Urban planning for outer suburb of metropolitan cities of China in the post-epidemic era
——The case of Fangshan District， Beijing

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“For a solution to be truly sustainable and good it must have a positive return to the environment and society. At the heart of any design problem is a question: Are we trying to make something less bad or are we trying to make things better?...
it's not just about solving for the negative;
it's about creating a positive."

——Eric Wicks

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Abstract

Novel coronavirus pneumonia (COVID-19) has had a major impact on global economic development, social life and governance. China is facing various risks and challenges in metropolitan areas due to its large and densely populated population base during the critical period of outbreak prevention and control. The distant suburban counties of the metropolis play an important role in this epidemic as a buffer zone for the epidemic. Prevention and control efforts and spatial governance strategies in distant suburban counties should be given high priority.

This paper identifies the problems in emergency prevention and control in distant suburban counties of metropolitan areas by observing them and combining them with China's national conditions. From the perspectives of public facilities, public spaces, community units, and emergency measures, we explore the problems of responding to emergency epidemics in distant suburban counties, explore their potential from existing policies and combine them with the advantages of distant suburbs, and propose corresponding solutions to build new distant suburbs in post-epidemic era.

Keywords

outer suburb， metropolitan cities，post-epidemic era，urban planning，policy

Chapter1. Introduction

1.1 Background

1.1.1 New coronavirus sweeps the world

At the beginning of the cold winter of 2019, a virus focused people's attention on Wuhan. I thought it would be a discordant episode at the end of 2019, but it turned out to be a very unpleasant New Year's prelude. The city was closed for a few months, the disaster would subside and everything would return to a peaceful life. No one would have thought it would be reinfected all over the world.

According to WHO's real-time surveillance data on coronavirus (COVID-19), as of 7:24 pm CEST, 23 June 2022, there have been 539,893,858 confirmed cases of COVID-19 in globally, including 6,324,112 deaths, reported to WHO[1].

So far, the epidemic has directly or indirectly affected many industries, such as representative catering, transportation, offline service industries, and construction industries.

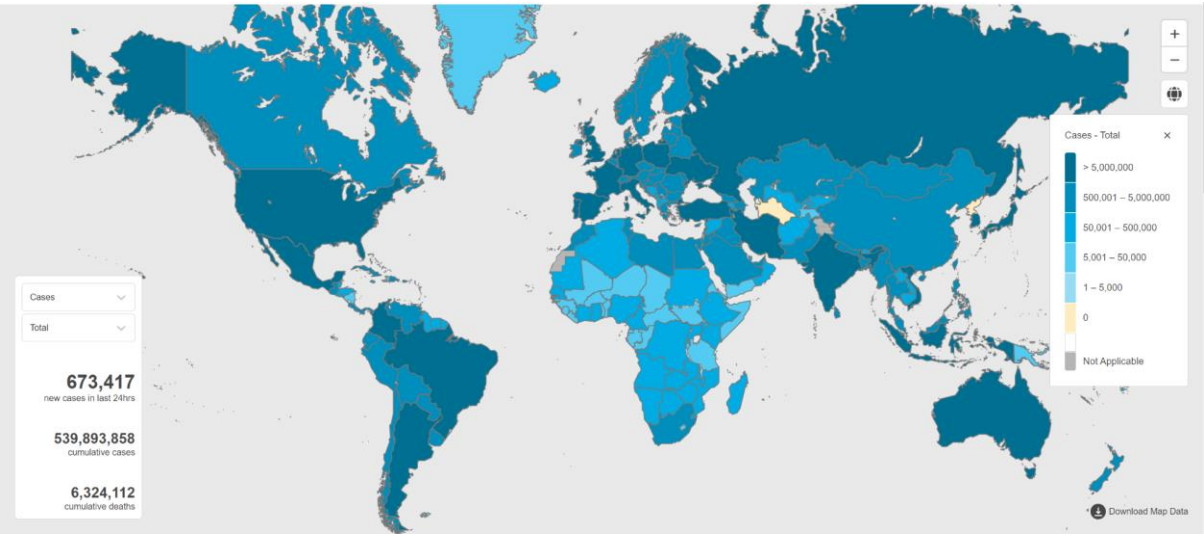


Figure 1.1.1 WHO Coronavirus (COVID-19) Dashboard

Source: WHO COVID-19 Dashboard. Geneva: World Health Organization, 2020. Available online: https://covid19.who.int/ (last cited: 26/06/2022).

[1] WHO:The World Health Organization ,WHO is a specialized agency of the United Nations responsible for international public health.The WHO Constitution states its main objective as "the attainment by all peoples of the highest possible level of health".Headquartered in Geneva, Switzerland, it has six regional offices and 150 field offices worldwide.

1.1.2 Cities are affected by the outbreak

The new crown pneumonia epidemic has caused unprecedented shocks and impacts on cities, especially metropolises. After 40 years of rapid development, China's economic and social development has entered a transitional stage, and structural contradictions have become increasingly apparent. The sudden outbreak of the COVID- 19 outbreak has exposed basic problems in urban development over the past 40 years, such as public services and community construction.

The urban problems exposed in the epidemic response are, first of all, the shortage of public medical resources and the unreasonable structure, which makes it difficult to cope with large-scale outbreaks. Taking Wuhan as an example, although the number of medical beds and the number of tertiary hospitals are in the leading position in the country, the overall medical facilities, especially the isolation hospitals, are insufficient. In addition, the layout of major high-quality medical facilities is unreasonable and excessively concentrated in the central urban area. The number of primary health facilities is seriously insufficient, far lower than that of developed countries such as Singapore and New Zealand. During the epidemic period, the pressure on general hospitals to seek medical treatment was huge, which increased the cross-infection rate. Secondly, the grassroots governance capacity is weak and the level is low, the community scale is too large, and the community service personnel are insufficient.

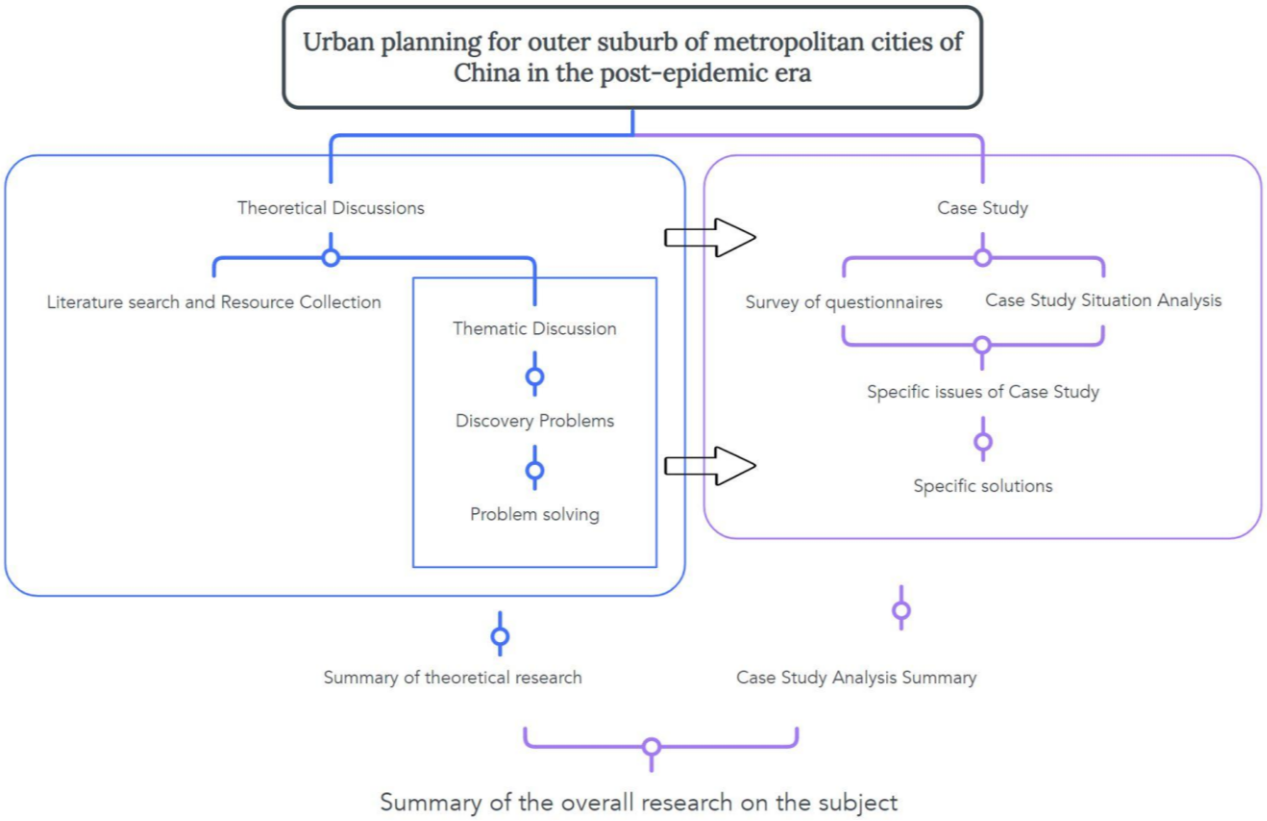
From the perspective of the potential problems in the city reflected by the epidemic, In the past 20 years, China has built a number of high-density and super high-rise residential areas on a large scale, especially in metropolitan areas. The quality of people's living environment needs to be improved. The existing old community is large in scale, involving a large population and heavy tasks. There is a lack of healthy space at all levels in the city, especially the lack of attention to the construction of green space for the elderly and children, and the lack of comprehensive utilization measures for green space and public space during disasters.

The high density and high mobility of the urban population has also exacerbated the spread of the epidemic to some extent. From a scientific point of view, urbanization increases the risk of infectious diseases. Urbanization leads to complex population sources, large environmental changes, and dramatic changes in the composition and diversity of microorganisms in the urban environment. Environmental pollution, especially air pollution, caused by the development of urbanization will significantly affect the spread of the virus.

1.2 Research aims

Due to the outbreak of the COVID-19 epidemic, large cities have many limitations in their anti-epidemic performance due to many factors such as dense population, high living density, and tight land use. Due to the lack of anti-epidemic experience at the city management level, the panic among citizens in the early stage of the epidemic, coupled with the rapid spread of the epidemic, led to serious overloading of public service facilities, home isolation, and the implementation of policies such as suspension of work and production, large-scale stagnation of economic and cultural activities, and economic development. serious impact on people's lives. Therefore, this paper focuses on the outer suburban areas with a low degree of development and relatively loose use of land and resources, and explores the outer suburban counties with huge development space by studying their existing problems and examples of how to share the epidemic prevention through the outer suburban counties. What kind of anti-epidemic potential does it have in order to share the pressure of epidemic prevention in urban centers?

1.3 Research methodology



Figures 1.3 Mind Map

By the author‘s made

The aim of this study is to explore urban planning issues in the outer suburbs of metropolitan China in the post-epidemic era. Firstly, a literature research approach is used to examine the intellectual background of urban planning and inter-professional integration in various literature to understand the huge impact on metropolitan China in the context of the epidemic. Secondly, the preceding research and observations are used to conduct a detailed study and analysis to present urban planning issues in the outer suburbs of metropolitan China in the context of the epidemic generally. Different situations and categories are understood and useful information is extracted.

The Fangshan District of Beijing, China was selected as a case study for this research. A questionnaire was first administered to 210 Beijing residents, the findings were analyzed

and summarized, and combined with the previous theoretical support to summarize the problems of urban planning in Fangshan District, Beijing, and to propose modifications.

Finally, based on the case study analysis, recommendations and summaries, relevant suggestions are made for urban planning in the outer suburbs of China's metropolis in the post-epidemic era.

Research methods used

Literature research method

Once the topic was selected, a large body of literature was collected through literature research and an in-depth study was conducted. In-depth research was conducted and the world is still divided on the definition of suburbia and suburbanisation, with different people having different interpretations. We summarize the definition, characteristics, driving mechanisms and development trends of suburbs and suburbanisation to provide a theoretical basis for future research.

We have analyzed the differences between China and the developed Western countries through a study of the dynamics of suburbanisation, and summarized the characteristics of suburbanisation mechanisms specific to China for subsequent research.

Survey Methodology

Through extensive research, we summarized the definition, characteristics, dynamic mechanisms and development trends of suburbs and suburbanisation, and raised the issue of urban planning in the outer suburbs of metropolitan cities in China in general in the context of the epidemic.

And finally, a representative case was selected for further study to explore the urban planning problems in the outer suburbs of Chinese metropolises and to propose solutions.

The Observational Approach

In the thesis, the observation method was used to conduct a questionnaire survey of 210 Beijing residents, analyze and summarize the findings through in-depth interviews and observations, and summarize the problems of urban planning in Fangshan, Beijing, and propose modifications in conjunction with the previous theoretical support. The survey was used to form a first impression of the site, which was then combined with other methods to conduct an in-depth study.

1.4 Literature review

1.4.1. Literature overview

By searching and organizing academic websites and databases such as CNKI Academic Journals, Baidu Academic, Urban Studies Bibliography, Cities Bibliography, Baidu Database, and Google Academic Search, the existing domestic and foreign research materials were sorted out from the needs of this study. Since the selected topic of this paper involves interdisciplinary expertise, it is necessary to first understand the basic information of the epidemic, and then the role of suburban counties in urban planning and its impact on the whole city, as well as how to reduce the impact of infectious diseases on the city through special geographical location Suburban counties in the post-epidemic era. To provide a theoretical basis for future research.

1.4.2. Topic review: Literature and main scholars

1.4.2.1 Relevant concepts and characteristics of the outer suburbs of metropolis

The objective of this study is to explore the potential of epidemic prevention in the outer suburbs of metropolises in the post-epidemic era, and to clarify the definition of suburbs as the main object of study is the basis of this case study. In this section, the literature is mostly focused on the last decade of the 20th century and the first decade of the 21st century, indicating that many Chinese and foreign scholars have already started and concluded this research earlier. In the process of clarifying the definition of suburbia, this paper is divided into the following topics for literature search and analysis.

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Major scholars:

Peng Jia, Ph.D. Supervisor Master's supervisor, whose main research interests include health geography, ecological and environmental health, infectious disease prediction and prevention and control, medical image processing, medical resource allocation planning, etc. His research takes health geography as the driving performance and explores the suburbanization driving mechanism.

Qunlang Sun: Professor of World History and PhD supervisor in the Department of History, College of Humanities, Zhejiang Normal University, a Fulbright Senior Visiting Scholar, a director of the Chinese Association for the Study of American History, and a director of the Chinese Association for the Study of Modern World History. His research takes history as a starting point to explore the characteristics and definitions of American suburbia.

Yanwei Chai: Research Professor, School of Urban and Environmental Studies, Peking University, research interests: human geography, urban social geography, behavioral geography, temporal geography, urban and regional planning

Ann Forsyth: Ruth and Frank Stanton Professor of Urban Planning and Director of the Master of Urban Planning program. She has contributed to research and practice in three major areas: documenting and evaluating innovative and high-density planning and design in suburban/metropolitan areas; evaluating and presenting work on how the physical environment can improve health; and linking research to practice.

Renkai Zhang: Ph.D. in Humanities and Economic Geography, East China Normal University, now an Associate Researcher in the Strategic Planning Research Office, conducting strategic planning of cities from three perspectives: human, economic, and geographic.

Zhixin Yang: Hebei Agricultural University, College of Resource and Environmental Science, Department of Environmental Science, Professor, PhD supervisor, analyzing the ecological condition of suburbs through environmental perspective.

Gu Chaolin: Tsinghua University, School of Architecture, Department of Urban Planning, Professor, PhD supervisor, research areas include urban and regional planning theory, urban geography, regional economics, etc.

Liu Bingkam: Professor and PhD supervisor at the Institute of Urban and Regional Economics, Nankai University, whose research fields include regional industrial analysis, logistics planning and policy, and transportation economics.

Topic Report:

Most of the research scholars in this theme are professors in the urban planning industry, whose research areas fit this theme. In contrast, scholars from non-urban planning professions, such as health, history, environment, and economics, explore the mechanisms of suburban development dynamics through side areas. Because the city is a complex social structure that connotes a diversity of factors, its development is also diverse. Each city has a historical significance, and the definition of its various conceptual aspects has a certain historical legacy.

1.4.2.2 Progress and strategy of metropolitan outer suburbs

After clarifying the basic issues of suburban definition, linkage with metropolitan areas and suburbanization, the process and dynamics of suburbanization in China and Western countries are studied, and the development trends are predicted through policies. Drawing on the experiences and lessons learned from past development processes is the purpose of studying the academic references in this

chapter. Most of the references on this topic focus on the first decade of the 21st century, which also indicates the prevalence of suburbanization in the world during this period.

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Xiong Wansheng & Chen Changjun.(2021). Suburbs, Suburbanization and Suburban Society in Local Context. Fujian Forum (Humanities and Social Sciences Edition) (11), 196-206.

Major scholars:

Zhang Hongyan: Professor and PhD supervisor, School of Social Sciences, Nanjing University, specializing in urban economic history, urban spatial planning history and Marxist urban history, especially pre-Qin urban economic history and pre-Qin urban spatial evolution history.

Diego Laguia Martinez: A highly motivated analytical thinker with a top-notch academic and professional background in distressed real estate and distressed loan transaction advisory and asset management.

Bill Hillier: Professor, University College London, whose main research areas are space, built form, and urban morphology

Arjun Ramani: Economist and journalist with a focus on innovation policy, finance and macroeconomics. He has analyzed the pros and cons of the donut effect in the US during the epidemic through economic instruments, mainly in terms of rental prices.

Nicholas Bloom: Professor of Economics at Stanford University, whose research interests focus on measuring and explaining management practices across firms and

countries. Like the previous scholar, he explores the donut effect and the development of suburbanization through the field of economics.

Peter Mieszkowski: Professor Emeritus of Economics at Rice University and a Rice Scholar at the Baker Institute, known for his work on tax attribution theory, he has also contributed to urban economics, the theory of fiscal federalism, and the design of optimal revenue maintenance systems.

Yuan Zheng: Shanghai Jiao Tong University, School of Life Science and Technology, Professor, Agriculturist. His research areas include the study of molecular regulatory mechanism of rice floral organ morphogenesis; molecular assisted breeding in rice; the study of molecular regulatory mechanism of rice plant morphogenesis.

Lin Xu: Professor at the School of Politics and Public Administration, Wuhan University, Wuhan, China: mainly engaged in the study of political science theory and contemporary Chinese politics. The future trend of urban development can be explored through policy aspects

Monday Xing: Professor at the Department of Urban and Environmental Studies, Peking University, Executive Director of the Chinese Geographical Society, Deputy Director of the Professional Committee of Urban Geography, Executive Director of the Chinese Society for Urban Science Research. The Suburbanization of Beijing and Its Countermeasures", first discovered in 1992 that Beijing has entered the process of suburbanization, this book takes Beijing as a sample and elaborates the occurrence, development, mechanism and countermeasures of suburbanization in China. The model of suburbanization in China develops the traditional Western theory. It has set off and promoted the study of suburbanization in China, which has been identified by the state as the main trend of the current development of large cities.

Topic Report:

The fields in which these research scholars are distributed in the study of this theme can be diverse. Suburbanization as a development outcome is driven by numerous factors during its development; economic, cultural, policy, and natural factors are all factors that drive people to move to the suburbs. After research, Chinese and Western scholars have produced different understandings and perspectives of suburbanization in their respective countries, in response to different national conditions and geographical differences. China's national conditions and statist patterns are different from those of the West. Therefore, the development results will be different.

1.4.2.3 Issues and strategies in outer suburb in post pandemic

After understanding the basic information and current developments in the suburbs, the next two chapters should consider the issues and strategies in outer suburbs in post pandemic and how to deal with the current or future epidemics. The literature in these two chapters is mainly based on survey reports, academic journals, and news reports from 2019 to 2022, which is the time period before and after the epidemic, to analyze the problems of suburbs and cities before and after the epidemic in a more focused manner and to provide solutions.

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Main scholars:

Gao Weiyi: Master of Health Career Management, Daytime Chemotherapy Group of the Day Surgery Special Committee of the Haymarket Hospital Association, Director of Medical One and Director of Emergency Department. The investigation was mainly made for the performance of staffing in tertiary hospitals during the epidemic.

Wu Jun: Chief physician of the Department of Traditional Chinese Medicine, Dongzhimen Hospital, Beijing University of Traditional Chinese Medicine.

Kong Junhui: Professor and supervisor of doctoral students, now working at Beijing University of Traditional Chinese Medicine. Research interests: health psychology and evaluation, TCM psychological and emotional intervention; work stress and performance management, TCM education management. He has been investigating and evaluating the existing township medical system through medical management level knowledge analysis.

Ye Ji: Shanghai Medical Emergency Center, research area: emergency medicine, clinical medicine, preventive medicine and hygiene.

Xu Ping: Shanghai Medical Emergency Center, research field: emergency medicine, clinical medicine, cardiovascular system diseases

Xue-Mei Zhang: Yanbian University, research fields: animal husbandry and animal medicine, traditional Chinese medicine

Si Wei: Tongji University, research field: road and waterway transportation

Topic Report:

The most prominent of the many deficiencies facing the suburbs is the medical system, so the authors of the literature in this section are mostly medical professionals and academics who can report inductively on the current problems from a doctor's perspective or for their experiences in the practice of medicine. Indeed, the best solution to the epidemic is to improve the health care system, and in this regard, distant suburban counties have a great deal of room for improvement and potential capacity.

1.4.2.4 Surveys and case studies

The last two chapters focus on actual surveys and case studies. We chose the Beijing city, Fangshan District, as the object of our study, and conducted a questionnaire survey on the perceptions of Beijing residents about the city and its suburbs at the time of the epidemic, and then analyzed the results to verify the theoretical basis of the previous section. In this section, we use mostly human and geographic information about the Fangshan area, and we use the graphs and charts of the information to complete the theoretical and practical analysis and to verify the theory.

Key reference:

Questionnaire about the residential area of Beijing residents

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The Spatial Layout Plan of Commercial Service Facilities in Beijing

Fangshan Zoning Plan (Territorial Spatial Planning) (2017-2035)

Topic Report:

This part provides practice for the theoretical basis of the previous article through existing public planning policies, as well as questionnaire reports, which makes the article more authentic and credible

1.5 Dissertation structure

The thesis is mainly divided into four parts.

The first is to use the literature research method to study the knowledge background of the combination of urban planning and inter-professionals in various literatures, and to understand the huge impact on the metropolis in China under the background of the epidemic.

Secondly, through the previous study and observation, we conduct detailed research and analysis, and propose urban planning issues in the outer suburb of metropolitan cities in China under the background of the epidemic. Learn about different situations and categories to extract useful information.

Third, through case studies, summarize the problems and propose changes.

Finally, based on case analysis, suggestions, and summaries, relevant suggestions are put forward for urban planning in the outer suburb of metropolitan cities in China in the post-epidemic era.

Chapter 2. Relevant Concepts and Characteristics of the Outer Suburbs of Metropolis

2.1 Introduction: outer suburb suburbanization and urbanization, Overview and Relationships

Suburbanization, as part of the city, is more simply and uniformly defined in terms of urbanization, which is the process by which formerly less densely populated settlements become urban due to the gradual concentration of population, increasing economic activity, and further expansion of infrastructure, thus causing a series of economic and social changes. Suburbanization, on the other hand, differs from urbanization in that it is broadly defined as the geographical expansion of urban areas beyond their boundaries. In relation to suburbanization as a result of high urbanization, more than 90% of urban development in the United States, the United Kingdom, Japan, Canada, and Australia in recent decades has been located in suburban areas due to the fact that cities gradually fail to meet people's demand for quality of life in the process of development, for which outer suburbs have more advantages and attractions, which influences suburbanization.

2.2 The concept of outer suburbs of the metropolitan and characteristics of China

Definition of the concept of suburbs

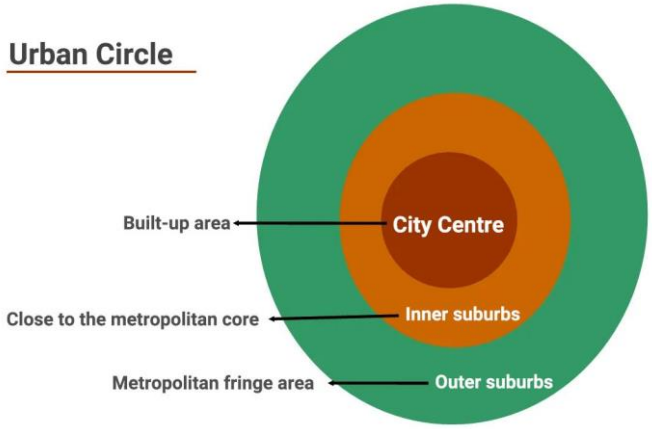

Figure 2.2 Schematic diagram of the urban circle structure

Author's made

reference：Ann Forsyth. 2012. Defining Suburbs. Journal of Planning Literature 27, no. 3: 270–281.

A suburb, as an abstract definition, is, in the simplest terms, a recently developed part of a city or metropolis that lies outside the core or historic district. In defining suburbia, location is probably the most logical criterion. As urbanization continues and metropolitan areas become more complex, suburbs will be an important part of the study of urban issues. The term suburb represents a long-term viable term to describe development outside of the core city[2]. In conjunction with the definition and characteristics of suburbs, exploring the impact of epidemics on them and their potential for epidemic prevention is the main object of study in this paper.

In general, suburbs should be defined in terms of locational space and regional function. In terms of locational space, a suburb is a marginal part of the urban fabric, an area that is constantly arising, changing and developing. The suburb should therefore be a concept that is opposed to the urban center, an area that is spatially located on the periphery of the urban center and is functionally and structurally secondary.

Because of the different perspectives and starting points, and because of the diversity, complexity and uncertainty of the suburbs themselves, this paper will group the concepts of suburbia into three main categories.

1. the connotation and extension of suburbia in terms of its geographical distribution.

[2] Ann Forsyth. 2012. Defining Suburbs. Journal of Planning Literature 27, no. 3: 270–281.

For example, Kenneth T. Jackson[3] in the United States argues that a suburb is a community of residents, a scattering of settlements and businesses outside the city walls, as old as human civilization and an important part of the traditional city in ancient times, the Middle Ages and in the early modern period. A suburb is a part of a city that lies outside the administrative boundaries of a central city, but which belongs to the same community as the city center as a whole. At the same time, a suburb is an area located outside the legal boundaries of a city but within commuting distance, particularly those settlements that are dependent on the city center for employment and for specific types of commerce and cultural entertainment. In the United States, the generally accepted definition is that of "the US Government's Office of Management and Budget[4]", which states that "the area within a metropolitan area, outside the central city, is collectively referred to as the suburbs". This paper therefore considers the suburbs to be the area within an urban borough that is outside of the urban center, including the built-up area surrounding the center. At the same time, the suburban area is originally meant to be the peripheral area, which is both a geographical concept and a concept relative to the urban area. In the preparation of urban planning, suburban land refers to the periphery of the urban planning area, i.e. the area that needs to be controlled for urban development, and more specifically, it refers to the area around the city that is closely linked to the urban area in terms of political, economic, cultural and defense development[5]. The Encyclopedia of China[6] - Geography defines a suburb as a ring-shaped area outside the urban area of a city and within the city boundary. The suburban landscape differs from that of the urban area in that it has low population and building densities, with most of the area being idyllic, green belt and some industrial areas[7].

[3] Jackson, K. T. (1985). Crabgrass frontier: the suburbanization of the United States. New York: Oxford University Press.

[4] Office of Management and Budget（2000）Standards for Defining Metropolitan and Micropolitan Statistical Areas .Federal Register Vol. 65, No. 249, December 27, 2000

[5] Sun qunlang(2005) Research on the Suburbanization of American Cities[M]Beijing: The Commercial Press. 2005.7. 26, 28, 25.

[6] The Encyclopedia of China is the first large-entry modern encyclopedia in the Chinese language. The compilation began in 1978. It comprised 74 volumes, with more than 80,000 entries.
《Geographical Terminology》, Second Edition

[7] Jia peng(2006)Research on the driving mechanism of population suburbanization in big cities——Taking Wuhan City as an example[D] Huazhong Agricultural University, 2006.

2. Defined in terms of the functional differences between suburbs and cities, and the relationship between suburbs and cities.

The term suburb itself has two meanings, the first being the relationship between urban areas and suburbs at a functional and structural level, i.e. suburbs are secondary, subordinate areas of the city; the second meaning is examined mainly in terms of geographical space, i.e. suburbs are peripheral, marginal areas of the urban center. These two layers of meaning indicate two essential characteristics of suburbs: firstly, they are functionally subordinate and secondly, they are spatially peripheral. In terms of locational space, the suburban area is a marginal part of the urban constituent, a zone where the city meets the countryside, and an area that is constantly generating, changing and developing[8]. According to scholar Liu Mingju, the suburbs are an objectively existing, intricate and special territorial complex between the urban and rural areas. It is generally considered to be an area outside the built-up area of the city, influenced by the economic radiation, social and ideological penetration and ecological effects of the urban area, and closely linked to the economic development, lifestyle and ecosystem of the urban area. It can be divided into suburban and distant suburban areas according to its location and its connection with the central city[9].

3. Defined in terms of the structure of the people who live there.

According to Robert L.Fishman, a suburb can be defined by what it contains - a middle-class residential area - and by what it excludes: all industry, most commerce and all lower-class residents[10]. That is, a suburb should be a purely middle-class residential area, where there can be neither industry nor commerce nor lower-class residents, otherwise it cannot be called a suburb.

In summary, the worldwide definition of a suburb is the transition zone between urban and rural areas. It lags behind the city in terms of economic development and social and cultural life, but differs from the traditional rural area in that it is influenced by the city and evolves with its development.

[8] Chai Yanwei (1995) Suburbanization and Its Research [J]. Economic Geography, 1995, (2): 48-52.

[9] Liu Mingju(2006) Research on the process of suburbanization in Changchun and its countermeasures [D]Northeast Normal University, 2006.

[10] Robert L. Fishman（1987）American Suburbs/English Suburbs: A Transatlantic Comparison.JOURNAL OF URBAN HISTORY , Vol . 13 No. 3 , May 1987 237-251

In practical terms, suburbia is a special type of settlement in Europe and North America. While suburbs embody a specific form of governance, traditional suburbs are often described as closed settlements of the middle class, Chinese suburbs are defined and characterized differently in terms of their morphology[11]. First, as mentioned above, suburbs are generally geographically defined as the periphery of urban centers or built-up areas, and are somewhat backward in development compared to cities. However, in general, suburban areas are less dense than cities, and cannot be classified as low density areas in the pure sense of the word. Second, in China, suburban areas are not a transition zone between urban and rural areas, and the urban-rural dichotomy still prevails. The suburbs must still be classified as either urban or rural in terms of jurisdictional institutionalization or social management. Third, suburbia refers to a way of life in Western countries characterized by each family owning a separate home, a way of life that has not emerged in China until recently. Rather than having suburbs consisting of separate family homes and maintaining a middle-class suburban lifestyle, China used to view urban life as progressive and civilized and rural life as backward and underdeveloped, ideas that have changed somewhat in recent years. Fourth, the government, which was clearly in the driver's seat in the earlier development that led to the creation of land, housing, capital, and labor markets, still plays an important role in organizing social life. Although suburban development in China has now improved somewhat, thanks to state promotion and the advancement of civic consciousness, objective development is still lacking, so China still has more room for progress in suburban development.

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Ann Forsyth. 2012. Defining Suburbs. Journal of Planning Literature 27, no. 3: 270–281.

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Sun qunlang(2005) Research on the Suburbanization of American Cities[M]Beijing: The Commercial Press. 2005.7. 26, 28, 25.

Jia peng(2006)Research on the driving mechanism of population suburbanization in big cities——Taking Wuhan City as an example[D] Huazhong Agricultural University, 2006.

Liu Mingju(2006) Research on the process of suburbanization in Changchun and its countermeasures [D]Northeast Normal University, 2006.

[11] Wu Fulong, Shen Jie (2015) Suburban development and governance in Chinese cities. 2015, 1673-9493.06-0027-07

Song yang(2005) Theoretical analysis and mechanism of urban suburbanization [D]Nanjing Aviation Nanjing University of Aeronautics and Astronautics, 2005.

Chai Yanwei (1995) Suburbanization and Its Research [J]. Economic Geography, 1995, (2): 48-52.

Zhang Jingxiang (1998). Re-examination of urbanization research in China[J].Geographical Sciences, 1998, (6): 555-560.

Robert L. Fishman（1987）American Suburbs/English Suburbs: A Transatlantic Comparison.JOURNAL OF URBAN HISTORY , Vol . 13 No. 3 , May 1987 237-251

Wu Fulong, Shen Jie (2015) Suburban development and governance in Chinese cities. 2015, 1673-9493.06-0027-07

Office of Management and Budget（2000）Standards for Defining Metropolitan and Micropolitan Statistical Areas .Federal Register Vol. 65, No. 249, December 27, 2000

2.3 The evolution of the relationship between the outer suburbs and the metropolis

We know that no administrative area can be separated from the territory to which it belongs. In ancient times, both in the East and in the West, urban areas were usually surrounded by high walls and deep moats, and cities were divided into different squares and urban areas according to their geographical location. Outside the city, my villages, farmlands, woodlands, mountains, open spaces, and waters were collectively referred to as suburbs, and the cultural symbols of the city walls were the dividing line between the city and the suburbs, which were more strategic in ancient times. In feudal China (thousands of years of imperial and feudal societies, before the fall of the last Qing dynasty in the early 20th century), the theory of urban planning and layout in all dynasties was based on Confucian ritual planning, with city walls surrounded by gates on all sides and gods guarding the gates, which was the ideal layout of ancient Chinese cities[12]. The outskirts of the city provided space for military operations such as reconnaissance, deployment, ambush, and garrisoning. At this point, the suburbs played a geopolitical element and became the first barrier to protect the city, as well as a transportation hub through which external activities such as transportation, escort, etc. had to pass. This urban layout continued in ancient China for more than 5000 years.

[12] Zheng Wei, Ding Kangle, Li Jingsheng (2009). The change of urban planning system and the transformation of urban imagery model in ancient China[J]. Journal of Urban Planning, 2009, 000(001):103-108.

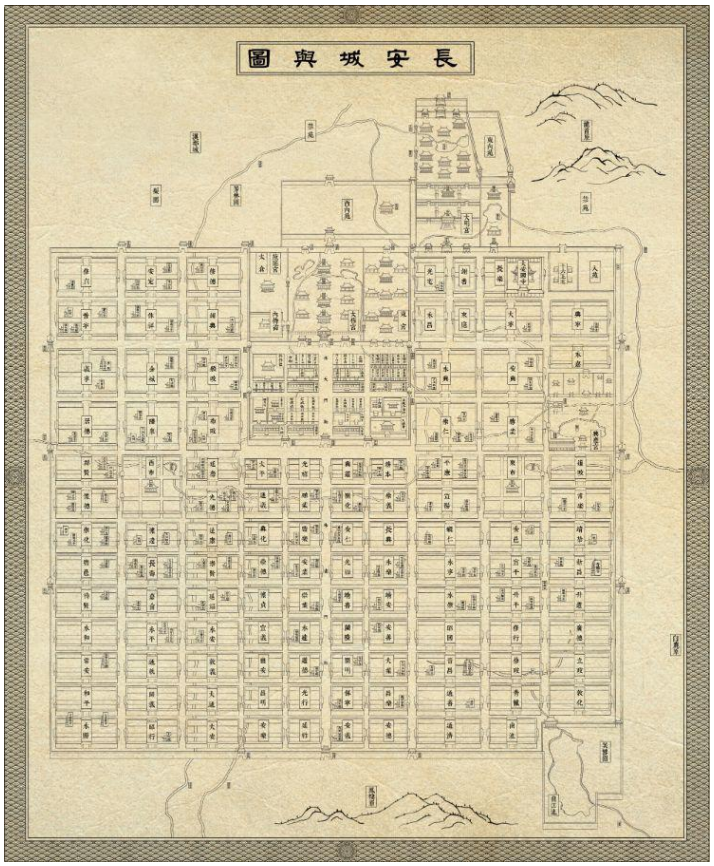

Figure 2.3.1 Restoration map of Chang'an in Tang Dynasty (AD 618-907)
The city walls, such as Chang'an, the capital of the Tang Dynasty, are surrounded by walls, and the dividing line between the city and the suburbs is shown in the figure.
https://pic.sogou.com/pic/searchList.jsp?statref=searchlist_hintword_down&spver=0&keyword=%E5%8F%A4%E6%B4%9B%E9%98%B3%E5%9C%B0%E5%9B%BE#top=400&more=false

For example, in the ancient Greek period of 500 BC, Hippodamus[13] followed the ancient Greek philosophy of seeking harmony and order between geometric images and numbers, and the city was surrounded by walls, and the main feature of city construction was the regularity of streets, buildings and squares[14]. During the Middle Ages (from the late 5th century to the middle of the 15th century), cities grew organically, most of them gradually "grew" around the castles of feudal lords, and few were built according to a plan[15]. The early unplanned spread of cities to the

[13] In the 5th century BC, the famous architect in the prosperous period of ancient Greece proposed that the urban construction should take the grid grid road system as the skeleton, the city square as the center, and the Hippodam planning model, which fully embodies the city-state spirit of democracy and equality, has become a A major example, and Hippodum is also known as the "Father of Urban Planning".

[14] Zhang Luofeng, Zhang Renkai (2005). Ancient urban planning in China and the West[J]. Urban and Rural Construction, 2005(5):3.

[15] Zhang Luofeng, Zhang Renkai (2005). Ancient urban planning in China and the West[J]. Urban and Rural Construction, 2005(5):3.

outskirts of the city occurred during this period. After the advent of thermobaric weapons (after the middle of the 16th century), tall walls were no longer able to withstand powerful artillery. By this time, the city had gradually abandoned its walls as a military facility and replaced them with a small fortress, and with it, the army abandoned the previous era. Turning to face the hostile army from the suburbs. During this period, the importance of the suburbs further increased as they became extremely important and became the only obstacle to the city.

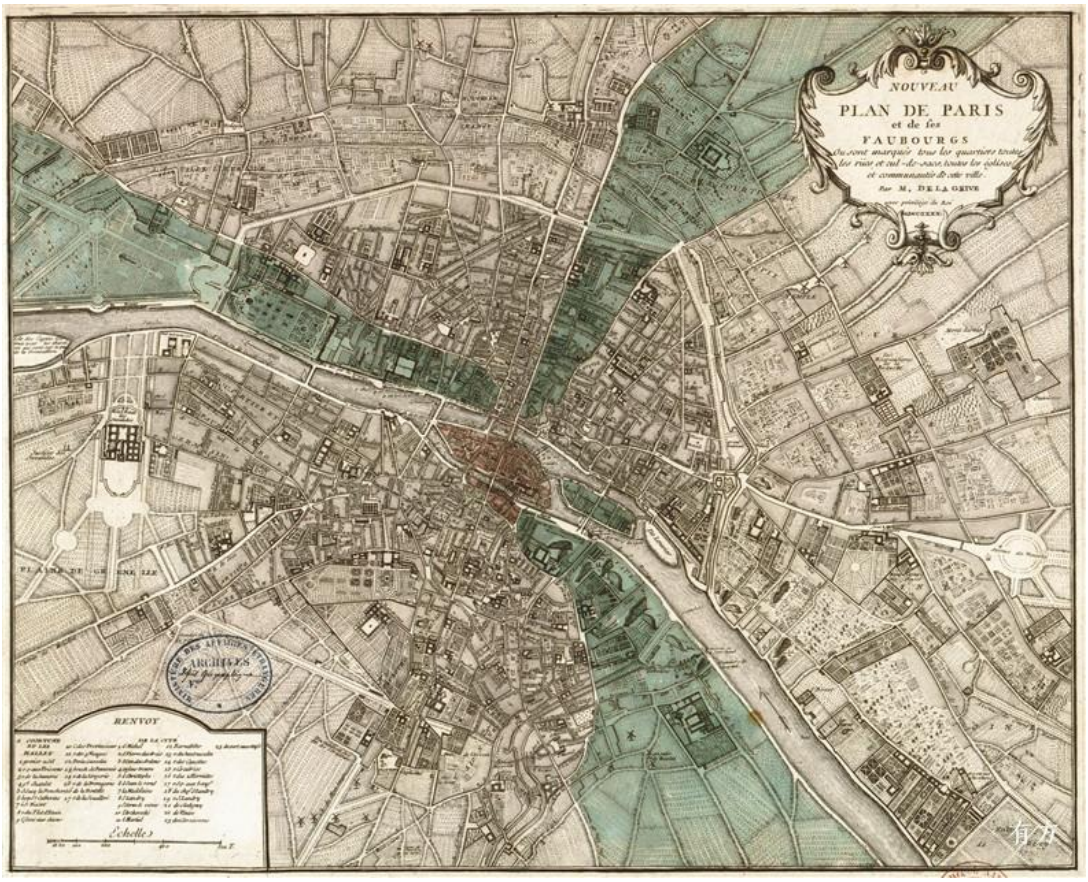

Figure 2.3.2 Ancient Luoyang MapGraphic. 17th-19th century, map of Paris
After the Middle Ages, especially in the age of firearms(after the middle of the 16th century), cities in Western countries have removed the city walls, and urban expansion has adopted a circular line to separate
http://www.archiposition.com/items/20180525105554

With few threats of war in today's world, the strategic importance of the suburbs has been replaced, while the developmental importance of agriculture, resource extraction, and transportation barriers remains. With the increase of economic development and industrial upgrading, urban space is not enough to carry many industries for which suburbs provide space resources (mainly primary industry: agriculture, secondary industry: industry)), suburbs still have many significance.

Today, when suburbs are faced with natural disasters, they can still be used as a barrier to protect the city, reduce damage, and realize their resilience potential, which is a question we need to explore.

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郑卫, 丁康乐, 李京生（2009）. 中国古代城市规划制度变迁与城市意象模式转型[J]. 城市规划学刊, 2009, 000(001):103-108.

Zheng Wei, Ding Kangle, Li Jingsheng (2009). The change of urban planning system and the transformation of urban imagery model in ancient China[J]. Journal of Urban Planning, 2009, 000(001):103-108.

张洛锋, 张仁开（2005）. 中西方古代城市规划[J]. 城乡建设, 2005(5):3.

Zhang Luofeng, Zhang Renkai (2005). Ancient urban planning in China and the West[J]. Urban and Rural Construction, 2005(5):3.

2.4 The definition of Suburbanization

To date, there is no global academic consensus on the definition of the concept of suburbanisation. In total, this paper summarizes that there are three main categories of views as follows.

1. emphasize that suburbanization is a process of population mobility.

According to Jackson in the United States, "suburbanisation is a process whereby the periphery of a city grows steadily and orderly and its development outpaces that of the central city; hence the suburban population has to commute daily to the central city for employment as a way of life." Suburbanisation is thus seen as a process of redistribution and decentralization of the population, i.e. suburbanisation causes a decrease in residential density within urbanized areas, a loss of population and a decrease in residential density in a central area, and leads to an increase in the proportion of people living in a particular area outside the central city and an increase in the distance between the place of work and the place of residence, while it also leads to an increase in the socio-economic status of the suburbs[16]. Thus, in general, suburbanisation is the expansion and dispersal of a functionally integrated population group over an expanding territory. This paper identifies with the beginning of suburbanisation in China's major cities, which is in essence nothing more than urban expansion, and this urban expansion is in a non-stable state. The suburbanisation of the population is, in essence, a voluntary migration of people from the center of the city to the center of the city, after a certain degree of concentration

[16] Zhang Jingxiang (1998). Re-examination of urbanization research in China[J].Geographical Sciences, 1998, (6): 555-560.

in the center of the city, guaranteed by the affluence of life and transport conditions[17]. According to Chinese scholar Li Hongmei, the so-called suburbanisation refers to the spatial concentration of population and economic activities in the suburbs of a city.

This paper therefore argues that a typical sign of suburbanisation is the emergence of a decline in absolute numbers, or absolute dispersion, in the urban centers. Suburbanisation refers to the process of migration of urban population, industry and commerce to suburban towns, and is the result of the centrifugal diffusion forces of urban development outweighing the centripetal agglomeration forces[18].

2. Suburbanisation is the process of centrifugal diffusion of economic factors.

According to Zhou Zhouxing, "while urban areas in general accumulate and expand, urban population, industry and commerce move centrifugally from the city to the outside in succession, and such a process is called suburbanisation. " . The core of the phenomenon of suburbanisation is therefore the centrifugal spread of population and economic factors leading to the development of suburban areas. The high rents, dense population, traffic congestion and poor environmental conditions in urban centers create a huge push to move people and industries out of the city center, creating a centrifugal phenomenon in relation to the central areas[19]. Suburbanisation was first seen in the developed countries of the West[20]. With the further development of large cities, population, industry, employment and housing gradually expanded and moved from the central urban areas to the suburbs, which is in essence a centrifugal expansion and diffusion of social and economic factors from the central urban areas to the suburbs[21]. Suburbanisation is a centrifugal movement of urban population, social institutions, economic activities, cultural and recreational activities and even political influence to the peripheral areas of the city[22], but this centrifugal movement is a movement under the precondition of the centripetal

[17] Li, Hongmei (1998). A brief discussion of suburbanization in the United States [J]. North Series, 1998, (3): 66-70.

[18] Wang, G. Y. (2004). A brief discussion on suburbanization in China [J]. Journal of the Party School of the Nanning Municipal Committee of the Communist Party of China, 2004, (6): 32-34.

[19] Gu, C.L. (2000). Agglomeration and Diffusion - A New Theory of Urban Spatial Structure [M]. Nanjing: Southeast University Press, 2000: 139.

[20] Liu B.L, Zheng L.B.(2004). Characteristics and dynamics of urban suburbanization in China [J]. Journal of Theory, 2004, (10): 68-70.

[21] Shen Ling, Ju Lixin(2004). The new situation of Shanghai suburbanization and the construction of metropolitan area [J]. Urban Management. 2004, (2): 34-37.

[22] Sun Qunlang（2004）. An analysis of the origins of suburbanization in the United States[J]. Studies in Historical Theory, 2004, (3): 44-54.

movement of urbanization, a decentralization under the precondition of concentration, rather than absolute decentralization. Suburbanisation is a product of accelerated industrialisation and urbanization, a product of the progress of urban transport, a process of sustained and accelerated development of the suburbs that breaks out of their previous stable state. As such, it is both a form of urbanization and a way of evolving the ecological organization of cities. Contemporary mega-cities are rapidly spreading and shifting their populations and functions to the suburbs, thus turning them into urbanized territories with multiple urban functions.

The essence of suburbanisation is the replacement of urban space by the market economy and institutional innovation, with some urban elements such as industry, population and services being displaced from the urban center to the suburban space of the city. Therefore, the essence of suburbanisation is the dynamic effect of "agglomeration effect" and "diffusion effect[23]".

3. The definition of suburbanisation in terms of function and landscape is emphasized.

The Dictionary of Geography prepared by the Geographical Institute of Japan defines suburbanisation as: suburbanisation is the change of rural areas around cities to a mixture of urban and rural factors, such as the relocation of housing, factories, schools and office buildings from urban centers and built-up areas, and the transformation of rural residential land into suburbanisation in terms of landscape; secondly, the increase of commuters to urban centers and the change of shopping areas. The second is the increase in commuters and changes in shopping areas to the urban center, and other functional suburbanisation.

Suburbanisation, as a stage in the urbanization process, refers to the transformation of cities from agglomeration to diffusion, as evidenced by the successive migration of population, employment, industry, commerce and services from city centers and built-up areas to the suburbs, thus constituting suburbanisation in terms of landscape and function[24]. When the level of urbanization tends to saturate, the pace of urban development becomes moderate and smooth, people begin to pursue the ideal natural environment and living environment, and urban population and industry begin to shift to the urban periphery or other places. This contemporary big city is due to the rapid diffusion and transfer of population and various functions to the suburbs, so that the

[23] Yang W., Wei H.(2004). A study of urban suburbanization [J]. Urban Issues, 2004, (3): 12-15.

[24] Tan Yangwei(2006). A preliminary study on the development of suburbanization in Guangzhou[J]. Guangdong Social Science, 2006, (5): 189-195.

suburbs have a variety of functions in the urban areas, while the suburbs gradually transform into urbanized territories[25]. According to Song Yang, suburbanisation is a transitional stage of urban development from concentration to diffusion, representing a 'win-win' process in which the population, jobs, services and certain urban functions that have spread out from large urban centers are concentrated in the suburbs, where new agglomeration centers of a certain scale are formed to promote the joint development of the city and its suburbs[26].

In summary, despite the different interpretations of suburbanisation around the world, in its essence, suburbanisation, as an advanced stage of urbanization, is a phenomenon of diffusion after a certain stage of urban development, which includes the suburbanisation of population, industry, commerce, finance and insurance and infrastructure, and this diffusion makes suburban areas become urban fringe areas with multiple functions. Suburbanisation is an inevitable product of accelerated industrialisation and urbanization in a market economy, usually marked by the mechanical growth of the population in the suburbs compared to the urban areas, and is in essence a result of the "centrifugal force" of the city exceeding the "centripetal force", causing socio-economic factors to move to the suburbs. It is a phenomenon of diffusion of socio-economic factors to the suburbs, caused by the "centrifugal" force of the city exceeding the "centripetal" force. The suburbs can be divided into residential suburbs and satellite towns according to their function, and the growing suburbanisation has resulted in the transformation of former cities from monocentric to polycentric, forming new satellite towns and independent towns.

Reference：

Zhang Jingxiang (1998). Re-examination of urbanization research in China[J].Geographical Sciences, 1998, (6): 555-560.

Li, Hongmei (1998). A brief discussion of suburbanization in the United States [J]. North Series, 1998, (3): 66-70.

Wang, G. Y. (2004). A brief discussion on suburbanization in China [J]. Journal of the Party School of the Nanning Municipal Committee of the Communist Party of China, 2004, (6): 32-34.

Gu, C.L. (2000). Agglomeration and Diffusion - A New Theory of Urban Spatial Structure [M]. Nanjing: Southeast University Press, 2000: 139.

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[25] Zhao Liguang(2007). A study of urban suburbanization simulation based on GIS_RS and CA [D]. East China Normal University, 2007.

[26] Song yang(2005) Theoretical analysis and mechanism of urban suburbanization [D]Nanjing Aviation Nanjing University of Aeronautics and Astronautics, 2005.

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Yang W., Wei H.(2004). A study of urban suburbanization [J]. Urban Issues, 2004, (3): 12-15.
Tan Yangwei(2006). A preliminary study on the development of suburbanization in Guangzhou[J]. Guangdong Social Science, 2006, (5): 189-195.
Zhao Liguang(2007). A study of urban suburbanization simulation based on GIS_RS and CA [D]. East China Normal University, 2007.

2.5 The emergence and development of suburbanization in metropolis

Suburbanization is the result of urbanization. Suburban urbanization is also related to urbanization, which represents the migration of population from the urban center to the urban periphery. The theory of global urbanization expands urban epistemology, pointing out that urbanization is the diffusion of urban lifestyles and urban functions, and provides new ideas for re-understanding the urban-rural divide. Professor Gu Chaolin of Nanjing University believes that suburbanization is due to the high rent, dense population, traffic congestion and harsh environment in the central area, which has formed a huge driving force and prompted the transfer of population and industries from the center. area, forming a larger area relative to the central area. Regarding the urban centrifugal phenomenon, Professor Zhou Xing also believes that suburbanization in a broad sense refers to the expansion of cities to the suburbs[27]. Only when the population, employment and services of the city center migrate to the suburbs, the population growth of the city center is relatively lower than that of the suburbs, which can be said to be true suburbanization.

The term suburbanization has never appeared as an independent individual, and the suburbs are also a part of the city. It cannot be said that the emergence of suburbanization is also inevitable. Urbanization is an inevitable stage of urbanization development. With the rapid expansion and reconstruction of the city, the surrounding area of the city has become a unique type, with the main characteristics of space growth, status strengthening, functional mixing, and morphological

[27] Xiong Wansheng & Chen Changjun. 2011 A new species of the genus Phyllostachys (Hymenoptera, Braconidae) from China. (2021). Suburbia, suburbanization and suburban society in the local context. Fujian Forum (Humanities and Social Sciences Edition) (11), 196-206.

alienation. It is the most difficult area for urban planning and management[28]. The term suburbs generally refers to the fringes of cities, which are often characterized by single-function residential clusters that exhibit low-density, striped, or jumping morphological characteristics. British scholars Phelps, Wood and Valler believe that post-suburbanization specifically refers to a new form of urbanization space[29], and it is also a new urban development path. In today's social and economic activities, the urban fringe and the city center are not simply subordinate relationships. In this logical structure, the urban suburbs are no longer completely dependent on the operation of the city center. With the improvement of the mixed utilization rate of suburban land, the suburbs that were dominated by single agriculture in the earlier period have shown a more complex economic structure, such as "satellite cities". The city-affiliated areas of this category have become complex spaces with complete infrastructure and high-quality living services. The theory of post-suburbanization is based on the summarization and refinement of global suburban development experience. It believes that suburbs no longer play a secondary role in urban development, identifies the complexity of the development of urban fringe areas in the post-suburban era, and emphasizes the importance of post-suburbanization. Uniqueness in form, function, planning ideas and governance methods[30].

Reference：

Tan, Jiangdi & Zheng, Youxu. 2011 A new species of the genus Phyllostachys (Hymenoptera, Ichneumonidae) from China. (2022). Re-conceptualizing the urban fringe: Global urbanization theory and post-suburbanization theory perspectives. Urban Development Research (01), 74-81.

Phelps, N. A., Wood, A. M., & Valler, D. C. (2010). A postsuburban world? An outline of a research agenda. Environment and Planning A, 42(2), 366-383.

Xiong Wansheng & Chen Changjun. 2011 A new species of the genus Phyllostachys (Hymenoptera, Braconidae) from China. (2021). Suburbia, suburbanization and suburban society in the local context. Fujian Forum (Humanities and Social Sciences Edition) (11), 196-206.

[28] Tan, Jiangdi & Zheng, Youxu. 2011 A new species of the genus Phyllostachys (Hymenoptera, Ichneumonidae) from China. (2022). Re-conceptualizing the urban fringe: Global urbanization theory and post-suburbanization theory perspectives. Urban Development Research (01), 74-81.

[29] Phelps, N. A., Wood, A. M., & Valler, D. C. (2010). A postsuburban world? An outline of a research agenda. Environment and Planning A, 42(2), 366-383.

[30] *Tan, Jiangdi & Zheng, Youxu. 2011 A new species of the genus Phyllostachys (Hymenoptera, Ichneumonidae) from China. (2022). Re-conceptualizing the urban fringe: Global urbanization theory and post-suburbanization theory perspectives. Urban Development Research (01), 74-81.*

2.6 The importance of the outer suburbs of the metropolis in the post-pandemic era

Rational suburban development can play a substantial, critical role in fighting the epidemic. The advantages of suburban areas can help big cities play an important role in the fight against epidemics, which are divided into the following points: 1. Suburban areas have vast and low-cost land, and the low cost of establishing large isolated hospitals, factories, etc. is conducive to government planning and capital manpower investment. 2. Suburban areas are less densely populated, and there are fewer facilities for large gatherings in suburban areas, which are not conducive to the spread of infectious diseases and less difficult for local administrators to control, which is conducive to The implementation of the control policy. 3. the proximity to the city center and the borders with external provinces and cities are conducive to quarantine treatment before entering the city center in the event of a serious epidemic. 4. convenient transportation, which is conducive to the transportation of emergency supplies, and the transport of sick people for treatment, and easy to manage under the embargo policy. 5. The abundance of mountainous natural resources and the attractiveness of the land are conducive to attracting capital and human investment. Therefore, the purpose of exploring suburban areas is to seek the potential of suburban areas for epidemic prevention that can be used to respond to present or future outbreaks.

Chapter 3.Research progress and strategy of metropolitan outer suburbs

3.1 The main characteristics and dynamic mechanism of the outer suburbs of European cities

Since the Industrial Revolution, the balance between urban and rural areas has been broken, followed by unprecedented urban population growth. Small, sparsely populated trading and manufacturing centers are transformed into new industrial cities, important commercial connections at home and abroad, and political centers, providing a wealth of activities and places to live for people with diverse cultural and intellectual backgrounds[31]. Developed countries in the world entered urbanization earlier, and urbanization is relatively complete. In the process, cities and suburbs develop and complement each other in the process. The family income and living standards of urban and rural society have been greatly improved compared with before, and the overall living standard of urban society has improved.

From an industrial perspective, urban suburbs in developed countries tend to be more developed and densely populated. Cities have already entered the development stage of urbanization and have been basically completed, and the remaining or future production capacity is bound to be excessive to suburban towns. Taking the suburbs of Milan as an example, Milan is the largest metropolis in Italy, one of the largest metropolitan areas in the world, a famous historical and cultural city in the world, and one of the most developed regions in the world. the most developed region in the world[32]. The region with the highest GDP is also the most economically developed region in Europe. The system is center-centered and distributed concentrically. From the perspective of population distribution, 66% of the urban population of Milan is scattered in suburban towns, 33% of the urban population is concentrated in the urban area of Milan, and 1% of the urban

[31] Zhang Hongyan. (2002). Analysis of the social causes of urban suburbanization in developed countries. Journal of Nanjing University of Technology: Social Science Edition, 1(2), 10.

[32] De Vidovich, L., & Scolari, G. (2022). Seeking polycentric post-suburbanization: a view from the urban region of Milan. Urban Geography, 43(1), 123-133.

population lives in rural farms. Suburbs of 5853 [33]. Suburban urban population accounts for a relatively large proportion, while urban population accounts for a relatively small proportion, and urban employment obviously occupies an absolute advantage. The Milan metropolitan area is the most densely populated, most urbanized and most industrially developed area in Italy. Of the total land area of 1,984 square kilometers in the entire metropolitan area, only 982 square kilometers are reserved for agricultural land and forests. If the land that has been planned as urban construction land is included, the urban construction land area in the metropolitan area is close to the urban construction land area in the metropolitan area. 50%, which is very rare in other metropolitan areas in Europe[34]. In this context, what are the motivations for people to migrate to the urban periphery? The answer is a developed transportation network. According to 2005 statistics, 4% of people in the Milan metropolitan area get off work within 15 minutes, and 50% of people work and live in the same town. This shows that there are already well-developed transportation lines between the urban area and the suburbs, and it is very convenient for citizens to travel in the urban area and the suburbs. The second characteristic of the suburbs of Milan is that knowledge-intensive industries have become the backbone of regional development. In terms of agriculture, the area of agricultural land in the planned suburbs of the Milan metropolitan area is 91,690 hectares [35]. In terms of industry, 94% of the industrial enterprises registered in the Milan metropolitan area in 2006 were small and micro enterprises. Although scattered in 188 suburban towns and towns, a closely connected industrial chain has been formed, gradually replacing the traditional agglomeration of large and medium-sized industrial enterprises; on the contrary, the service industry is developing in a large-scale direction, especially the retail and wholesale and communication industries.

[33] Ye Qimao. (2008). Suburban Development in Developed Countries Series No. 7 Suburbs in Italy: The Case of Milan and Tuscoli. Small Town Construction (12), 71-82.

[34] Ye Qimao. (2008). Suburban Development in Developed Countries Series No. 7 Suburbs in Italy: The Case of Milan and Tuscoli. Small Town Construction (12), 71-82.

[35] Ye Qimao. (2008). Suburban Development in Developed Countries Series No. 7 Suburbs in Italy: The Case of Milan and Tuscoli. Small Town Construction (12), 71-82.

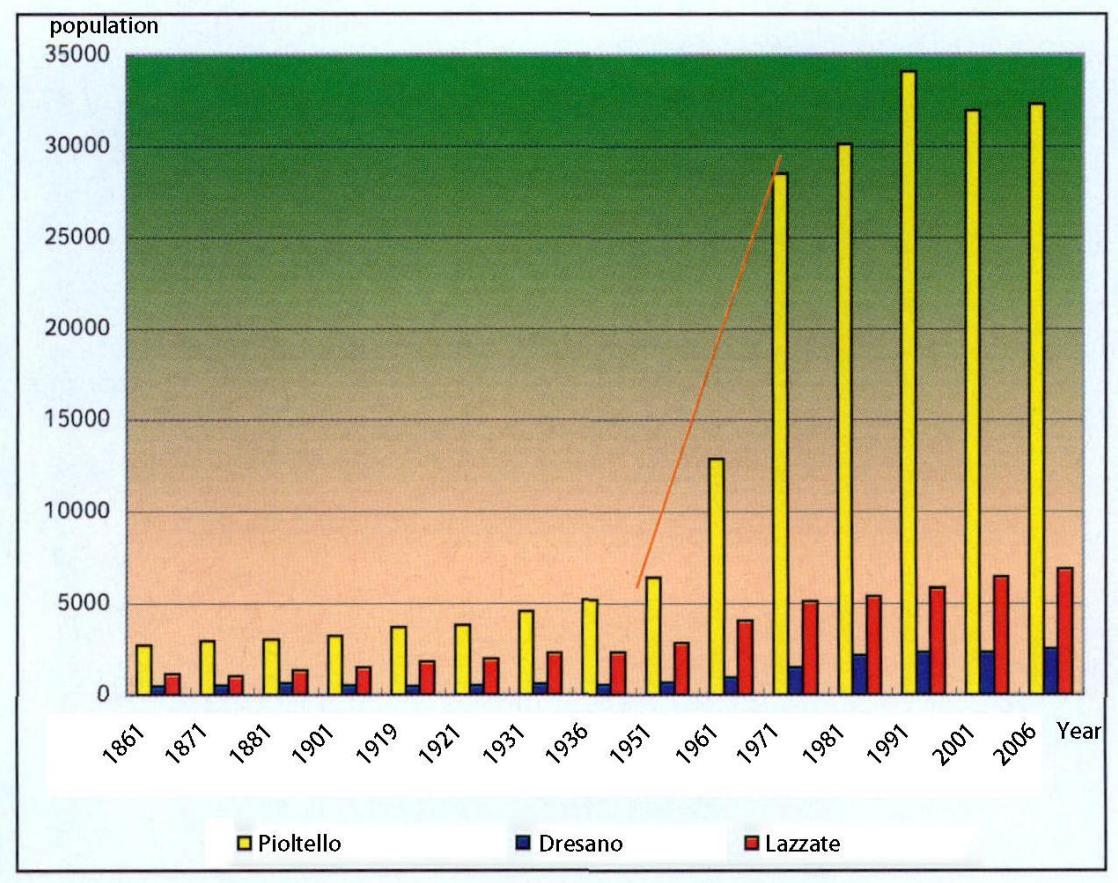


Figure 3.1.1 Industry comparison of three suburban towns in Milan

source：Ye Qimao. (2008). Suburban Development in Developed Countries Series No. 7 Suburbs in Italy: The Case of Milan and Tuscola. Small Town Construction (12), 71-82.

Pioltello is 15 kilometers away from the center of Milan and belongs to the suburbs of Milan. The population grew rapidly between 1951 and 1971, which was caused by the mechanical inflow of population caused by industrial development.
Dresano and Lazzate are respectively 20 kilometers and 30 kilometers away from Milan, two towns with agriculture as their main industry, reflecting the basic tendency of the population change of agricultural towns in the outer suburbs of Milan[36].

From a humanistic point of view, the improvement of urban members' income and quality of life is one of the driving forces of suburbanization. Since industrialization, the family income and living standards of urban society have been greatly improved, and the requirements for the quality of life will also increase. However, land costs

[36] Ye Qimao. (2008). Suburban Development in Developed Countries Series No. 7 Suburbs in Italy: The Case of Milan and Tuscoli. Small Town Construction (12), 71-82.

and quality of life in the suburbs are much lower than in the city center. In addition, changes in the social structure of North American and European cities have led to the emergence of new social stratification relationships, which some call "social risk groups," namely the unemployed, retirees, blacks, and immigrant workers. Groups, these people are the groups that harm the interests in the changing social structure, and are the new unstable social "factors" in the urban center [37]. When the expanding urban population exceeds the carrying capacity of the urban area, countless "urban diseases" will inevitably appear. The consequent urban overpopulation, poor traffic conditions, overcrowded housing, severe environmental pollution, and rising crime rates have all contributed to the prevalence of "anti-urbanism". The cultural location cost of industrial structure and industrial location changes is another major driving force for suburbanization. The change of urban industrial structure is related to the change of location structure, and is restricted by labor cost, resource cost, land cost and operation cost. In the wave of urban social structural change, cities with a long history, especially large cities, have increasingly prominent shortcomings such as aging industrial structure, outdated equipment, unreasonable layout, and the rise of emerging industries. This high-tech industry is very important. The production layout presents different requirements. They have few employees, but the per capita factory area is large, and they have high requirements on the quality of the ecological environment. They are very suitable for rural development, and the corresponding service industry is also expanding outward. The third driving force is the development of traffic conditions, vehicles and transportation technology. The establishment of the public transportation system provides material conditions for urban economic agglomeration and the regional expansion of urban social structure, making it possible for urban people to interact with life and production in a wider range. The emergence of urban agglomerations, urban belts, and megacities promotes each other with the technological progress of large transportation systems. In some developed countries, cars have become a part of life or "part of the human body", and people's living radius and concept of life time and space have changed.

From a natural point of view, cities continue to expand, not only in the growth of urban areas, but also in the transformation of social values and organizational

[37] Zhang Hongyan. (2002). Analysis of the social causes of urban suburbanization in developed countries. Journal of Nanjing University of Technology: Social Science Edition, 1(2), 10.

structures of the inhabitants who settle there [38]. Similarly, suburban expansion represents the expansion from the urban center to the urban periphery based on a single land use plan, which brings with it multiple social and environmental impacts. However, from the perspective of impact on human and ecological health, urban expansion destroys the ecological environment. First, urban expansion increases people's dependence on cars, reduces the need for walking, and directly increases human obesity, high blood pressure and the probability of cardiovascular disease. Second, in recent years, the frequency of car accidents has been high, especially in low-density residential areas in the suburbs. The road design here is wide, allowing vehicles to drive at high speeds, and the risk factor is high.As for Disaster Center . U.S. Death statistics 2015, car accidents have become one of the main causes of death for people aged 5 to 24. Third, with more and more impervious surfaces on roads and parking lots, heat island temperatures have reached historic peaks. Therefore, how to scientifically carry out suburban expansion under the premise of protecting ecological health is a problem that we need to study. "Urban fringe" itself focuses on the urban planning part of "rural-urban fringe" proposed by Griffiths, and the comprehensive development factors of urban areas, such as The surrounding environment, the existing boundaries, the characteristics of future development and operation of the area, etc., the urban fringe is often accompanied by the expansion and redesign of the boundary, which represents a non-static area of the city [39]. In recent years, while suburban expansion, strategies to protect agricultural land or natural environment have been emphasized, but hindered the development of urban areas that require a large amount of land or residential areas, such as roads or railways, waste recycling and transfer stations, airports, Hospitals and other large facilities, power or sewage treatment plants, etc. At this time, city managers need to propose more refined urbanization designs, ensure a more stable planning prospect, and respect and integrate historical contexts. European countries are closely related to the long historical evolution of metropolises. In the process of urban fringe expansion, it is necessary to adjust the street texture in order to integrate into its surrounding cities. Before they became part of the city fringe, these areas displayed certain characteristics that were different from other modern suburbs, and some

[38] Diego Laguia Martinez.(2016). Analysis of European Suburban Expansion Based on Mechanism and Policy. Urban Design (04), 98-107. doi:10.16513/j.urbandesign.2016.04.010.

[39] Griffiths M B. （2010）, Lamb Buddha’s migrant workers: Self-assertion on China’s urban fringe[J]. Journal of Current Chinese Affairs (China Aktuell), 39(2): 3-37.

even persisted, as shown below. First, mix the nature of the natural and organic land use, ranging from agriculture, residence to industry, etc. Second, due to the natural appearance of the center and the lack of previous regularity, the buildings here are adapted to the situation where the population density is much higher than that of the contemporary suburbs, and the land resources are used efficiently. Third, commuting levels to urban centers remain lower than typical modern fringe suburban areas due to previous conditions of independent self-government, possibly confirming the polycentric nature conservation mentioned earlier[40]. Therefore, historical settlements in urban fringe areas should form a more active and sustainable growth model, and this process requires precise human intervention.

Figure 3.1.2 A typical case of a historic settlement on the fringes of the city partially absorbed in Vallecas, Madrid.

Source from: Diego Laguia Martinez.(2016). Analysis of European Suburban Expansion Based on Mechanism and Policy. Urban Design (04), 98-107. doi:10.16513/j.urbandesign.2016.04.010.

[40] Hillier B. 1999, Centrality as a process: Accounting for attraction inequalities in deformed grids[J]. Urban Design International, 4(3-4): 107-127.

(a) Industrial estates; (b) Modern suburban sprawl; (c) Consolidated suburban sprawl, which exhibit a mix of natural and organic land uses, ranging from agricultural, residential to industrial, etc.[41]

Reference:

Zhang Hongyan. (2002). Analysis of the social causes of urban suburbanization in developed countries. Journal of Nanjing University of Technology: Social Science Edition, 1(2), 10.

Ye Qimao. (2008). Suburban Development in Developed Countries Series No. 7 Suburbs in Italy: The Case of Milan and Tuscoli. Small Town Construction (12), 71-82.

Meng, Xianglin. (2014). Suburban urbanization: Development options for China from the development models of developed countries. China Development, 14(2), 7.

Diego Laguia Martinez.(2016). Analysis of European Suburban Expansion Based on Mechanism and Policy. Urban Design (04), 98-107. doi:10.16513/j.urbandesign.2016.04.010.

Hillier B. （1999）, Centrality as a process: Accounting for attraction inequalities in deformed grids[J]. Urban Design International, 4(3-4): 107-127.

Griffiths M B. ,2010, Lamb Buddha's migrant workers: Self-assertion on China's urban fringe[J]. Journal of Current Chinese Affairs (China Aktuell), 39(2): 3-37.

De Vidovich, L., & Scolari, G. (2022). Seeking polycentric post-suburbanization: a view from the urban region of Milan. Urban Geography, 43(1), 123-133.

3.2 Strategies and transitions in the metropolitan area and outer suburbs of the United States

The development process of cities in developed countries often has great reference significance. Taking the development of the New York metropolitan area as an example, it is divided into three stages[42] , and each stage adopts different strategies for different situations. The first is the stage of urban decentralized development. Around 1870, before the American Civil War, urban development was slow, and agriculture dominated urban industry. With the slow development of the city, the economy and population gradually gather in the city. Due to the strategy of

[41] Diego Laguia Martinez.(2016). Analysis of European Suburban Expansion Based on Mechanism and Policy. Urban Design (04), 98-107. doi:10.16513/j.urbandesign.2016.04.010.

[42] Liu Zihan. (2017). Research on population development and public service provision in the suburbs of megacities. (Doctoral dissertation, Shanghai Academy of Social Sciences).

https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201702&filename=1017122533.nh

decentralized development of the city, New York, Philadelphia, Boston and other port cities have developed rapidly and quickly took the lead. nation. The second stage is the formation of the urban regional system. From 1870 to 1920, the advanced industrial system gradually replaced the agricultural society. The Industrial Revolution brought about a developed transportation network and an increase in the number of cities. Under this circumstance, New York and Philadelphia have gradually developed into a central city, and the urban spatial structure has also shifted to a polycentric development trend. The third stage is after 1920. A mature industrial system has brought about efficient productivity, and the secondary and tertiary industries have developed rapidly. Under the blessing of the third technological revolution, the tertiary industry has developed more rapidly. Industrial upgrading accelerated the speed of urban expansion, and finally formed a metropolitan area with New York and Philadelphia as the core.

The general situation in China is that there is a big difference between urban and rural areas. Cities have obvious advantages over rural areas in terms of infrastructure, public education, and social welfare. Therefore, people with certain economic conditions will choose to live in cities. In the United States, the situation is just the opposite. The poor congregate in the central city, and the rich are scattered in the suburbs to settle down. This situation is caused by the high population density, cramped living space, and heavy traffic in the city, and the suburbs can not only provide the same good as the city. Education and complete supporting facilities, but also provide a better living environment. After 1920, suburbanization in the United States began to rise[43]. Due to the upgrading of the transportation system, the transformation of the economic structure to a post-industrial economy, and the guidance of federal and local government policies. Especially after the Second World War, the demand for housing increased sharply. In the decades that followed, the demographic and social structure of the United States has changed significantly, with the growth of the young workforce, changes in immigration structure, the rise of working women, and the mass retirement of the baby boomer population, and its suburban development has shown Dense, diverse and prosperous new features.

[43] Xiao Yiping. (2017). Thinking abroad | New characteristics of American suburbs: density, diversity and prosperity. https://mp.weixin.qq.com/s/RAG9mm7Z4Lvowqpr1qCaCQ

Not only the United States, but also the urban development models of developed countries such as Europe and Japan have similarities[44]. Due to the disparity in economic development, urban industries are divided into circles. At this point in time, the development of urban industries and economies is driven by every industrial revolution. Urban centers often have huge economic power and can gather more resources. The outer circle of the city, that is, the outer suburbs, often gathers industries that have been eliminated by the times due to pollution and other impacts. Therefore, the history of urban development in developed countries is worth learning from. One is to choose an appropriate spatial expansion model and take advantage of the gradual expansion of the city. The suburbs of cities and towns are the first choice for the coordinated development of the three major industries. Suburban farming, however, is hardly self-reliant. To protect basic farmland and consolidate the basic position of agriculture, it is necessary to use the planning system to solve the problem of cultivated land protection[45]. The second is to rationally plan urban development. Due to the lack of policies and experience in capitalist countries such as the United States, the United Kingdom, and Japan in the early stages of urbanization, cities have extended to the suburbs excessively, resulting in excessive suburbanization, resulting in a large waste of land resources and serious ecological damage. During the reunification of the two Germanys, the German capital was moved to Berlin, which once put Berlin under enormous pressure for land development. Therefore, since the 1990s, the city of Berlin has provided Berliners with clean drinking water, fresh air, green spaces and recreational spaces in order to maintain the natural and cultural character of the suburbs of Berlin, with a total area of the "regional nature park". In the name, it is investing in the construction of 2866 square kilometers around the city of Berlin[46]. In this way, the land for agriculture, forestry and environmental protection can be maintained for a fee, help the outer suburbs to develop a new service economy, and solve the contradiction between ecological protection and local development. The third is to

[44] Liu Zihan. (2017). Research on population development and public service provision in the suburbs of megacities. (Doctoral dissertation, Shanghai Academy of Social Sciences).

https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201702&filename=1017122533.nh

[45] Ye Qimao. (2009). The development of suburban areas in developed countries: Eleventh in a series of talks focusing on the reform and development of suburban rural areas. Small Town Construction (04), 68-71.

[46] Ye Qimao. (2009). The development of suburban areas in developed countries: Eleventh in a series of talks focusing on the reform and development of suburban rural areas. Small Town Construction (04), 68-71.

optimize the industrial structure. The development of the industry is inseparable from the development of transportation, and the development of the transportation network is also inseparable from the development of the transportation network. Industrial upgrading has given the suburbs more opportunities for economic development, not only to undertake labor resources for industrial upgrading, but also to undertake financial and technical support. As mentioned earlier, the urban construction land area of the Milan metropolitan area is close to 50% of the land area of the metropolitan area. The scale of Milan itself has not become larger and larger, but in traditional agricultural villages, there are more and more industrial and commercial towns in the secondary and tertiary industries. Around these towns, there are 982 square kilometers of farmland and forest. In this way, it is possible for the primary, secondary and tertiary industries to synergistically drive the economic development of the suburbs.

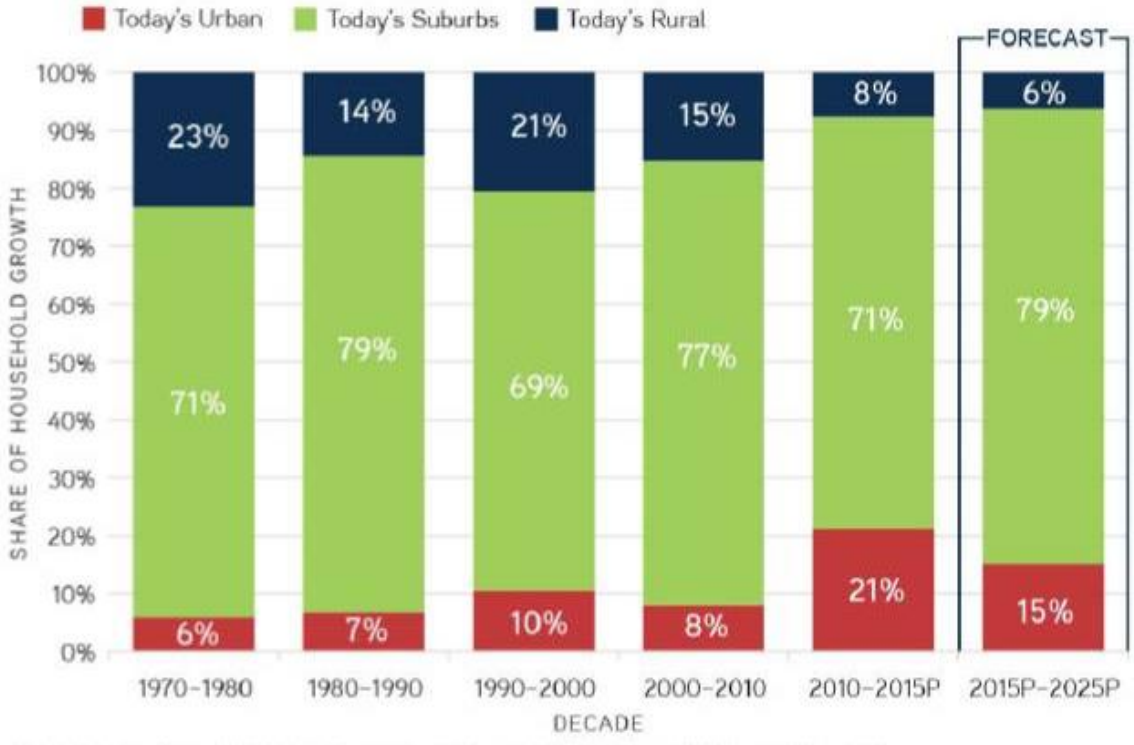


Figure 3.2.1 U.S. housing demand growth share per decade

Housing demand has grown in both urban and suburban areas, with suburban housing demand growing the fastest

Source from: Join Burns Real Estate Consulting LLC calculation using U.S Census Bureau data

Since the outbreak of COVID-19, some scholars believe that traditional "suburbanization" will return. Under the Covid-19 pandemic, central cities are no longer as attractive as they once were. With the popularity of home office and

teleconferencing software, people can choose more flexibly where they live, so it is necessary for suburban cities to start thinking about new planning to meet the increasing demand for housing and infrastructure services[47]. In this context, the doughnut effect of America's big cities was born. What is the doughnut effect, the massive reallocation of housing and office demand from dense urban centers to urban suburbs and suburbs, this is the "doughnut effect" - the rise of suburbs and the depression of urban centers Work from Home (WFH)[48]. More developed areas have been hardest hit by the massive exodus from New York to Chicago to San Francisco to Washington in the wake of the virus, but cheaper land and more space on the outskirts of the city have weathered the pandemic. Pandemic, rents haven't dropped significantly since the pandemic, and rents have barely changed. As the chart below shows, rents in the CBD and high-density areas have fallen by more than 10 per cent, confirming that demand for real estate in dense urban centers has actually fallen. Compared to rents, the overall decline in property prices was smaller, but there was a similar demand redistributive effect, with declines in areas where prices were relatively low in dense urban areas. The chart below shows a heatmap of annual price changes for New York City and San Francisco, with downtown New York, Manhattan, and San Francisco being hit harder relative to their surrounding areas. The main reason for this is that the pandemic has led to a huge increase in the number of people working from home, and this shift is likely to continue. In fact, executives expect nearly 20 percent of the workday to be done at home post-pandemic, and those who can afford to work from home are being reassigned from inner city centers to lower-cost areas on the outskirts of the city because they don't. You don't have to commute frequently. While people will still be heading to America's largest city for work, the urban fabric will certainly change. State and local governments must ease the transition. In this case, people will go to work offline less and less often each week, and more and more people will leave the city center in search of more affordable and comfortable suburban living, which increases the awareness of fragmented public transport network needs. As a result, cities will also benefit from more balanced property prices in different regions as transport networks strengthen. The best-case scenario is a more affordable city center with

[47] Chen Yefu. (2021). "Suburbanization" under the epidemic/Development plan for Amazon's second headquarters. International Information.https://mp.weixin.qq.com/s/ELBw8F1b98hTAcVXpq0KKA

[48] Ramani, A., & Bloom, N. (2021). The Donut effect of COVID-19 on cities (No. w28876). National Bureau of Economic Research.

more comfortable work environments, rather than expensive living spaces dominated by the wealthy[49].

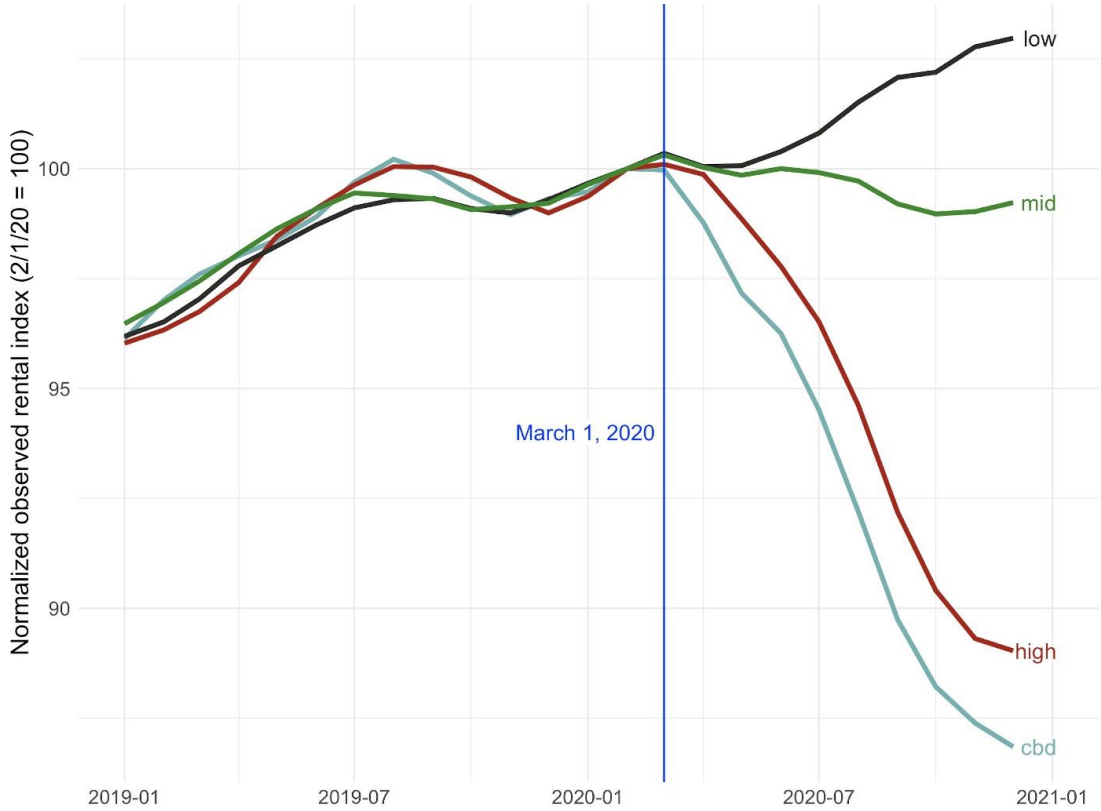
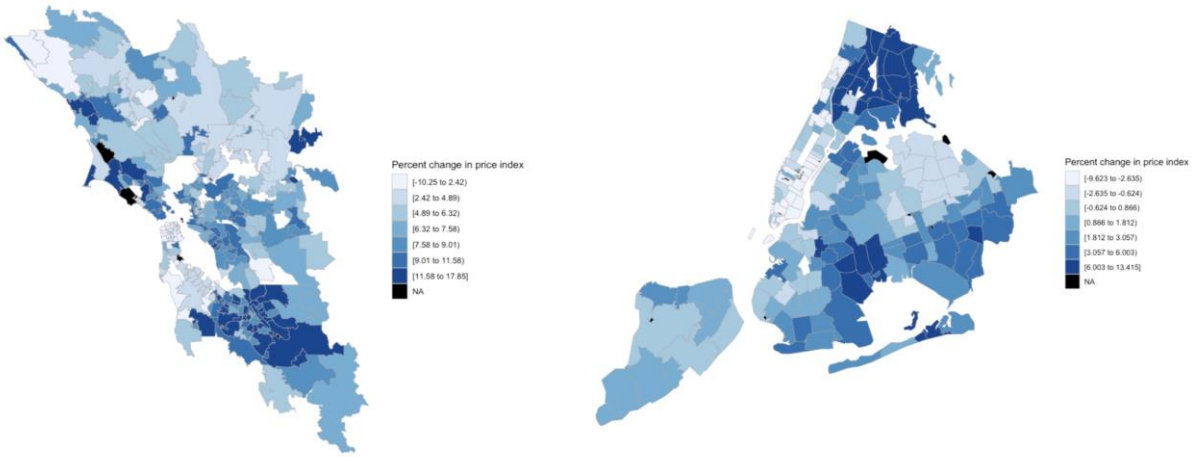


Figure 3.2.2 Rental index for twelve largest metros broken by density group
Rents in the CBD and high-density areas have fallen by more than 10 per cent, confirming that demand for real estate in dense urban centers has actually fallen.
Source from: Ramani, A., & Bloom, N. (2021). The Donut effect of COVID-19 on cities (No. w28876). National Bureau of Economic Research.



[49] Ramani, A., & Bloom, N. (2021). *The Donut effect of COVID-19 on cities* (No. w28876). National Bureau of Economic Research.

Figure 3.2.3 Heatmap of annual price changes in New York City and San Francisco
In both maps, home prices in downtown, Manhattan, and downtown San Francisco each took a huge hit relative to the surrounding areas.

Source from: Ramani, A., & Bloom, N. (2021). The Donut effect of COVID-19 on cities (No. w28876). National Bureau of Economic Research.

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Liu Zihan. (2017). Research on population development and public service provision in the suburbs of megacities. (Doctoral dissertation, Shanghai Academy of Social Sciences). https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201702&filename=1017122533.nh

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Xiao Yiping. (2017). Thinking abroad | New characteristics of American suburbs: density, diversity and prosperity. https://mp.weixin.qq.com/s/RAG9mm7Z4Lvowqpr1qCaCQ

Ye Qimao. (2009). The development of suburban areas in developed countries: Eleventh in a series of talks focusing on the reform and development of suburban rural areas. Small Town Construction (04), 68-71.

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Stanback, T. M. (2019). The new suburbanization: Challenge to the central city. Routledge.

3.3 Planning policies for the outer suburbs of Chinese metropolises

Since the reform and opening up, all regions in China have begun to rely on the market economy. With the development of the economy and the upgrading of the industry, the flow and migration of people has become a trend. Due to the limited space in big cities, industrial transfer will occur between cities and suburbs, and the corresponding population and labor will also transfer. The suburbanization experienced by China at the current stage is not unified with the traditional theory of suburbanization[50]. The suburbanization in traditional western countries is often caused by the fact that when the city develops to the post-industrial stage, the diffusion effect of the urban center area is greater than the agglomeration effect. Suburbanization of population, industry, commerce, etc. At this time, the agglomeration effect in the central area is getting smaller and smaller, and even the

[50] Xu, Lin. (2009). Urban suburbanization with Chinese characteristics and its policy discussion. Journal of Fujian Normal University, Fuqing Branch (04), 71-75.

phenomenon of economic stagnation and recession appears. However, this phenomenon does not appear in China. On the contrary, the urban center area is more prosperous and strong, showing the phenomenon of the co-development of urbanization and suburbanization, which is a typical Chinese characteristic. On the other hand, the suburbanization of the population in western countries is mainly due to the development of the economy, the improvement of transportation systems, the popularization of vehicles such as cars, and the emergence of urban diseases in cities. Citizens above the middle class begin to seek more Because of the good living environment and other reasons, there is a process of active migration to the suburbs. In China, the driving and guiding role of policies is far greater than that in Western countries. The reason is that the policies of socialist countries are more guiding, while people in capitalist countries are more spontaneous. China's suburban development strategy is mainly reflected in the following policies: 1. The system of paid land use, the reform of the land system, the land use structure in the central urban area has undergone great changes, and industries with high investment returns, such as the financial industry, continue to move to the center. The industrial enterprises with low land input and output rate have to move to the suburbs. 2. The housing system and the household registration system have changed. The housing system has changed from the traditional welfare housing system to the commercial housing system. The housing price has become a factor that has to be considered. In order to obtain a more spacious and comfortable housing, ordinary citizens, especially the working class, have to consider buying a house. In suburban housing, if the infrastructure of the place of residence is not perfect, the phenomenon of sleeping in the city is likely to appear. 3. Policies for the renovation of the old city and the development of the new area, the renovation of the old city, and the construction of infrastructure inevitably force many citizens and enterprises to move out, such as the construction of the South-North Viaduct in Shanghai, the construction of large-scale infrastructure in the central urban area of Beijing, and so on. So, no matter in motivation, strategy, or development situation, China has its own characteristics, and this characteristic makes its suburbanization not stagnate the development of urban centers, and can bring urban and suburban leadership two-way development. And this is a real implementation of China's urban development policy: urban-rural integration.

In fact, in China, "urban-rural integration" is a widely circulated concept, but its meaning is still vague. It is precisely because of its ambiguity that over the years,

Chinese local governments have made many practical policy mistakes in their exploration of this road. From the point of view of system and market equilibrium, cities and villages should be a whole, and the flow of people, logistics and information should flow freely and reasonably; It is very small, so that various temporal and spatial resources are used efficiently[51]. Under such a system, cities and towns have the same status but different responsibilities. Therefore, the main contents of urban-rural integration proposed for this situation include: urban-rural political integration, urban-rural economic integration, and urban-rural social integration. First of all, urban-rural integration does not mean the integration of urban and rural physical environment layout. In the process of exploration, some local governments handed over the formulation and implementation of urban-rural integration goals and tasks to the land and urban planning departments. It is inevitable that urban and rural land use is mixed, and urban-rural integration is not a simple "urban village" + "village city" + "Tianzhong village" = urban and rural integration. Second, urban-rural integration does not mean integrated urban-rural governance. The effect of China's urban-rural integrated governance in the past few decades has not been ideal. The production and living organization and management of urban and rural areas are very different. Urban affairs have a strong public nature. Yes, the management methods are advanced, and the talent advantage is obvious, and the municipal government can conduct direct and centralized management. Townships are smaller in scale, their activities are largely private or small collective, and their social publicity is far less than that of cities. The geographical distribution of things is scattered, public affairs are not centralized, and management techniques are relatively backward. Therefore, rural public management is more suitable for a decentralized autonomous system. It can be seen from the above that the original intention of China's urban-rural integration movement is to reform the institutional isolation of economic and social development between urban and rural areas, and to create an integration mechanism for economic and social operations between urban and rural areas. The ongoing new round of urban and rural household registration system reform is an opportunity, some places are gradually canceling or narrowing the policy differences between urban and rural population in terms of education, employment, and house purchases, and some places are considering the establishment of urban and rural integrated social welfare and social security

[51] Yuan Zheng. (2004). Urban-rural integration in China: A review and public policy discussion. Economic Geography (03), 355-360.

network system, and the effect has been initially presented. China is a country with a large population and little arable land. The per capita arable land is only 1/4 of the world average level, and the reserve resources of arable land are seriously insufficient. To cherish and rationally use every inch of land is of great significance to the sustainable development of the country. Therefore, it is now necessary for managers to gradually realize the unified household registration system in urban and rural areas, and gradually realize the unified urban and rural labor employment, public goods supply, social welfare, and social security; gradually realize the unified political rights of urban and rural residents, and finally realize the real urban-rural integration .

Taking the capital Beijing as an example, since 1990, due to market transformation, the trend of suburbanization in Beijing has begun to increase. According to research [52] , the new trend of suburbanization in Beijing has changed from government-led to market-led. The census shows that the construction of suburban villas and affordable housing, increasing private car ownership, industrial decentralization and the development of large suburban shopping malls and retail parks are driving a new wave of suburbanization. Passive relocation is no longer the main source of suburbanization, which shows that in recent years, under the guidance of policy support, more and more funds and manpower have poured into the outer suburbs of Beijing. Government is no longer a single actor, in that sense it is becoming governance. This process has a similar manifestation in reformed China, a spirit of entrepreneurship that transcends the commercial realm. In the process of urban transformation in China, planning occupies a central position in social and spatial changes, because as part of the state apparatus, planning not only promotes the operation of the market, but also uses market tools to realize state power. National entrepreneurship uses the market tools provided by institutional innovation to extend the status of the state to the market field and safeguard state power. State power is not replaced by market forces, but augmented by the use of market tools[53]. In this context, the development of the suburbs will receive strong support from the government and capital, and the development potential will also

[52]Feng, J, Zhou, YX, Wu, FL (2008) New trends of suburbanization in Beijing since 1990: From government-led to market-oriented. Regional Studies 42: 83–99.

[53] Wu, F. (2018). Planning centrality, market instruments: Governing Chinese urban transformation under state entrepreneurialism. Urban studies, 55(7), 1383-1399.

increase. Outer suburban counties are expected to develop into pioneer camps in the fight against natural disasters.

Reference：

Feng, J, Zhou, YX, Wu, FL (2008) New trends of suburbanization in Beijing since 1990: From government-led to market-oriented. Regional Studies 42: 83–99.

Wu, F. (2018). Planning centrality, market instruments: Governing Chinese urban transformation under state entrepreneurialism. Urban studies, 55(7), 1383-1399.

Xu, Lin. (2009). Urban suburbanization with Chinese characteristics and its policy discussion. Journal of Fujian Normal University, Fuqing Branch (04), 71-75.

Yuan Zheng. (2004). Urban-rural integration in China: A review and public policy discussion. Economic Geography (03), 355-360.

3.4 The suburbanization trend of Chinese Metropolis

The development of a city is driven by centripetal and centrifugal forces. The mutual extinction of these two forces leads to a phase of urban development [54] . Suburbanisation is a stage of centrifugal dispersion after the city has undergone absolute and relative concentration in the central area, and it manifests itself in the successive outward migration of population, industry and commerce from the city center to the suburbs. The precursor of suburbanisation is the slowing down of population growth in the city center and the decline of its relative share in the total urban population, known as relative dispersion. A typical sign of suburbanisation is a decline in the absolute number of people in the urban centers, i.e. absolute dispersion[55].

In recent years, empirical studies of some of China's megacities, such as Beijing, Shanghai[56], Guangzhou, Shenyang and Dalian, have shown that these cities have entered a typical process of suburbanisation. This is an important turn in China's urban development process. This subsection provides some basic overviews of the suburbanisation trends and characteristics of China's megacities, using Beijing, Shanghai, Shenyang and Dalian as examples.

[54] Hall, P., (1984) , The World Cities, 3rd Edition, London: Weidenfeld and Nicolson

[55] Walker, R.(1981), A theory of Suburbanization: Capitalism and the Construction of urban space in the United States, in Dear, M. and A.J. Scott (eds.), Urbanization and Urban Planning in Capitalist Society, New York: Methuen, 383-429

[56] Ning, Y. M. & Yan, Z. M.(1995), “The Changing Industrial and Spatial Structure in Shanghai”, Urban Geography, 16(7), 577-594

The identification of urban centers

Suburbanisation is a spatial process in cities over a period of time and is grounded in the urban center to observe the centrifugal diffusion to the suburbs of the city. The study of suburbanisation therefore begins with a geographical definition of urban centers and suburbs. In the West, the urban center is the administrative central city, while the suburbs are the built-up areas or metropolitan areas outside the central city. In some major cities in China, there is a 'circle' type of territorial division, with a relatively clear concept of the central area in line with the administrative boundaries, such as Beijing[57], while in other cities, there is a 'carve-up' type of territorial division, without a ready-made territorial concept of the central area. In some cities, there is no existing territorial concept of central districts, so researchers need to determine them according to the historical process of urban development, with reference to the current land class and population density, and sometimes they have to break the existing administrative boundaries and use street offices as the basic unit, such as Shenyang and Dalian.

Although the proportions of the geographical composition of the four cities in Table 3.4.1 differ from each other, the population densities of the three geographical areas are of the same order of magnitude, with tens of thousands in the central areas, thousands in the suburbs and hundreds in the distant suburbs (Table 3.4.2).

Area (Km2)	Beijing	Shanghai	Shenyang	Dalian
Central District	87.1	132	25.8	28.8
Suburban	1282.8	770	689.3	521.4
outer suburbs	15437.9	5438.5	2761.9	1864.7
total	16807.8	6340.5	3477	2414.9

Table 3.4.1 The geographical composition of the four major cities of Beijing, Shanghai[58], Shenyang[59] and Dalian

[57] Zhou Xing（ 1996），The Suburbanization of Beijing and the Thinking It Causes, Geographical Science, 16(3), 198－208

[58] Ning Yuemin and Deng Yongcheng (1996), Research on the Suburbanization of Shanghai, Li Siming et al. Editor-in-Chief, "Aspects of China's Regional Economic Development", published in Taipei and Hong Kong, pp. 129-153

[59] Zhou Xing, Meng Yanchun (1997), Suburbanization of Shenyang: A Comparison of Chinese and Western Suburbanization, Acta Geographica, 52 (4), 289-299

Source: Zhou Xing 1996, Ning Yuemin, Deng Yongcheng 1996, Zhou Xing, Meng Yanchun 1997, Meng Yanchun 1996.

	Beijing	Shanghai	Shenyang	Dalian
Central District	26607	40833	31919	20774
Suburban	3101	3460	4274	3406
outer suburbs	291	836	326	395
total	642	1988	1343	1028

Table 3.4.2 Population density of Beijing, Shanghai, Shenyang and Dalian (person/Km2)

Source: Zhou Xing 1996, Ning Yuemin, Deng Yongcheng 1996, Zhou Xing, Meng Yanchun 1997, Meng Yanchun 1996.

Since 1982, China's big cities have begun the process of suburbanization

By analyzing the census data of Beijing, Shanghai, Shenyang, and Dalian, the population changes in the three regions are shown in Table 3.4.3.

	Beijing 1982-1990		Shanghai 1982-1990		Shenyang 1982-1990		Dalian 1982-1990	
	Growth rate(%)	Increment (1000)	Growth rate(%)	Increment (1000)	growth rate(%)	Increment (1000)	growth rate(%)	Increment (1000)
Central District	-3.38	-82	-2.86	-148	-6.73	-59.4	-11.82	-60.8
Suburban	40.46	1149	55.52	951	31.04	697.6	56.00	408.0
outer suburbs	13.12	521	-1.28	-58	3.10	27.5	11.58	85.4
total	17.20	1588	6.28	745	16.60	665.7	18.34	432.6

Table 3.4.3 Population changes in the four cities of Beijing, Shanghai, Shenyang and Dalian (%)

Source: Zhou Xing 1996, Ning Yuemin, Deng Yongcheng 1996, Zhou Xing, Meng Yanchun 1997, Meng Yanchun 1996.

As can be seen from Table 3.4.3, the central areas of all four major cities experienced an absolute decline in population after 1982. The total population in the central area of Beijing decreased by 3.38% in 8 years, with 82,226 people; in Shenyang by 6.73%,

with 59,424 people; in Dalian by 11.82%, with 70,807 people; and in Shanghai by 2.8% in 10 years, with 154,000 people. The population growth in the suburbs of all four cities was much lower than the average growth rate of the city's population over the same period, and in Shanghai the growth rate was even low and negative. At the same time, the suburban areas of all four cities had high population growth rates (Table 3.4.3), translating into average annual growth rates of 3.44% in Shenyang, 4.10% in Shanghai, 4.34% in Beijing and 5.74% in Dalian. With natural population growth in the urban centers (e.g. 4‰ in Beijing and 3.9‰ in Shenyang), the decline in population in the central areas implies an out-migration of population, mainly to the suburbs rather than the distant suburbs, signaling that all four cities have begun the process of suburbanisation.

The phenomenon of suburbanization in China began in the 1980s and experienced the suburbanization of population, industry and commerce[60]. As the last stage of the four stages of suburbanization, the suburbanization of office buildings is gradually emerging in China's megacities. The study found that the surrounding environmental conditions and the rental cost of site selection are the most important factors for the location selection of office activities in the suburbs. In terms of location, whether it is an outer suburb or a suburb, it is already located in the outer ring or edge of the city. Low housing prices and the suburbanization extension of public transportation, especially rapid rail transit, further promote suburbanization, which can attract more capital and manpower injection, and more office workers will work here. How to continue to take advantage of the suburbs and attract more office activities is worth thinking about in urban planning and related policies. Promoting the suburbanization of office buildings from the perspective of urban planning.

(1) Traffic planning. Focus on the development of large-capacity rapid public transportation, especially rail transportation, to strengthen the connection between urban and suburban areas, and reduce the cost of commuting time. For the suburban office gathering area, reasonable allocation of traffic facilities such as parking lots and bus stations will create a good traffic environment for enterprises and employees.

[60] Chen Yelong & Zhang Jingqiu.(2010). The analysis of the factors influencing the location of office activities in the suburbs: Taking Yizhuang, Beijing as an example. Journal of Capital Normal University (Natural Science Edition) (06), 69-73. doi:10.19789/j.1004- 9398.2010.06.013.

(2) Green space planning. Increase the rate of green space in the suburbs, strictly control the encroachment of green space by other construction land, and give full play to the advantages of the suburban ecological office.

(3) Improve the planning and construction of public service facilities such as education, medical care, and business services, and reduce the psychological barriers for enterprises and employees to settle in the suburbs.

(4) Residential area planning. Plan public spaces, strengthen "neighborhood relations", and create a humanistic living environment.

Suburban office location selection factor	Selection number	Frequency
Office location and environmental conditions	49	58. 3%
Rental cost	40	47. 6%
Safety	40	47. 6%
Living conditions	34	40. 5%
Traffic conditions and parking	34	40. 5%
Ample office space	30	35. 7%
Preferential Policy Factors	26	31%
Convenience of communication network	23	27. 4%
Human Resources	16	19%
Dining and shopping around	15	17. 9%
Proximity to airport and logistics center	6	7%
Proximity to company headquarters	5	6%
Personal preference of company leaders	2	2. 4%

Figure 3.4.4 Statistical table of location selection factors for suburban office activities

Source:Chen Yelong & Zhang Jingqiu.(2010). The analysis of the factors influencing the location of office activities in the suburbs: Taking Yizhuang, Beijing as an example. Journal of Capital Normal University (Natural Science Edition) (06), 69-73. doi:10.19789/j.1004- 9398.2010.06.013.

It can be seen from the chart that the working environment, rent, safety, living conditions, traffic conditions, and preferential policies account for a high proportion, which are the main factors for the suburbanization of offices[61].

[61] Chen Yelong & Zhang Jingqiu.(2010). The analysis of the factors influencing the location of office activities in the suburbs: Taking Yizhuang, Beijing as an example. Journal of Capital Normal University (Natural Science Edition) (06), 69-73. doi:10.19789/j.1004- 9398.2010.06.013.

reference：

Hall, P., (1984) , The World Cities, 3rd Edition, London: Weidenfeld and Nicolson

Walker, R.(1981), A theory of Suburbanization: Capitalism and the Construction of urban space in the United States, in Dear, M. and A.J. Scott (eds.), Urbanization and Urban Planning in Capitalist Society, New York: Methuen, 383-429

Ning, Y. M. & Yan, Z. M.(1995), "The Changing Industrial and Spatial Structure in Shanghai", Urban Geography, 16(7), 577-594

Zhou Xing（1996），The Suburbanization of Beijing and the Thinking It Causes, Geographical Science, 16(3), 198—208

Ning Yuemin and Deng Yongcheng (1996), Research on the Suburbanization of Shanghai, Li Siming et al. Editor-in-Chief, "Aspects of China's Regional Economic Development", published in Taipei and Hong Kong, pp. 129-153

Zhou Xing, Meng Yanchun (1997), Suburbanization of Shenyang: A Comparison of Chinese and Western Suburbanization, Acta Geographica, 52 (4), 289-299

Chen Yelong & Zhang Jingqiu.(2010). The analysis of the factors influencing the location of office activities in the suburbs: Taking Yizhuang, Beijing as an example. Journal of Capital Normal University (Natural Science Edition) (06), 69-73. doi:10.19789/j.1004- 9398.2010.06.013.

3.5 The dynamic mechanism of suburbanization in China

China's industrialisation is not yet complete, the urban-rural dichotomy still exists, the gap between urban and suburban areas is still wide, and the public amenity base in the suburbs is still far less than in the city center. Therefore, the driving force behind China's suburbanisation is more a matter of government policy guidance.

1. Driven by various Chinese policies and institutions.

(1) Reform of the urban land use system[62].

Before China's reform and opening up, China had a long-standing system of land use without compensation. Because of the better infrastructure and superior regional location of urban centers, factories, businesses and residences clustered in the city centers. This, coupled with a lack of rational planning in urban centers at the time, led to inefficient use of land, resulting in excessive population density, a mix of factories and residences, and cultural heritage sites and high-rise buildings 'facing each other'. After the reform and opening up, the use of urban land changed from unpaid to paid, and the price of land in the core of the city was often ten or even dozens of times higher than the price of similar land in the suburbs. As a result, the structure of urban land use gradually changed, with those factories, commerce, trade and finance that could pay high land prices clustering in the central areas, while

[62] Liu Bingjian, Zheng Libo (2004). The characteristics and dynamic mechanism of urban suburbanization in China [J]. Journal of Theory, 2004(10) : 68- 70.

factories, warehouses and residential land with low output rates moved into the suburbs. To a certain extent, this has resulted in a more reasonable spatial exchange, allowing the land use in urban and suburban areas to be transformed into an optimum and efficient one.

(2) Reform of the urban housing system[63].

After the reform and opening up, China enacted many housing reform policies, such as the reform of the urban housing distribution system, i.e. the commercialisation of housing, the implementation of cash subsidies for rent, the pooling of residents' capital to build houses, and the establishment of housing provident funds, among other measures to encourage individual home ownership. In addition, the late 1990s saw the abolition of the welfare housing allocation system and the replacement of welfare housing allocation by commercialisation, which forced people to consider the issue of housing prices. These changes in the system have shifted the direction of people's investment and consumption. The general public had to choose to buy homes in the suburbs in order to obtain more spacious and cheaper housing, which undoubtedly promoted the suburbanisation of living. At the same time, in view of these changes, many companies and individuals have started to invest in the suburban real estate sector, which has to some extent stimulated the development of the suburban real estate sector.

2. The driving role of urban renewal

Urban renewal[64] in China is a compensatory approach to historical legacy problems. In the early years of the founding of the PRC, China's urban planning was not scientific and rational enough, the living standards of urban residents were low, and there were many dangerous, dilapidated, small and cluttered houses in the urban areas, which seriously restricted the current development of the cities and spatially bounded the enhancement of urban functions. Therefore, in response to such a problem, the Chinese government has started to implement a policy of urban renewal, with the real intention of better enhancing the functions and landscape of the central city and better urbanization. In this process the government often adopts

[63] Zheng Libo (2005). Analysis of the main constraints of urban suburbanization in China [J]. Qilu Journal, 2005(6): 154- 157.

[64] Zhou YiXing, Meng Yanchun (1998). The trend of suburbanization of large cities in China [J]. Journal of Urban Planning. 1998, (3): 22-26.

various preferential policies to facilitate the relocation of the original residents to the suburbs, promoting the suburbanisation of population living.

Figure 3.5 The process of urban renewal in Beijing

The renovation of old houses in some areas of the city is already planned, and scenarios such as urban villages do not match the metropolis.

Source :

https://gimg2.baidu.com/image_search/src=http%3A%2F%2Fss2.meipian.me%2Fusers%2F3103464%2F3d656c12b18db2c4a880998b048eb2bd.jpg%3Fmeipian-raw%2Fbucket%2Fivwen%2Fkey%2FdXNlcnMvMzEwMzQ2NC8zZDY1NmMxMmIxOGRiMmM0YTg4MDk5OGIwNDhlYjJiZC5qcGc%3D%2Fsign%2Ffee59a82b11c618386830661018b882c.jpg&refer=http%3A%2F%2Fss2.meipian.me&app=2002&size=f9999,10000&q=a80&n=0&g=0n&fmt=auto?sec=1658286450&t=2b60f49f6e078412c6818714cc522ed6

3. Improvement of transport and communication infrastructure

With the development of the national economy, China's urban construction funds have increased significantly, and investment in urban transport and other facilities has also increased significantly, resulting in improved urban transport conditions. At the same time, the rapid development of communication technology has accelerated the speed of information exchange. To a certain extent, enterprises' access to information is no longer restricted by time and space, which allows the separation of the business sector from the production sector and will largely reduce the cost of land and other costs for enterprises. In addition, modern mass communication media have made it possible to access a wider range of information

from a wider area, allowing people to enjoy urban civilization as much as in the suburbs. The improvement of the above-mentioned facilities and technologies shortens the distance between the city center and the suburbs, expands the links between the two and facilitates the relocation of businesses and residents from the center.

4. The promotion of new enterprises in the suburbs and the relocation of existing enterprises

Compared to the city center, the suburbs are relatively cheap in terms of land, rent and labor, and the environment is pleasant, which, combined with the convenience of transport and communications, has attracted many foreign companies to invest in the area and establish labor-intensive businesses. The emergence of these enterprises has attracted wage earners from all over the country, contributing to a more pronounced suburbanisation. At the same time, some enterprises that were previously located in the city center often chose to move to the suburbs due to the difficulty of affording high land prices and rents, coupled with the need for land for business development. After the reform and opening up, China has set up various types of development zones, mainly economic and technological development zones, high-tech development zones and export processing zones. They have gradually become a highlight of regional economic development. Because of this, the government has also invested a great deal of human and material resources in the large-scale planning and construction of development zones, which to a certain extent has accelerated the process of suburbanisation.

The above analysis of the dynamics of suburbanisation is biased towards the analysis of objective mechanisms, but of course there are also some subjective reasons for the existence of suburbanisation. For example, people's expectations of the future development of suburbanisation in light of China's rapid economic development[65], the weighing of interests by enterprises and individuals, the consideration of marginal costs and marginal benefits, and so on.

Reference：

Liu Bingjian, Zheng Libo (2004). The characteristics and dynamic mechanism of urban suburbanization in China [J]. Journal of Theory, 2004(10) : 68- 70.

[65] Yang, Yanru (2004). A study of the geographical process of suburbanization of urban population--- Taking Beijing as an example [D]. Northeast Normal University. 2004.

Zheng Libo (2005). Analysis of the main constraints of urban suburbanization in China [J]. Qilu Journal, 2005(6): 154- 157.

Zhou YiXing, Meng Yanchun (1998). The trend of suburbanization of large cities in China [J]. Journal of Urban Planning. 1998, (3): 22-26.

Yang, Yanru (2004). A study of the geographical process of suburbanization of urban population---Taking Beijing as an example [D]. Northeast Normal University. 2004.

3.6 The impact of suburbanization on real estate

The process of suburbanisation affects the target market for suburban real estate development. Although China has entered the suburbanisation stage of development, it has not experienced hollowing out in the process of suburbanisation, but rather has become more prosperous in the urban centers and has become more attractive to the population and commercial and other economic activities. This stage of urban development, where centrifugal diffusion and centripetal agglomeration coexist and agglomeration is the main focus, dictates that suburban real estate development in China's metropolitan areas should be carried out according to the specific characteristics of the suburban plots[66]. The market should be segmented to develop mainly low- and mid-range housing to meet the residential needs of the non-agricultural population in the suburbs and the working class in the urban areas, while developing high-end housing and villas for the wealthy in the urban areas. The development of suburban residential and industrial real estate should be commensurate with the rate of suburbanisation of the population and suburbanisation of industry respectively. Premature development of a large number of suburban properties could easily result in a large backlog of properties and vacancies, leading to a waste of resources. If suburban real estate development lags behind the pace of suburbanisation, it will limit the smooth development of suburbanisation. A shortage of suburban real estate supply will lead to a rapid rise in land prices and a significant rise in house prices, which will easily lead to overheated suburban real estate investment.

The direction of spatial expansion of suburbanisation affects the choice of location for suburban real estate development. Suburban real estate development should be in line with the spatial expansion direction of suburbanisation, making full use of the locational advantages of the transportation axis to develop residential construction

[66] Xuan Mingfei（2006）. Development positioning of suburban real estate[J] China Real Estate 2006,(5).

in suburban clusters[67]. As the out-migration of the population from the city center in the process of suburbanisation is along the main transport routes and the purchase of houses in areas with relatively good supporting facilities, and the industrial enterprises in the city center are further concentrated in the suburban development zones along the main transport routes, suburban residential and industrial building development can rely on the transport axes and choose to carry out real estate development in the suburban development zones and key towns. At present, most of the out-migrating residents in China's suburbanisation are ordinary working class people who want to increase the size of their homes. As China's large cities have excellent public transport systems, people rely mainly on public transport systems to get around, and the out-migration of people is not far away and mostly concentrated in the suburban areas of the city, accordingly, suburban residential development can choose the suburban areas to build relatively low-priced ordinary commercial housing. The wealthy urban class, on the other hand, are more interested in a beautiful living environment and well-designed, well-equipped facilities, generally own private cars and have a higher tolerance for transport costs.

The residential needs of the out-migrating population in suburbanisation influence the structure of suburban residential development. People are interested in suburban residential consumption, which can be divided into four types: the first type is residential and cultural consumption, interested in the suburban environment, landscape and leisure; the second type is suburban holiday, as a lifestyle enhancement and supplement; the third type is residential practicality, interested in the current lower prices in the suburbs; and the fourth type is housing investment, bullish on suburban development trends[68]. Population residence usually has a tendency to cluster with similar populations, i.e. people of similar cultural backgrounds or similar income levels tend to prefer to live together, while in reality there are differences in people's occupations, incomes, social status, and perceptions of life, which result in different preferences for housing[69]. The residential consumption type of the average working class in suburbanisation is the residential utility type, the middle class is usually the residential culture type, while

[67] Chen Zhangxi, Fang Liang（2002）. Appropriate development of suburban real estate industry in the process of suburbanization[J]. Economic Frontier, 2002(3)

[68] Chen Zhangxi, Fang Liang（2002）. Appropriate development of suburban real estate industry in the process of suburbanization[J]. Economic Frontier, 2002(3)

[69] Hao Shouyi, An Husen (2004). Regional economics [M]. Beijing:Economic Science Press, 2004.

the wealthy class prefers the residential holiday and leisure or investment utility. Therefore, the structure of suburban residential development should be adapted to the diversified residential needs of the out-migrating population in suburbanisation. As various types of population gather to live in different suburban locations, the spatial differentiation of people's social classes is manifested in the suburban residential differentiation.

Also suburban real estate development can have a significant impact on suburbanisation.

Suburban residential development contributes to the suburbanisation of the population. Residential development in the suburbs is currently a significant area of suburban real estate development and a crucial element of residential development across the city. The scale and quality of residential buildings rise as a result of residential development, significantly raising people' overall standards of living. The suburbanization of the population has been facilitated by various types of suburban residential development, which meet the housing needs of households displaced by urban development, urban residents who want to expand their living space, and higher-income groups looking for a good quality of life. Residential development has an impact on people's consumption conceptions and values at the same time. Residential spending has become a larger share of urban inhabitants' annual consumption since the commercialization of housing was reformed, and residential property has become a valuable investment due to its appreciation and value preservation. The appreciation potential of suburban residential real estate is rising as a result of the suburban economy, and suburban residential growth is advantageous for satisfying the needs of urban inhabitants seeking investment returns.

Suburban real estate has its own advantages in terms of attractiveness to the population and industrial enterprises. Suburban housing is generally laid out in places with a superior natural environment. These areas usually have low population density and low pollution, and the planning and design can fully respect nature and pay attention to the harmony between nature and people, so suburban housing attracts urban residents with its quiet and elegant environment, fresh air and close to the natural landscape[70]. The suburbs are usually located in a combination of urban

[70] Jiang Shiliang (2005), Residential Suburbanization and Residential Development in Metropolis Suburbs--Taking Nanjing as an Example [D] Nanjing: School of Geographical Sciences, Nanjing Normal University, 2005.

and rural areas, and their well-connected road transport system links the inner and outer areas of the city, providing a great convenience for the distribution of products and raw materials.

The price advantage of suburban real estate is reflected in the price of land and housing in the suburbs. Real estate developers have more freedom to carefully plan and build their projects as well as to segment their target markets in accordance with real estate demand, which results in a variety of the grade and price of their own developments and makes them more appealing to the public and businesses. Suburban real estate is also less expensive to acquire thanks to the suburbs' relatively low land prices.

Suburban real estate development affects the locational conditions of suburbanisation. Successful suburban real estate development can better meet the needs of out-migrating populations and enterprises for physical space, enhance the ability of suburban areas to attract investment and talent, and promote the concentration of investment and population in suburban areas. The real estate industry has become a new economic growth point and consumption hotspot for residents in China. The government receives significant tax and land premium revenue from real estate development and sales, and this revenue is used to build a variety of support facilities in the suburbs, including those for commerce, health care, education, and transportation. This improves the location conditions of the suburbs and encourages the movement of urban residents and industrial workers. This has improved the suburbs' geographic location and made it easier for urban residents and businesses to relocate there.

Reference：

Xuan Mingfei（2006）. Development positioning of suburban real estate[J] China Real Estate 2006,(5).

Chen Zhangxi, Fang Liang（2002）. Appropriate development of suburban real estate industry in the process of suburbanization[J]. Economic Frontier, 2002(3)

Hao Shouyi, An Husen (2004). Regional economics [M]. Beijing:Economic Science Press, 2004.

Jiang Shiliang (2005), Residential Suburbanization and Residential Development in Metropolis Suburbs--Taking Nanjing as an Example [D] Nanjing: School of Geographical Sciences, Nanjing Normal University, 2005.

3.7 Chapter conclusion

Through the previous analysis, it is not difficult to see that China is going through the process of suburbanization, but the background, specific performance and development process of suburbanization in China are very different from those in other countries. The source of many differences is the particularity of the dynamic mechanism. The background of suburbanization in western developed countries is that the city has developed into the post-industrial era, the economy has developed steadily, and the difference between the suburbs is getting smaller and smaller. The extensive use of modern vehicles such as automobiles, and the continuous improvement of traffic road conditions and supporting infrastructure have made some high- and middle-class people choose to flock to the suburbs to avoid problems such as urban traffic congestion and environmental pollution. It is basically a voluntary and spontaneous behavior of people guided by a market mechanism. At present, China's industrialization has not yet been completed, the urban-rural dual structure still exists, the gap between urban and suburban is still large, and the infrastructure of public supporting facilities in the suburbs is poor. Therefore, the driving force of China's suburbanization is more guided by government policies.

Chapter 4.Issues in outer suburb

4.1 Links to metropolitan city centers

4.1.1 The medical system cannot support the rescue of seriously ill patients (needs to be delivered to the city center)

In addition to the lack of planning for suburban health care facilities, the implementation of existing suburban health care facilities and access strategies is unsatisfactory. The following is a study of suburban healthcare services by medical researchers Pan Chang, Sui Kaixin, Zhao Chenjie, Pan Chang, Sui Kaixin, Zhao Chenjie, Xiao Eddie, Wang Junyan, Gao Yue and Kong Junhui[71] from Beijing University of Traditional Chinese Medicine[72]. This study, conducted by medical researchers, gives us a medical professional perspective on what is lacking in suburban healthcare. With regard to the participation of village inspection in 80 villages and 46 newly built, reconstructed and expanded village health offices in seven suburban districts of Beijing according to the Notice of the General Office of Beijing Municipal People's Government on the Distribution of Work Plan of Important Practical Matters of People's Livelihood in Beijing in 2019 on June 22-23 and December 21-22, 2019, it was found that village inspection in outer suburban counties was not efficient. According to the analysis of the chart below, a total of 75 of these 80 villages carried out inspection activities, but only 52 of the inspected villages met the weekly

[71] The field of study of scholars

Pan Chang: Research on medical and health policies and laws and regulations, medical education and medical fringe disciplines, clinical medicine.

Sui Kaixin: Research on medical and health policies, laws and regulations, medical education and medical fringe disciplines.

Zhao Chenjie: Research on medical and health policies and laws and regulations, medical education and medical fringe disciplines.

Xiao Yun: Research on medical and health policies and laws and regulations, medical education and medical fringe disciplines.

Wang Junyan: Medical Education and Medical Edge, Medical and Health Policies and Laws, Clinical Medicine.

Gao Yue: Research on medical and health policies and laws and regulations, medical education and medical fringe disciplines, Chinese medicine.

Kong Junhui: Chinese medicine, medical and health policies and laws, medical education and medical marginalization

[72] Beijing University of Traditional Chinese Medicine is a national key university directly under the Ministry of Education of the People's Republic of China featuring traditional Chinese medicine. It is jointly constructed by the Ministry of Education, the National Health Commission, the State Administration of Traditional Chinese Medicine and Beijing. The construction of colleges and universities consists of 14 teaching units and 12 undergraduate majors; there are 8 directly affiliated hospitals, 4 non-directly affiliated hospitals, 5 non-directly affiliated clinical medical schools, and 8 teaching hospitals.

standard. The total inspection rate was 93.75%, and the compliance rate was only 65%. The efficiency of doctors' inspections was low. Second, the village health clinics were understaffed and inefficient. In the construction plan for the same period, 88.89% of the village health offices were functioning in some areas, while only 5% of them were functioning in some areas. Seventy-six percent of these village health clinics have basically completed the construction of hardware facilities, but there is a lag in the arrangement of medical personnel in the clinics. Nearly 40% of the clinics did not have a clear plan for staffing arrangements. According to the regulations, village clinics should be equipped with no less than 80 kinds of drugs. However, only a few clinics actually meet the standard. Some village doctors reflected that the clinics' medicines were purchased by doctors themselves, and the government's subsidy rate was low[73]. As a result, in areas with inefficient medical services, residents have to choose to go to large hospitals in the city center, which may delay treatment.

Research area name	Number of mission Village in the Research Area	Number of village inspections have been implemented	Implementation rate of inspection visits (%)	The number of villages with the inspection rate	Compliance rate (%)
C area	13	11	84.62	9	69.23
F area	17	17	100.00	15	88.24
Y area	39	36	92.31	24	61.54
T area	4	4	100.00	1	25.00
M area	7	7	100.00	3	42.86
Total	80	75	93.75	52	65.00

Figure(Table) 4.1.1.1 Implementation of village inspections

Area names are area acronyms. Just like the analysis of several areas above, the implementation of medical inspections in villages is very poor, and even in areas with the lowest compliance rate of inspections, only 25% of the villages meet the standards.

Source: Pan Chang, Sui Kaixin, Zhao Chenjie, Xiao Yun, Wang Junyan, Gao Yue, Kong Junhui. (2021). Status quo and problem analysis of rural primary medical and health service capacity in Beijing suburbs [J]. China Health Quality Management (09), 80-84. doi: 10.13912/j.cnki.chqm.2021.28.9.22.Analysis on the current situation and problems of primary medical and health service capacity in rural areas of Beijing suburbs

[73] Pan C., Sui K.X., Zhao C.J., Xiao Y., Wang J.Y., Gao Y. & Kong J.H. (2021). Analysis of the current situation and problems of primary health care service capacity in rural suburbs of Beijing. China Health Quality Management (09), 80-84. doi:10.13912/j.cnki.chqm.2021.28.9.22.

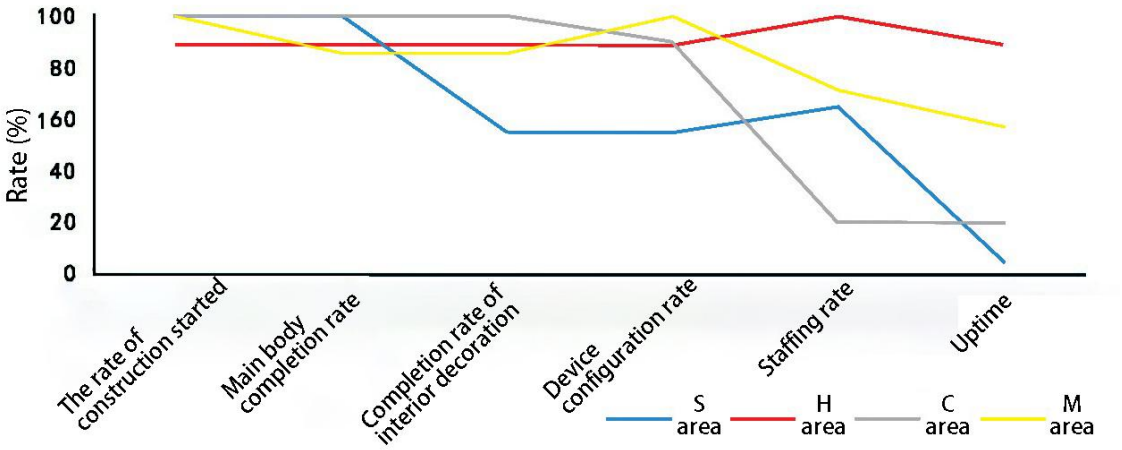

Figure 4.1.1.2 Construction of health centers in various villages

Area names are area acronyms. As can be seen from the above chart, the construction of the health centers in various villages is not the main problem, but the lack of equipment and personnel, which leads to the low normal operation rate of the health centers.

Source: Pan Chang, Sui Kaixin, Zhao Chenjie, Xiao Yun, Wang Junyan, Gao Yue, Kong Junhui. (2021). Status quo and problem analysis of rural primary medical and health service capacity in Beijing suburbs [J]. China Health Quality Management (09), 80-84. doi: 10.13912/j.cnki.chqm.2021.28.9.22.

REFERENCE:

Pan C., Sui K.X., Zhao C.J., Xiao Y., Wang J.Y., Gao Y. & Kong J.H. (2021). Analysis of the current situation and problems of primary health care service capacity in rural suburbs of Beijing. China Health Quality Management (09), 80-84. doi:10.13912/j.cnki.chqm.2021.28.9.22.

Gao W.Y. (2022). A plan for the deployment of medical staff and spatial resources in tertiary general public hospitals during the novel coronavirus pneumonia outbreak. Internal Medicine Theory and Practice (02), 132-134. doi:10.16138/j.1673-6087.2022.02.007.

Wu J. (2022). Hospital human resource deployment strategies during the novel coronavirus pneumonia outbreak. Modern Hospital (05), 742-744.

4.1.2 Difficulties in transporting critically ill patients

In 2012, the Chinese Academy of Social Sciences noted in its China Drug Market Report that the gap between physical healthcare and human resources in China continues to widen, with the rural population, which accounts for 70% of the total population, enjoying only 20% of health resources, while 30% of the total population. The urban population enjoys 80% of health resources[74]. Due to the lack of medical facilities in suburban areas, inefficient village clinics, and insufficient medical manpower, once suburban residents are infected with COVID-19 or other diseases, they need to be transported to the city center for treatment. In the early stages of the epidemic, the huge number of infections led to an explosion in demand for medical resources, shortages of supplies, inadequate beds, and delays in treating patients. Ambulance attendance increases rapidly, especially when citizens present at home with fever, cough, and other symptoms of infection. During the COVID-19 outbreak, the demand for ambulances increased significantly.

The ambulance has always been an important force in prehospital emergency care and a special environment for infection control. The ambulance environment is susceptible to contamination, accompanied by complex factors such as small space, closed environment, insufficient handover time, inability to clean and disinfect regularly, and concentration of personnel. These are important sources of cross-infection and are a potential source of nosocomial infection[75]. There are two important reasons for the delayed response of suburban areas in epidemic prevention and control. First, high-quality resources are mainly concentrated in urban areas, while suburban areas, new towns and large residential areas are severely under-resourced and lack resources for health. In Beijing, for example, as the capital of China, the total amount of health care resources is higher than in other cities. In addition to municipal medical institutions and enterprises, it also has a number of influential tertiary hospitals that rank among the top in the country in terms of hospital examination equipment, hospital size, and doctors' professional

[74] Zhao Shuairan & Li Na.(2018). Analysis of the current situation and countermeasures of medical resource allocation in Beijing. China Health Industry (22), 27-28. doi:10.16659/j.cnki.1672-5654.2018.22.027.

[75] Ye Ji, Xu Ping, Li Minghua, Tang Xiaojun & Wu Degen. (2022). Analysis of pollution status of daily ambulance medical cabin under normalized prevention and control of novel coronavirus pneumonia. Hainan Medicine (10), 1314-1316.

skill levels, and most of these hospitals are concentrated in urban areas[76]. On the contrary, suburban areas, new towns and large residential areas with limited resources have rudimentary medical facilities, low levels of medical personnel, and an "inverted triangle" pattern in the structure of health resources. Therefore, the lack of medical facilities and the high quality of medical resources in the city center make people living in the suburbs more willing to go to the city center hospitals when illness strikes. In addition, the physical distance between urban and suburban areas directly contributes to longer ambulance transport times for patients, and the long transport times can have a delayed impact on the treatment of acute patients. Therefore, the primary solution to this problem is to strengthen medical construction in the suburbs so that patients can be transported to hospitals in a short period of time. 2. The ambulance environment in some hospitals is not up to standard. In the face of public health emergencies, the current number of ambulances is indeed insufficient to cope with the large number of patients, but the environmental hygiene of ambulances is a key factor to ensure that secondary infections and medical staff infections do not occur. According to the survey of several doctors, including Ye Ji, Xu Ping, Li Minghua, Tang Xiaojun and Wu Degen[77], on their workplace, Shanghai Medical Emergency Center, the number of bacteria in different locations and equipment in the medical cabin of daily ambulances since December 2020, the stretcher bed in the ambulance was seriously contaminated, and the total bacterial colony detection rate was only 75%, of which the total bacterial colony detection rate of the bilateral handrails of the stretcher bed was 33. 33% . The total bacterial colony detection failure rate of the stretcher bed shoulder straps was 62.50%, with a maximum colony count of 168 cfu/cm2, exceeding the national standard that the average total number of bacteria on the surface of the medical cabin should be less than or equal to 10.0 cfu/cm2. unqualified sanitary conditions will aggravate the secondary infection of the virus, therefore, the frequency of disinfection of the ambulance and the frequency of replacement of patient contact

[76] Zhao Shuairan & Li Na.(2018). Analysis of the current situation and countermeasures of medical resource allocation in Beijing. China Health Industry (22), 27-28. doi:10.16659/j.cnki.1672-5654.2018.22.027.

[77] The field of study of scholars

Ye Ji：Emergency medicine, clinical medicine, preventive medicine, health science

Xu Ping：Emergency medicine, clinical medicine, cardiovascular system diseases

Li Minghua: Emergency Medicine, Clinical Medicine, Cardiovascular System Diseases

Tang Xiaojun: Preventive Medicine and Health, Cardiovascular System Diseases

Wu Degen: Emergency Medicine, Cardiovascular System Diseases Preventive Medicine and Hygiene

surfaces such as stretcher beds is to ensure The key factor for patient health during transportation.

Test items	The number of items	Number of qualified	Number of unqualified pieces
stretcher bed	84	63 (75.00)	21 (25.00)
Medical equipment	37	35 (94.60)	2 (5.40)
medical cabin object	81	74 (91.40)	7 (8.60)
wheelchair	72	66 (91.70)	6 (8.30)

Figure(Table)4.1.2.1 Comparison of the pass rate of daily hygiene inspections in ambulance medical cabins under the normalized prevention and control of the new crown epidemic [pieces (%)]

It can be seen from the chart that the hygienic inspection of the medical stretcher is unqualified. The stretcher is the most frequently used tool to rescue patients, and it is conceivable that the residue of viruses and bacteria on it is the most.

Source from: Ye Ji, Xu Ping, Li Minghua, Tang Xiaojun & Wu Degen. (2022). Analysis of pollution status of daily ambulance medical cabin under normalized prevention and control of novel coronavirus pneumonia. Hainan Medicine (10), 1314-1316.

Test items	Number of pieces detected	Number of qualified pieces	Pass rate(%)	Number of unqualified	Failure rate(%)
Stretcher head side	12	12	100.00	0	0
Stretcher bed lumbar safety belt	8	7	87.50	1	12.50
Stretcher left side	12	10	83.33	2	16.67
Stretcher bed side rail	12	8	66.67	4	33.33
Stretcher bed foot harness	8	5	62.50	3	37.50
Stretcher bed shoulder	8	3	37.50	5	62.50
Stretcher back side	12	10	83.33	2	16.67
Stretcher right side	12	8	66.67	4	33.33
Total	84	63	75.00	21	25.00

Figure(Table) 4.1.2.2 Statistics table of the total number of qualified colonies on the surface of the daily ambulance stretcher bed under the normalized prevention and control of the new crown epidemic

It can be seen from the chart that the main gathering areas of the stretcher bed colony are the seat belts and handrails, which have the lowest hygiene compliance rate. It is easy to ignore these areas in daily disinfection.

Source from: Ye Ji, Xu Ping, Li Minghua, Tang Xiaojun & Wu Degen. (2022). Analysis of pollution status of daily ambulance medical cabin under normalized prevention and control of novel coronavirus pneumonia. Hainan Medicine (10), 1314-1316.

Reference:

Ye Ji, Xu Ping, Li Minghua, Tang Xiaojun & Wu Degen. (2022). Analysis of pollution status of daily ambulance medical cabin under normalized prevention and control of novel coronavirus pneumonia. Hainan Medicine (10), 1314-1316.
Zhao Shuairan & Li Na.(2018). Analysis of the current situation and countermeasures of medical resource allocation in Beijing. China Health Industry (22), 27-28. doi:10.16659/j.cnki.1672-5654.2018.22.027.

4.2 Outer suburb's own Issues

During the course of the outbreak, the suburbs are currently not performing as well as they should in terms of prevention and control. This is mainly due to the shortcomings in the development of the suburbs and the problems that exist in the suburbs themselves, in addition to the epidemic, and the effects of these problems are magnified in the epidemic.

First, as explained in the first section of this chapter, the lack of medical facilities in the suburbs themselves made it necessary to establish a link between the suburbs and the big cities in order to compensate.

The second point is the lack of commerce. The first step will be to seal off the city after the outbreak. If external aid is not accepted, the continued closure of the city will make supplies insufficient. In order not to bring supermarkets and other vending facilities to a standstill, the suburbs can only receive supplies sent down from the city. The shortage of suburban businesses makes the service pressure on the existing commercial facilities greater, that is, the current commercial facilities will be subject to service loads beyond their service areas and the number of people they serve.

The third point is that the existing residential areas are large and concentrated, with inadequate infrastructure. Although suburban areas are not as densely populated and inhabited as urban areas, some distant suburban counties have their populations concentrated in one area of the entire region, which can lead to increased residential density and increase the risk of virus transmission. On the other hand, overly dense residential areas add to the overload on the service sector in areas that already have poor infrastructure.

Finally, there is a lack of a diversified transportation system. As of today, suburban transportation is likely to be dominated by walking and private cars. The current public transportation network in the suburbs is not very well developed, and there are fewer public transportation routes within the suburbs; there are few direct routes between suburban districts and counties and most of them are buses, so if more rail transportation can be planned it will greatly improve the efficiency of direct communication between suburban districts and counties; there are few transportation routes between the suburbs and the city, and driving into the city may

still be the first choice for residents. So strengthening transportation construction is also a current issue that should be considered.

4.3 Chapter conclusion

This chapter focuses on the current deficiencies of the distant suburbs and counties, which are magnified by external conditions like the epidemic, leading to even stronger impacts. The inadequacy of medical facilities makes the suburbs in a sense linked to the cities, for one, in that suburban medical facilities are less than perfect, both in terms of quantity and in terms of quality or efficiency of services, and lag far behind the cities in this respect. As a consequence, emergency patients in the suburbs must be transported to the city for treatment, and the objective physical distance causes a more serious delay in the treatment of patients. If more hospitals were established in the suburbs, the efficiency of patient care would be greatly improved. Secondly, the limited number of ambulances combined with the distance between the city and the suburbs makes the treatment of patients in the suburbs even more unfavorable. Moreover, during the epidemic, some hospitals' ambulances were not up to sanitary standards, possibly because the panic caused by the epidemic made disinfection incomplete. The residual bacteria and viruses in the ambulances exacerbated the risk of secondary infection for patients and health care workers. In addition to the association with large cities, there are other problems in the suburbs themselves, which can be grouped into four main points.

1. Uneven distribution and insufficient number of medical service facilities; 2 Excessive concentration and insufficient coverage of community- level commercial; 3 Existing residential areas are large and clustered with imperfect infrastructure; 4 Lack of diversified transportation system.

Chapter 5. How outer suburbs could be efficient in reducing pandemic outcomes in Chinese cities

5.1 Advantages of outer suburb

The development potential of suburban epidemic prevention mainly has two advantages, geographical factors and location factors. In terms of geography, unlike the noisy environment of the city center, the suburbs tend to be quieter, with rivers, mountains and lakes, large green areas, obvious natural features, and often open fields or dense forests between cities and suburbs. The vast green plants are called the lungs of the earth, which can effectively purify the harmful substances in the air. It can not only achieve a healthy living environment, but also make people happy for their physical and mental health. It plays a certain role in building the psychological factors of people's physical and mental health. Second, tall mountains, rivers, and swamps are like a natural barrier, which physically separates the city from the suburbs or separates the urban territory from the external territory. Whether it is necessary to establish various epidemic prevention areas, isolators or epidemic-free areas, the unique natural conditions can be utilized. In terms of location, whether it is an outer suburb or a suburb, it is already located in the outer ring or edge of the city. The vacant land resources and superior natural conditions can introduce more funds and talents for the development and construction of epidemic prevention facilities. Low housing prices and suburbanized public transport, especially rapid rail transit, may attract more capital infusions. Due to the geographical location, the residential density of suburban residents will be significantly lower than that of urban areas, the number of high-density places is less, the area and population managed by managers are less, and the epidemic spreads faster. Compared with the urban area, it is greatly reduced, and the population of the township is smaller. Access and liquidity management are relatively easy. Therefore, the unique location of the suburbs can be regarded as a checkpoint between the urban area and the external area, and can be used as a barrier to isolate the input of external disease sources during the epidemic prevention and control period.

5.2 Strategies to take advantage of the outer suburb

5.2.0 Introduction: Decision-making and implementation of the strategy

The Chinese government has strong decision making and action power when it comes to major issues, from the national government to the municipalities, which is why China was able to control the spread of the epidemic in just a few months at the beginning of the epidemic. The Chinese Center for Disease Control and Prevention[78] (CDC) is a bridgehead for major public health events. It is a public welfare institution organized by the government of the People's Republic of China to implement national-level technical management and services for disease prevention and control and public health, and is a public institution directly under the National Health Commission of the People's Republic of China[79]. Virus strains will be studied at the CDC, the National Health Council of the People's Republic of China will publish prevention and medical strategies, and the municipal authorities will undertake the development and construction of the facility.

5.2.1 Relieving the pressure of huge numbers of segregated people in the city center

The SARS incident in 2003 was an important turning point in China's medical reform. After the SARS incident, the government and the public paid more attention to the construction of public health and medical services, and significantly increased investment and construction speed. Looking back at the spread of the virus during the two epidemics, it is not difficult to find that although the virus types and transmission capabilities of the two epidemics are similar, the difficulty of controlling the epidemics is far apart due to differences in viruses and times. In terms of transmission route, the SARS epidemic (only in mainland China and Hong Kong, Macao and Taiwan regions) took 8 months, and finally 7,754 cases were diagnosed and 730 people died, while the 2019 new coronavirus (only in mainland China and

[78] https://www.chinacdc.cn/jgxx/zxjj/

[79] The National Health Commission of the People's Republic of China, referred to as the National Health and Health Commission, also referred to as the National Health and Health Commission, is the component department of the State Council of the People's Republic of China in charge of health and health affairs. The National Health Commission is mainly responsible for formulating national health policies, coordinating and deepening the reform of the medical and health system, organizing the formulation of the national essential drug system, supervising and managing public health, medical services, and emergency health care, responsible for family planning management and services, and formulating responses to population aging. , policies and measures for the combination of medical care and elderly care, etc.

Hong Kong, Macao and Taiwan regions) only took a lot of time. In two months, more than 10,000 patients have been infected[80]. The reason lies in the rapid development of the urban economy in the past 20 years, the increasing population density, the high-speed coverage of the high-speed rail network between cities, and the surge in the long-distance flow of people. Flow and aggregation.

As mentioned above, the medical conditions in the suburbs are far lower than those in the urban areas, so the vast majority of residents in the suburbs need to be sent to the urban areas for treatment after contracting the new coronavirus pneumonia. But even if medical conditions in urban areas are much higher than in suburbs, will existing medical facilities be sufficient to deal with sudden outbreaks? The answer is clearly not. As the first city where the new crown outbreak broke out, Wuhan has exposed many shortcomings in the face of the sudden outbreak. As a first-tier city in China, Wuhan's economic development level is at a high level in the country. The number of medical beds for 1,000 people and the number of tertiary hospitals for 10,000 people are in the leading position in the country[81]. However, in general, there are insufficient medical facilities, especially isolated hospitals, and the layout of major high-quality medical facilities is not good. Reasonable, too concentrated in the central city. The number of primary health facilities in the city is seriously insufficient, fever clinics are generally lacking, and the number of outpatient clinics per 10,000 people is far lower than that of developed countries such as Singapore and New Zealand. Moreover, in the early stage of the epidemic, large-scale general hospitals failed to effectively exert their advantages in the diagnosis and treatment of public health emergencies, and the occurrence and emergence of new infectious diseases were uncertain. The early stage of the epidemic should be a critical period to effectively curb the spread of the epidemic. As a second-level hospital, large general hospitals send personnel to take over designated hospitals in the form of paired assistance. It is difficult to give full play to the "accommodation advantage" and

[80] Pu Yi. (2020). Progress and shortcomings of China's health care service system since the reform and opening up - a comparative analysis based on the outbreak and prevention and control of the 2019 novel coronavirus and SARS virus. China Science and Technology Industry (03), 60-64. doi:10.16277/j.cnki.cn11-2502/n.2020.03.019.

[81] Hu Gang. After the epidemic. (2020). 10 major changes are expected in Chinese cities. Feng Feng Dialogue.https://gd.ifeng.com/c/7tqBJJv1O3a

expert resource advantages of large general hospitals with many beds[82]. In addition, the lack of medical facilities and beds in secondary hospitals makes it difficult for a large number of confirmed and suspected patients to receive more care in the early stage, and it is even more difficult for critically ill patients to receive timely and effective medical care. norm, resulting in family clustering transmission.

Since the implementation of the comprehensive epidemic prevention policy, the government has established a number of makeshift hospitals for the treatment of patients diagnosed with mild symptoms, and built Leishenshan and Huoshen Shan hospitals at a very high speed, and two large-scale epidemic prevention medical facilities have been completed. , together with the large-scale tertiary hospitals and designated hospitals in the region for the treatment of confirmed critically ill patients, which has greatly reduced the burden on the reception and treatment of patients with new coronary pneumonia, and the expansion of the number of beds for patients with new coronary pneumonia has accelerated significantly. Wuhan Huoshenshan Novel Coronavirus Pneumonia Specialist Hospital is a hospital specializing in infectious diseases. The hospital was established with reference to the model of Xiaotangshan SARS Hospital in Beijing. It does not have outpatient clinics and specializes in treating patients infected with the 2019 novel coronavirus. As shown in the picture, it is located on the bank of Zhiyin Lake, Caidian District, Wuhan City, Hubei Province, China. This is Caidian District, which is located on the outskirts of Wuhan municipality. The hospital was announced by the Wuhan government on January 23, 2020, and was jointly constructed by a number of companies. Construction started on January 25, 2020 and completed on February 2. The entire construction cycle can be described as extremely fast, which reflects the great location advantage of the suburbs. First of all, it is difficult to locate the hospital in the urban area, because the high-density construction land in the urban area is not enough to select a site and build a hospital of this scale in a short period of time. . From the perspective of architecture, the extremely fast construction cycle is inseparable from the space provided by the open land. The transportation, processing, assembly and construction of building materials are significantly more efficient in the open land, and the roads in the suburbs are often It is a wide expressway, which not only accelerates the transportation efficiency of building

[82] Yang, J. Y. & Li, Z. Q (2020). Reflections on the functional positioning of general hospitals during the novel coronavirus pneumonia epidemic. Chinese Hospital Management (04), 22-23+26.

materials during construction, but also accelerates the transportation efficiency of medical transportation vehicles for patients during use, taking into account the urban and suburban areas. In the course of the epidemic, higher efficiency means more life-saving treatment.

Figure 5.2.1.1 The location of Huo Shenshan Hospital and Lei Shenshan Hospital Both Huoshenshan Hospital and Leishenshan Hospital are located in the suburbs of the city.

Source from: Google map

Figure 5.2.1.2 Huoshenshan Hospital

Huoshenshan Hospital occupies a large area, and such large-scale medical prevention and control buildings are suitable for construction in open land resources.

Source from: https://www.hubei.gov.cn/hbfb/rdgz/202205/t20220509_4119093.shtml

Reference：

Pu Yi. (2020). Progress and shortcomings of China's health care service system since the reform and opening up - a comparative analysis based on the outbreak and prevention and control of the 2019 novel coronavirus and SARS virus. China Science and Technology Industry (03), 60-64. doi:10.16277/j.cnki.cn11-2502/n.2020.03.019.

Hu Gang. After the epidemic. (2020). 10 major changes are expected in Chinese cities. Feng Feng Dialogue.https://gd.ifeng.com/c/7tqBJJv1O3a

Yang, J. Y. & Li, Z. Q (2020). Reflections on the functional positioning of general hospitals during the novel coronavirus pneumonia epidemic. Chinese Hospital Management (04), 22-23+26.

Zhou, Jing & Ye, Qing. (2022). The role of ideological and political work in responding to urgent and difficult tasks: An example from the construction of Wuhan Vulcangshan and Lei Shenshan hospitals by China Construction Group. Enterprise Civilization (01), 104-105.

5.2.2 Creating a natural barrier system by taking advantage of the location

The so-called barrier is to isolate and protect when the danger comes. When the epidemic breaks out in the first city, timely isolation and control can greatly reduce the spread of the disease. As the origin of the epidemic, it is the duty of city managers to isolate the epidemic to this city and not infect more cities. Non-originating cities need to isolate the disease outside the city. As a key item in the construction of an epidemic-free area, the construction of the barrier system has played an important role. The establishment of a complete natural or artificial barrier system can control the entry and exit of the epidemic prevention area and reduce the risk of foreign diseases entering the epidemic prevention area. The barrier system to maintain a disease-free state includes natural barriers and artificial barriers.

Natural barriers refer to geographical barriers that exist naturally enough to block the natural entry and exit of humans and animals, such as mountains, rivers, forests, swamps, etc., while artificial barriers refer to strategies to prevent and control entry and exit. Suburban areas have natural geographical advantages, with obvious natural features. Mountains, rivers, lakes, and forests form physical barriers to the source of foreign disease transmission at the horizontal and vertical levels, respectively. During the construction of Yongji Immune FMD-free area in Jilin, local government managers gave full play to local advantages and man-made policies to establish a complete natural and man-made barrier system[83]. Foot-and-mouth disease is a non-lethal viral infectious disease that mainly infects livestock, but also humans. As shown in the figure, in terms of local geographical features, Yongji County is located in the transition zone from the remnants of Changbai Mountain to Songnen Plain, showing a landform with high in the southeast, low in the northwest, and elevated in the northern edge. The east and west sides are surrounded by mountains, and the north and south sides are isolated by rivers, lakes and wetlands. The superior geographical environment provides a unique natural barrier for Yongji County in the construction of an epidemic-free area.

[83] Liu, L.B., Xu,C.G., Ma, X.W., Yan, Z.J.& Zhang, X.M. (2014). The role of barrier system construction in the construction of Yongji immune foot-and-mouth disease free zone. Jilin Animal Husbandry and Veterinary Medicine (11), 69-70.

Figure 5.2.2.1 The map of Yongji, Changchun, Jilin province

Yongji County is located in the transition zone from the remnants of Changbai Mountains to Songnen Plain, showing the landform features of high southeast, low northwest and high north. edge. Surrounded by mountains on the east and west sides, the north and south sides are separated by rivers, lakes and wetlands.

Source from: Google map

After discussing and playing with the established natural characteristics, human factors are the key to establishing an epidemic prevention barrier, because the process of manual intervention is full of uncertainties, and the implementation of strategies requires feasibility studies and human operations. Taking the Yongji Immunity Free Zone of Jilin Province as an example, 1. Set up warning signs. At 18 traffic crossings and 2 expressway entrances and exits in and out of Yongji County, a total of 22 traffic warning signs "prohibiting the passage of livestock vehicles" have been set up. It plays an important role in effectively isolating foreign infections. 2. Set up road animal health supervision and inspection stations to conduct necessary health monitoring and disinfection, strengthen supervision strategies, and isolate external viruses. 3. Set up an isolation field. The above strategies cannot completely isolate the invasion of foreign diseases. Setting up an isolation area can isolate, monitor and treat the viruses that have invaded, so as to prevent human and animal infections as much as possible. Of course, as a city-scale settlement, it is extremely

difficult to implement effective isolation and supervision strategies. The city needs to invest more human, financial and material resources in the construction of epidemic prevention areas and epidemic-free areas. Meng Fanli, secretary of the Shenzhen Municipal Party Committee and leader of the Municipal Leading Group for New Coronary Pneumonia Prevention and Control, stated that he adhered to the general policy of "dynamic clearing" and insisted on the point, line and surface. Combined, to achieve all-round comprehensive prevention and control, resolutely build a barrier for epidemic prevention and control, and consolidate and hold on to the hard-won results of epidemic prevention and control[84]. Meng Fanli[85] emphasized that we should resolutely guard the ports, airports, railway stations, long-distance bus stations, highways and other gates, strictly manage community communities and urban villages, and continue to do a good job in port prevention and control. Therefore, the control of traffic intersections in big cities is more complex and diverse, while in suburbs, health inspection checkpoints can be set up at the intersections of expressways, provincial roads, and national roads entering the city for disinfection and monitoring. As for the establishment of an isolation field, as mentioned above, the land resources in the suburbs can be quickly built into an epidemic prevention hospital. Similarly, this can also be used as a place for isolation and monitoring, or more small-scale isolation and treatment places can be set up to distinguish and treat mild cases. patient.

[84] Qi Wei (2022-05-10). Determined to build a firm barrier for epidemic prevention and control and to consolidate the hard-won achievements in epidemic prevention and control. Shenzhen Special Zone Daily, A01.

[85] Meng Fanli: Politician of the People's Republic of China. Graduated from the Accounting Department of Shandong University of Economics with a major in Business Accounting, an on-the-job master student of Western Accounting from the Accounting Department of Nankai University, and an on-the-job Ph.D. in Accounting from Tianjin University of Finance and Economics. He is currently the Deputy Secretary of the Guangdong Provincial Party Committee and the Secretary of the Shenzhen Municipal Party Committee.

Figure 5.2.2.2 Traffic node automatic vehicle disinfection channel

The new automatic disinfection channel not only protects personnel from cross-infection, but also improves efficiency

Source from: http://m.lotuslyrics.com/xiaoduguia/1-4075359.html

Reference:

Liu, L.B., Xu,C.G., Ma, X.W., Yan, Z.J.& Zhang, X.M. (2014). The role of barrier system construction in the construction of Yongji immune foot-and-mouth disease free zone. Jilin Animal Husbandry and Veterinary Medicine (11), 69-70.

Qi Wei (2022-05-10). Determined to build a firm barrier for epidemic prevention and control and to consolidate the hard-won achievements in epidemic prevention and control. Shenzhen Special Zone Daily, A01.

5.2.3 Take advantage of location to develop traffic

During the epidemic, transportation is one of the most critical factors in ensuring people's livelihood. It is mainly reflected in three aspects: daily traffic, transportation and blockade of traffic nodes. The first is the control of important entry and exit checkpoints, highway entrances, national and provincial highways, railway stations, bus stations, ports and other important urban traffic nodes. As mentioned above, suburbs can strengthen the control of epidemic areas by setting up isolation checkpoints and building epidemic prevention monitoring stations. The second point is that daily traffic needs to be normalized and new developments. In the early stage of the epidemic, due to the strong virulence and rapid onset of the first wave of strains, effective medical drugs could not be developed worldwide for a period of time. Therefore, the national government has adopted a relatively strict isolation control policy and a complete shutdown of production. Coupled with the high fatality rate of the first wave of the new coronavirus, people are panicked. To sum up, all the conditions were superimposed, and the rate of citizens going out at that time was not high. However, as recently, when the Omicron strain invaded, the toxicity caused by the mutation of the virus was greatly reduced. The government currently adopts the policy of "dynamically clearing" infected patients, and there will be no large-scale blockade in the city. And the complete shutdown of production, the gradual recovery of residents' lives makes it necessary for daily transportation to return to normal. The city center usually has a relatively developed public transportation network. At this time, the urban transportation system needs to prevent cross-infection. This can be achieved by restricting the flow of people on shifts to ensure that there is enough space on each bus for ventilation.

The focus is on the suburbs. The long-term problems faced by the suburbs are the lack of public transport lines, the rapid growth of the suburban economy and population, and the original supply and demand balance has been broken[86]. Public transport is the main mode of green travel guided by the government, and suburban public transport is a common travel mode for residents. However, at present, the external channel network is not perfect, and the internal road grading is not reasonable. In terms of external access, there are generally few fast lanes connecting suburban new towns with central urban areas and surrounding important functional

[86] Sun, Z.H., Zeng, M.Z. & Gong, W.Q. (2021). A study on public transport planning in suburban areas - taking Fangshan District of Beijing as an example. Heilongjiang Transportation Science and Technology (05), 191-192. doi:10.16402/j.cnki.issn 1008-3383.2021.05.102.

areas, and the development of public transport construction is relatively backward. The external public transportation construction and development model is relatively simple, and the suburban new city lacks the suburban rapid transportation connection with the central city and surrounding important functional areas. Therefore, it is particularly important to establish a complete development system for building traffic guidance[87]: 1. Establish a coordinated, layer-by-layer planning system level. It is necessary to emphasize not only the traffic planning in the urban master planning, zoning planning, regulatory detailed planning, and constructional detailed planning stages, but also the traffic demonstration in the non-legal planning stages such as urban design and conceptual planning. 2. Improve the administrative management system in a timely manner, and avoid the root causes of contradictions between departments, districts and districts, and urban areas through changes in departments and adjustment of functions, and block the realization path of turning contradictions into traffic problems. 3. For the construction and operation system, on the basis of land use planning, implement land reserve policies around traffic facilities and important traffic arteries, and implement a construction advance strategy during the construction process to reserve development space for future traffic development and integrate traffic facilities. The development process of construction and surrounding land construction, realize the premium recovery of transportation facilities construction, and promote the implementation of the basic mode of transportation-led development. Considering the construction of a traffic-guided development system in the construction stage of suburban new towns can effectively prevent the occurrence of some typical traffic problems, so as to facilitate more scientific urban construction, strengthen the connection between urban and rural areas and between towns and towns to make the connection more closely, so as to facilitate the construction of multiple Comprehensive and comprehensive epidemic prevention network.

The third point is the transportation of materials. The smooth operation of transportation and logistics is related to the supply of key livelihood materials such as "vegetable baskets and rice bags" for the people, the supply of important production materials such as energy and raw materials, and the livelihood of the

[87] Si W. (2021). Research on building a traffic-led development system. Engineering Construction and Design (22), 65-67+82. doi:10.13616/j.cnki.gcjsysj.2021.11.220.

majority of truck drivers[88]. Road transportation is an important element supporting economic and social development, and trucks need to operate normally. After the outbreak of the epidemic, the city of origin will face measures to close the city. At this time, the city needs the delivery of a large amount of external medical supplies and living materials. affected by the epidemic. However, in recent times, many truck drivers have encountered problems such as difficulty in parking, nucleic acid testing, and passage during transportation. In response to these problems, according to Xinhua Daily Telegraph[89] In May 2022, Wang Tai[90], Deputy Director of the Highway Bureau of the Ministry of Transport of China, put forward a few points: 1. In the highway service area, by optimizing the layout of parking spaces and setting up tidal parking spaces, reasonably increase the parking spaces for trucks. 2. Nucleic acid testing points will be set up encrypted in places such as expressway service areas, toll station squares and other places with high traffic flow, and areas with conditions are encouraged to provide free nucleic acid testing services. 3. In order to reduce the risk of spreading the virus, the Ministry of Transport further optimized the on-site service of expressway toll stations, and at the same time guided the public to voluntarily install and use ETC, and minimize the use of transit media and cash payment. Li Guoping, the current safety director of the Ministry of Transport, also said that in key epidemic-related areas, the main priority is to ensure a stable supply of living materials. As far as Shanghai, the current key epidemic area, is concerned, the Ministry of Transport has promoted the construction and opening of 6 emergency supplies transfer stations in Shanghai and the surrounding outer suburbs and suburbs. "Rapid inspection, rapid testing, and fast passage " give full play to the important role of the pass in the transportation of civilian materials. Therefore, suburbs can be used as containers for transportation services, and various transportation service points can be built to ensure and assist the supply of materials in epidemic areas.

[88] Ye H.M & Hu Y. (2022-05-12). How to keep traffic and logistics smooth and protect people's livelihood as the epidemic spreads across the country. Xinhua Daily Telegraph, 007.

[89] "Xinhua Daily" is a newspaper of the People's Republic of China. It was founded by Zhou Enlai and others. It was also the first newspaper published by the Communist Party of China in the whole of the Republic of China. In 1952, it became the organ of the Jiangsu Provincial Committee of the Communist Party of China and is currently owned by Xinhua Newspaper Media Group. Xinhua Daily is now a public institution directly under the Jiangsu Provincial Committee of the Communist Party of China

[90] Wang Tai, male, Han nationality, born on January 3, 1963, member of the Communist Party of China, from Qixia City, Shandong Province, graduated from the former Xi'an Highway College (now Chang'an University) in 1986, majoring in road transportation management, and graduated from Chang'an University in 2002 in transportation planning and Management (Master) major, graduated from Chang'an University in 2012, majoring in Transportation Planning and Management (PhD)

Figure 5.2.3 Shanghai emergency supplies transfer station

The construction of the emergency material transfer station provides a safe guarantee for the delivery and disinfection of materials

Source from: National Development and Reform Commission of China

Reference:

Sun, Z.H., Zeng, M.Z. & Gong, W.Q. (2021). A study on public transport planning in suburban areas - taking Fangshan District of Beijing as an example. Heilongjiang Transportation Science and Technology (05), 191-192. doi:10.16402/j.cnki.issn 1008-3383.2021.05.102.

Si W. (2021). Research on building a traffic-led development system. Engineering Construction and Design (22), 65-67+82. doi:10.13616/j.cnki.gcjsysj.2021.11.220.

Ye H.M & Hu Y. (2022-05-12). How to keep traffic and logistics smooth and protect people's livelihood as the epidemic spreads across the country. Xinhua Daily Telegraph, 007.

5.3 Chapter conclusion

Suburban and urban development go hand in hand. Current medical facilities do not have the capacity to respond to health emergencies. In the case of the suburbs, basic medical facilities are inefficient in terms of service delivery, while large general hospitals are extremely lacking. Patients have to be transported to urban centers for treatment, which creates a delay in prevention and control. In the process, the sanitary conditions of the transporting ambulances may also be substandard, and the large number of patients transported leads to incomplete daily disinfection. Moreover, the transport of patients from the suburbs to the city hospitals can lead to overloading of the city with medical care. Therefore, we need to consider how to take advantage of the geographical and locational advantages of the suburbs to play an effective role in both isolation and treatment of the epidemic. Firstly, suburban areas have abundant and inexpensive land resources, so there is enough space and superiority to strengthen basic medical facilities, large general hospitals or large epidemic prevention hospitals. Secondly, natural features such as mountains, rivers and other rivers are obvious, and the physical barrier conditions of natural aspects are sufficient to plan and build epidemic-proof and epidemic-free zones here. Finally, the location advantage of suburban areas is brought into play so that they can serve as a barrier against epidemics in the city. Take advantage of the transportation advantage to block foreign epidemics by setting up barriers, epidemic detection stations and other methods. Use the remaining land resources to build various material transfer or service stations to ensure that external resources can support the epidemic area smoothly and safely.

Chapter 6. Questionnaire about the residential area of Beijing residents

6.1 Introduction of questionnaire

This questionnaire, compiled and distributed by the authors themselves, was designed to understand Beijing residents' perceptions of the city and its suburbs, and their propensity to live there in the future, as evidence of the theme, the importance of developing suburbs in a post-popular era. Because of the analysis in the previous chapters, we believe that in the current situation people's attitudes toward living in the city may change significantly after the epidemic, and that suburbs will need and receive more comprehensive development after that

The survey was conducted by randomly distributing questionnaires and summary questionnaires to a total of 210 Beijing residents. The group was predominantly middle-aged and included residents of all ages and areas of Beijing. They were college students. They were college students, office workers, retirees, etc. The specific questionnaires are as follows.

Questionnaire

Ask friends who live or used to live in Beijing to help fill in

1. What is your age?

2. Where does the area you live in belong to (city center; suburbs)?

3. What area do you work/study in (city center; suburbs)?/

4.1 At the current stage of epidemic prevention and control, do you think the area where you live is convenient for life?(Answers from friends who live in the city center)

Is primary medical care adequate?	YES/NO
Is the business package sufficient?	YES/NO
Satisfaction with green space?	YES/NO
Satisfaction with community service?	YES/NO
Are you satisfied with the area you live in?	YES/NO

4. 2 At the current stage of epidemic prevention and control, do you think the area where you live is convenient for life?(Answers from friends who live in the suburbs)

Is primary medical care adequate?	YES/NO
Is the business package sufficient?	YES/NO
Satisfaction with green space?	YES/NO
Satisfaction with community service?	YES/NO
Are you satisfied with the area you live in?	YES/NO

5. What aspects of your daily transportation are you dissatisfied with?
sidewalk
bicycle lane
bus convenience
road patency
Parking convenience

6. 1 After the epidemic, if you need to increase service facilities within a quarter of an hour's walk (within one kilometer), what kind of facilities do you think need to be added?(Answers from friends who live in the city center)
-Community activity center, library and other cultural facilities
-Basic education facilities such as kindergarten, primary school, junior high school
-Medical facilities such as health service stations
-Parking facility
-Renovation for the elderly, elderly care stations and other elderly care facilities

-Fitness equipment, fitness plaza, indoor activity venues and other sports facilities
-Social service facilities such as terminal distribution (express cabinet), washing and dyeing (laundry), housekeeping service, maintenance, postal and telecommunications service outlets
-Green outdoor event space
…

6. 2 After the epidemic, if you need to increase service facilities within a quarter of an hour's walk (within one kilometer), what kind of facilities do you think need to be added?(Answers from friends who live in the suburbs)
-Community activity center, library and other cultural facilities
-Basic education facilities such as kindergarten, primary school, junior high school
-Medical facilities such as health service stations
-Parking facility
-Renovation for the elderly, elderly care stations and other elderly care facilities
-Fitness equipment, fitness plaza, indoor activity venues and other sports facilities
-Social service facilities such as terminal distribution (express cabinet), washing and dyeing (laundry), housekeeping service, maintenance, postal and telecommunications service outlets
-Green outdoor event space
…

7. After the epidemic, will you prefer to live in the suburbs or the city center?

8. Factors in selecting suburban living (select one or more)
Relatively low prices
The quality of the neighborhood is relatively good
More green space, high quality living environment
Low population density
Other

9. Factors for choosing city center living (select one or more)
Short commute
Adequate commercial facilities
Complete medical system
High-quality and sufficient educational resources
Rich entertainment and cultural activities
other

10. what is your suggestions of the access of public facilities?

Figure 6.1 Questionnaire about the residential area of Beijing residents

6.2 Questionnaire outcomes

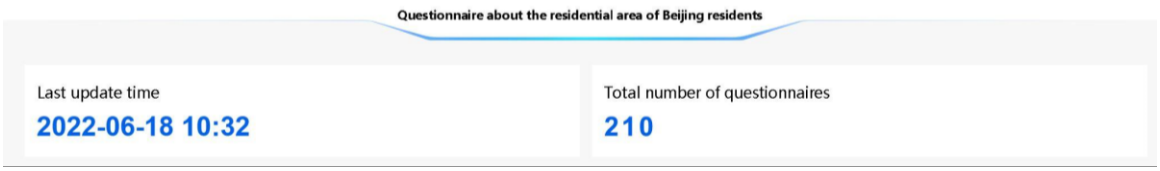

Figure 6.2.1 Number of people surveyed

In this questionnaire, we obtained a total of 210 sample data. First of all, we counted the age groups of the residents who participated in the questionnaire. The sample used in this survey is all adults， The age structure is as follows, mainly the middle-aged group， including residents of various age groups and areas in Beijing. They were college students, working people, retired people, etc.

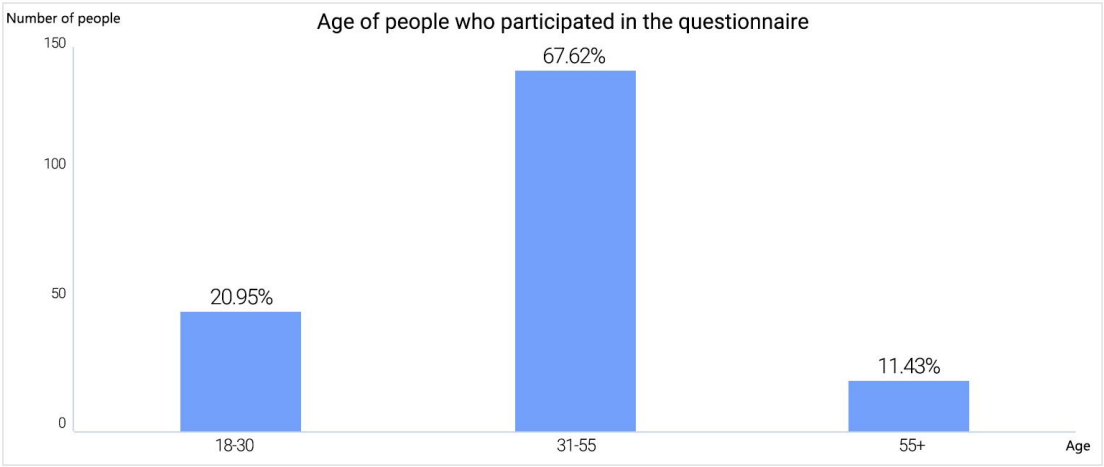

Figure 6.2.2 Age range of investigators

“Where does the area you live in belong to (city center; suburbs)?”

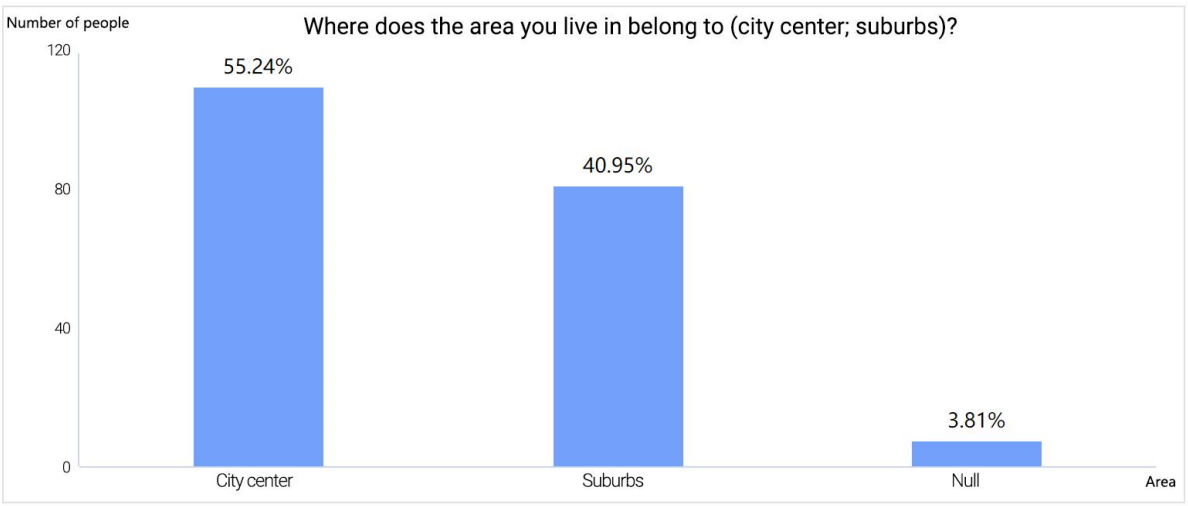

Figure 6.2.3 Survey results of “Where does the area you live in belong to (city center; suburbs)?”

This question was designed to understand where investigators currently live in order to compare it to the ideal post-pandemic area where investigators live. The survey results show that 55.24% of the residents currently live in the city center, and 40.95% of the residents live in the suburbs. The findings confirm previous claims that China's suburbs are gradually developing and achieving some results (Section 2.6 & Section

3.3). The urban and suburban population ratios are very close, indicating that with the implementation of the policy, the development of suburban towns is improving, and the suburbanization of population and housing has achieved certain results. At the same time, it also verifies the difference between Chinese suburbanization and traditional suburbanization. Suburbanization in China has not affected the development of cities and the dominance of urban populations.

"What area do you work/study in (city center; suburbs)"

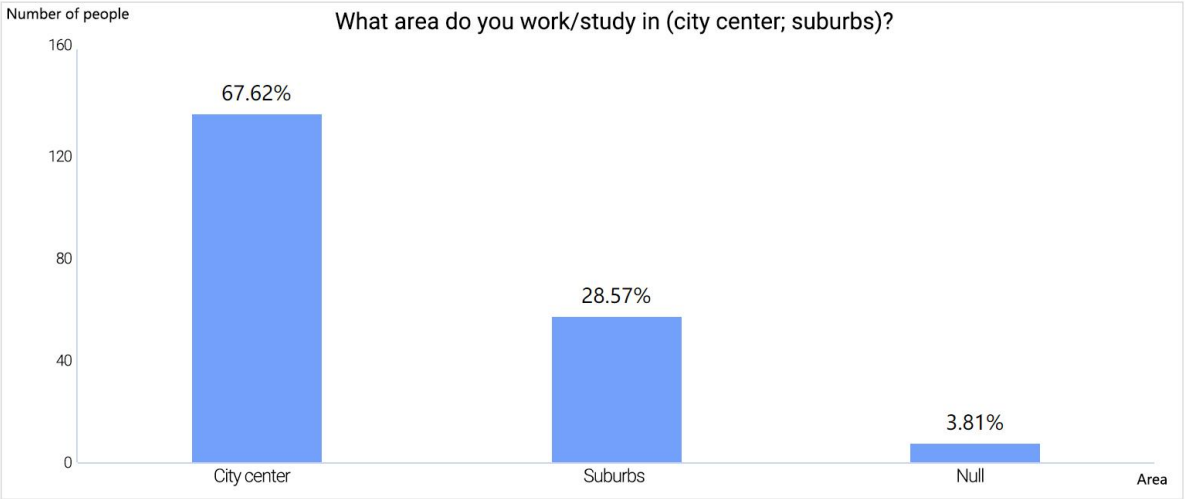

Figure 6.2.4 Survey results of "What area do you work/study in (city center; suburbs)"

We believe that work and study areas are also important for everyone, especially for office workers, which can be an important factor in some people's choice of where to live. As the survey results show, 67.62% of people work in the city, and 28.57% work in the suburbs. This also proves that the suburbanization of office buildings in China is still in the process of job vacancies in the suburbs (Section 2.6), which we believe will improve in the future. The large disparity in population and employment ratios between cities and suburbs suggests that some people who live in suburbs still work in urban areas. Therefore, we have reason to believe that the penetration rate of automobiles is already very high, and the construction of suburban highways is relatively complete.

“At the current stage of epidemic prevention and control, do you think the area where you live is convenient for life?”

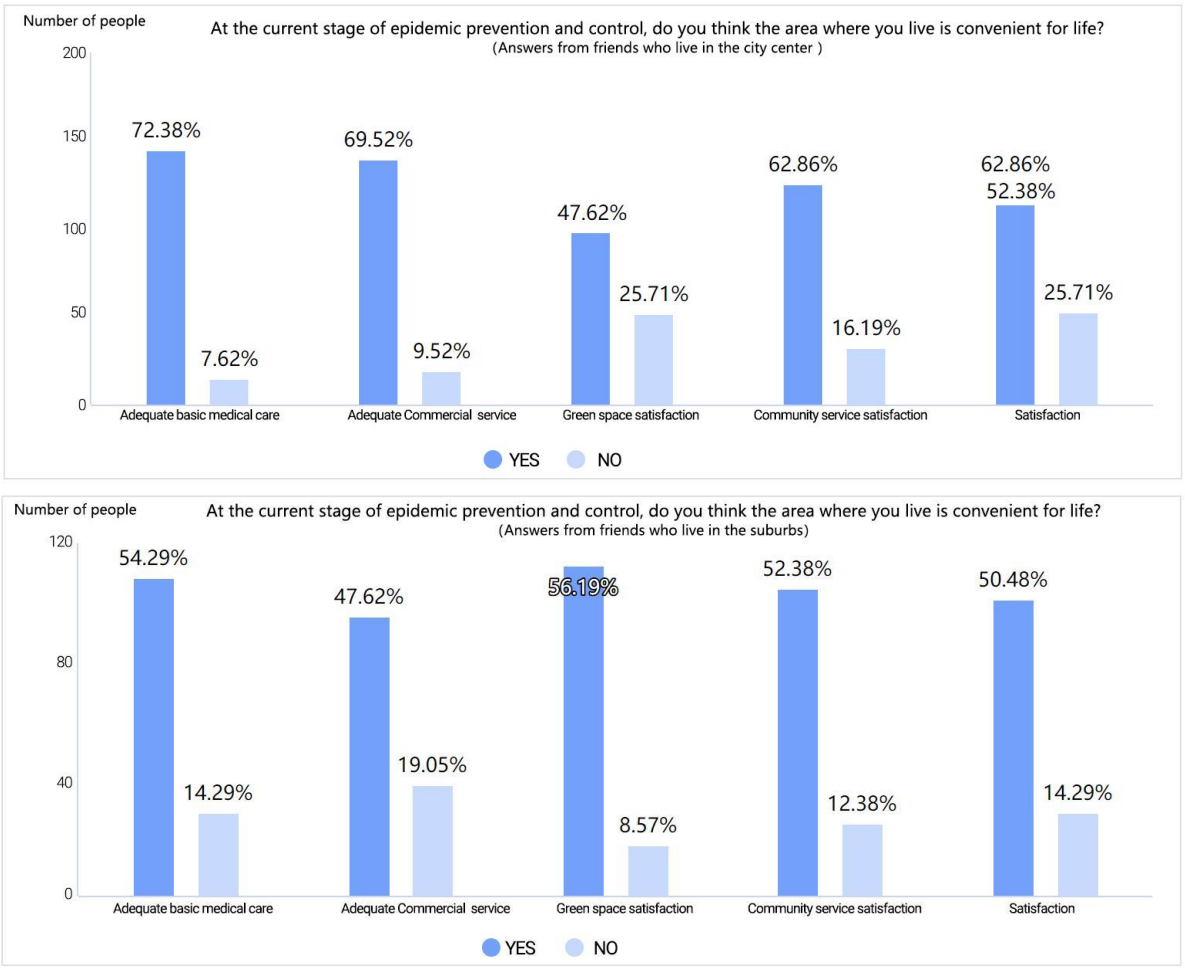

Figure 6.2.5 Survey results of “At the current stage of epidemic prevention and control, do you think the area where you live is convenient for life?”

Next, for the current epidemic prevention and control, residents conducted a survey on the convenience of the facilities in the area where they currently live (the percentage of residents who are satisfied and dissatisfied with the same project does not reach 100% because the survey sample did not fill in this item residents), and contrasts were drawn for urban and suburban areas. The first is the basic medical service. We see that the residents living in the city are satisfied with the medical treatment as high as 72.38%, and only 7.62% are dissatisfied, while the residents in the suburbs are 54.29% satisfied with the medical treatment, and 14.29% are dissatisfied. Compared with cities, suburban residents are nearly 20 percentage points less satisfied with healthcare and 7 percentage points more dissatisfied. This result corroborates the above (section 4.1) that medical care in the suburbs is still extremely inadequate.

The same problem exists in commercial facilities. The commercial satisfaction in urban areas is 69.52%, and the dissatisfaction is only 9.52%. The suburban commercial satisfaction is only 47.62%, and the dissatisfaction is as high as 19.05%. The reason for this is not because of the distribution of the retail industry, but because of the lack of large-scale commercial and cultural centers in the suburbs, which cannot meet the residents' shopping and entertainment needs.

In terms of greening, the suburbs are far better than the urban areas. 56.19% of residents are satisfied with the greening in the suburbs, and only 9.52% are dissatisfied; 47.62% of urban residents are satisfied with the surrounding greening, and 25.71% are dissatisfied. As mentioned above (Section 3.3), one of the reasons for the emergence of suburbs in China is driven by government policies, including the planned renovation of old urban districts and policies for the relocation of native residents. First of all, there are many old communities in the city, and these communities generally have poor living environments and lack of greenery. The suburbs themselves have unique natural advantages. Coupled with the late development of suburbs, most of them are new-type communities. People pay more attention to the comfort of life during the construction process. Therefore, whether it is an artificial or natural ecological environment, the suburbs are ahead of the Urban.

When it comes to community service, the city is slightly better. The satisfaction level of urban residents reached 62.86%, and 16.19% of residents were dissatisfied with it; the satisfaction level of suburban residents was 52.38%, which was nearly 10 percentage points lower than that of urban areas, but 12.38% of residents were dissatisfied with it , 4 percentage points lower than the city. We speculate that this is due to the fact that the service facilities and personnel provided by the new residential area are better, while the urban areas are mostly old residents, and the residential areas in the urban areas have been developed for a long time.

For the last item we did a survey on overall satisfaction, the results were unsurprising. The proportion of urban residents and suburban residents who are satisfied with their current living area is roughly the same, respectively 52.38% in urban areas and 50.48% in suburban areas, but they are not satisfied. The proportion of urban residents is as high as 25.71%, which is 10 percentage points higher than 14.29% in

suburban areas. Therefore, after the epidemic, the situation in China is the same as that in the United States as mentioned above (section 3.2), people will be more attracted to the suburban living environment, and people will also tend to live in the suburbs, which will help the construction of the suburbs develop.

"What aspects of your daily transportation are you dissatisfied with?"

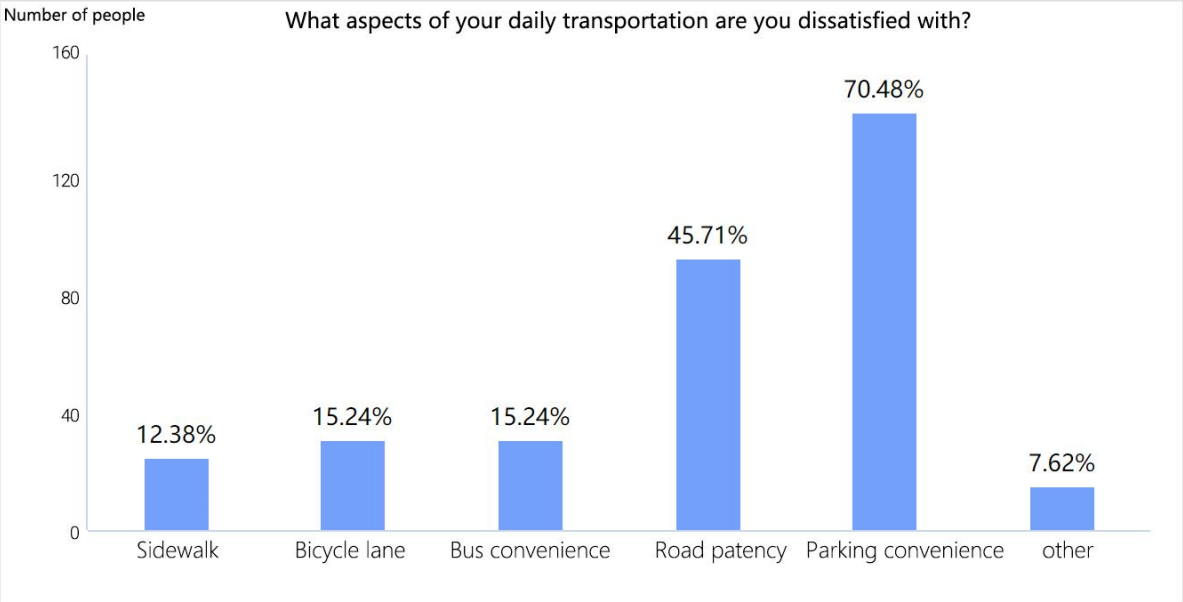

Figure 6.2.6 Survey results of "What aspects of your daily transportation are you dissatisfied with?"

This survey is to find out how satisfied citizens are with transportation, it is mainly divided into walking, cycling, public transport convenience, road patency and parking. The results showed that road patency and parking problems were the most serious. This shows that the ownership rate of private cars is very high, resulting in daily traffic congestion, and the implementation of parking in the city cannot be satisfied. Increasing traffic congestion is also one of the reasons why cities are no longer attractive.

“After the epidemic, if you need to increase service facilities within a quarter of an hour's walk (within one kilometer), what kind of facilities do you think need to be added?”

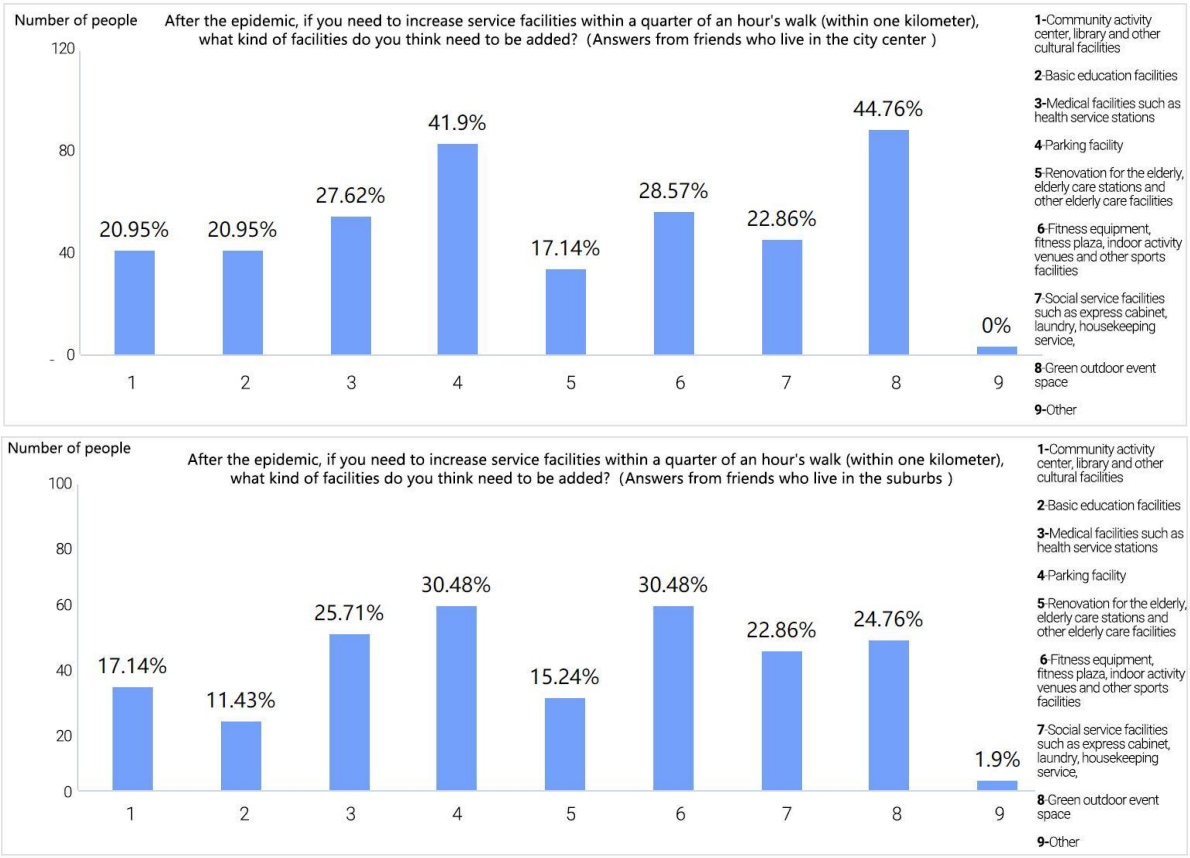

Figure 6.2.7 Survey results of “After the epidemic, if you need to increase service facilities within a quarter of an hour's walk (within one kilometer), what kind of facilities do you think need to be added?”

After we rescued the epidemic, we investigated what kind of facilities the residents would like to add to their living area. Looking at the conditions of living in urban areas, the demand for parking facilities and green space is particularly prominent, with more than 40% of the votes, which is about 10 to 20 percentage points higher than other projects. The situation in the suburbs appears to be more balanced, with no sharply significant demand votes between each item, with recreational facilities, parking and medical facilities at the top of the list. As mentioned in the review, parking is a relatively acute problem in both urban and suburban areas. Others are as stated, lack of greenery in urban areas and lack of medical care in suburbs.

“After the epidemic, will you prefer to live in the suburbs or the city center?”

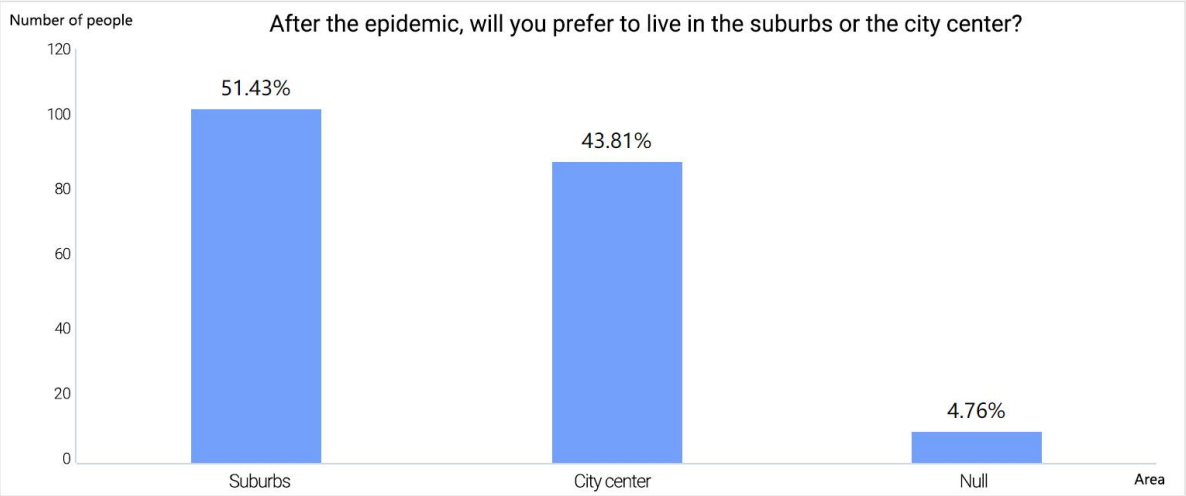

Figure 6.2.8 Survey results of “After the epidemic, will you prefer to live in the suburbs or the city center?”

The results of this survey show that more people are willing to live in the suburbs after the epidemic. We believe that the higher transmission rate in cities after the outbreak is the first reason. Under strict epidemic prevention and control policies, the convenience of life in cities has declined, while suburbs can provide people with a healthier living space.

“Factors in selecting city center living (select one or more) or suburban living (select one or more) ”

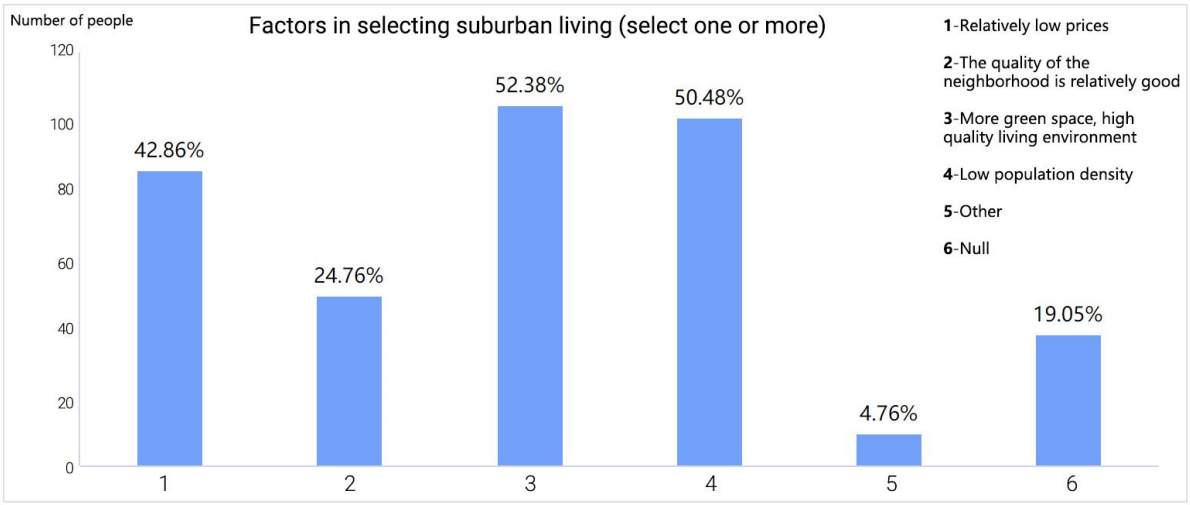

Figure 6.2.9 Survey results of “Factors in selecting city center living ”

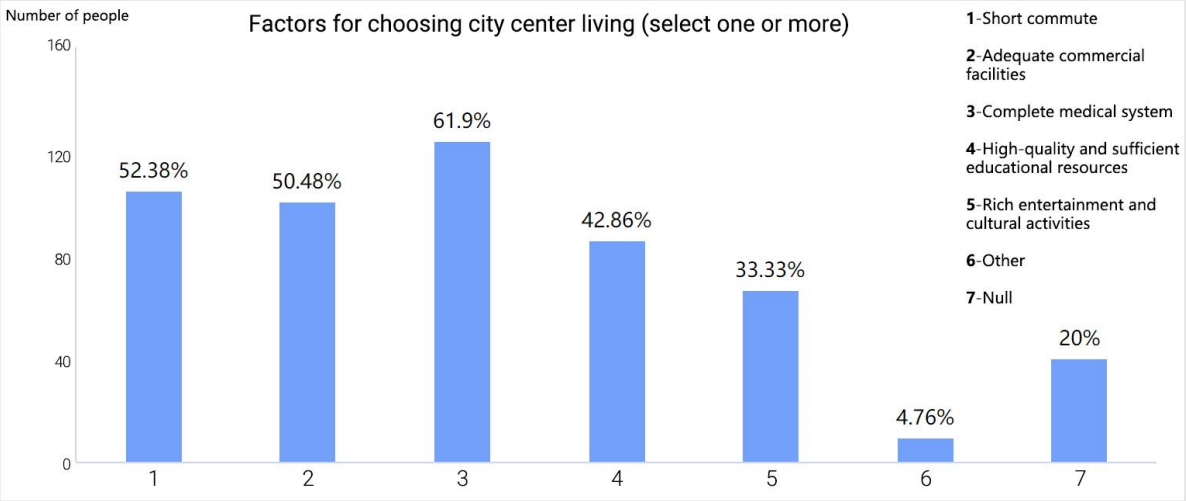

Figure 6.2.10 Survey results of "Factors in selecting suburban living "

The final survey was to explore why people choose to live in the city or the suburbs. Taken together, the city was chosen for its proven advantages, shorter commutes, more commercial facilities, but most importantly, health care, with 61.9% of the vote, also the highest. Suburbs have low housing prices, abundant greenery, and sparse populations that attract residents. Therefore, the development of the suburbs needs to learn from each other's strengths and complement each other's weaknesses, mutual benefit and complementarity, and common development.

6.3 Results of analysis

According to the collected data, we have made the following analysis. First of all, the residents have more dissatisfaction with the living environment in the urban area, but at present, the basic service facilities in the urban area such as medical, transportation, commercial and other factors are still more developed. But even so, more than half of the residents want to live in the suburbs after the epidemic. Therefore, it can be concluded that with the subjective awareness of the population and the attention of the government, the development of the suburbs after the epidemic will be inevitable.

Chapter 7. Fangshan District, Beijing: a case study

7.1 Fangshan, Beijing

7.1.1 Urbanization and main urban data's

Fangshan District belongs to Beijing and is located in the southwest corner of Beijing, adjacent to Mentougou District in the north, Fengtai District in the northeast, Daxing District across the Yongding River in the east, and Hebei Province in the south and west. The total area of the district is 2019 square kilometers. As of June 2020, it has jurisdiction over 8 streets, 14 towns and 6 townships. As of November 1, 2020, the permanent population of Fangshan District was 1,312,778， an increase of 65,000 over the previous year. Among its resident population, the urban population is 1.025 million, accounting for 78.1% of the resident population.

Figure 7.1.1.1 Location of Fangshan District in Beijing

Source:https://baike.baidu.com/pic/%E6%88%BF%E5%B1%B1%E5%8C%BA/6694849/0/b219ebc4b74543a9471be44910178a82b9011436?fr=lemma&ct=single#aid=0&pic=b219ebc4b74543a9471be44910178a82b9011436

Fangshan District is about 34 kilometers away from the center of Beijing. There is a subway line from downtown Beijing to Fangshan District. Beijing Subway Fangshan Line (Beijing Subway Fangshan Line).As of 2020, the road mileage in Fangshan District is 3,139.9 kilometers, a decrease of 2.6 kilometers from the previous year. Among them, the highway mileage is 100.5 kilometers, and the highway coverage density is 157.8 kilometers/100 square kilometers.

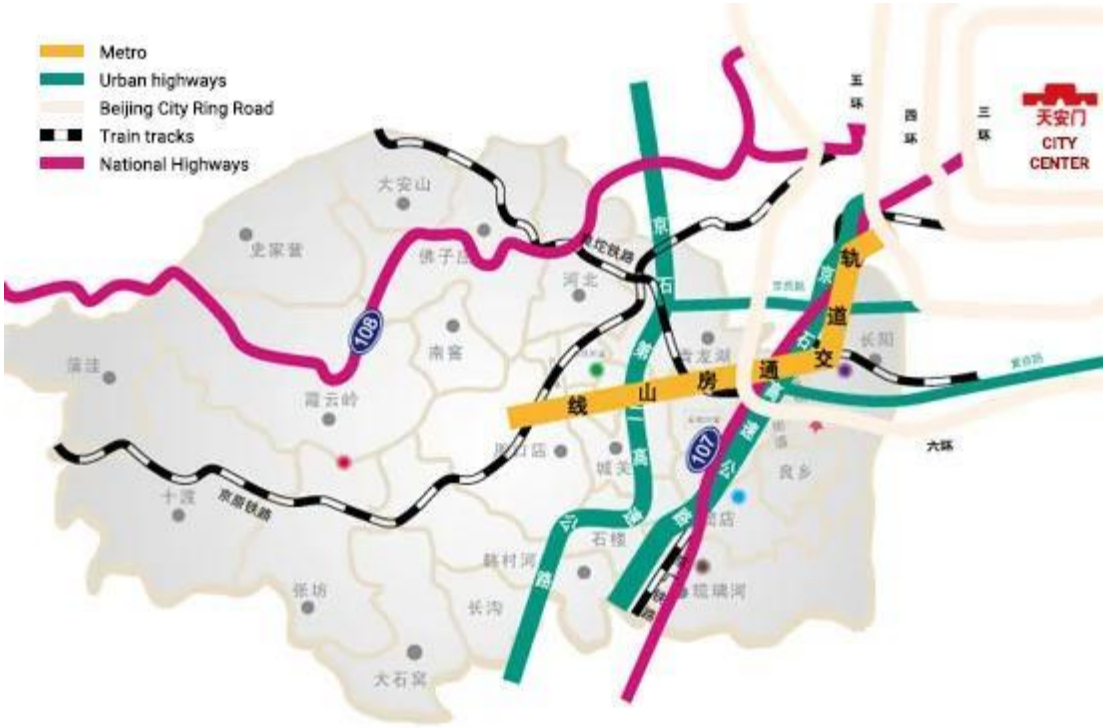

Figure 7.1.1.2 Fangshan Transportation Chart

Source:https://baike.baidu.com/pic/%E6%88%BF%E5%B1%B1%E5%8C%BA/6694849/0/241f95cad1c8a7860a8189a06609c93d71cf50f1?fr=lemma&ct=single#aid=0&pic=241f95cad1c8a7860a8189a06609c93d71cf50f1

Population

According to the NBS[91] and the Beijing Municipal Bureau of Statistics, the resident population in Beijing has increased year on year between 2006 and 2020, with all districts showing a clear upward trend in 2015. However, the population in the main urban centers has been decreasing year by year after reaching a record high around 2015, while the suburban areas, especially the distant ones (Tongzhou, Shunyi, Fangshan, Changping...) The suburbs, especially the distant suburbs (Tongzhou, Shunyi, Fangshan, Changping...) are still growing.

[91] The National Bureau of Statistics (Chinese: 国家统计局), or simply the National Bureau of Statistics, is a deputy cabinet-level agency directly under the State Council of the People's Republic of China. It is responsible for collecting, investigating, researching and publishing statistics on the country's economy, population and other aspects of society.

	Changping District	Chaoyang District	Fangshan District	Fengtai District	Haidian District	Mentougou District	Shijingshan District	Shunyi District	Tongzhou District	Dongcheng District	Xicheng District
2006	823000	1853000	767000	1052000	2158000	244000	360000	578000	656000	621000	793000
2010	1661000	3545000	945000	2112000	3281000	290000	616000	877000	1184000	919000	1243000
2015	1963000	3955000	1046000	2324000	3694000	308000	652000	1020000	1378000	905000	1298000
2020	2269487	3452460	1312778	2019764	3133469	329606	567851	1324044	1840295	708829	1106214
Rate of growth 2015-2020	15.61%	-12.71%	25.50%	-13.09%	-15.17%	7.01%	-12.91%	29.81%	33.55%	-21.68%	-14.78%

Figure 7.1.1.3 Beijing resident population statistics by district between 2006-2020

Source：(2006) (2015)(2020)National Bureau of Statistics of China (web)

The data is categorized under China Premium Database's Socio-Demographic – Table CN.GW: Population: Municipality District.

https://www.ceicdata.com/en/china/population-municipality-district

The resident population figure for Fangshan is reported at 1,312.778 in 2020. This is an increase of 266,778 people over the 2015 population statistics, a growth rate of 25.50% and the third highest of all districts in Beijing.

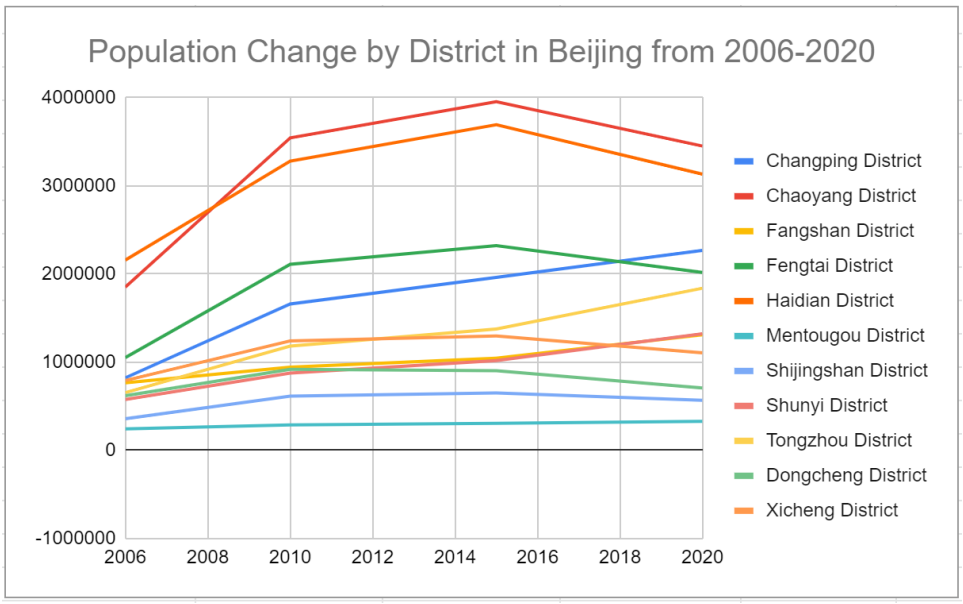

Figure 7.1.1.4 Population Change by District in Beijing from 2006-2020

Source：The data is categorized under China Premium Database's Socio-Demographic – Table CN.GW: Population: Municipality District.

https://www.ceicdata.com/en/china/population-municipality-district

Education

Fangshan has Liangxiang University Town, a total of 5 colleges and universities have settled in, and the number of students is 90,000 to 100,000.

As of 2020, Fangshan District has 5 vocational colleges, 59 secondary education schools, 9 secondary vocational schools, 108 primary schools, 127 kindergartens, 1 special education school, and 111 students.

Science & Technology

In 2020, Fangshan District will implement 100 science and technology plan projects, including 69 municipal science and technology plan projects. There are 828 national high-tech enterprises.

Cultural undertakings

There are 2 public libraries in Fangshan District, with a construction area of 22,000 square meters and a collection of 1.616 million volumes. 2 cultural centers.

Medical hygiene

In 2020, Fangshan District has a total of 1,047 medical and health institutions, 11,008 health technicians, and 6,469 beds.

7.1.2 Reasons for choosing Fangshan District

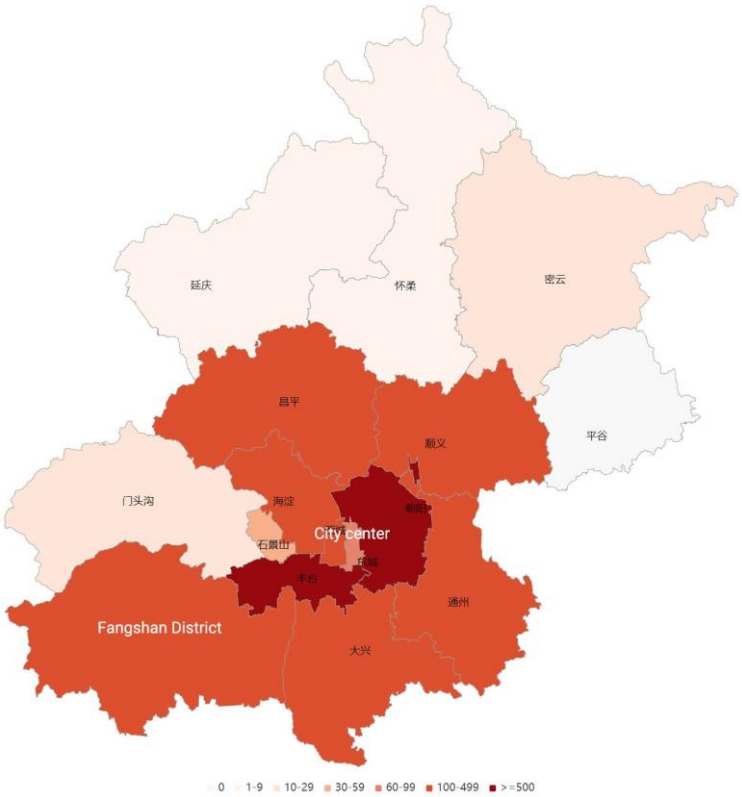

Figure 7.1.2.1 Map of the distribution of confirmed cases by district in Beijing

Source：https://news.sina.cn/zt_d/yiqing0121?ua=iPhone8%2C1__weibo__9.9.3__iphone__os13.3

Fangshan performed relatively well in the epidemic, and it has unique natural conditions as a neighboring distant suburban county of the capital city of Beijing. We chose Fangshan as a case study for the following reasons.

1. Since the outbreak, as shown in the figure, Fangshan is the district with better control of the new crown epidemic in 16 districts of Beijing, and although there were 232 confirmed cases in the new outbreak in May 2022, the number of new cases was controlled to 3 in just one month.

2. Fangshan is located in a suburban area with low land costs and low costs for establishing large isolation hospitals, factories, etc.

3. The suburbs are less densely populated, which is not conducive to the spread of infectious diseases, and there are fewer facilities for large gatherings in the suburbs, making it less difficult for local administrators to control the area.

4. The proximity to the city center（34 kilometers）, and as a peripheral area of Beijing, bordering Hebei Province, is conducive to quarantine before entering the city center in the event of a serious epidemic

5. Convenient transportation, which is conducive to the transportation of emergency supplies

6. the rich natural resources of the mountains and water, and the attractiveness of the land, which is conducive to attracting capital and human investment.

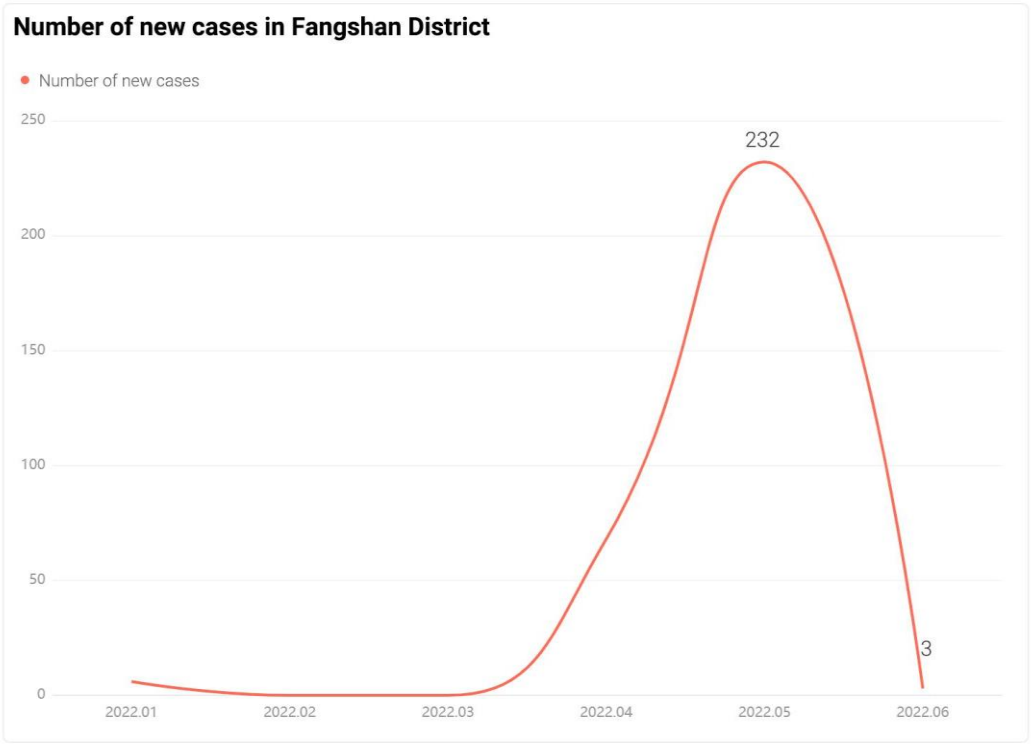

Figure 7.1.2.2 Statistics of new cases by month in Fangshan District 2022

Source：

https://voice.baidu.com/act/newpneumonia/newpneumonia/?from=osari_aladin_banner&city=%E5%8C%97%E4%BA%AC-%E6%88%BF%E5%B1%B1%E5%8C%BA

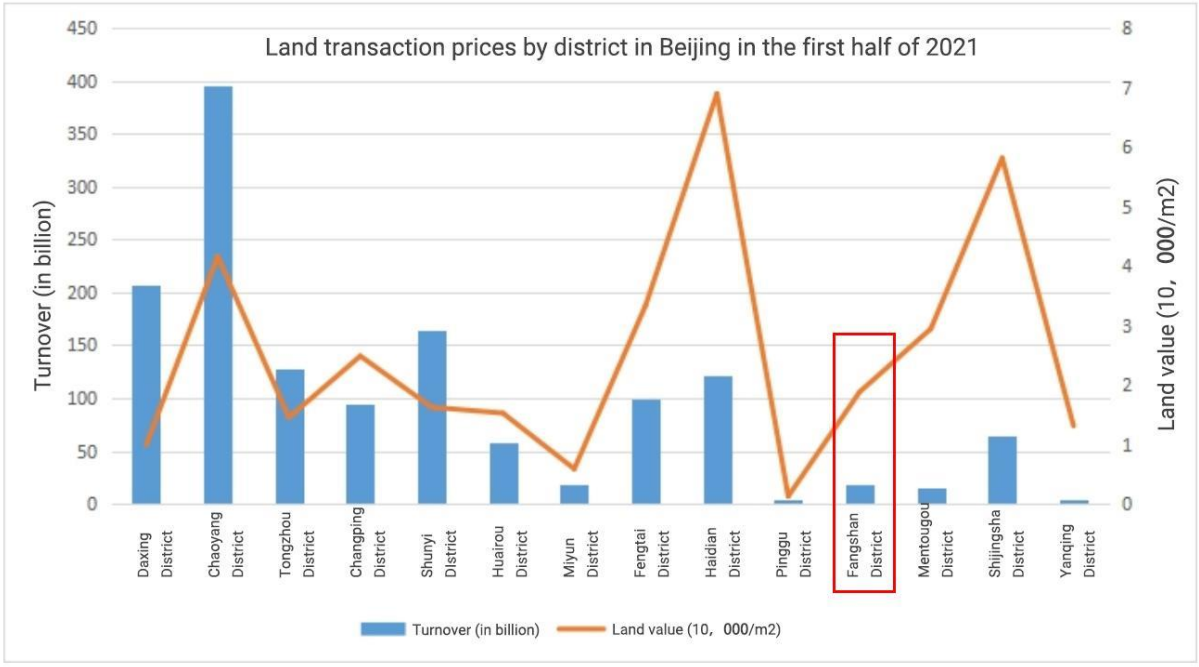

Figure 7.1.2.3 Land transaction prices by district in Beijing in the first half of 2021

Source：http://www.bjhxpg.com/research/hxh/hxh2020230/shichang/2021-10-13/1842.html

7.1.3 Beijing's Epidemic Strategy

In order to respond effectively to the spread of epidemics, it is of utmost importance to create an active urban health defense system. The urban spatial environment has a very close influence on public health and is an important basis for modern urban planning and design.

The plenary (enlarged) meeting of the Urban Working Committee of the Beijing Municipal Committee in March 2020 proposed that, taking the epidemic as a lesson, efforts should be made to make up for the shortcomings in urban planning and construction and governance, improve the urban disaster prevention and mitigation system, especially the public health emergency management system, compile special planning for epidemic prevention, and propose key strategies regarding the construction of urban defense systems under the concept of health prevention

Embedding health in urban planning and construction

The Beijing government has requested to study and grasp the laws governing the operation of Beijing as a capital and metropolis, embed health in urban planning and construction, carry out health impact assessments, improve the level of operational services and security, and build a resilient and healthy city.

A healthy city is defined by the World Health Organization in 1994 as "a city that is constantly developing and developing its natural and social environment and expanding its social resources so that people can support each other in enjoying life and reaching their full potential".

Preparation of special plans for epidemic prevention and strengthening of community health services

The Beijing Municipal Government requires that urban planning and design standards be raised to enhance the city's ability to withstand natural disasters. Planning to reserve emergency shelters. Urban spatial transformation should be considered from a public health perspective to optimize the layout of medical and health facilities and strengthen the configuration of community medical and health services; health and safety standards should be raised for office and commercial buildings and residential communities, and the configuration of public service facilities in communities should be optimized.

The production, storage and transportation system for emergency supplies in Beijing should be improved. Sound working mechanisms and emergency plans should be developed to retain the production capacity of important emergency materials and urban necessities, and to improve the emergency material supply guarantee network.

Construction is an important part of epidemic prevention

Modern architectural development has been improved in line with the development of the epidemic, and the level of architecture and urban planning and design has been improved across the board, and has become an important driver of healthy urban development. Urban construction planning and design should strengthen water and sewage systems, sanitation facilities and public space places. As the problem of environmental pollution continues to intensify, it has made public infrastructure for urban sanitation central to urban planning and design, fully mobilizing the positive elements of existing buildings.

In the face of public health emergencies, built spaces can provide security for people and can also effectively isolate sources of pollution. If the interior of a building space is exposed to a large number of viruses, it can also pose a serious threat to people's lives and health. The building should be well ventilated and drained during design and planning to ensure that people's living space becomes an important fortress to protect people's lives and health.

Vigorous development of green buildings

In the context of increasing public health incidents, Beijing must actively explore long-term response mechanisms. Buildings, as the main battleground for epidemic prevention and control, form an emergency use mechanism and improve the use of construction standards to effectively respond to emergencies. China's vigorous development of green buildings will not only reduce the building industry's consumption of energy resources, but also provide a healthy and comfortable space for people to use, ensuring that people live in harmony with nature and improving the overall use of the building's internal functions. Active protection during the construction of green buildings, natural lighting, ventilation and mold prevention provide an excellent environment for epidemic prevention and control, and home isolation.

In the post-epidemic era, in the process of urban spatial planning and management, in addition to the proper planning of industrial layout and economic layout, it is also

necessary to carry out a comprehensive layout of public health, enhance the overall effect of urban spatial planning, urban defense construction, closely combine the tough city with the healthy city, to create a city with toughness characteristics but also focus on health characteristics, while in the urban planning and design of health epidemic prevention and control. as a public policy throughout the whole process of urban planning and management.

7.2 Issues during the epidemic of Fangshan, Beijing

7.2.1 Uneven distribution and insufficient number of medical service facilities

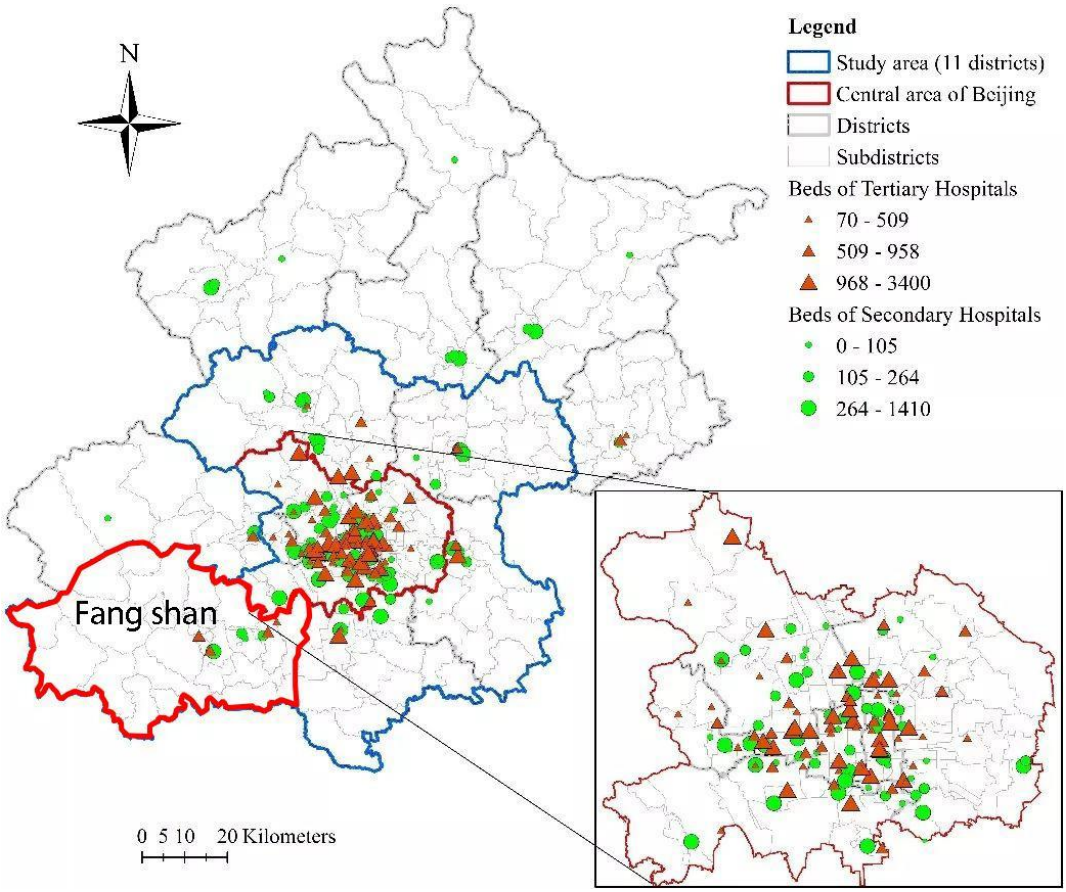

Figure 7.2.1 Distribution map of hospitals in Beijing

Source: https://www.sgss8.com/tpdq/10788300/3.htm

Just as the suburbs have problems, Fangshan District is no exception. Medical resources in Fangshan District are scarce and unevenly distributed. As shown in the figure, the distribution of various secondary and tertiary general hospitals is relatively dense in the downtown area, while there are only a few small hospitals scattered in the surrounding suburbs. The whole Fangshan District covers a large area, but the number of visible hospitals is only a few. The hospitals in the region are all located in the northeast and close to the city center, and the number of beds in

both secondary and tertiary hospitals is relatively small. Compared to the neighboring suburban counties in Fangshan District, the size of its secondary and tertiary hospitals is also slightly inferior. The eastern part of Fangshan District borders Daxing District, which has more secondary hospitals with 264-1410 beds and tertiary hospitals with 968-3400 beds.

The limited medical care is also not efficient at present, which lies in the fact that a regional medical information resource sharing system has not been established in the distant suburbs of Beijing, according to a survey report on the analysis of the current situation of medical information resource utilization in Fangshan area in 2018[92], according to the feedback from the interviews of medical staff of 26 public medical and health institutions in Fangshan area, the utilization of medical information resources in Fangshan area Most of the effects are not up to expectations, and the information awareness and information utilization ability of medical personnel are also weak, resulting in a large number of information resources being idle and not giving full play to their own role and value. At present, medical institutions have not yet broken the situation of each one of them, and have not made use of the resources among libraries to complement each other, so as to achieve common sharing and mutual benefit, which can bring out greater social and economic benefits in the construction of regional medical health. Therefore, if the first regional medical information resource sharing system can be built in Fangshan area according to local conditions, it can not only improve the utilization rate of medical information in Fangshan area, thus improving the administrative efficiency of the medical system, but also provide a reference basis and practical guidance for other prefecture-level administrative medical institutions to establish a regional medical information resource sharing system.

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Anna & Ma Lu.(2018). Research on the Countermeasures of Establishing Medical Information Resource Sharing System by Medical Institutions in Prefectural Administrative Regions. Journal of Medical Informatics (12), 78-81.

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7.2.2 Excessive concentration and insufficient coverage of community-level commercial

From a city-wide perspective, the scale of commercial buildings is relatively adequate, but the structure and layout need to be adjusted. In recent years, due to the influence of new city development and other factors, the urban population flows to multi-point distant suburban areas obviously, but the status quo commercial facilities still gather in large numbers in the city center, and the spatial matching degree of commercial facilities and residential facilities is low. Secondly, there is a gap between Beijing's community commercial facilities and those of large cities at home and abroad in terms of per capita occupancy, coverage rate and network density. There are also large gaps in the density of outlets in central urban areas, new cities, suburban areas, rural areas and centralized construction areas, and the coverage of commercial convenience facilities in some areas is insufficient, the degree of chainization is low, and the service quality needs to be improved.

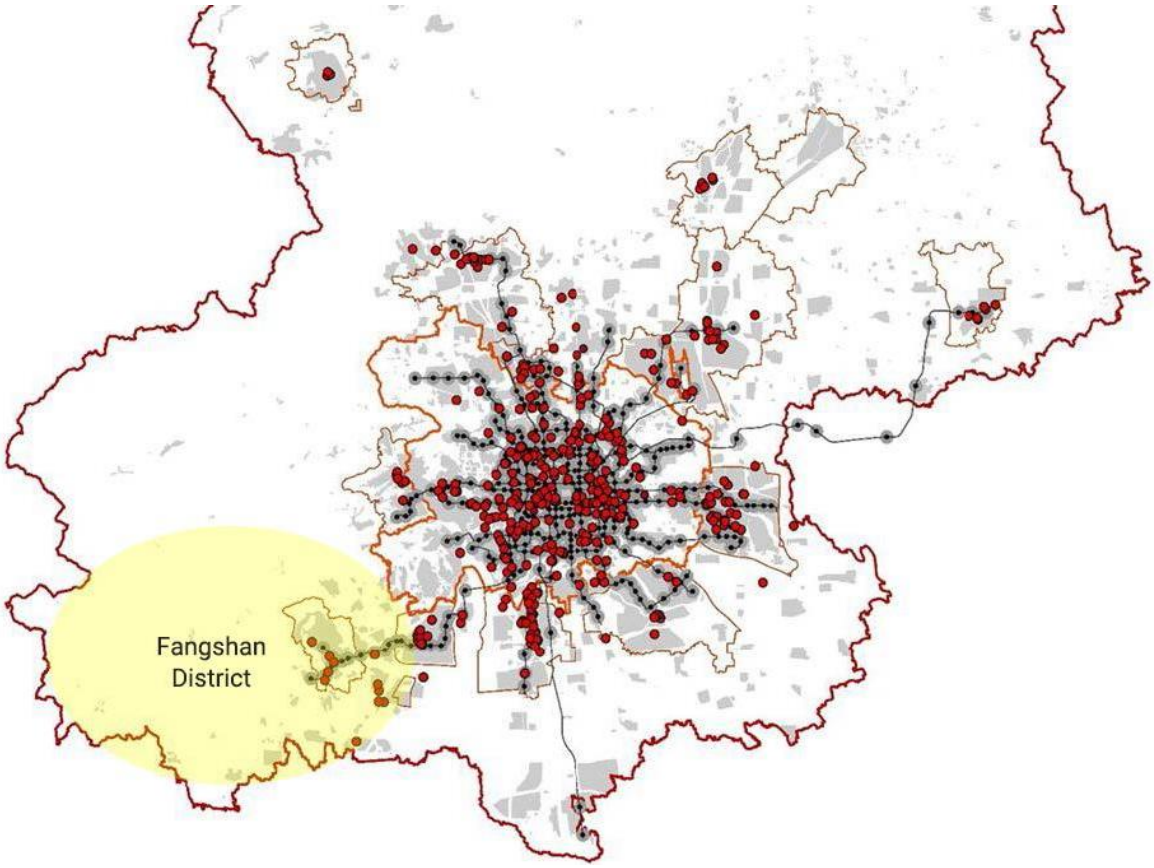

Figure 7.2.2.1 Layout plan of large commercial facilities

Source: Spatial layout planning of commercial service industry facilities in Beijing

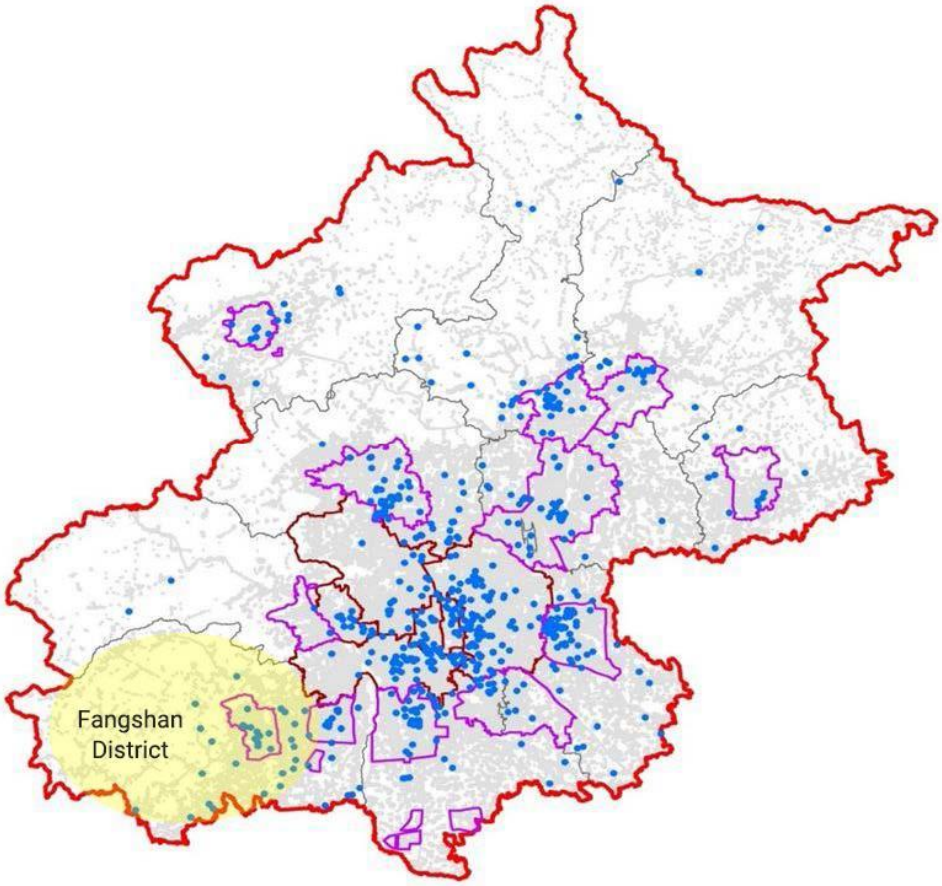

Figure 7.2.2.2 Schematic diagram of the spatial distribution of the city's commodity trading market

Source: Spatial layout planning of commercial service industry facilities in Beijing

Then we focus our attention on Fangshan District. From the following two maps, the number and regional coverage of both large commercial range facilities and small commodity trading markets in Fangshan area are on the low side. The lack of commercial facilities directly leads to the fact that Fangshan area ranks last in the status quo commercial area of all districts in the city as shown in the map below, and the degree of commercial coverage is not proportional to the local population. As one of the five distant suburban districts and counties with the same level of status (Shunyi District, Daxing District, Changping District, Fangshan District and Mentougou District), the per capita commercial area of Fangshan District is far lower than that of other districts and counties except Mentougou District, which shows that the commercial facilities in Fangshan The service load is huge.

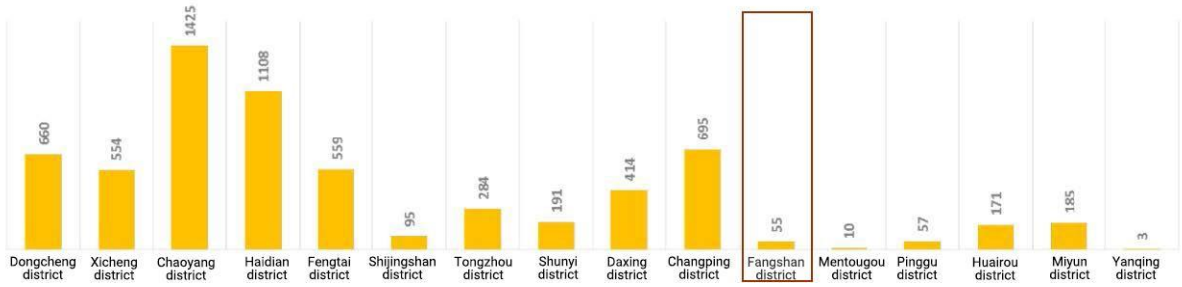

Figure 7.2.2.3 Estimated value of the current commercial scale of various districts in the city

Source: Spatial layout planning of commercial service industry facilities in Beijing

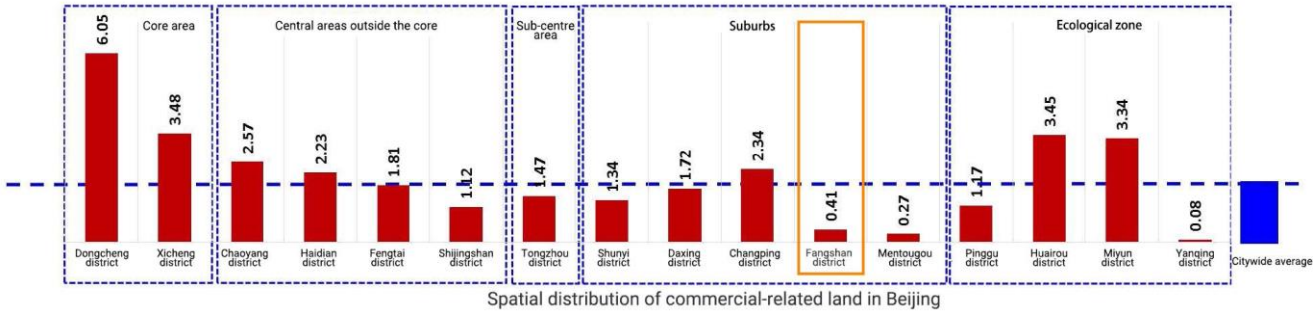

Figure 7.2.2.4 Estimated value of current per capita commercial area in each district of the city

Source: Spatial layout planning of commercial service industry facilities in Beijing

7.2.3 Existing residential areas are large and clustered with imperfect infrastructure

Although suburban areas are not as dense as urban living, the existing residential areas are large and concentrated (as shown in the map below). Several areas marked in the figure are residential areas in Fangshan District, Daxing District, Tongzhou District, Shunyi District and Changping District, and we can see that the residential areas in Fangshan District and Tongzhou District are overly dense. The limitations of such a layout are as follows.

1. The distant suburbs are often larger than the urban districts, and the layout is too concentrated to be a waste of current land resources. If the layout is more inclined to multi-point scattering, from point to point and interconnected, mutually beneficial common development is a more efficient use of land resources, and can promote the development of transportation network construction.

2. Overly large and densely populated areas can increase the spread of the epidemic. During an epidemic, dense urban populations and high living densities are a very important factor in exacerbating the spread of the epidemic. The post-epidemic era we are considering hopes to control the spread of the epidemic through certain

measures. Therefore, rational and scientific planning is the way to control the epidemic from the source.

3. The suburban infrastructure (e.g. medical, commercial, education, etc.) is imperfect and few in number, and the layout of overly dense residential areas makes the load of local infrastructure services, which is already imperfect, higher. The figure below shows the layout of medical facilities, and we can see that, as mentioned above, the number of hospitals in the residential area of Fangshan is low, which means that the load of each hospital visit will be higher, and the residential area of Fangshan as shown in the figure There are only three hospitals around, and none of the three hospitals are located within the residential area, so it will be more difficult for the residents of the Fangshan residential area to enjoy medical services.

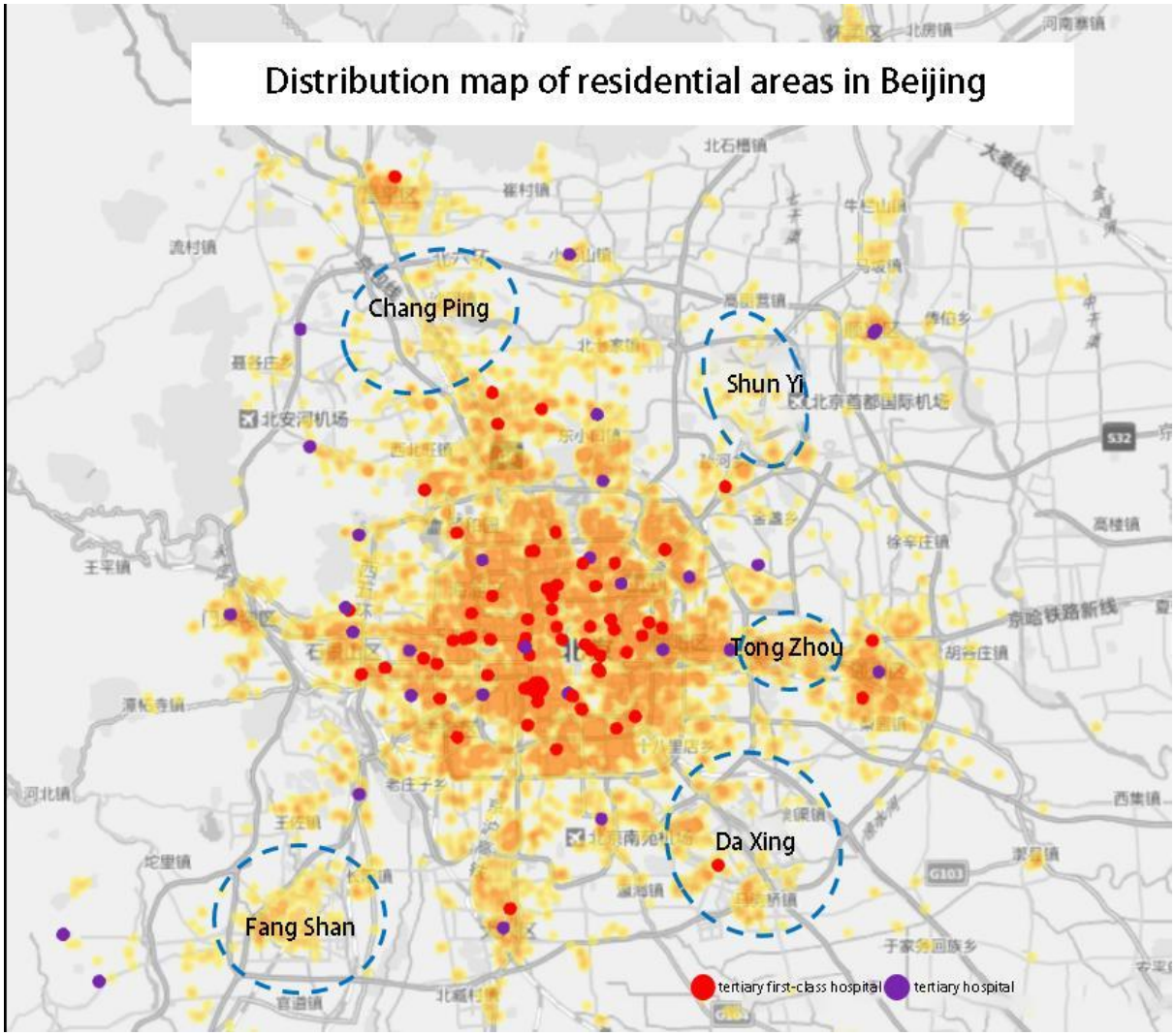

Figure 7.2.3 Distribution map of residential areas in Beijing

Source: https://m.sohu.com/n/483505785/

7.2.4 Lack of diversified transportation system

Urban public transportation carries the main flow layout of passenger flow, but the slow development of urban public transportation in suburban areas does not match its economic development and internal population growth rate, resulting in inconvenient travel for suburban residents. Fangshan is currently connected by a rail line which has nine stations within Fangshan District. In general, Fangshan has a territory of 2,019 square kilometers and a total resident population of 1,188,000. In terms of the region in general, only one rail transit is not enough for such a vast territory and a large population. Bus lines are also the same, the density of bus lines in Fangshan District is 1.59 square kilometers, of which only Liangxiang and Yanfan are slightly higher, reaching 3.11 square kilometers and 2.42 square kilometers respectively. The coverage rate of 500 m bus stops in the region is 24.2%, of which 75.0% and 35.1% in Liangxiang and Yanfang respectively. So, the bus lines are also lacking. Moreover, more diversified transportation should be developed, such as BRT rapid transit, subway, light rail and other transportation modes.

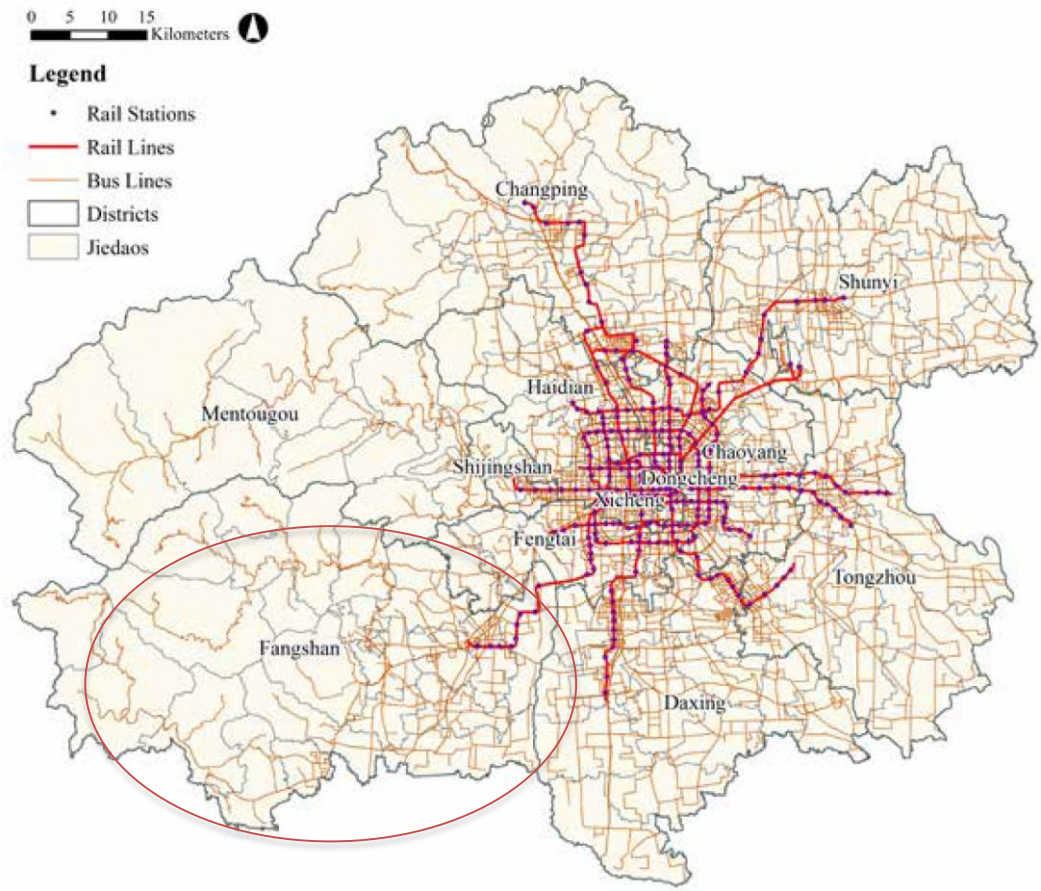

Figure 7.2.4 Public Transport Network Map of Fangshan District

Source: Sun T.S.,Fan Y.L. (2018) THE JOURNAL OF TRANSPOT AND LAND USE VoL. 11 No. 1 [2018] pp.791-803

7.3 Preventive solution

As an important space and gateway corridor for the future development of Beijing, Fangshan District has significant location advantages. Located within the Bohai Sea economic circle represented by Beijing, Tianjin and Hebei, Fangshan District is the southwest gateway of Beijing and assumes important functions such as ecology, population and industry of the capital. In terms of transportation location, as the southwest transportation hub of the capital, Fangshan District is an important node on the Beijing-Hong Kong-Macao corridor. The superior geographical factors give Fangshan District great potential for development, and better strategies for existing problems will help the future development of the region. To explore the potential of Fangshan District, public service facilities should be rationally deployed for residents' use, starting with healthcare. In the post-epidemic era, the development of medical facilities can make a significant contribution to public health and also effectively combat possible future epidemics. Fangshan's current land utilization rate is not high, and the number of hospitals is small, scattered and far from residential areas. Therefore, there is an urgent need for expansion and new large hospitals to share the pressure of access to existing hospitals. The second point is that the natural and locational conditions of the Fangshan area have natural advantages, and abundant land resources can be used to plan isolated hospitals, epidemic-proof and epidemic-free zones. It can be used as a quarantine facility when an epidemic strikes, and can function as a medical institute after the epidemic has passed. After the SARS epidemic in 2003, Xiaotangshan Hospital, then located in Changping District, Beijing, was continued to be opened as an isolation hospital on January 29, 2020 in response to the 2019 coronavirus disease epidemic.

The same problem is faced by public facilities other than medical care for the unevenly distributed population of the Fangshan residential area. And to get a solution, not a single development can be solved. To diversify and develop together, need to get the policy drive. The suburbanization of China today is not only guided by out-migration policies, but also by the increasing amount of capital that is being spontaneously introduced into the suburbs. This behavior should be encouraged and supported, and policy preferences can be given for the development of capital. Whether it is government action or spontaneous capital action, the two can be mutually beneficial and complementary. In the case of business, the government's preferences will promote the commercial development of vacant land in the suburbs, and the suburban land will be more attractive after the commercial development,

which, together with the guidance of the out-migration policy, will bring about the joint prosperity of suburban population and business. The problem of the original residential area and commercial distribution will also be solved, and as more land is planned and built, the original centralized residential area can be developed into a regional multi-point development, with a network of regional connections from point to point.

So, before that, reasonable transportation planning is essential. Regarding the "Fangshan Zoning Plan (Territorial Spatial Planning) (2017-2035)" provided by the Beijing Municipal Commission of Planning and Natural Resources, the future public transportation in Fangshan will be centered on the two major groups of Yanfan and Liangxiang, relying on passenger hubs and establishing a bus line network radiating to all villages and towns in Fangshan; increasing the construction of bus yards to support the bus line network Optimization and adjustment. It is expected that by 2025, the daily passenger volume of public transportation will reach 1.1 million, with a travel ratio of 42%; of which the daily passenger volume of ground bus will reach 800,000, and the daily passenger volume of rail will reach 300,000. Through the perspective of site selection, line network layout and service scope, the public transportation point-line surface will be combined to make the public transportation operation smoother and meet the travel demand of residents.

7.4 Chapter conclusion

This chapter introduces basic information about Beijing, Fangshan District, and uses it as a case study of urban planning in the outer suburbs of a Chinese metropolis in the post-popular era. Through the study of Fangshan District, we can find that Fangshan as a distant suburban county inevitably shares the problems common to the emergence of distant suburban counties: 1. uneven distribution and insufficient number of medical service facilities; 2. over-concentration and under-coverage of community-level businesses; 3. large size and clustering of existing residential areas with inadequate infrastructure; and 4. lack of a diverse transportation system. As the gateway corridor of the capital Beijing, Fangshan has significant location advantages, assumes important functions of the capital such as ecology, population and industry, and as the southwest transportation hub of the capital and an important node on the Beijing-Hong Kong-Macao corridor, the development trend is unstoppable. Therefore, solving the current problems and scientific development are the challenges that managers will face. To diversify and develop together, Fangshan District needs to be promoted by policies, optimized medical care, guided by out-migration policies, coupled with more and more capital entering the suburbs spontaneously and with the upcoming expansion of the transportation network, so it can be concluded that the future development of Fangshan District will stand out among the distant suburbs and counties in the post-epidemic era.

Chapter 8. Conclusion

8.1 Research results

The purpose of this paper is to explore the potential for epidemic preparedness in metropolitan suburban counties in the post-epidemic era. Combining the definition of suburbia with a study of the history of suburbanization in China and the West, we find both similarities and differences in suburbanization or suburban development and urban sprawl between China and the West, due to differences in national conditions, social composition, and statism. Most of the suburbanization in China has been led by the government, and the reason for suburbanization has been the out-migration of the population guided by urban renewal policies. Therefore, suburban development in China is strongly supported by the government. On this premise, the latter chapters of this paper focus on the advantages and existing problems of current suburban development, and use Beijing and Fangshan District as case studies to verify their advantages and disadvantages by means of a questionnaire. By examining the existing development policies and location advantages, we can conclude that the government is expected to develop it intensively and rapidly in the near future. In the case of Fangshan District, it has a great potential to become economically developed and ecologically healthy in the post-epidemic era qu

8.2 Theoretical research: Definition of suburbia and the development of suburbanization

The second and third chapters of this paper focus on figuring out the suburb as an object of study and its development. As can be seen through the literature survey, a suburb, as an abstract definition, is simply a recently developed part of a city or metropolis that lies outside of the core or historic district. Location is probably the most reasonable criterion in defining a suburb. In general, suburbs will be defined in terms of space and function. From a spatial perspective, suburbs arise, change and evolve as cities expand. Therefore, a suburb should be a concept relative to an urban center. Therefore, a suburb is the transition zone between urban and rural areas. It lags behind the city in terms of its level of economic development and social and cultural life, but is different from the traditional rural areas. The development of a city is driven by centripetal and centrifugal forces. The mutual ebb and flow of these two forces leads to a phased urban development. In terms of the academic definition of the concept of suburbanization, there is no global consensus so far. However, in

terms of its essence, suburbanization, as an advanced stage of urbanization, is a proliferation phenomenon after a certain stage of urban development, which includes various aspects such as suburbanization of population, industry, commerce, finance and insurance, and infrastructure, and this proliferation makes suburban areas become urban fringe areas with multiple functions.

In a study of the history and strategies of suburbanization in China and Western countries, the suburbanization in Western countries is mostly a spontaneous out-migration of population, with the fact that cities become more crowded in the process of development, the social and humanistic structure leads to a poorer living environment, and the quality of life decreases, coupled with epidemic outbreaks and the prevalence of home office, people prefer to live in the suburbs where housing prices are low and the ecological environment is better. The government's role in this is mostly to intervene in favor of the situation, such as promoting business and industry to provide proximity to jobs, and developing public transportation to make urban and suburban areas more efficient in terms of commuting time. In China, suburbanization is mostly government-led, as there are many old communities and urban villages in urban areas, and the government plans to renovate and redevelop them, and in recent years, more and more capital is introduced spontaneously, and the government supports and encourages them through preferential policies. It is also a multi-benefit for both urban and suburban areas to develop together. China's policy on urban-rural integration is that it is hoped that urban and suburban areas will be mutually beneficial, each having its own role to play, complementing each other's strengths, and developing together.

8.3 Strengths and weaknesses study: Issues and development strategies for the outer suburbs in the post-pandemic era

Chapters 4 and 5 focus on the existing deficiencies in the far suburbs and counties and development response strategies. The deficiencies of the distant suburbs and counties themselves are magnified by external conditions such as epidemics, leading to a heightened impact. The primary problem is the inadequacy of medical facilities, which makes it necessary to associate the suburbs with the cities in a sense. The medical facilities in the suburbs are not adequate in terms of quantity or quality or efficiency of services, and emergency patients in the suburbs have to be sent to the cities for treatment, and the objective physical distance causes more serious delays in patient treatment. If more hospitals were established in the suburbs, the efficiency

of patient care would be greatly improved. Second, the limited number of ambulances, combined with the long travel distances between urban and suburban areas for ambulances, makes treating patients in suburban areas even more detrimental. In addition, during the outbreak, some hospital ambulances failed to meet hygiene standards, possibly because the panic caused by the outbreak made disinfection incomplete. Residual bacteria and viruses in ambulances exacerbated the risk of secondary infections among patients and health care workers. In addition to their association with large cities, the suburbs themselves have other problems that can be summarized in four main points: 1. uneven distribution and insufficient number of medical services; 2. over-concentration of community-level businesses with inadequate coverage; 3. large, clustered existing residential areas with inadequate infrastructure; and 4. lack of a diversified transportation system.

Suburban and urban development are mutually reinforcing. Current medical facilities do not have the capacity to respond to health emergencies. In the case of the suburbs, basic medical facilities are inefficient in providing services, while large general hospitals are extremely lacking. In addition, transporting patients from suburban areas to urban hospitals can result in overburdening the city with medical care. Therefore, we need to consider how to use the geographical and locational advantages of suburban areas to play an effective role in both isolation and treatment of outbreaks. First, with abundant and inexpensive land resources, suburban areas have sufficient space and advantages to enhance basic medical facilities, large general hospitals, or large epidemic-proof hospitals. Secondly, the natural features such as mountains and rivers are obvious, and the physical barrier conditions in natural aspects are sufficient to plan and build epidemic-proof and epidemic-free zones in this area. Finally, the suburban area has the advantage of location, so that it can become a barrier against epidemics in the city. Take advantage of transportation to block foreign epidemics by setting up gates and epidemic detection stations. Use the remaining land resources to build various material transfer stations or service stations to ensure that external resources can support epidemic areas smoothly and safely.

8.4 Survey and case study

The last two chapters are a questionnaire and a case study with Fangshan as the target population, respectively. Through the results of the questionnaire for Beijing citizens, we can see that there is a strong fit between the theoretical study and the

real-life situation as far as the 210 respondents' feedback results are concerned, most of the residents prefer to live in the suburbs after the epidemic is over, so the development of the distant suburbs is very necessary and urgent. In terms of the basic situation in Beijing's Fangshan District, its status as a distant suburban county inevitably presents common problems that occur in distant suburban counties: 1. uneven distribution and insufficient number of medical service facilities; 2. over-concentration and insufficient coverage of community-level businesses; 3. large, clustered existing residential areas with insufficient infrastructure; and 4. lack of a diversified transportation system. Although there are problems, the superior geographical location makes Fangshan's development not receive hindrance. As the gateway corridor of the capital Beijing, Fangshan has obvious location advantages, assumes important functions of the capital such as ecology, population and industry, and as the southwest transportation hub of the capital and an important node on the Beijing-Hong Kong-Macao corridor, the development trend is unstoppable. Therefore, solving current problems and scientific development are the challenges that managers will face. To achieve diversified co-development, Fangshan District needs the promotion of policies, optimization of medical care, and guidance of out-migration policies. Coupled with more and more capital entering the suburbs spontaneously and the imminent expansion of transportation networks, it can be concluded that the future development of Fangshan District will stand out among the distant suburbs and counties in the post-epidemic era.

8.5 Summary

The COVID-19 outbreak had a long and widespread impact on the city where we live, during which time the government took a long time to protect and treat the outbreak. As a vehicle for modern life, cities carry important socio-economic, scientific, and humanistic significance, and it is of great importance for the development of humanity that they be prepared for future major health disasters. As a part of the city, we have the obligation to develop it as an important carrier for epidemic control in the post-epidemic era. Scientific and effective planning and development requires a full range of political, economic, medical, and transportation considerations. The good news is that all this is possible, and with the advantages that nature has given us, the potential for development is enormous, and with the attention of the government, suburban development will reap unprecedented results in the near future.

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