STRATEGIES FOR BUILDING RESILIENCE OF 15-MINUTE COMMUNITY LIFE CIRCLES FROM THE PERSPECTIVE OF PANDEMIC

SIYUAN CAI & WENYONG TAN
Department of Urban Planning, Chongqing University, China

ABSTRACT
COVID-19 has triggered the scholars to think about how to improve the city's ability to respond to public health emergencies. From the perspective of the community, this article reviews the risk cases in Wuhan Chenjiadun Community and other communities under the epidemic, and analyzes the response to public health emergencies such as infectious disease outbreaks in the excellent cases of resilient epidemic prevention communities. Then, combined with the planning of the life circle, it demonstrates the necessity of integrating the concept of resilience into the 15-minute community life circle to make up for the shortcomings of infectious disease prevention. Finally, it is proposed to strictly control the source and tail of the epidemic in the layout of the life circle, daily health and epidemic emergency should be taken into account in planning, community medical resources should be decentralized in management, and the application of smart technologies in the planning of life circle should be fully emphasized, so as to improve the community's ability to respond to public health emergencies.
Keywords: pandemic, resilient cities, resilient community, 15-minute community life circle.

1 INTRODUCTION

We live in an era of technological and material prosperity, and we do not need to suffer the disaster of war. Even if we were born in peace, modern cities are still at risk. In the spring of 2003, SARS started in Guangdong, China, and then a global outbreak followed. 17 years later, the new coronavirus has swept in... Short to nearly two decades, long to the entire human history, the struggle between epidemic infectious diseases and human society is like a history intertwined with nightmares and progress. The history of plagues such as smallpox, cholera and the Black Death in ancient and modern times, and the history of plagues such as smallpox, cholera and the Black Death is endless in the books.

In the face of a pandemic hitting a metropolis, with weak urban security infrastructure on the one hand, and a rapidly mutating and unpredictable epidemic virus on the other, we are not only in an era of rapid urbanization, but also in an era of new epidemics. As a huge 'artificial system' where countless human beings gather, the city is a continuum of 'positive and negative', with four dimensions of the city: 'space, economy, society and organization' are all at risks [1], and behind these risks lies a window that opens up to social progress.

In recent years, Shanghai, Qingdao, Changsha, Ningbo and other places are formulating planning guidelines for life circles. The concept of life circle has officially become the legal discourse of planning, showing a strong trend. From the perspective of resilience building in urban communities, this paper takes the 15-minute community life circle as the basis for spatial scope of the built environment around the community, and discusses how to integrate the concept of resilience into the planning of the 15-minute community life circle to respond to address urban epidemics in terms of policy and community built environment.

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2 TAKING HISTORY AS A MIRROR: LESSONS FROM WUHAN

2.1 Case analysis of Chenjiadun Community during the epidemic

Sorting out community risk cases under the epidemic has important warning and guiding significance for potential future epidemic risks, therefore, the following chapter selects Chenjiadun community in Hankou, Wuhan, defined by the 15-minute community life circle, as the study object to review the early stage of the epidemic outbreak.

In the Chenjiadun community defined by the 15-minute community life circle (Fig. 1), there are many types and grades of urban public facilities. Hankou Railway Station, the highest-ranking urban public facility around the community, is only one way from Chenjiadun community. With the continuous and intensive population movements brought about by the 'the spring festival travel season', the COVID-19 spread at an exponential speed in the early stage of the outbreak, putting the surrounding residents at great risk of infection. In addition to Hankou Railway Station, the internal environment of the Chenjiadun community is also very complicated. There are not only Wuhan Youfu Hospital and Union Hospital Cancer Center serving as fever clinics, but also many fruit wholesale markets, wet markets, and even Huanan Seafood Wholesale Market, one of the 'source' of the COVID-19, are located inside the Chenjiadun community, which means that at the beginning of the outbreak, a large number of patients gathered in the Chenjiadun community and surrounding blocks for a short period of time, the open and

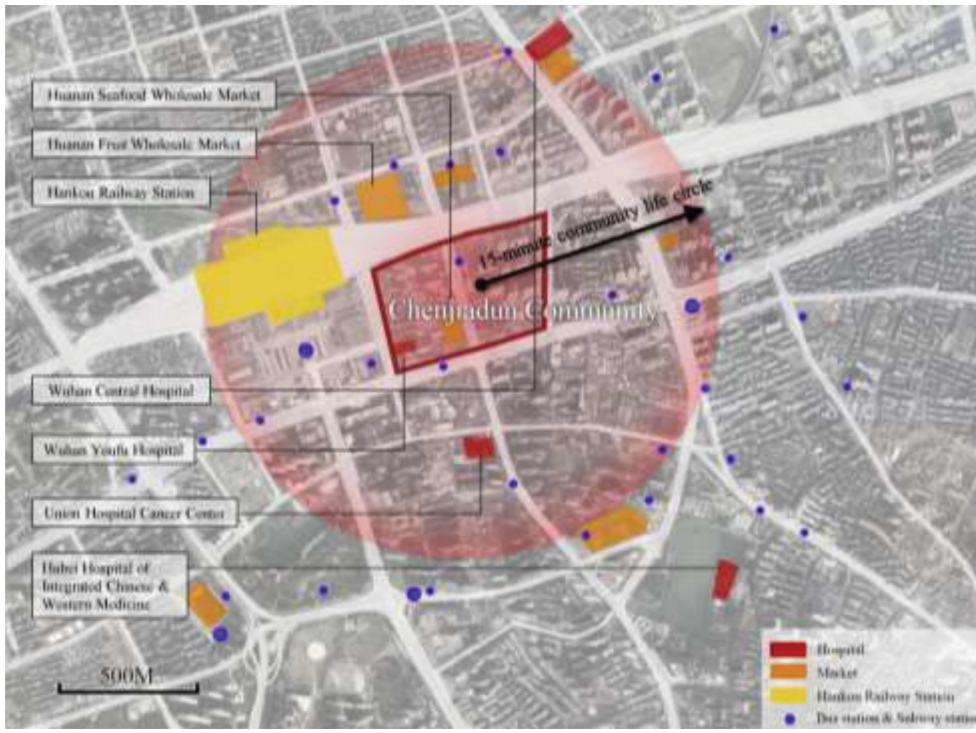

Figure 1: Chenjiadun Community Surroundings.

disorderly informality of the Chenjiadun community makes it possible for residents and patients to interpenetrate the trajectory of their activities, thus making the community a high-risk one [2] .

The neighbouring communities of Zhandong and Bagudun are located to the east of Chenjiadun, which are adjacent neighbourhoods. Based on the statistics of the 'Micro-community platform' in early and mid-February 2020 and *Wuhan Community-level Epidemic Risk Assessment* report, the epidemic profiles of the three communities are shown in Fig. 2. It can be seen that the infection rate of Chenjiadun community is higher than that of the two adjacent communities. This is due to the accelerated spread of the virus caused by the closed traffic space, and the epidemic is mainly caused by high-grade transportation facilities, accompanied by the comprehensive impact of a series of differential environments inside and outside the community, making Chenjiadun community a sample of forced high-risk communities adjacent to high-grade transportation public facilities [2].

To sum up, since the public facilities and environment around the communities such as Chenjiadun are easy to induce the outbreak of the epidemic, it is easy to become the hardest hit area of the epidemic. In addition, on the other hand, the management of the community is also full of loopholes – how can a dirty and disorganized seafood market operate in a densely populated area for so long? Why some disadvantaged groups can only turn to the media instead of the community? Why do some communities still insist on holding banquet despite the epidemic emergency? What we have seen is only the tip of the iceberg, problems and contradictions below the surface need to be reflected even more.

2.2 Reflection: the necessity of resilience planning in the 15-minute community life circle in the post-epidemic era

The research on urban health is still emerging, and the focus of the academic attention has mostly been on chronic diseases, i.e., promoting human health by optimizing the environment of cities. However, less research has been conducted on epidemic infectious diseases, especially in response to this outbreak of COVID-19, and the cost paid by communities such as Chenjiadun in this outbreak has revealed the shortcomings in prevention and control of infectious diseases, and the resilience is missing from life cycle planning: insufficient emergency facilities, chaotic built environment and inadequate management of relevant institutions, resulting in communities lacking the resilience to deal with epidemic infections.

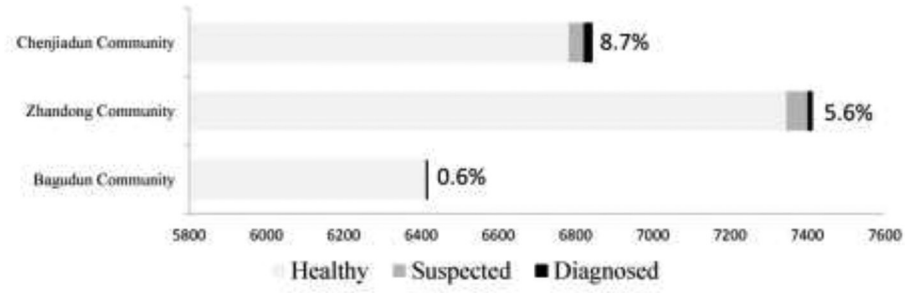

Figure 2: Health status of residents in three communities near Chenjiadun
(Source: http://www.shequxiehui.net.cn)

In the field of resilient city research, most scholars focus on the social, economic, environmental and other aspects of the city at the macro level, while at the micro scale, they analyze city based on the geographical scope or a certain dimension of the city, but ignore the urban security itself. As the most basic unit of residents' lives, the community is also an important fortress for maintaining stability under the abnormal activities of the city. With the gradual promotion of life circle planning in recent years, the integration of 15-minute community life circles into resilience planning is also of great significance – Shanghai took the lead in releasing the *Shanghai 15-minute community life circle planning guidelines*, followed by *Planning and Design Standards for Urban Residential Areas*, clarifying the concept of a 15-minute life circle residential area, the public gradually realized the importance of community management and public service provision. Promoting the construction of 'resilient communities' has become an important issue in front of people, highlighting the science of building a 15-minute community life circle.

Since the outbreak of the epidemic, the COVID-19 outbreak has triggered a reflection on the means of prevention within cities, and the public has gradually become aware of the importance of community management and public service provision. How to integrate the concept of resilience into the 15-minute community life circle has become an important issue in front of people.

3 LEARNING FROM OTHERS: EXCELLENT CASES OF RESILIENT EPIDEMIC PREVENTION COMMUNITIES

3.1 Japan: Daily care and disaster prevention and epidemic prevention system based on life circles

Japanese public health daily care system relies on a life circle within a slow walking distance. For example, taking the accessibility of the elderly within 30 minutes walking distance as a structure for constructing a daily care and prevention system, that is, the size of a middle school district. The functions of a daily life circle are shown in Fig. 3. The various facilities or services must be within that spatial area to form a 'life support network' [6-7], including multiple levels from hospitals to care, which can be divided into regional comprehensive support centers, hospitals, care service institutions, nursing homes and other non-public resources, etc. [8]. In 2012, Japan began implementing a regional comprehensive care policy to build a regional comprehensive care system, and strive to create a community where all seniors can continue to enjoy their own lives according to their personal wishes. Even specially developed rental housing, supporting community care services for applicants, and policies also encourage qualified residential and commercial buildings to develop commercial nursing homes with elderly care and nursing functions in them. It can be seen that Japan has great concern for the old, and this series of measures is conducive to protecting vulnerable groups in public health emergencies.

In terms of emergency epidemic prevention, in the face of the spread of a large epidemic virus, the 'circle of daily life' of the Japanese community can also be regarded as a 'medical circle'. According to the data provided by the Ministry of Land, Infrastructure, Transport and Tourism, emergency centers located in cities can provide rescue services for 100,000 to 200,000 people, and the time required for an ambulance to rescue is usually 1 to 1.5 hours, which is equivalent to a local life circle size in Japan. There is no doubt that reducing the rescue vehicle assistance time will have a positive impact on emergency patients. Japanese authorities regard the travel time of 0.5 to 1 hour as a 'medical circle'.

Table 1: Japan is an island country near the sea, and is located in the earthquake zone. In addition, there are many and active volcanoes in the territory. Its geographical features are destined to lead to frequent occurrence of natural disasters such as earthquakes, volcanic eruptions, typhoons and rainstorms in Japan. Therefore, as a country faces disasters at any time, disaster prevention plays a very significant role in Japan's land remediation system [4]. At the same time, Japan is also the first country to practice community life circle planning. Table 1 lists the number of people and facilities in each circle. Medical and welfare facilities provide residents with health consultation, medical treatment and medical services, and other commercial facilities provide services for residents' daily life. 'Life circle' in Japan is a geographical and planning concept proposed in the process of urbanization. Therefore, the planning of life circle attaches great importance to secondary public health risks caused by natural disasters. The following will list how Japan relies on the life circle to build an epidemic prevention system from daily care and pandemic emergency. Population size and medical facility support in the Japanese life circle. *(Source: Shao, 2020.)*

	Local life circle	Secondary life circle	First life circle	Basic settlement circle
Radius	20–30 km	20–30 km	4–6 km	1–2 km
Access time	1.0–1.5h by car	Within 1 h by car	15 min by car	Walking for the elderly and young children
Central area population	More than 150,000	More than 10,000	More than 5,000	More than 1,000
Affiliated Facilities	Various hospitals, various schools, central market	Commercial streets, specialized schools, specialized hospitals	Government offices, clinics, meeting places, primary and secondary schools	Child care, elderly welfare equipment

Figure 3: Diagram of regional comprehensive support *(Source:Shao, 2020.).*

In addition to the construction of the medical circle, green space and open space are also considered and planned as important spatial elements in Japan. Open spaces such as parks not only play a positive role in alleviating earthquakes, rainstorms and fires, but also contain functional roles that are expected in the face of the spread of epidemic viruses, such as evacuation sites, reconstruction sites, temporary housing sites and temporary parking places for cars. Although there are no specific countermeasures to deal with the epidemics and prevent the infection of germs, the construction of open spaces in cities is of great significance as a necessary blank space for the construction of emergency hospitals and evacuation facilities.

In the epidemic prevention system based on the life circle in Japan, we can see the community-level support in emergency prevention and care for the elderly and other disadvantaged groups. With the studies of life circle conducted in China in recent years, we can also think about how to closely integrate daily health care and emergency epidemic prevention based on walk to reach the community life circles.

3.2 UK: Establishing response levels and supporting

The Department of Health Social Services & Public Safety (DHSSPS) emphasizes the principle of 'proportionality' in emergency response to pandemic [10], that is, taking measures to guide the community according to different response levels. Infectious diseases in the UK are set to four gradients of initial, low, medium and high intensity, with different levels corresponding to different guidelines at the community level.

In the early stages of the epidemic, health care providers will be required to respond by preparing for any possible development by preparing supplies or deploying staff; when the epidemic reaches low intensity, antiviral drug suppliers will be provided in high prevalence areas and non-registered pharmacies will be eased; when the epidemic reaches medium-intensity, antiviral suppliers will be required in all areas and home isolation treatment will be supported, while community public service need to ensure the maintenance of infrastructure. When a high-intensity response is achieved, all medical stuff, social workers and voluntary agencies will fully support the basic medical services in the community, and reserve secondary medical facilities for emergency response to the epidemic.

Therefore, when a pandemic occurs, the UK government recommends that most patients with symptoms do not have to go to hospital, but go to community-level clinics for basic diagnosis and care. It can be seen that the clear hierarchical response mechanism in the United Kingdom is the core starting point for the principle of 'proportionality', which helps to make full use of available health care resources and avoid cross-infection of patients with different levels of illness.

For epidemic viruses, due to the suddenness of such large-scale and rapid spread, each country has its own advantages and weaknesses in responding to major public health emergencies and epidemic outbreaks of infectious diseases such as COVID-19. The resilience system constructed by Japan at the level of life circle planning is of reference significance, and the graded response measures in the United Kingdom are worth promoting; but they lack a relatively complete corresponding system, and the response methods are not mature enough, so we should learn from the strengths of others in making the resilience of community life circles for epidemic infectious diseases.

4 LOOKING TO THE FUTURE: 15-MINUTE COMMUNITY LIFE CIRCLE RESILIENCE PLANNING IDEAS

According to Maslow's Hierarchy of Needs Theory, among the five levels of needs proposed by him: physiological, safety, love and belonging needs, esteem and self-actualization, the first three belong to the hierarchy where the basic needs can be satisfied through external conditions. Based on physiological needs, the 15-minute life circle should meet the needs of food, medicine, daily necessities, water, electricity, heating, etc., so it needs to be equipped with supermarkets, pharmacies, etc.; based on security needs, community life circles need to be equipped with primary and secondary schools, kindergartens, police stations, community hospitals, day care centers for the elderly, banks, etc.; based on love and belonging needs, the community life circle needs to be equipped with parks with green spaces, leisure and recreation places, etc. [11]. Referring to Maslow's Hierarchy of Needs Theory, combined with the *Shanghai 15-minute Community Life Circle Planning Guidelines* and *Urban Residential Area Planning and Design Standards*, the service facilities that must be configured in a 15-minute community life circle are divided into five categories: culture, sports, medical care, education and commerce.

Community governance should be the top priority when dealing with public safety incidents of epidemic infectious diseases, and we must take the construction of the '15-minute life circle' as an opportunity to integrate resilience planning into the 15-minute community life circle to response to epidemic infections and other emergencies. Therefore, the following resilience planning ideas are proposed.

4.1 Life circle layout: strictly control the source and tail of the epidemic

From the source, the SARS virus in 2003 and COVID-19 In 2019 are related to the market and live poultry trading in the market. In order to prevent similar things from happening again, the management must first prohibit the trading of live poultry in the market, and secondly, in the layout of the city should consider the front-end processing base of fresh food in the periphery of the city rather than in the city center, and it should not be arranged in the 15-minute community life circle. The 15-minute life circle should be laid out in supermarkets or food stores, and learn from the B2B model of European and American countries. If it is not aimed at ordinary consumers, the wet market should not be located in the city center, and should be sold in supermarkets after processing, and cold chain distribution should be implemented.

From the tail, the 15-minute community planning circle must have a safety blank space. In the past, urban blank space mainly served large-scale industries and strategic tasks with uncertainty, mainly serving economic goals, and rarely considered the blank space of risk and safety. The blank space based on ecology and safety should become the most important option for urban planning and construction [12]. It is not difficult to see that green space and open space are both important spatial elements in Japan. In addition to serving as an urban landscape, it can serve as a necessary temporary residence, emergency hospitals and shelter facility in the face of the spread of epidemic viruses.

4.2 Establishing a public health unit: balancing daily health and epidemic emergency

Virus transmission has no boundaries, and urbanization has enhanced the ability of virus transmission. Planning experts such as Wang Lan and Duan Jin call for design optimization

of community public space as the smallest unit, suggesting that the integration and interruption of social space and urban space should be reasonably organized, and that an effective spatial system for preventing and responding to emergencies should be established through 'defense units' [12], which can reflect the resilience and flexibility in responding to emergencies and form a decentralized public network. As a public health unit, the 15-minute community life circle can be considered from the Japanese epidemic prevention system in terms of both daily health and epidemic emergency response, and include in the 15-minute community life circle two major types of institutional facilities for the growth of chronic non-communicable diseases and outbreaks of communicable diseases to achieve health promotion and improve timely response to public health emergencies such as epidemics.

From the perspective of daily health, the 15-minute community life circle should build a healthy life circle with the main purpose of promoting the physical health of residents: adding fitness facilities, walking systems and open spaces, etc., so that residents can improve their quality of life in a comfortable urban environment. It should also be strengthened in terms of health monitoring at the community level and improve the chronic disease prevention and control service system.

In the face of the danger of a sudden epidemic virus, providing prevention, isolation, treatment and assistance during an outbreak is an important tool. Referring to Japan's emergency epidemic prevention plan, public health units should be based on the infrastructure of the 15-minute community life circle, with a wide coverage of medical facilities within walking distance, and include emergency support for infectious diseases, such as basic surveillance wards, isolation areas, health prevention liaison stations, antiviral drug supply points and disaster prevention parks with evacuation plaza design considerations, with adequate staffing. When an emergency occurs within the 15-minute community life circle, this emergency response circle can be activated in time for response, reporting and closure. These institutions and facilities serve one or more 15-minute community life circles based on population and employment density, population age structure and other characteristics [13].

4.3 Empowering the community: restarting the self-organizing function of the community

Community resilience includes the community's ability to self-organize, the ability to adjust, learn and adapt under pressure. A resilient community responds to change or stress in a positive way and recovers quickly. A smart government should strive to create

Figure 4: Diagram of resilience integrating into Public Health Unit *(Source:Wang, 2020.).*

an environment conducive to the improvement of the community's capabilities. During the epidemic, the importance of community governance is highlighted, especially the need for decentralization of medical services: proper separation of decentralized diagnosis in the community and centralized treatment in hospitals is beneficial to curb the spread of epidemics and avoid cross-infection caused by blind gathering of crowds in hospitals. If the community is given a certain degree of autonomy, self-determination and autonomy, this basic cell of the city will truly come alive [12]. On the other hand, empowering communities can also play the role of grassroots organization to mobilize and bridge the government and the market, and alleviate the temporary shortage of life security materials.

4.4 INCORPORATE SMART TECHNOLOGY INTO 15-MINUTE COMMUNITY LIFE CIRCLE PLANNING

There is no doubt that smart city technologies make our cities more resilient, so the resilient construction of a 15-minute life circle is even more indispensable with the support of pan-wisdom technology. From real-time query, visualization, analysis and prediction at the beginning of the outbreak, to auxiliary resource scheduling and prevention and control decision-making, it is evident that big data has become an important medium of participation in residents' lives and city operations.

Big data such as mobile signaling can limit the number of passengers and the density of public transportation and other means of transportation, so as to play a timely warning role in areas with high travel density; smart technology can also ensure travel, medical, food, logistics, urban basic services such as public safety, waste collection and disposal are uninterrupted; citizens who are isolated at home can work from home and online education through internet, which greatly improves the 'stamina' of public life at home during the epidemic [12]. Therefore, smart technology has greatly contributed to the resilience of the 15-minute community life circle planning.

CONCLUSION

By looking back at the epidemic in the Chenjiadun community of Wuhan, we recognize that the community planning or construction of supporting facilities needs to be re-examined and re-evaluated in terms of how to take into account the two different states of community public health in times of peace and epidemic, and the urban renewal approach also needs to be establish a new balance in the relationship between the daily needs of the community and the matching of urban public space [2]. Drawing on the excellent initiatives in community epidemic prevention planning in Japan and the UK, four suggestions are put forward on the resilience construction of the 15-minute community life circle: the layout of life circles should strictly control the source and tail of epidemics; planning should balance daily health and epidemic emergencies; management should decentralize community resources, especially the need to strengthen primary health care resources; and smart technology needs to be given full attention in life circle planning.

Taken together, the integration of the concept of resilience into the 15-minute community life circle focuses on a community-based platform that contains both comprehensive fitness and health care facilities, and a community system for public health protection, based on intelligent management and big data setup and interfacing to form a flexible response plan for unexpected outbreaks.

We will never achieve a city free of disease, but we deserve a city that is safe, healthy, prosperous, and able to cope with all kinds of dangers, emergencies and long-term challenges. So both cities and communities need to learn to recover from destruction and integrate health into all policies.

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