RESILIENT SPATIAL PLANNING AND GOVERNANCE STRATEGIES FOR INDUSTRIAL TOWNS FACING SUDDEN EPIDEMIC: BASED ON THE CASES IN CHINA (1097)

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Abstract. Industrial towns, emerged during the restructuring process from planned economy to market economy, are special products of China's urban-rural dualistic structure, and also are important bases for the civilian production industry. Currently, under the crucial circumstances of epidemic prevention, industrial towns are also faced with multiple risks and challenges. It is necessary to pay full attention to the prevention work and spatial governance strategies in those industrial towns. Based on the observation of some industrial towns in the Yangtze River Delta and the Pearl River Delta, this paper analyzes the ability and shortcomings of those industrial towns in preventing the epidemic, and points out that it is essential to plan and develop those industrial towns with resilience theory. In further, following the concept of resilience, the paper discusses the key points of spatial planning in industrial towns from the perspectives of public space, community unit, public facilities and emergency space redundancy, etc. Finally, several spatial governance strategies have been put forward, including resilient allocation of medical resources, coordinated prevention mechanism, participation of social organizations, refined community governance and so on.

Keywords: sudden epidemic, industrial towns, resilience, spatial planning, governance

1. Introduction

On January 20, 2020, the National Health Commission of the People's Republic of China officially included the COVID-19 pandemic into the B class infectious diseases stipulated in the "Law on the Prevention and Treatment of Infectious Diseases of the People's Republic of China", adopted the prevention and control measures of A class infectious diseases,[1] and issued a unified pneumonia prevention and control plan, marking the launch of the nationwide coronavirus epidemic prevention battle in China. Under the current national epidemic prevention and control plan, except Hubei Province, the focus is on imported infections in megacities and large cities, and strict control measures have been taken across the country. But in fact, there are a large number of industrial towns in China, also known as industrial towns, which have been facing more complex and

difficult problems in the epidemic. Among these industrial towns, the largest town has a total population of nearly one million (Hu Men Town and Chang An Town in Dongguan, Guangdong). There are 72 towns and districts with a population of more than 100,000, but the administrative structure of their governments is the same as that of general towns with less than 10,000 residents. These industrial towns are mostly distributed in the Pearl River Delta, Yangtze River Delta and southern Fujian (Figure 1), and they are also regions with high density of migrant population and severe impact of the epidemic (or will face great pressure of prevention and control soon). In the coming period of the work resumption, those industrial towns may face a greater risk of the epidemic, so how to effectively conduct prevention and control measures is crucial and should be paid attention to.

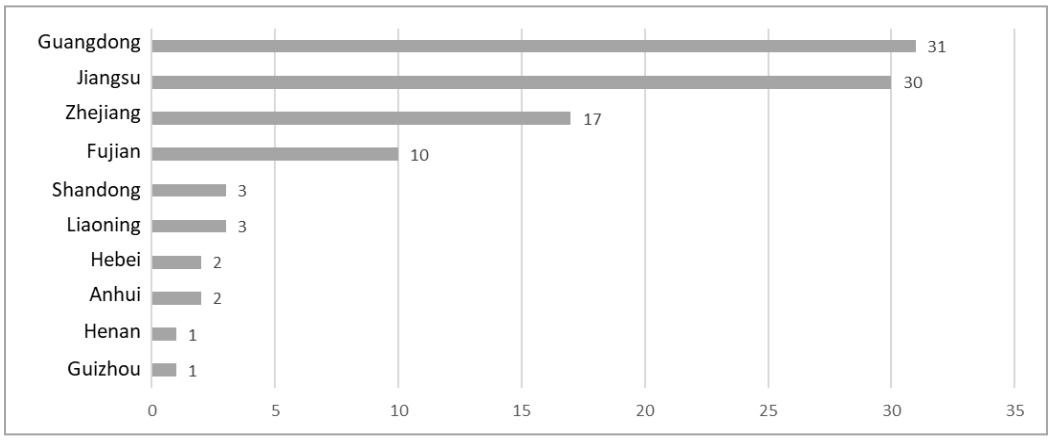


Figure 1. Top 100 industrial towns in China counted by provinces

The outbreak of infectious diseases is a great test of the entire national public health governance system from the central to the local, and to the grass-roots level. In view of this epidemic, how to put forward scientific control and prevention strategies from the perspective of planning has aroused extensive discussions among scholars of urban planning. Perspectives as follows have been mentioned broadly, how to infer the transmission path and impact scale of the virus based on big data technologies such as population flow and Baidu migration data,[2] how to improve the urban management and governance means to cope with emergent infectious diseases,[3] [4] how to optimize the urban prevention and control system, how to improve the community governance,[5] [6] how to make use of the digital platform to dynamically update the prevention and control program,[7] etc. Existing academic studies on the outbreak of infectious diseases have focused more on how to improve the emergency management capacity at the city level, but less at the township level, and have not taken the industrial towns into the consideration of urban and rural emergency management system. On the other hand, the existing academic studies on industrial towns have mostly focused on the reform of

government rights and industrial upgrading, etc., but have not touched on the emergency capacity and measures in response to public health emergencies or emergency disasters.

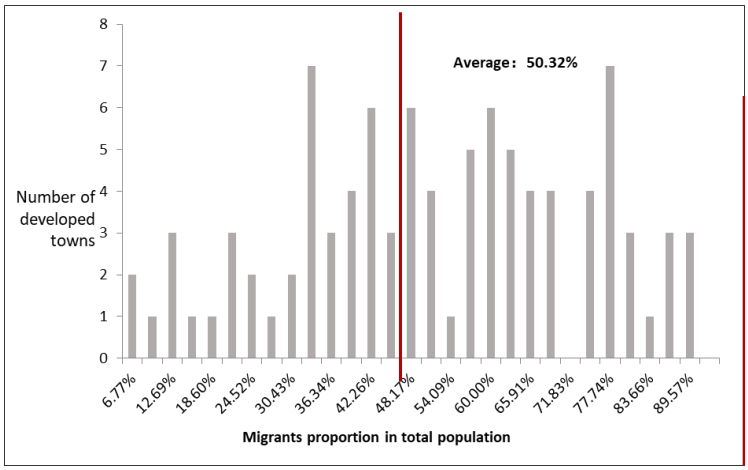
Although the population and economic aggregate of most industrial towns have reached the level of small cities, their infrastructure construction, administrative ability and staff allocation are basically at the township level, resulting in a serious mismatch between their governance capacity and economic level, which also leads to higher risks for industrial towns when dealing with sudden disasters. Based on the current prevention and control work, there are many disadvantages and challenges in the prevention and control of the epidemic in industrial towns. It is not only necessary to take active response but also to plan ahead and provide support for future contingencies.

2. Identification of characteristic risks of industrial towns in the epidemic emergency

Industrial towns are the special product of China's urban-rural dual system and the transition from planned economy to market economy, which have played an important role in China's reform and opening up and rapid economic growth in a certain period. In the current critical period of China's economic transformation and upgrading, industrial towns still play an important role in providing local employment, attracting foreign labor, cultivating new industries and improving industrial chain upgrading, especially in the Yangtze River Delta and Pearl River Delta regions. However, most of these industrial towns have been developed from traditional low, small and scattered industries, which not only have many difficulties in the industrial transformation but also expose the strong risk and serious shortcomings in spatial organization and governance ability when dealing with major public health events such as sudden infectious diseases. Combined with the characteristics of industrial towns, there are the following key risks in the face of the epidemic.

First, the high proportion of migrant population causes great pressure of imported prevention and control. Industrial towns generally grew from township enterprises. A large number of small and medium-sized enterprises gathered together as the downstream supporting parts of the industrial chain, or as the manufacturing and production of people's livelihood necessities with relatively low technical requirements. This kind of labor-intensive industry determines that population structure in industrial towns has a relatively high proportion of migrant people (usually more than the local population). Taking China's top 100 towns as an example, the average proportion of non-native population in their total population is 50.3%, among which the average proportion of non-native population in Guangdong's top 100 towns is as high as 65% (Figure 2). In terms of the sources of migrants, they mainly came from other provinces

and cities due to the relatively developed local economy. Therefore, the population of industrial towns is from a wide source, large in number, and with complex flow situation, which have undoubtedly posed a high risk of disease spread in the period of epidemic, and also caused a high pressure of control and control.



Migrant proportion	Number of Top 100 developed towns	Interval proportion	Cumulative proportion
<20%	11	11.58%	11.58%
20%~50%	36	37.89%	49.47%
50%~80%	40	42.11%	91.58%
>80%	8	8.42%	100.00%

Top 100 developed towns by province	Average migrant proportion
Guangdong	64.69%
Jiangsu	47.16%
Zhejiang	43.50%
Fujian	49.64%
Others	24.14%

Figure 2. The migrants' proportion in total population in Top 100 industrial towns in 2017

Second, the highly dense living environment makes the higher risk of internal infection. The prosperity of township enterprises has also led to a large number of construction of staff dormitories and the emergence of village rental houses, and these collective dormitories and village rental houses generally present a living environment with a high-density, which is easy to induce the internal infection of virus. At the same time, the old town center of industrial towns is still the center of all kinds of economic and social activities in the whole town. Although the construction of new towns has been generally carried out in developed town, the construction quality of the old town remains at a low level (as shown in Figure 3). In terms of space organization, town and village, industry and housing space are highly mixed. However, public places such as traditional markets and street markets have serious environmental problems due to the poor regulation, which undoubtedly contributed to a greater potential danger to public health and safety.

Figure 3. The old town center in an industrial town in Zhejiang Province

Thirdly, cross-border traffic rises the difficulty in conducting closed-off management. The development of industrial towns has benefited a lot from their convenient traffic conditions. As a result, industrial towns are mostly located at the arteries of traffic and closely connected with regional cities (such as Xinqiao Town in Jiangyin City, Jiangsu Province, which is located at the intersection of several national highways and major urban expressways, and adjacent to the urban area of Zhangjiagang city). Convenient transportation is an advantage in daily life, but during the epidemic period, the cross-border traffic system makes have put the industrial towns in the risk of imported infection through multiple channels, which not only greatly increases the probability of being infected by the external epidemic, but also has been a great test to the control level of industrial towns.

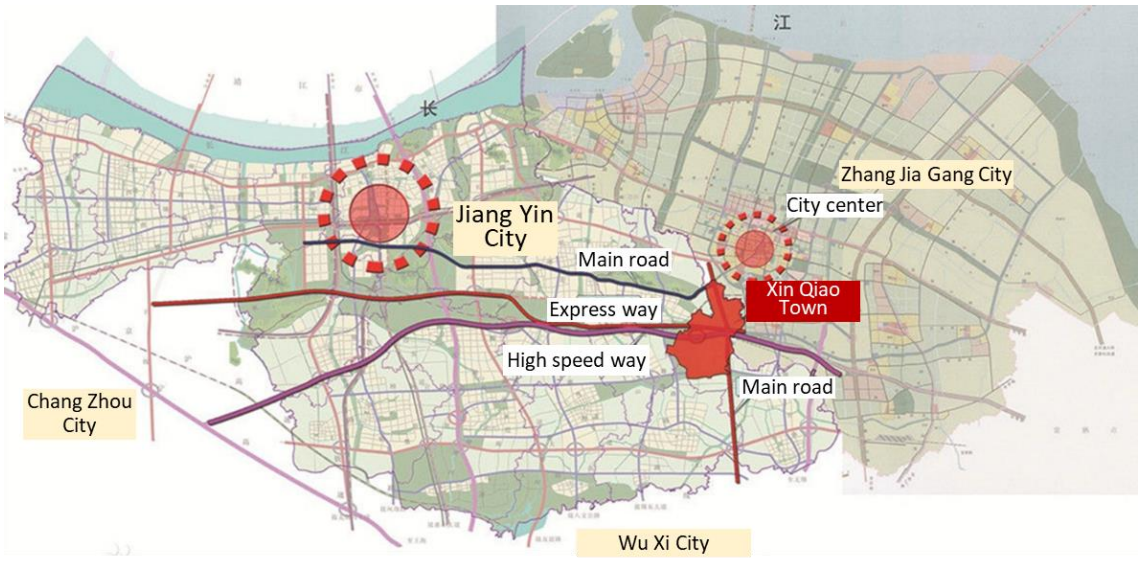


Figure 4. The old town center in an industrial town in Zhejiang Province

Fourthly, the limited administration authority restricts the ability of comprehensive control and prevention. Due to the government administrative structure of China, although the economy of industrial towns is relatively developed, the economic aggregate of some industrial towns is strong enough to be compared with the prefecture-level cities in the central and western regions in China, the administrative authority of the government is still limited to the town level. Except for some pilot towns of power expansion, most industrial towns basically have no administrative approval authority, no independent financial authority, etc. In general, administrative management lags behind economic development, as well as public service level lags behind the level of urbanization, which is a common management system dilemma in industrial towns at present.[8] Especially under the circumstances of current poor prevent system in grassroots towns and villages,[9] these contradictions will result in the lack of manpower and material support, professional talents and medical assistance, which will restrict the efficiency of fighting against the epidemic in industrial towns.

Fifthly, the high mobilities between villages and towns make it difficult to conduct thorough control. As the lowest level of government, industrial towns also take charge of rural governance. In case of an epidemic, industrial towns should not only deal with the town itself, but also have to conduct the epidemic control in rural areas, which increases the burden of management in industrial towns. At that time, less staffing, low management ability, high workload pressure will undoubtedly restrict the ability of local governments to take emergency decisions and the deployment of prevention and control measures.

Sixthly, the urgency of work resumption poses extra difficulty in management. The industrial types of industrial towns are mainly related to the basic livelihood of people (as shown in Table 1), and the product supply often covers the whole country or even the overseas. During the epidemic period, especially in the face of a long period of epidemic, many enterprises in industrial towns are in urgent need of resuming work before the end of the epidemic, so as to provide social necessities to maintain the basic production of the country. In this case, those industrial towns can’t afford being shut down for a long time, which poses extra difficulty in preventing epidemic and organizing work resumption at the same time.

Table 1. The main industry category of Top 100 industrial towns in the Yangtze River Delta Area and the Pearl River Delta

Industrial towns in the Yangtze River Delta	Main industry	Industrial towns in the Pearl River Delta	Main industry
Liushi town, Wenzhou city	High and low voltage industrial electrical equipment	Xintang town, Guangzhou city	Automobile parts
Beibaixiang town, Wenzhou city		Dali town, Foshan city	Aluminum manufacturing
Hongqiao town, Wenzhou city	Electron component	Beijiao town, Foshan city	Machine manufacturing
Puyuan town, Jiaxing city	Woollen sweater, fashion clothes	Shishan town, Foshan city	Automobile parts, medicine and medical apparatus
Shengze town, Suzhou city	Silk crafts	Chang'an Zhen, Dongguan city	Mechanical hardware
Datang town, Zhuji city	Socks	Humen town, Dongguan city	Clothes industry

3. The performance and predicament of industrial towns in preventing COVID-19 Epidemic

It has been nearly two months since the outbreak of the epidemic, and governments across the country have launched multiple prevention and control plans. Based on the observation of some industrial towns in the Yangtze River Delta and Pearl River Delta, we can preliminarily judge the ability and deficiency of industrial towns in emergency prevention and control.

3.1. Industrial towns are the areas with high incidence of the epidemic

For infectious diseases, the degree of infection is closely related to the extroversion of local economic activities and population mobility. The Yangtze River Delta and the Pearl River Delta, the most economically developed regions in China, are home to more than half of the top 100 towns in the country, and are also one of the most severely affected regions except Hubei Province. In Zhejiang province, Wenzhou, which is famous for township enterprises and private economy, has become the most severely affected city

outside Hubei province. Taking Wenzhou City of Zhejiang Province and Foshan City of Guangdong Province as examples, focusing on the township level, it can be clearly found that a small number of industrial towns (there are 11 industrial towns in Wenzhou, accounting for 5.98% of the total number of local administrative units; There are 18 industrial towns in Foshan, accounting for 56.25% of the total number of local administrative units) however, account for a relatively high proportion of actual cases of local diseases (Figure 5).

For example, in Wenzhou, Yueqing is the county-level unit with the most epidemic cases in the whole city, among which, the number of cases in industrial towns (a total of 4 cases) accounted for 44% of all. Liushi Town (ranked 12th in the towns of whole country), the most economically developed town has the most reported cases, followed by Hongqiao Town (ranked 40th in the top 100), Dajing Town (top 1000 towns in the whole country) (Figure 6).

In Foshan, Nanhai District, where Shishan Town, the second largest town in China, and the other five top 100 towns locate, is also the administrative unit with the largest number of confirmed cases in the whole city. In the whole Foshan, the number of cases in the industrial towns accounts for nearly 50%. Therefore, by analyzing these two typical cities with relatively a larger number of industrial towns, it is quite enough to tell that when dealing with the sudden epidemic, industrial towns are in much higher risk than general towns, even higher than that of sub-district. It has further illustrated that in epidemic prevention and control, industrial towns itself must be vigilant, to strengthen early warning, while the higher-level government must attach great importance to the prevention and control deployment of large towns and industrial towns, and the prevention and control plan should be different from that of general towns to appropriately improve the level of epidemic prevention and control in industrial towns.

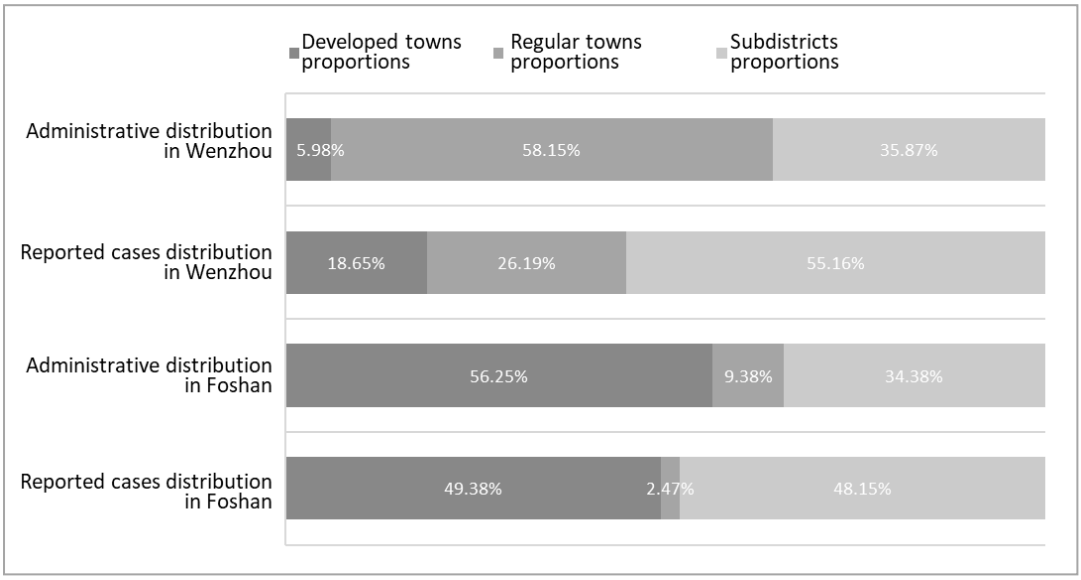


Figure 5. Administrative distribution and reported cases distribution in Wenzhou and Foshan

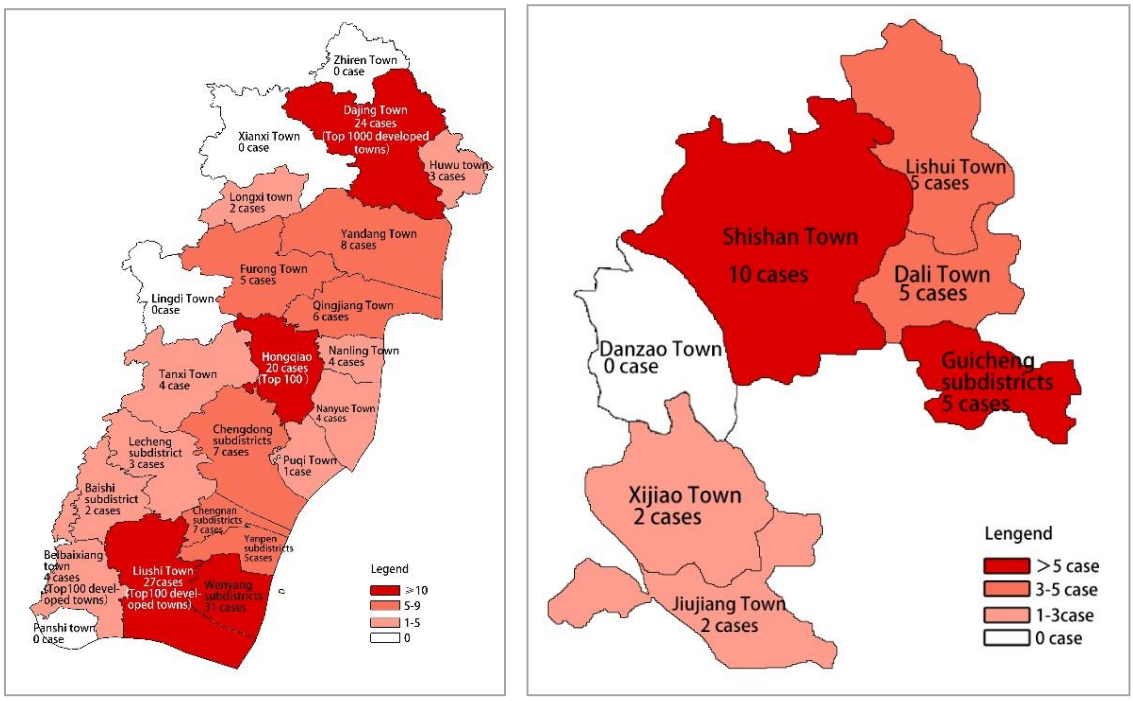


Figure 6. The distribution of reported cases in Yueqing, Wenzhou(left) and Nanhai, Shishan

3.2. Spatial isolation predominates while systematic prevention and control preparation lack

Since the outbreak of the epidemic, 31 provinces have launched a level 1 response to major public health emergencies, and the prevention and control plan has been implemented from top to bottom covering all grass-roots units. According to the available public information, the focus of prevention work in the industrial towns is conducting spatial isolation by adopting regional blockade and artificial control to cut off the transmission path of the virus. The difference among those towns lies in the strict degree of the prevention and control measures due to different risk levels.

Industrial towns in high-risk areas, such as Liushi Town and Hongqiao Town in Yueqing, Wenzhou, implemented strict prevention and control and investigation with rapid response. Liushi Town, known as the "Electric Appliance Capital of China", is home to more than 7,000 small and medium-sized enterprises and about 410,000 permanent residents, including nearly 200,000 migrant population. Great pressure of epidemic prevention and control is self-evident in the case of Wenzhou outbreak. Since January 23, prevention and control measures have been taken in Liushi Town, including investigation of migrant population in urban communities and rural villages, suspension of bus operation, and detection of key traffic intersections. By February 2nd, Wenzhou City and Yueqing City were deployed to upgrade the level of prevention and control. Traffic restrictions and intersection control were carried out in the whole town, and only 5 external entrances and exits were reserved (Figure 7) and strictly controlled. With community units as the basis of the defense line, all communities, village residents were asked to implement two weeks of closed management and only allowed to go out twice a day for necessary supply. As a result, the town was urgently promoted into the "dormant" state.

Industrial towns in relatively high-risk areas, such as Shishan town, Lishui town in Nanhai district, Beijiao town in Shunde district etc., took the adjust measures of partition enclosure due to their larger jurisdiction territory. In this case, urban space was divided into units by peripheral roads around communities, forming temporary closed units (Figure 8).

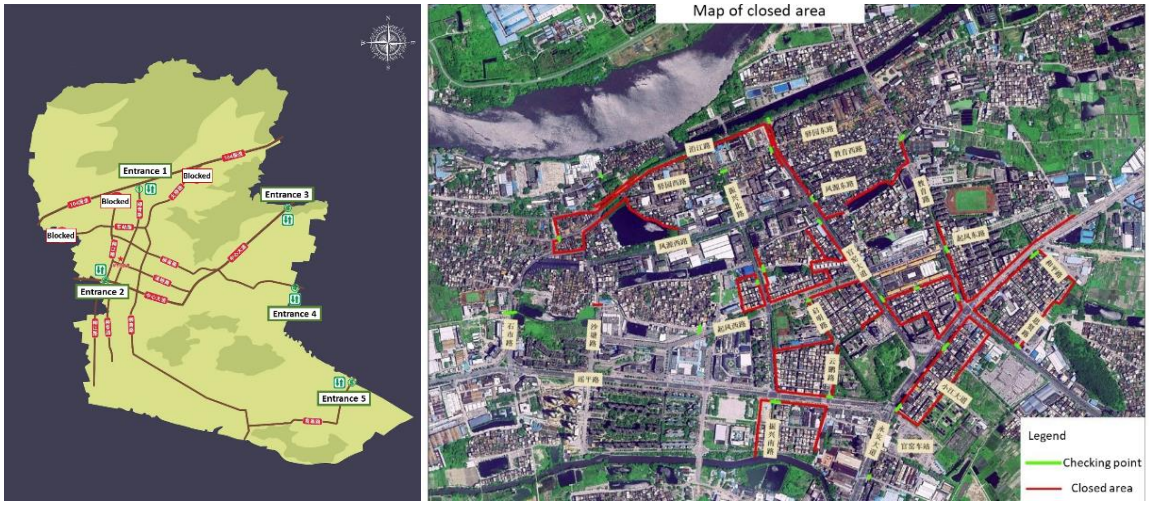


Figure 7. Map of traffic control in Liushi town

Figure 8. Map of partition enclosure in Shishan town

However, in terms of the emergency system, the current measures are only limited to emergency prevention and control in disasters, and there is still a lack of adequate preparation for risk warning, allocation of regional emergency resources, and people's livelihood issues after isolation, among which the most prominent shortcoming is still the medical level. The concentration of high-level medical resources in urban areas has limited the local treatment capacity of many industrial towns to the pre-inspection of fever outpatient clinics, or even to the level of general township health centers, which increases the transport cost and diffusion risk in the treatment work.

3.3. Government organizations are dominant, with scattered social participation

In the current grassroots prevention and control work, the town generally adopted the "town social cadres, police, grid personnel, health personnel" equipped with a team to conduct investigation. However, for a strong town with hundreds of thousands of permanent residents and hundreds of communities living in villages, it is indeed too difficult to carry out household investigation of each community in the area with the daily manpower of the town level. In addition to the community survey, of the town of township government work include domain thousands of enterprises to carry out supervision and return to work for the record, no property management community, scattered on the tenant such as "blind Angle", to social prevention and control of material supply, regulation of market environment, etc., to general township level architecture to deal with more complicated control system, the strong town is clearly unsustainable. To this, many cities and counties in an emergency dispatching grass-roots organs at the corresponding level personnel aid a line of work, such as, Shunde district, Foshan city, adopted a level 3 subcontract screening system, led by the district town "package" sinking villages and towns to guide the work, the town leaders "Bao Village" create positions village in line inspection, party members and cadres "package enterprise", "bag community" is a hard upon of illness.

In this outbreak, many local enterprises and public figures in Industrial towns showed positive social responsibility, such as CaiDuoDuo Food Co., Ltd. in Liushi Town, Wenzhou, which provided vegetable distribution service for the village residents in Liushi Town. Most of these spontaneous social forces are concerned with the demands of people's livelihood. If they can be actively integrated into the government-led prevention and control system, they will not only greatly improve the efficiency of government command and deployment, but also provide useful supplements where government forces cannot reach.

3.4. Prevention as well as work resumption increases the burden of public service supply

With the development of epidemic situation into the second-half, return to work and production and epidemic prevention and control to combine to become a new focus, policy focus all over the country in succession by rein fight to restore the traffic, transportation, withdrawal barrier free point, simplify examination and approval procedures, in order to promote all kinds of enterprises to return to work and production, in particular, increase support for small and medium enterprises such as policy transfer. It is the heavy pressure that falls on the grass-roots work to do a good job of supervision and service for enterprises to return to work at the same time. This for the jurisdiction of thousands of enterprises in the town, not only faced with the huge pressure of public service security, such as corporate dining, car, health protection equipment, transportation and logistics channel management; At the same time, it is also an important test of the governance capacity and the flexibility of the system and mechanism, such as how to set an appropriate threshold for resuming work, how to supervise the prevention and control work of enterprises, how to simplify procedures and speed up the process of resuming work, etc. Under the guidance of the national "game of chess for resuming work", Zhejiang, Jiangsu, Guangdong, Fujian and other labor-heavy provinces were the quickest to respond to the policy, and successively introduced resumption plans and favorable policies for enterprises. From local counties and cities to industrial towns, they were actively exploring and adjusting their local policies. For example, Liushi Town of Wenzhou assisted the leading enterprises Deli Group and Zhengtai Group to carry out the service of "charter" and "meal package" for the resumption of work, and opened up the special passage for trucks for enterprises.

At present, the above all kinds of emergency prevention and control measures for subsequent outbreak control has been showing a certain effect, but temporary physical isolation measures such as sealing city, road in alleviating the shortage of facilities toughness town pressure also had a great social cost, in the long run, there are still many weaknesses and challenges, the need to address. According to the characteristics of Industrial towns and the problems exposed in this epidemic, industrial towns should be sorted out and optimized at the level of spatial planning and governance.

4. Key points of spatial planning in industrial towns based on the concept of resilience planning

Resilience, which has been discussed in the west academy for more than a decade, is a new idea for exploring risk management and sustainable development in urban and

rural areas.[10] Urban resilience generally refers to the ability of urban systems and regions to recover normal operation of public security, social order and economy through reasonable preparation, buffering and coping with uncertain disturbances. The study of urban resilience is multi-disciplinary covering infrastructure, system, economy and society.[11] [12]

Compared with emergency system planning and comprehensive disaster prevention planning, the research of resilient urban planning has extended to urban public safety and long-term sustainable development with the overall goal of coping with unforeseen disasters.[13] The planning framework is more complete, including the city's lifeline system, social organization system, emergency management capacity, residents' awareness of disaster prevention and reduction.[14] In terms of planning mechanism, more emphasis is placed on the combination of soft and hard systems and the coordination of various departments to build a multi-level linkage comprehensive governance platform and a multi-participation social co-governance model.[15]

In order to achieve efficient and safe epidemic prevention and control in industrial towns, it needs to be supported in the stage of spatial planning. Guided by the theory of resilience planning, it is important to improve the system resilience and resilience of industrial towns to cope with the sudden epidemic. In general, the current level of construction and facilities in industrial towns is much lower than in cities, and construction funds and resources are also limited. Therefore, spatial resilience planning for industrial towns needs to be adjusted based on the urban resilience theory, in order that the capacity of industrial towns in dealing with emergency disaster can be ensured to the greatest extent with limited resources and space.

4.1. Pay attention to public space design and increase emergency space reservation

It is of great significance to construct urban public space system for disaster prevention and mitigation. Public open space is an important space carrier to maintain urban public health and public health, as well as an important space reserve to alleviate the insufficiency of urban emergency facilities system. At present, in the construction of industrial towns, the quality of living environment is generally poor, especially for the ecological green space, sports and leisure places and other public space history debt is too much. Therefore, in the spatial planning, it is necessary to design enough public space with multi-function as the orientation, so that the public open space of different scales, such as urban parks, squares, community/village fitness sites, can be effectively combined with different levels of emergency shelters; Secondly, the layout of grey infrastructure and public space should be considered simultaneously, and the capacity of public space in terms of infrastructure such as energy and water should be strengthened,

and temporary or permanent facilities for public health monitoring and emergency use should be appropriately increased. In addition, the enhancement of both the maintenance of public space, update and strengthen health supervision and management, refine of Suggestions at all levels of public space can be use to daily, planning department can be combined on public health, public security and other relevant departments to formulate daily with the very period of the public space use guide and management rules, so that more accurate for design and maintenance.

4.2. Strengthen the construction of community units and stabilize the urban security pattern

Community is the basic unit of social governance and the frontier position of urban disaster prevention. The outbreak, the community is the first defense line of the epidemic prevention and control, especially the traditional "door village" in the very period became the important tool of social protection, behind it reflects, in response to sudden disasters (especially in infectious diseases), how to carry out the "closed" on the urban space unit management inner demands, it is also the important manifestations of urban space toughness. From the present situation, the construction of community units in industrial towns is relatively weak. First of all, the size of the community is different, which is not conducive to administrative management and facility layout. Taking Dali Town, one of the top 100 towns in Guangdong Province as an example, the largest community contains 15,000 households and nearly 40,000 permanent residents. The minimum community size is only 300 households; Secondly, the boundary of community space is not clear. Based on the historical causes, strong town above, commercial housing building, dormitory, property and other kinds of mixed crisscross of living space, coupled with the development of all types and at all levels, the industrial layout dispersion "blossoming", lead to different land use properties and management ownership of space interspersed with interweave each other, is not conducive to the disaster period of flexible management of space requirements.

In the study of urban resilience, it is believed that the "network + cluster" spatial structure is a resilient spatial organization form that can quickly adapt to the changes of external environment and disperse risks,[13] which also proposes a reference idea for the spatial governance of industrial towns. From the perspective of practice, "industrial park" and "residential area" may be the main trend of spatial intensification in industrial towns around the country. Combined with the characteristics of industrial towns, we should actively explore the spatial unit models of various "industrial communities", systematically sort out and organize the spatial relations and corresponding management ownership of industrial space, residential space, basic supporting service

space, public open space and other space in each community. On this basis, actively absorb the concept of community life circle, the community public service facilities and space resources actively integrating into the community level of emergency disaster prevention system, to make every industrial community can form the basic protection, guarantee supply system of emergency supplies safety nets, "toughness" to improve the community itself to respond to disasters. Therefore, the ideal layout pattern is to construct an urban security pattern with flexible organization and systematic toughness by several industrial community units with complete production and living functions and relatively independent space aggregation.

4.3. Raise the standard of public facilities construction and make up for weak links in peacetime and wartime

Technological resilience, including the level of urban health care and lifeline infrastructure, is the basic guarantee to achieve spatial resilience. For Industrial towns, the first thing is to improve its public facilities supporting standards, fundamentally improve the ability of Industrial towns disaster resistance. In the current planning and construction of public facilities in most powerful towns, there are not only the quality problems of supporting productive facilities and active services, but also the quantity is usually allocated according to the standard of local registered population, resulting in the level of various facilities lagging seriously behind the actual living needs. For example, in Shishan Town of Foshan City, Guangdong Province, the second largest town in China, there are only two secondary public hospitals for the permanent resident population of 870,000 people. The average number of beds for 1,000 people is 1.5, which only reaches the level of towns and cities but is far lower than the average standard of 4-5 beds per person in small cities. The same situation as well happens in Puyuan Town of Tongxiang City, famous for its woolen sweater production, in Zhejiang Province. With whole registered population of 47,300 people and 170,000 migrating population, there is only one health center in the town, and the number of community medical stations can’t even reach the coverage of each village. Therefore, it is necessary to enhance the overall allocation standard of public facilities in industrial towns, so that the carrying capacity of public service facilities matches the permanent population capacity of towns.

In addition, the planning of public facilities in industrial towns must fully consider the annexation of gun-bombs and the combination of peacetime and wartime, and construct the system of emergency facilities and resource supply and allocation. In addition to the allocation system of health facilities, in terms of transportation facilities, it is necessary to strengthen the efficient connection channels between regions, attach importance to the construction of logistics channels, meet the needs of rapid

mobilization and supplement of resources within the region in the emergency period, and timely fill the gap; At the same time, improve the density of internal road network to support its internal traffic accessibility, increase the proportion of branch roads in the town, improve the construction of rural roads; If conditions permit, independent transit roads should be planned and constructed to facilitate closed control during the epidemic period.

4.4. Appropriately improve spatial redundancy and reserve temporary construction space for emergency facilities

Appropriate redundancy is an important concept in toughness planning. When considering infrastructure construction, a certain degree of functional overlap space should be planned to prevent the overall failure of the system.[16] Urban redundant space refers to the space that can be quickly used for personnel evacuation, refuge, isolation, material storage and other functions in a short period of time under the state of emergency, among which the more important facilities include large-scale sports facilities, exhibition space, large-scale material warehouse, etc.[17] The spatial planning of Industrial towns should also fully show foresight and predictability, and have a certain "redundant consciousness". Combined with the development level of Industrial towns, temporary construction space should be reserved for public health emergencies, and pipeline interface should be reserved for important infrastructure, so as to ensure the available space during emergency. For example, sports facilities of medium capacity are encouraged to be planned in the town. Such facilities have the advantages of high safety and rapid evacuation, and can be used as emergency shelters in disasters and emergency isolation hospitals to treat patients with mild diseases in epidemic times. For the strong town, under the limited land resource constraints, can make full use of redundant space revitalize the inefficient use of land, the inefficient spatial resources into the reserved space security risks, on the other hand, based on redundant public demand space of public use function, to the use of being serviceable at both peacetime and wartime best effect.

5. Spatial governance strategies for industrial towns in response to the sudden epidemic

Research shows that good public governance order is the guarantee for the resilient development of small towns.[18] From the perspective of resilience planning, all kinds of emergencies are only the inducing factors to highlight urban vulnerability, while the lifeline system and public service level enhance spatial resilience. However, the social organization system, emergency management capability and national awareness of

disaster prevention and reduction are the keys to resilience and social resilience, which greatly affect the extent of epidemic spread and the speed of urban recovery. Therefore, it is necessary to strengthen social coordination ability, improve governance ability and emergency management ability when dealing with sudden public crisis events, so as to systematically promote the resilience level of cities and towns, and mitigate the impact and impact caused by public crisis to the greatest extent.

5.1. Link medical resources at the town level with those at the county and city levels, making flexible preplan for general medical facilities

China's current disease prevention and control system mainly includes national, provincial, municipal and county levels of disease prevention and control centers, grassroots community health service centers (township health centers) and rural community health institutions. During the emergency prevention and control period, the strong town must formulate the emergency preplan with the linkage of upper and lower levels. On the other hand, according to the emergency degree of the epidemic, we should dynamically adjust the allocation of resources, treat personnel at a higher level during the emergency period, transfer high-grade treatment equipment to the township level, and improve the capacity of local treatment and isolation, so as to avoid the large-scale spread of the disease which is difficult to control. On the other hand, we should strengthen the level and material allocation of urban and rural community health institutions, strengthen the training of community doctors, fully mobilize and integrate the medical resources of communities at all levels during the epidemic, and build the first line of defense at the community level. On this basis, through the mobile Internet platform, the monitoring and contact channels and first-aid dispatching system among community health service points, local centralized diagnosis and treatment hospitals and superior CDC are established, and a decentralized, centralized, hierarchical and cooperative dynamic disease prevention and control system is constructed.

5.2. Establish a systematic prevention and control mechanism for the linkage of towns, villages and enterprises

The prevention and control work needs to establish the upper and lower linkage working mechanism. The prevention and control work at the township level focuses on formulating the overall emergency plan, clarifying the medical treatment policy, traffic management policy and public goods supply policy during the epidemic period, and systematically deploy and command the prevention and control work of urban communities, rural communities and enterprise units in the area under their control according to the risk assessment in different points and levels. Community village

residents are staffed with community workers, community police officers and medical staff to carry out investigation and epidemic publicity for key personnel in the community, and take prevention and control measures according to local conditions. In accordance with the policy, the enterprise units set up the epidemic command working group, formulated the control and supervision plan for the park and the enterprise, strictly managed the flow of employees, timely reported the epidemic situation to all government departments, and properly arranged the order of returning to work according to the overall deployment of the epidemic prevention and control in the town. The transparency and unobtainability of information at all levels can effectively enhance the flexibility of prevention and control work. In addition, local governments should actively adjust their working boundaries, actively include social forces in the prevention and control work plan, such as cooperating with platforms such as e-commerce and logistics enterprises to provide basic livelihood materials and logistics services, and expanding publicity with the help of public media platforms.

5.3. Promote the development of social organizations and establish a linkage mechanism between government and non-governmental participants

In the epidemic prevention and control of novel coronavirus, civil forces cannot be ignored. Especially for industrial towns, a large number of local private enterprises and local chambers of commerce are also important non-governmental organizations actively engaged in the front line. However, in general, the current voluntary actions of the people are scattered and spontaneous, while the strength of professional prevention and control or relief social organizations is still not sound. International experience shows that giving full play to civil society is an indispensable part of the epidemic prevention and control network. More importantly, when looking into the construction of public health governance system in the future, civil society should play a major role in the prevention and detection of infectious diseases. In the epidemic report, voluntary service, goods and materials donated, publicity education should give full play to the multiple aspects, such as natural advantages of civil society organizations (mobilization rapidly, flexible organization and wide type, laminating the masses, etc.), and expand public participation channels make more professional ability of society to positive advices, multi-level, three-dimensional social support and the government forces with complementary, Thus, an organic, complete and resilient public health security system will be formed. Therefore, it also requires industrial towns to attach importance to the cultivation of social organizations in the system construction of social governance, and to actively explore the management system conducive to the vigorous development of social organizations by giving play to the advantages of local social capital. This is also one of the tasks of modernizing China's governance system and capacity.

5.4. Establish an intelligent data system to achieve fine community governance

The application of intelligent technology in modern governance should be strengthened, and the community partitions should be classified and refined in combination with the intelligent data system. In this epidemic, many townships across the country adopted grid governance. For example, in Dayun Town of Jiashan, Zhejiang Province, the "large grid" of villages, communities and enterprises was subdivided into "micro grids". Party members, as the leader of the micro grids, carried out information screening, policy publicity and psychological counseling. In Zhuzi Town of Wuyi Mountain, Fujian Province, the "three cards and one card" system has been established, with permanent residents holding "green cards", floating residents holding "red cards" and people in the worst-hit areas holding "yellow cards", to implement rapid identification and precise management. Xixiashu Town, Changzhou City, Jiangsu Province, has implemented a "grid + police grid" management system, using intelligent devices such as video surveillance, face recognition and access control identification to track the tracks of quarantined people and confirmed cases. Intelligent tools have played an important role in the epidemic prevention and control, promoting more accurate and refined governance, should be further optimized. In the future, intelligent information system which involves residents' information collection, community access management, security monitoring, daily supplies, information publicity and other functions should be increasingly strengthened.

6. Conclusions

The sudden coronavirus outbreak caused great influence to the national economic and social development, also to local space planning and social governance present a major challenge, at the same time also reveals the strong town in unexpected events occur (public health) facing the high risk and long-term accumulated space planning and social governance issues caused by the vulnerability. In fact, the outbreak of the epidemic happened close to the Chinese Lunar New Year, when a large number of migrants had left the migrant towns, which to a large extent reduced the pressure of epidemic prevention in the towns. Even so, the epidemic prevention risk of industrial towns reflected in the comprehensive prevention and control period has also made clear that the emergency disaster prevention (epidemic) of industrial towns is very important and cannot be ignored.

The pursuit of social development and spatial quality will be more significant when China's per capita GDP has just entered the threshold of 10,000 US dollars. The

development of industrial towns needs to be transformed. It is the future road for industrial towns to change from a traditional town with low, small and scattered industries gathering and production as its main focus to a comprehensive and professional modern town with innovative industries driving and high-quality living environment. From this perspective, improving the resilience of cities and towns is an issue that should be fully paid attention to and considered during the transformation and development of industrial towns across the country, as well as an emergency guarantee when industrial towns deal with sudden (epidemic) disasters.

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