channel for sharing health emergency information, and promote the empowerment of health emergency information to prevent and combat epidemics of public health emergencies, so as to effectively respond to public health emergencies.

## 6. Summary

In this study, from the background of informatization society, combined with the interrupted equilibrium theory, a new theoretical perspective of public policy change, in-depth excavation of China's health care informatization policy formulation of the social background, the social needs of the policy picture of the changes in China's health care informatization policy content of the textual content analysis, and gradually touching the focal point of the interaction of the social network. On the basis of the focus analysis, the power source of policy change is unveiled, which is the transformation of the policy venues. In the process of analyzing the policy change

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of China's medical and health informatization, we try our best to avoid the functional original theory of policy issue setting, set the intermittent equilibrium theory to the whole social network space of China, and emphasize more on the cognition of the policy picture under the interaction mode of social interaction and social relationship. The dynamic process of policy change is always in the trend of three-dimensional rotation in social space. Based on the theoretical interpretation but not sticking to the ontology of theoretical interpretation, the analysis of the dynamic wave line of China's health informatization in stages will better understand the process of policy change. In the future policy making process of medical and health informatization, we should emphasize the performance characteristics of social relationship interaction in the dynamic social environment and the analysis of policy change motives, which will better optimize the policy making process and promote the development of medical and health informatization construction.

Undoubtedly, there are still some shortcomings in this study, on the one hand, the interrupted equilibrium theory provides the perspective of policy change analysis, in today's information technology accelerated update iteration of the environment, on the policy change but outside of the policy change, the science and technology of the endogenous promotion of the power of the explanatory power of the slightly insufficient. On the other hand, the policy text analysis content of this study comes from the national health department's website network discovery, the lack of text content analysis of health care information technology policy at all levels, and the policy change of verticality at all levels is still to be further explored and analyzed.

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## References

[1] Charles E. Lindblom. The American Economic Review. American Economic Review. 1958; 48(3): 298-312.

[2] Yan Q. National governance system and policy change-toward an empirical explanation of Chinese political economy. 2008. Beijing. Central Compilation and Translation Press.

[3] Li JL, Tang HF. Fundamentals of Public Management. 2008. Shanghai. Shanghai People's Publishing House.

[4] Luo Miao, Mao Shoulong. Understanding the Process of Policy Change: An Analysis of the Triple Path. Journal of Tianjin Institute of Administration. 2017; 19(2): 58-65.

[5] Li Wenzhao. Discontinuity Equilibrium Theory: Exploring the Logic of Stability and Change in Policy Processes. Journal of Shanghai Institute of Administration. 2018; 19(2): 54-65.

[6] Baumgartner, F. R., Jones, B. D. Agendas and instability in American politics. 1993. Chicago. University of Chicago Press.

[7] Li Wenzhao. The Evolutionary Logic and Trends of Discontinuity Equilibrium Theory: A Leap Forward to Behavioral Public Policy Theory. Journal of Jiangsu University of Administration. 2018; (1): 82-91.

[8] Wu Guizhen, Su Chongao. China health yearbook. 1991. Beijing. People's Health Publishing House.

[9] State Council. http://www.gov.cn/gongbao/content/2006/content_268766.htm. Accessed 14th March, 2024.

[10] Li Yuefeng, Hu Jianping, Zhou Guanghua, Meng Qun. China's Health Informatization Construction: Current Situation and Development. Chinese Journal of Health Information Management. 2012; 9(5): 7-10.

ISSN: 2688-8653

[11] NHIC. 2001. http://www.nhc.gov.cn/wjw/zcjd/201304/70205f18b9064f799f4c2fe88ad0c70d.shtml. Accessed 3th January, 2024.

[12] National Health and Wellness Commission. http://www.nhc.gov.cn/guihuaxxs/s10741/200804/ffcd3279de0846b1981b82d43d2e9fc9.shtml. Accessed 14th April, 2024.

[13] China Internet Network Information Center. http://www.cac.gov.cn/2018-01/31/c_1122347026.htm. Accessed 5th March, 2024.

[14] Zeng Runxi, Jiang Xinxin. Transformation and Relationship of Media Issues, Public Issues, and Policy Issues. Modern Communication (Journal of Communication University of China). 2016; 38(3): 69-74.

[15] Huan pingqing. Research on the "relation" of theoretical consciousness and social construction. Studies on Socialism with Chinese Characteristics. 2018; (2): 59-66+76.

[16] Hu Ningsheng. Public Policy Interpretation of Strategic Changes in China's Social Transformation: The Application of Nonlinear Process Theory of Western Public Policy in China. Jianghai Academic Journal. 2006; (1): 85-90+238-239.