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Reflections on the Design of Urban Community and Residential Buildings in China in the Post-epidemic Era

Abstract

The epidemic of COVID-19 is a public health emergency of international concern. China cities have taken many measures to control the outbreak, which are timely and effective, but the problem and weaknesses in the urban planning stage have emerged. At the urban level, a comprehensive disaster prevention planning for the dual situations of normality and epidemic should be concerned. At the community level, the necessary improved facilities, the reasonable form, optimized spatial structure can support to construct a resilient community. At the architectural level, it is necessary to conceive the variation of residential buildings and the flexibility of living space to respond to the changes in daily lives in the Post-epidemic Era.

Keywords

Dual Situations — Buffer area — Resilient community — Space flexibility

The epidemic of COVID-19 is a public health emergency of international concern. The rapid spread of the epidemic depends not only on the flow of people but also on the urban spaces and buildings that act as carriers. This paper will firstly explore the countermeasures to prevent the epidemic of COVID-19 in China cities, then discuss the paradigms of responsive cities, urban communities and living space for the Post-epidemic Era.

I Make a comprehensive disaster prevention planning for the dual situations of normality and epidemic.

After the epidemic outbreak, China cities have taken many measures, such as postponing restart of schools and factories and suspending most inter-city public transportation to prevent virus transmission. Meanwhile, the makeshift hospitals were quickly built and in operation, and a few public gymnasiums have been transformed into mobile cabin hospitals and temporary quarantine points (Fig.1). Though the response is quick and positive to stop the disaster, the problems and weaknesses caused by the previous urban planning have emerged.

The control of epidemic needs to restrict urban mobility, while the implementation of epidemic prevention needs to guarantee the mobilization of rescue materials, personnel and equipment (Yang et alii, 2020). The urban administrative management unit lacks alignment with the epidemic control system, which has led to the insufficient and unevenly distribution of urban public resources and services. For example, the medical facilities are unevenly distributed for urban residential areas,



Fig. 1

Mobile cabin hospitals in Wuhan.
Source: <https://www.ettoday.net/news/20200219/1649257.htm>

especially the aging communities (Li et alii, 2020). After the rapid urbanization and disordered development, the urban space is overcrowded and complicated to be managed or controlled (Duan 2020). In addition, the function of urban nature ecosystem to prevent and control epidemic has not been fully realized (Yuan et alii, 2020).

Some possibly effective measures have been discussed corresponding to the above problems. First of all, a better mix of work and living in planning can reduce unnecessary mobility. A dynamic digital map of the city epidemic situation can be used to assess and formulate the emergent rules, such as to switch the quarters' opening or to adjust the transportation systems. Second, the urban administrative management unit can be subdivided into smaller 'defense units' which can operate as a self-sufficient unit with necessary urban infrastructure and public service facilities. Last but not least, a more comprehensive disaster prevention planning should be formed for public health emergencies. As an essential part of the urban natural ecosystem, the blue-green space can function well while combining with the system layout and local conditions for dual situations. Learning from Dujiangyan Irrigation System in China, which has been working for field irrigation at regular days and water discharge in flood season over 2200 years, we can also set up the buffer area in the city to enhance the dynamic adaptability of the existing urban spatial system and the resilience of the city. The buffer area can participate in urban life in normality and reorganize the urban space in an emergency. This could be the starting point of rapid response and the core of urban operation (Fig.2), it can make use of vacant buildings and the areas with a sustainable approach as well.

II Improve the necessary facilities, optimize the spatial organization and construct a resilient community.

The management for a matrix of urban communities has been carried out to prevent the epidemic, with setting up passes to limit the entry and exit of residents (Fig 3). As the popular form of the residential

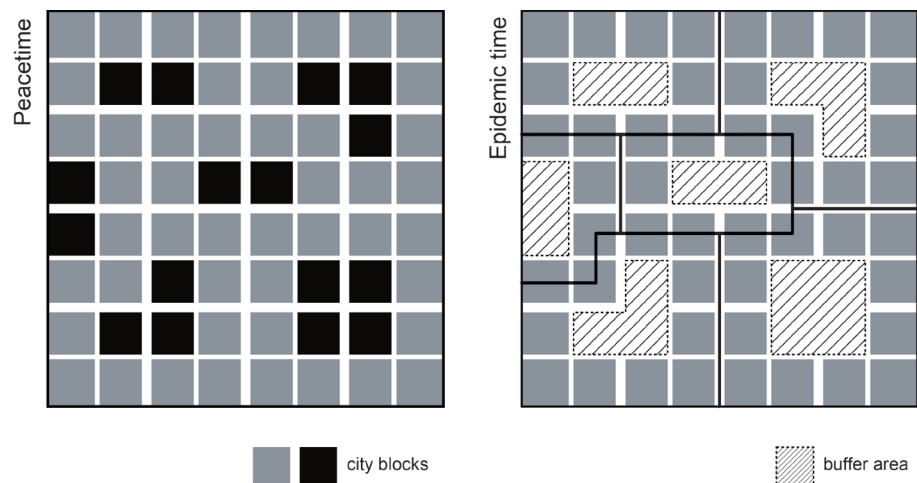


Fig. 2
Buffer area in Peacetime and
Epidemic Periods.

blocks in China, the gated communities have clear boundaries which are efficient to control the epidemic. However, the daily necessities are insufficient, especial at the beginning when the public service and commercial facilities could not work ultimately. Thus it is hard to maintain the communities' everyday life, and the low resilience has been revealed soon. The large scale and high density in space and population of most existing communities have made it more difficult to respond quickly and effectively.

Meantime, community isolation leads to an increase in the duration and number of residents staying in outdoor space. The contradiction between people gathering and safe distance, between space sharing and division has asked for the redefinition and reorganization of the public space of community.

i The commerce and medical facilities in the community

With the strengthened epidemic prevention measures and the requested home isolation, the residents' lives rely on the community commercial services increasingly. Community commerce can not only make up for the shortage of urban market but also serve as an essential part of improving the urban emergency security system (Wang and Wang 2020). The current community level's commerce should be increased in the whole urban system. Furthermore, the modes of commercial service can be more flexible and diverse to achieve the balance of cost and efficiency and to promote the standard of community commerce which based on the information technology and logistic support, such as online integrated with the offline sale, warehouse store direct for community group purchase. Regarding the community as the basic urban defense unit, it is vital to complement the medical facilities in communities and improve the medical service. Also, all of the facilities and services have to adjust during the different periods of the epidemic.

ii The reasonable form and the optimized spatial organization

The high density of the community means the high population of residents with the high-rise buildings. It has become a prevalent phenomenon in China cities, highly detrimental to epidemic prevention. To decrease such high density has become a crucial issue. The decentralization or multi-centralization of city development, the multiple types of productions, from tower apartments to single house in real estate could be effective solutions.



Fig. 3
Community setting up passes,
(Photo by author).

The dynamic balance between opening and closure of urban settlements has attracted much attention (Wu et alii, 2020). To cope with the dual situations, a three-level spatial prevention and control system of the urban community has taken a crucial role in preventing the epidemic: large open block, medium controlled community and small isolated unit.

The scale of community and the structure of the street need to be carefully defined in planning, open communities with smaller neighbourhoods and denser street networks could be taken for more flexible and controllable. The roads should provide alternative routes according to the demand of the balance between traffic mobility and management convenience.

Moreover, the concern has raised in the public space of the community (Fan and Li, 2020). The continuity of green space shall be enhanced in the community. And the flexibility of public space can be reconsidered and reexamined, in the forms of the sunken passage or hanging platforms combined with the available space to create hierarchical public spaces at different heights (Fig 4).

iii Residents' self-organization and intelligent community

The Internet and other technological means have shown the advantage of building up the intelligent community in terms of building maintenance and community management. Along with that, the residents' self-governance can also help to form a resilient community against the emergency, such as establishing the owner committee and jointly managing the living space.

III The variability and flexibility of residential buildings and living space

During the period of home isolation, children should stay at home and study online courses, while the parents also have to shift into online working mode. The grand-parents prefer quiet space, but the kids

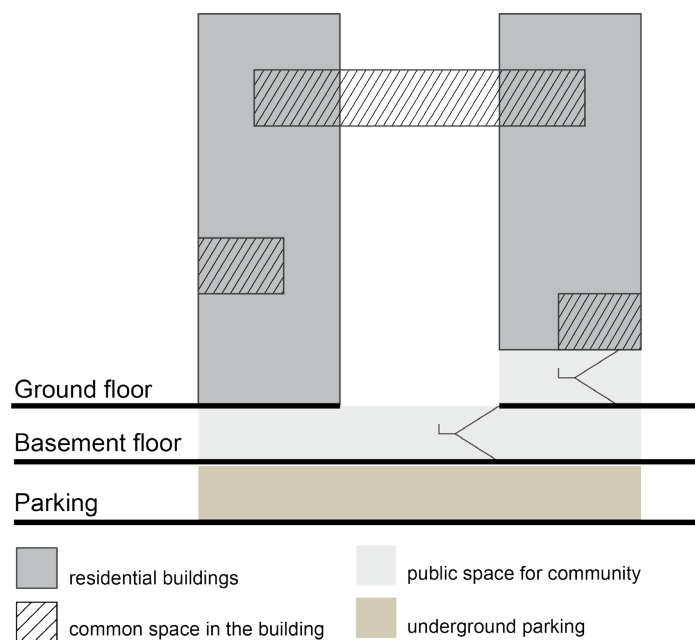


Fig. 4
Hierarchical public spaces at different heights.

always make noises. The family members' behaviours are mixed, living with working and studying. The interferences and conflicts have frequently occurred in limited space. Therefore, the living space has to be variable and flexible to meet the various demands, especial in families with three generations.

i Variability of residential building

Relying on IT and digital technology, a new mode of production and lifestyle has appeared. The home isolation has reinforced the demand for workspace at home and tightened work with life closely. Therefore, new residential buildings can provide more space for fitness, entertainment, and other activities during isolation. Also, the residential towers can contain common spaces vertically and separated. For instance, some floors can be inserted into the tower for co-work shared by a particular group of neighbours in the same building (Fig 5).

ii Flexibility of living space

Staying all-day-long at home with family is a 'sweet trouble'. The various demands of each member should be taken into consideration. The flexible layout with movable partitions of furniture and the overlap of usage time become an effective strategy. Also, it is useful to provide the space redundancy either in terms of the area of indoor space or enough height of the space, which can define an extra-upper level workspace.

The measures taken in China cities are timely effective to deal with the sudden epidemic. However, the problems in urban planning, communities, and residential buildings design have been also revealed. Firstly, a more overall view of the comprehensive disaster prevention planning should be formed based on public health emergencies. Then to further improve the necessary facilities and optimize the spatial organization can support to build up a resilient community. It is also required to conceive the variation and flexibility of residential buildings and living space for the changes in daily lives.

Though China has been gradually back to the normal state, the city,

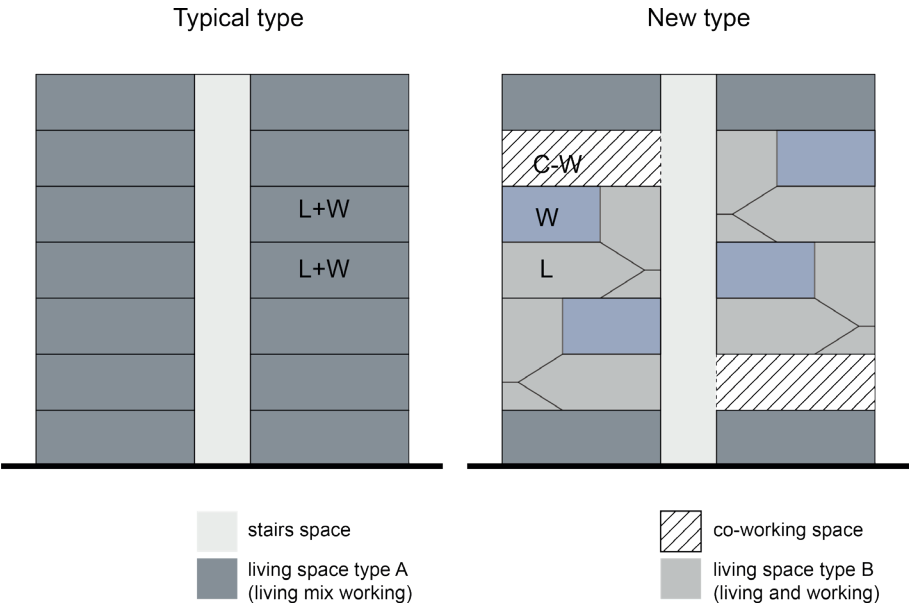


Fig. 5
Co-working floor.

the communities and residential buildings still request the dynamic adaptability to respond to the future uncertain emergency. Through the interpretation and reflection, the experience of the last few months in China can give the lessons and inspiration for the Post-epidemic Era, which is the intention of this paper.

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Die Hu (1995) architecture graduate students, she graduated with honour from Architectural Department of Southeast University.

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