

INFLUENCE OF COVID-19 ON CHINA'S URBAN PLANNING AND DESIGN REGULATIONS:

A SYSTEMATIC REVIEW OF RECENT POLICY AND REGULATORY CHANGES

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I. Background & Context

Cities globally have been profoundly impacted by the COVID-19 pandemic. This has sparked a discussion about how cities are designed to make them better equipped to resist the spread of disease and reshape urban planning to adapt to risks in health crises.

History shows that infectious diseases have been hugely influential in shaping cities. Pandemics, such as the Black Death, Cholera, and Spanish flu, helped to catalyze innovations like urban sanitation systems and zoning regulations. Now the coronavirus is adding to the list, influencing key aspects of urban planning, architectural design, and city management. Integrating health in urban planning, design and management to make our cities resilient is critical, and the toll of COVID-19 is making this extremely relevant as well as timely.

The first country to experience a coronavirus outbreak, China has been struggling to revive an economy impacted by COVID-19. The pandemic has caused economic losses of \$1,600 billion¹, with nearly ten thousand people infected², and economic loss as a percent of gross domestic product (GDP) of around 2 percent. China's GDP growth is forecast to fall sharply to 1.6 percent in 2020 before rebounding back to 7.9 percent in 2021.³

The purpose of this note is to explain how the pandemic is reshaping regulations in China and affecting urban planning and city management. In preparing this note, a meta-analysis was conducted based on a review of China's urban planning responses to COVID-19. The review covered newly issued regulations and amendments to the existing regulations at both national and subnational levels between February and August 2020. The note identifies regulatory gaps in urban planning and provides a systematic review of how China responds to COVID-19 and addresses gaps in urban planning and building design, including emergency interventions in the midst of this crisis, and post-COVID-19 responses to build health-resilient cities. The note concludes that in response to the pandemic, Chinese authorities have issued various policies and regulations on land use, environmental management, sectoral planning, public spaces, city management, and building design for different types of buildings. This note will directly contribute to the research on health cities, one of the four pillars of the China Urban, Resilience and Land Programmatic ASA. Our objective is to document diverse practices and responses to the pandemic from different countries and offer the policymakers a handy reference that can help them plan, develop, and implement policies and regulations.

II. Emergency Policy on Urban Planning and Management in the midst of COVID-19

The COVID-19 pandemic highlighted weaknesses of the prevailing approaches and offered the possibility of reorienting policies and approaches in five distinct areas.

Land use planning: There were concerns about land use planning and safe siting of facilities such as wet markets, waste collection points and solid waste dumps. The authorities realized that additional or more stringent land-use planning and zoning regulations that separate high-risk activities from other land use types and regulate hygienic conditions were of critical importance.

Spatial planning and safe siting: It is important for urban planners to work in close collaboration with city authorities to select sites for temporary epidemic treatment facilities, such as cabin hospitals which are required in the very early stages of any disease outbreak.

Waste management: It is critically important for city authorities to be mindful of waste management, including medical and household waste.

City management: Effective city management systems are vital for the identification, regulation, and monitoring of the likely “foci of infection.”

Tracking tools to facilitate management: Advancements in big data provide planners and city managers an effective way of tracking the virus seamlessly and making data-driven decisions. city managers an effective way to track the virus seamlessly and make data-driven decisions.

Early in the crisis, China’s national and municipal governments announced multiple coordinated policy initiatives in response to weakness revealed, and realizations generated, by the coronavirus. These initiatives, developed with multiple ministries, departments and bureaus, cover five areas (see table 1). These include:

(a) **land use and spatial planning**, covering regulations on the site selection, land resources allocation, strategic plans for land use that ensure separating residential and industrial areas, and urban spatial layouts;

(b) **environmental management** regulations on solid waste management, sewage treatment, medical and hazardous waste management, and waste sorting;

(c) **sectoral planning** focusing on specific planning for the physical layout of health services and sanitation facilities and integrating health standards into building designs;

(d) **public spaces regulations**, focusing on ensuring open green spaces, recreation spaces, and emergency evacuation spaces for inhabitants; and emergency evacuation spaces for inhabitants;

(e) **city management** for emergency responses to identify, regulate and monitor any health crisis.

To ensure the timely build-out of emergency hospitals and other health facilities, the Ministry of Natural Resources issued a policy for guidance on “land use for construction projects related to epidemic prevention and control”. Among other aspects, the policy relaxed the land quota, which would have constrained the building of new temporary facilities, and prioritized land use for pandemic related projects. At the same time, innovative methods such as an online construction approval system were put in place to facilitate the approval process.⁴

Table 1. Emergency Policy Initiatives on Urban Planning and Management

Scale	Policy Initiatives	Issued by	Thematic Areas				
			Land Use and Spatial Planning	Public Space	Sectoral Planning	Environmental Management	City Management
National	Land use for construction projects related to epidemic prevention and control	Ministry of Natural Resources (MNR)	✓				
	Technical guide on emergency treatment of medical waste	Ministry of Ecology and Environment (MEE)				✓	
	Medical waste management in health institutions in response to COVID-19	National Health Commission (NHC)				✓	
	Medical waste management at the diagnosis isolation places	NHC				✓	
	Emergency monitoring program in response to the coronavirus	MEE				✓	✓
	Information construction and application guidelines for community-level prevention	Ministry of Industry and Information Technology (MIIT), NPC, Ministry of Civil Affairs (MCA)					✓
Municipal	Solid waste dumps and management during COVID-19 (Ningbo municipality)	General Administrative Bureau, Ningbo Municipality				✓	
	Architecture and Technology guide of Health Code (Shenzhen municipality)	Association for promoting Standards, Shenzhen Municipality					✓

This health crisis also drew attention to medical and household waste management. The Ministry of Ecology and Environment (MEE) issued technical guidance on the emergency treatment of medical waste⁵, and the National Health Commission (NHC) announced specific guidance on medical waste management in healthcare facilities, and at the first diagnosis and quarantine places⁶. Several municipalities, such as Ningbo Municipality, also announced guidelines on solid waste management in their jurisdictions.⁷

Furthermore, MEE announced an emergency monitoring program in response to the coronavirus aimed at monitoring air, water quality, and to support decision-making.⁸ To facilitate effective city management using digital methods, the Ministry of Industry and Information Technology collaborated with the NHC in issuing information system construction and application guidelines for community-level prevention and control.⁹ Specifically, dynamic monitoring methods facilitated city management through two mechanisms: public transit tracking codes and health codes. Cities nationwide adopted a public transit tracking code which passengers on trains, buses, metros and in taxis were asked to scan to register their names and contact numbers. This code helped to trace potential contacts more systematically so that transmission routes could be cut as early as possible. In addition, a health code system, used to track information - including individuals' health condition, place of recent inter-provincial/jurisdiction travel, and past contacts with confirmed cases - allowed the categorization of risk levels. (Figure 1 and 2)

Short-term emergency policy responses were prioritized during the pandemic. Priority was given to **environmental management**, particularly the management of medical waste in healthcare facilities and household waste in residential areas, and **city management**, in which digital tools are used to track and contain the spread of COVID-19. Policy interventions on public spaces and sectoral planning were introduced as medium- and long-term responses; these are discussed in the next section.

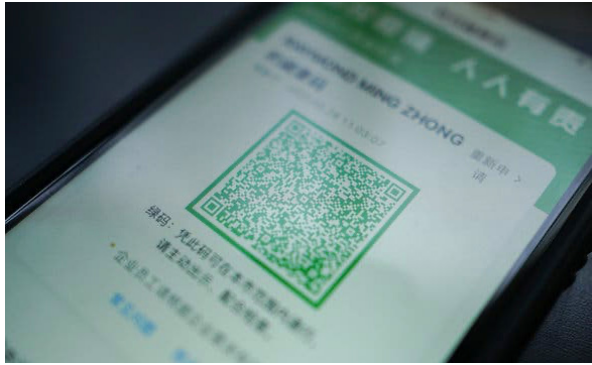


Figure 1. Health code inside the Alipay app.¹⁰



Figure 2. Identify individuals with an elevated temperature¹¹

III. Medium- and Long-term Interventions in Urban Planning and Management post COVID-19

Beyond the emergency responses, the pandemic and its aftermath has prompted cities to rethink how to plan urban spaces. Firstly, highly congested and polluted residential areas are a pressing issue across various cities. Due to the unprecedented pace of China's urbanization, some localities in cities which were built between 1960 to 1990 with deficient construction standards and services have become highly congested and lack proper environmental conditions. Conditions in these disadvantaged neighborhoods were found to be posing high hygiene risks to their residents.

The coronavirus also highlighted the importance of accessible green spaces, which are associated with improved physical and mental health for residents. The management of many Chinese cities found that they lack green spaces, parks, and recreation areas, which are perceived as a "refuge" during the crisis.¹² In the context of COVID-19, the 15-minute life circle concept (where essential public amenities or spaces are located within a 15-minute walkable and cycling distance) has gained attraction as a means of increasing the quality and sustainability of life in Chinese cities. This is also in line with the United Nations Sustainable Development Goal #11 on sustainable cities and communities.

Moreover, the health crisis has highlighted the need for city authorities to be mindful that urban environmental service networks such as underground sewer and rainwater disposal, and solid waste systems, are well planned and maintained.

In addition, the likely origin of the coronavirus outbreak first from wet markets in Wuhan and in a later episode in Beijing, illustrated the need for careful and deliberate selection of wet market locations, and the health-conscious environmental design and maintenance of supportive services that are necessary for hygienic functioning of these markets.

The physical location of key medical facilities, a function of urban planning, was identified as an issue because these facilities are currently unevenly distributed in cities. Most medical facilities in megacities, such as Beijing and Shanghai, are concentrated in the urban cores.¹³ Meanwhile, medical and sanitary facilities in rural areas and community levels are weak and have low capacity. The fight against coronavirus also reminded authorities of the lack of specific planning on pandemic prevention within the current planning system.

Lastly, effective city management systems and data-driven planning could play a critical role in addressing any future crisis. The need for constantly updated and transparent information which is openly available to city officials as well as to the public was underlined.

Long-term policy initiatives were taken as the next step in the post COVID-19 response. After initially devising short-term emergency responses related to land use, environmental management, and city management, Chinese cities started shaping long-term policy initiatives for greener, healthier, more resilient cities. Medium- and long-term responses are clustered around five categories: (See table 2)

- i) land use and spatial planning;
- ii) public space;
- iii) sectoral planning;
- iv) environmental management;
- v) city management.

To address all the weaknesses in public open spaces, the country has developed standards and guidelines to integrate green and blue spaces into current urban design. For example, the planning and design standards for urban residential areas developed by MoHURD provide clear indicators - including floor area ratio (FAR), building density, and green space ratio - to ensure sufficient green spaces and recreation spaces for inhabitants and adequate public spaces that can be reoriented to emergency evacuation spaces.

Another longer-term policy response is the development of guidelines for the renovation of disadvantaged neighborhoods. These address poor housing conditions and are aimed at alleviating the negative impacts of the health crisis. The State Council announced these guidelines in July 2020 and set a goal of strengthening public health and sanitation infrastructure through the renovation of 39,000 residential communities¹⁴ by the end of 2020.¹⁵

Table 2. Medium- and Long-term Responses Post COVID-19

Scale	Policy Initiatives	Issued by	Thematic Areas				
			Land Use and Spatial Planning	Public Space	Sectoral Planning	Environmental Management	City Management
National	Guidelines on building and implementing territorial and spatial planning system	State Council	✓				
	Priorities on New Urbanization and Integrated Urban–Rural Development for 2020	National Development and Reform Commission (NDRC)			✓		
	Planning and design standards for urban residential	Ministry of Housing and Urban–Rural Department (MOHURD)		✓			
	Guidelines on the renovation of disadvantaged neighborhoods	State Council		✓		✓	
	Solid waste, pollution, and environment management law	NPC Standing Committee				✓	
	Implementation plan for strengthening the weakness of waste sorting and sewage facilities	NDRC, MOHURD, and MEE				✓	
Provincial and Municipal	Guidelines on improving the public health emergency management system and mechanisms (Guangdong Province, Shanghai Municipality)	People’s Government (Shanghai Municipality, Guangdong Province)					✓
Municipal	Beijing Municipal land use regulation on strategic spaces	People’s Government of Beijing Municipality	✓				
	Specific planning on pandemic prevention (Beijing Municipal)	People’s Government of Beijing Municipality			✓		
	Regulations on the Prevention and Control of Environmental Pollution by Hazardous Wastes (Beijing)	Beijing Municipal Ecology and Environment Bureau				✓	

The national guidelines on developing and implementing territorial and spatial planning further encourage cities to integrate public health into urban design. They require incorporating health risks into the disaster prevention and mitigation system and stress the importance of the location of essential urban functions to ensure easier access to public services and amenities while securing safety and health for their residents.¹⁶ The improvement of public health and sanitation facilities was set as a critical agenda in the *2020 Priorities on New Urbanization and Integrated Urban–Rural Development*, which was issued by the National Development and Reform Commission (NDRC), the Chinese Government’s highest level and most important department responsible for urbanization strategies, policies, and investments.¹⁷ The 2020 Priorities highlighted the importance of the rational allocation of resources and public services, including health services.

Beijing Municipal Government also initiated a land use regulation on strategic spaces. The government believes that reserving unplanned spaces¹⁸ builds

resilience; the regulation, initiated in April 2020, reserves 132 square kilometers within the jurisdiction and states that these unplanned spaces can be used for responding to future public services or major public safety issues.¹⁹ In addition, the Beijing Municipal Master Plan (2016-2035) now places a ban on new large wholesale wet markets and regional wholesale markets, or the extension of existing markets, within its jurisdiction.²⁰ Beijing Municipality is also ahead of others in the development of specific planning on pandemic prevention, which enhances the capacity of disaster prevention and mitigation, particularly emergency management mechanisms on public health.²¹

To close the regulation gaps relating to environmental sustainability, the national government revised the solid waste, pollution, and environment management law. Highlighting medical waste management during the pandemic,²² NDRC, MOHURD, and MEE developed an implementation plan for strengthening, and addressing weaknesses in, waste sorting and sewage facilities.²³ At the municipal level, a variety of cities, such as Beijing Municipality, have initiated policy measures for the regulation of hazardous waste to prevent and control environmental pollution.²⁴ Further, aiming to improve the capacity of city management, provincial and municipal governments have developed guidelines on improving public health emergency management systems and mechanisms.²⁵

In sum, post-COVID-19, the government has made environmental management a priority in policy interventions. More attention was given to solid waste management in residential, waste sorting and sewage treatment in the long-term.

IV. Emergency Interventions on Building Design in the midst of COVID-19

The crisis has also highlighted the need to support the improvement and adaptation of building design, essential for managing the spread of diseases. Cabin hospitals have played an important role in the country's response to the coronavirus. However, when stadiums or conference centers were designed, they did not consider their likely temporary use as cabin or emergency hospitals. There was also no specific planning for contagion prevention in the prevailing planning system. Consequently, building designs did not have specific regulations in place for air conditioning and ventilation systems, common corridors, water supply and drainage systems, or waste management, cleaning and sterilization during a crisis. In particular, guidance was lacking on ensuring clean air ventilation, the proper collection and management of medical and household waste, and timely cleaning in high-density and high-rise residential and office buildings.²⁶

During the outbreak, different levels of governments adopted a variety of responses in terms of building design and space use, to contain the spread of the virus. National and various provincial governments announced design guidelines for different types of buildings, including medical facilities, hotels for quarantine and treatment, office buildings, residential buildings, schools, shopping malls and supermarkets, and public places, such as transport, elevators, and recreational facilities. All of these responses are focused on regulating air conditioning and ventilation, water supply and drainage systems, waste management, cleaning and sterilization. (See table 3.)

Table 3. Architectural Responses during the Coronavirus

Scale	Architectural Responses	Issued by	Building Types								
			Medical facilities		Hotel for quarantine and treatment	Office	Residential	Schools	Shopping Malls and markets	Public Places	
			Hospitals for infectious diseases	Cabin hospitals							
National	Hygienic guideline for operation and management of air-conditioning and ventilation systems in offices and public places	NHC				✓					✓
National	Technical guide on preventing the coronavirus	State Council	✓			✓	✓	✓	✓	✓	✓
National	Technical guidelines for the construction of negative pressure zones for emergency treatment facilities	MOHURD, NHC	✓								
National	Design guidelines for emergency treatment facilities	NHC	✓								
National	Emergency management guide for hotels used for temporary quarantine and treatment	MOHURD			✓						
National and Provincial	Technical guidelines for operation and management of offices (National, Hubei, Zhejiang, Shanghai)	MOHURD, Provincial and Municipal Housing and Urban-Rural Department				✓					
National and Provincial	Operational guidelines for coronavirus prevention in residential areas (National, Hubei, Shanghai)	National, Provincial, and Municipal Property Management Association					✓				
Provincial	Design guidelines for hospitals of respiratory infectious diseases (Hubei, Zhejiang)	Provincial Housing and Urban-Rural Department	✓								
Provincial	Technical requirements for hotels redesigned to temporary infectious disease therapy (Hubei Province)	Provincial Housing and Urban-Rural Department			✓						
Provincial	Technical guidelines for cabin hospitals for centralized treatment (Zhejiang, Heilongjiang)	Provincial Housing and Urban-Rural Department		✓							
Provincial	Design guide for cabin hospitals under public health crisis (Jiangsu)	Provincial Housing and Urban-Rural Department		✓							

In February 2020, the State Council announced a technical guide on preventing the spread of coronavirus in offices, nursing homes, medical facilities, residential, schools, shopping malls, and public places.²⁷ NHC further developed a national-level set of hygienic guidelines for regulating the operation and management of air-conditioning and ventilation systems in offices and public places during COVID-19 outbreaks,²⁸ followed by provincial-level guidelines for the operation and management of office buildings against COVID-19 or similar outbreaks, and operational guidelines for coronavirus prevention in residential areas.^{29,30}

To regulate medical facilities and cabin or temporary hospitals, NHC and MoHURD jointly developed technical guidelines for the construction of negative pressure zones for COVID-19 emergency treatment facilities,³¹ and design guidelines for emergency treatment facilities.³² Hubei, Zhejiang, and several other provinces also developed provincial-level design guidelines for hospitals of respiratory infectious diseases, setting regulations on site selection, water drainage design, building structure design, heating, ventilation and air-conditioning.³³ Also, since several hotels were adopted as quarantine centers and emergency treatment facilities, MoHURD issued an emergency management guide for temporary quarantine and treatment hotels.³⁴ Hubei Province, as the most affected region, announced technical requirements for hotel buildings redesigned as temporary hospitals for respiratory infectious disease therapy.³⁵ Zhejiang, Jiangsu, Heilongjiang, and various other provinces also issued technical guidelines for cabin hospitals for centralized treatment.

Overall, design regulations during the health crisis focused mainly on medical facilities. These included design guidelines for infectious disease hospitals and cabin or temporary hospitals. Meanwhile, regulations on the operation and management of air-conditioning and ventilation systems in offices have been stressed as well.

V. Medium- and Long-term Responses on Building Design post COVID-1

With the COVID-19 outbreak under control, Chinese authorities started thinking proactively about more systemic measures. Some topics that will require further consideration at a national level such as long-term solutions to building design to ward off future outbreaks. The pandemic sparked a realization that will be critical to give more consideration to public health when designing buildings and urban spaces. For example, well-ventilated public areas with plenty of natural light can help prevent infectious diseases from spreading. City planners should also have responsibility to help with location selection for temporary epidemic treatment facilities in support of the long-term viability of the facilities, strengthen transportation and urban infrastructure access. Planners should also be involved in putting in place plans for reserve areas for emergency response facilities, including the action plans needed to establish, evacuate, and rehabilitate the sites and facilities rather than wait for an epidemic to occur to react to such needs.

To build resilience against future pandemics and emergencies, MoHURD announced urban residential planning and design standards. These provide clear requirements on FAR, building density, building height, and green space ratio. In response to the needs of building infectious hospitals, the Urban Planning Society of China developed guidelines for site selection, design, construction, and operation management of emergency infectious disease hospitals. (See table 4.)

Table 4 Long-term Architectural Responses post the coronavirus

Scale	Architectural Responses	Issued by	Building Types						
			Medical facilities	Hotel for quarantine and treatment	Office	Residentials	Schools	Shopping Malls and markets	Public Places
National	Urban residential planning and design standards	MOHURD				✓			✓
	Guidelines for site selection, design, construction, and operation management of emergency infectious disease hospitals	MOHURD	✓						

VI. Concluding Remarks

The unprecedented impacts of the Covid-19 pandemic have highlighted the pressing need to bridge technical and regulatory gaps in urban design. Based on the points raised in this note, a variety of emergency initiatives and long-term responses have been taken by the Chinese authorities. In summary, these responses, which focus on strengthening land-use and spatial planning; enhancing environmental management; ensuring public spaces are well-managed; improving sectoral planning; improving city management's capacity; and enhancing the architectural designs of various building types, are vital for making cities resilient and healthy.

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