

Strategies of Residential Area Regeneration and Urban Development in China from the Perspective of Mismatch between Population Mobility and Land Supply: Take Shenzhen as Example

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Objectives: After the global financial crisis in 2008, the housing price in cities of China turned from comprehensive prosperity to regional differentiation, and the phenomenon of coexistence of "high housing price" in some cities and "high inventory" in some other cities appeared. The problem of mismatch of land resources and population mobility in China has generated superimposed effect on the high housing price and high inventory in different areas, and the outbreak of COVID-19 in the world has also brought new challenges to the urban development modes; thus, how to develop mega-cities to guarantee the residents' welfare has become an important academic issue and practical issue. In this paper, with Shenzhen, the most representative city in China, as an example, typical characteristics of real estate market in cities are analyzed, and the methods such as field investigation, questionnaire survey and behavior observation are adopted to analyze the conflicts between the spatial environment of the old residential areas and the demands of residents from the perspective of man-land mismatch. On the basis of expounding the corresponding relationship between the residents' actual demands and the space, the intergeneration-integrated age-appropriate community regeneration strategy is proposed, and the corresponding suggestions on improving the residents' welfare are proposed from the perspectives of aging of population, architectural space and urban development. This paper concretely reflects the real estate policy of "one policy for one city", and proposes new thinking for the development of resilient cities in the post-epidemic era.

Key words: mismatch between population mobility and land supply; high housing price; resilient cities; residential area regeneration

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After the housing monetization reform in China in 1998, the real estate market in China presented a situation of “global prosperity”, and the housing price and investment in real estate rose rapidly all the time. However, after the global financial crisis in 2008, the government and all sectors of society realized that the housing price rising excessively would generate irrational expectations to form much speculation demand adverse to the market stability and cause huge potential financial risks. The real estate market in China was a typical “policy market”, and the housing price fluctuated more because of the government’s powerful external intervention, so the government began to utilize the macro policies and housing regulation policies to regulate the market, so as to make the market return to the rational level. However, in view of the vast territory of China as well, the real estate market in China gradually presented the characteristics of high differentiation between regions. It was reflected in that in some first-tier and second-tier cities, housing price continued to rise, with the decline in the inventory, but in some third-tier and fourth-tier cities, the sale of real estate was depressed, with a lot of housing inventories. Growth in housing price in China was no longer “global”; instead, it was reflected as the co-existence of high housing price and high inventory, and presented the typical unbalanced regional development.

Such phenomenon triggered the thinking in the academic circle: What was the reason behind such regional high housing price on earth? How should the real estate market in the areas with high housing price develop to really improve the residents’ welfare and bring the sustainable growth of the urban economy? A lot of researches in developed countries indicated that the relevant indicators of macroeconomic fundamentals could explain most housing price fluctuations.¹⁻⁴ However, Shen Yue and Liu Hongyu thought that the growth in housing price in most cities could not be well explained

by the economic fundamentals and historical information of housing price.⁵ Yu Huayi thought that housing price had deviated upward from the economic fundamentals.⁶ In recent years, more scholars have turned their perspective from the demand end of housing regulation to the supply end, and have thought that spatial resource mismatch has been the most fundamental reason for the high housing price in some cities.⁷ Specifically speaking, the housing supply and the population mobility are in opposite directions, or to say, land urbanization and population urbanization deviated from each other. For the perspective of the supply level, the land supply policy will indeed significantly promote the rise in housing price.⁸⁻⁹ Recently, some researchers thought housing price differentiation between different cities at present rooted in the mismatch between land supply and demand from the spatial perspective, so reducing the spatial distortion of land supply could guarantee the healthy development of real estate market.¹⁰⁻¹²

In view of this, “improvement of the man-land mismatch phenomenon may control the high housing price” is undoubtedly a correct proposition. However, there is a paradox thereby: For mega-cities in China, such as Beijing, Shanghai, Guangzhou and Shenzhen, it is difficult to increase the urban land supply (in particular, the residential land in Shenzhen is extremely limited), and at present, when the household registration system is gradually liberalized, the government cannot and should not curb the inflow of population. At the same time, China is facing serious problems of aging and fewer children at present, and the two problems of pension system and the scarcity of children’s education resources restricts the life of the current working-age people. How should the mega-cities with high housing price develop the real estate market? Where is the future of new urbanization? Many scholars began to pay attention to the issues of “housing regeneration” and “age-appropriate housing”, that is, how should we improve the environment of residential areas and reshape the residential functions to adapt to the appearance of the aging society and the update of cities from different perspectives when

the quantity and location of residences are unable to be expanded.¹³⁻¹⁴

About the research on the existing age-appropriate residential areas, most Chinese scholars have studied the aspects such as residential area planning, residence for the old people, community pension and care service facilities. Such as: Research on discussing the feasibility of new-type residential areas combining the demands of the old people living in the community and the non-age-appropriate problem of residential areas;¹⁵ Research on the suggestions on the structure and content of the community life support service system based on the old people's demands for the living space and community care facilities.¹⁶ Lei Zhikeng carried out research on providing the feasible plan to solve the conflict between the old people's specific living demands and age-appropriate insufficiency of old residence under the mode of home-based care for the old people.¹⁷ About the age-appropriate research on outdoor public space of old residential areas, Lin Wenjie et al. put forward the age-appropriate outdoor activity space strategy.¹⁸ Macroscopically, from the perspectives of urban planning and community planning design, the research aims to discuss the living arrangement and living decision collaborating with the intergenerational relations in multiple dimensions. Microscopically, based on the exploration of the psychological and behavioral habits of the old people and the children, the spatial environment of residential areas and service facility layout of residential areas have been studied. Zhou Yanmin et al. analyzed the dwelling size design of multi-generation residence, with regard to the multi-generation residence demand in cities and combined with the survey and research, in the context of serious aging, accelerated urbanization and high housing price.¹⁹ For example, starting from the research on behavioral and psychological characteristics of the old people and the children, and based on the analysis of common characteristics of outdoor activity space required by the old people and the children, Lv Yuan put forward the design strategy of space sharing by the old people and the children from the aspects such as function, space, environment and facilities.²⁰ However, the current research has

mostly focused on the analysis of single population, but there has been a lack of research on the communication behavior demands of the old people and the children; in particular, there has been little research on the relationship between the behavior demand of the migrated old people for taking care of their grandchildren and the outdoor space of existing residential areas.

In this paper, combined with the above issues, Shenzhen, the most representative city in China, is selected for the case study, and the methods such as field investigation, questionnaire survey and behavior observation are adopted to analyze the conflicts between the spatial environment of old residential areas and the residents' demands from the perspective of man-land mismatch and conduct the intergenerational communication research on the outdoor space of such existing residential areas from the perspective of interaction of the old people and the children, so as to attempt to put forward the strategy for regeneration of existing residential areas; in addition, the suggestions on improving the residents' welfare are proposed from the perspectives of population aging, architectural space and urban development. Part II is the statement of reasons for selecting Shenzhen as the research object and its current situation; Part III includes the research methods and result analysis, Part IV is the policy suggestions, and Part V is the conclusion.

CURRENT SITUATION

In this part, current situation of misallocation between the flow direction of Chinese population and the supply of land resource is described and the tendency of house price of Chinese cities is analyzed to clarify two main problems: the reason why Shenzhen is selected as the research objective and the reason why further research will be conducted.

It is held in the paper that the problem of supply and demand misallocation between land and population serves as the fundamental reason why both "excessive-priced housing" and "high inventory" exist at present. In simple terms, the supply direction of land resource is not consistent with the population flow direction. Chinese population and talents are mainly flowing towards developed cities, while there is a serious imbalance in the distribution of construction land indexes among Chinese cities, less developed ones tending to gain higher construction land indexes compared with their developed

counterparts. Therefore, "population urbanization" is out of line with "land urbanization", resulting in less supply in the place where there is more demand and less demand in the place where there is more supply. In China, 258 prefecture-level cities are selected to better reflect this divergence trend in this part, and these cities are classified into tight (land policy) ones and slack (land policy) ones via the construction of a land supply identification index. Meanwhile, the population factor is introduced to classify these cities into ones with population inflow and ones with population outflow, thus four quadrants take

shape as shown in Table 1. Accordingly, these 258 cities are classified into ones with tight land supply and population inflow, ones with tight land supply and population outflow, ones with slack land supply and population inflow, and ones with slack land supply and population outflow. The relaxation and tightening of land supply depends on the land policy after 2003. Whether a city is with population inflow or outflow depends on whether there have been more than 6 consecutive years of population inflow or outflow in the past 12 years. We can see that cities with tight land policy and also population inflow are mostly distributed in the Bohai Sea Rim, Yangtze River Delta and Pearl River Delta.

Classification of the Phenomenon of Misallocation between Land Supply and Population Flow		
	Population outflow	Population inflow
Tightening Land Supply	Quadrant II: Slump of property market (Relative matching of resources)	Quadrant I: Areas with excessive-priced housing (Resource misallocation)
Slackening Land Supply	Quadrant III: areas with high inventory (Resource misallocation)	Quadrant IV: Healthy development of the property market (Relative matching of resources)

Quadrant I mostly contains cities with "excessive-priced housing", demonstrating an obvious resource misallocation; cities in Quadrant III are also those with resource misallocation, showing, however, the "high inventory" of housing; resources in quadrant II and IV are relatively well-matched in terms of resources, the former witnessing a slump of the property market and the latter, however, seeing a healthy development of property market. Of these 258 cities, the numbers of which belonging to quadrants I, II, III, and IV respectively are 45, 17, 104 and 92. The mega-cities like Beijing, Shanghai, Guangzhou and Shenzhen belonging to quadrant I are those with most serious misallocation among these cities.

Meanwhile, these 258 cities are divided into first-tier, second-tier, third-tier and fourth-tier cities based on the Chinese city classification criteria, the average house price of each group from 2000-2018 is calculated. They are plotted as shown in figure 1. Meanwhile, the house prices of Shenzhen from 2000 to 2018 are plotted here simultaneously. It can be seen that the house price in Shenzhen has already been significantly higher than the average one in first-tier cities.

Looking further, as of March 2021, the average house price in Shenzhen has reached RMB 94,165 per square meter, the highest all over China. Meanwhile, data from the seventh national population census shows that, in Shenzhen, a typical city of immigrants, the permanent resident population in 2020 has reached 17.56 million, with an average annual population increase of 700,000 from 2010 to 2020 (10 years). Separately, in Shenzhen, also China's "youngest", and "most hardworking" city, the average age of the permanent resident population currently reaches 33, the proportion of the employed exceeding 86%. The arrival of young families also facilitates the inflow of a large number of old people. And as the first generation of "pioneers" in Shenzhen gradually steps into their old ages, a serious aging problem hits the city. A large influx of population will undoubtedly bring huge demand for housing, while the city indeed suffers from the very limited land supply, of which the residential part is more insufficient. Additionally, a large number of houses based on "dual-track" policy were built in Luohu, Futian and Nanshan districts of Shenzhen in the early period. Despite the age of construction, these centrally located settlements provide convenient life and transportation. As time progresses, there is great room for improvement in aging suitability for these settlements that are no longer able to meet life

demands of the residents. In summary, Shenzhen is selected as the research objective because it is the most typical representative of the above-mentioned problems.

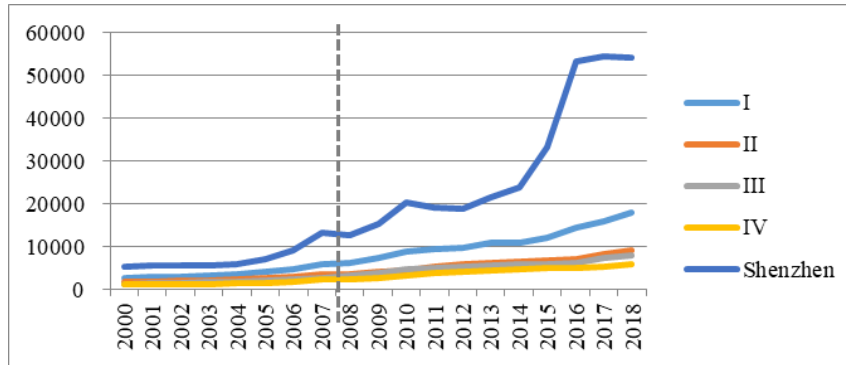


Figure 1 House price trends in tier I-IV cities (and Shenzhen) in China from 2000 to 2018

INVESTIGATIONS

Research Objects


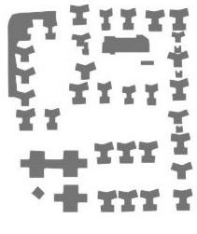


At the initial stage of reform and opening-up, Shenzhen took the districts of Luohu, Futian and Nanshan as the key development and construction areas, and most of the existing residential areas built in the 1980s are distributed in such three districts above. Therefore, the cases in this survey cover such three districts. The typical and representative existing residential areas are selected, and the residential areas built before the end of the “double-track system” policy¹ are mainly selected for the research and analysis. Most of such residential areas were funded and built by the government or used to solve the housing shortage problem at that time; thus, due to the backward design, it is difficult for the residential areas to meet the current living demands. Most of the residents in the communities served the same unit; the neighbors are well acquainted; in addition, the quantity of the old people is higher than the average level, and there are frequent parent-child behavior activities of the old people and the children. Upon the pre-survey, four existing residential areas including Overseas Chinese Town East Cluster, Xiabumiao North Community, Cuizhuyuan and Dwere selected as the key research objects (as shown in Table 2).

Built leaning Yanhan Mountain, the terrain of residential area of Overseas Chinese Town East Cluster is low on the southeast side and high on the northwest side. Its construction planning is dominated by the row and line type, and the housings are mainly of multi-storey board type and point type. Buildings in Xiabumiao North Community are arranged in rectangles, and their plane is of multi-storey butterfly type. The terrain of Cuizhuyuan is high in the north and low in the south, existing large altitude difference in the community. For the building types, the point-type multi-storey tower buildings dominate, and there are a few multi-storey board buildings. The building plane of residential area of Dongle Garden is divided into butterfly type and board type, including 6 high-rise planes of butterfly type and 112 multi-storey buildings of board type, and they are arranged in rows and lines.

Questionnaire Survey

The writer randomly distributed a lot of questionnaires to the residents above the age of 60 in four selected residential areas in Shenzhen. The questionnaire mainly includes four parts: 1. Basic information; 2. Physical conditions; 3. Reasons for coming to Shenzhen; 4. Characteristics of daily activities. A total of 1,200 questionnaires were distributed, 1129 recovered; of which 1098 questionnaires are valid, the effective rate is 91.5%.

Table 2
Basic Situation of Four Typical Residential Areas in Shenzhen, China

Residential Area Name	The East Group of OCT	Xiabumiao North community	Cuizhuyuan	Dongle Garden
Form of Residential Area				
Location	Nanshan District	Futian District	Luohu District	Luohu District
Construction Time	1987	1983	1982	1988
Scale	27 Buildings	32 Buildings	73 Buildings	118 Buildings

Note: The form of residential areas in the table is drawn by the authors.

In the aspect of basic information, the old men account for 49.6%, and the old women account for 50.4%. Of which, 60-65-year-old people account for 44.8%; 66-70-year-old people account for 22.1%; 71-80-year-old people account for 22.8%, and the people above the age of 80 account for 10.3%. In the aspect of physical conditions, most of the old people interviewed can take care of themselves, and most of them are between the age of 60 and 65. About the “reasons for coming to Shenzhen”, the old people who seek care and asylum from their children account for 22%; 41% of the old people come to Shenzhen to help to take care of their grandchildren, and 30% of the old people are settled in Shenzhen because of their work in early years. While the original residents of Shenzhen only account for 3%, and 4% of the old people are still working in Shenzhen at present (as shown in Figure 2). The questionnaire results indicate that the proportion of old people who come to Shenzhen to help to take care of their grandchildren is very high. That is to say, among the residents of the residential areas surveyed, there are young

children and the old people who help to take care of their grandchildren in a lot of families.

About the characteristics of daily activities, the old people interviewed have relatively more leisure time in daily life. 64.1% of the old people go out for activities twice and more every day, and 8:00 a.m. – 11:00 a.m. and 2:00 p.m. – 5:00 p.m. are two peak periods for the old people to go out for activities. The survey results indicate that the old people’s activity contents in outdoor space mainly include walking, square dancing, playing chess and cards, using the fitness equipment, ball games, walking dogs, chatting, basking in the sun, sitting at leisure and taking care of children (as shown in Figure 3). Of which, the activities of high proportion include walking, basking in the sun, sitting at leisure and taking care of children. By further chatting with most old people, the writer learnt that many of them who selected “basking in the sun” and “sitting at leisure” also took care of children in outdoor activities, but they chose such options because they failed to understand clearly at the time of filling in the questionnaires.

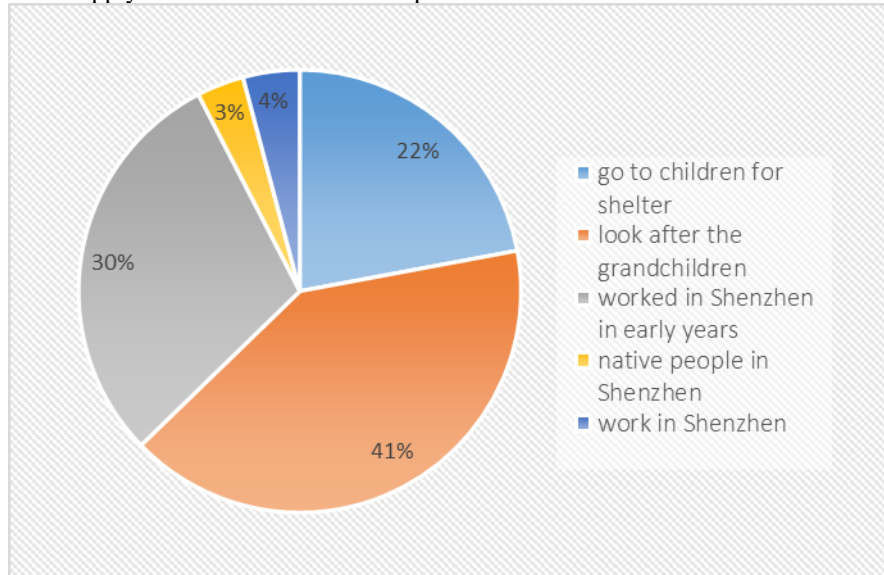


Figure 2: Reason for coming to Shenzhen

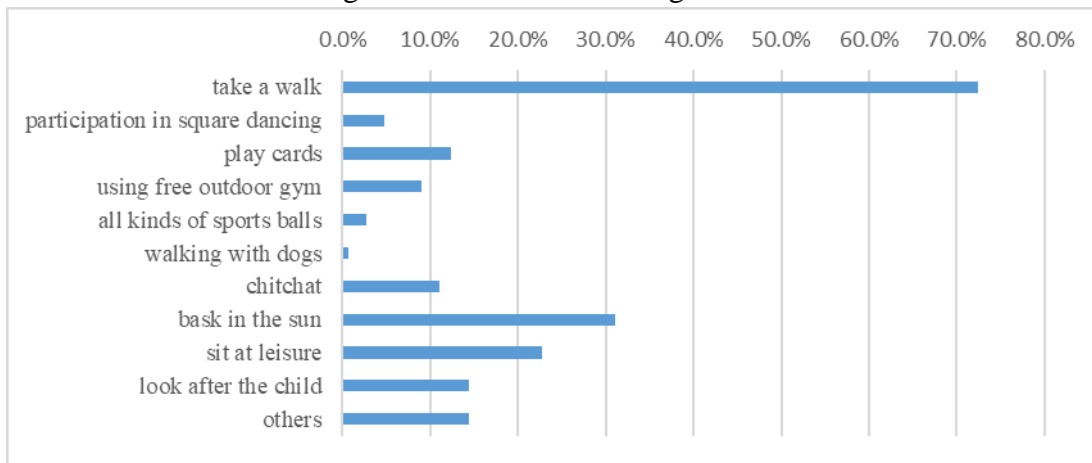


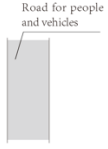

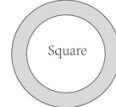

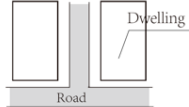

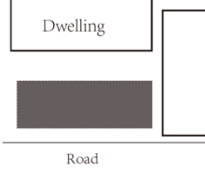
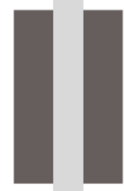


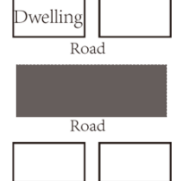
Figure 3: Types of daily activities and time proportion of the elderly in Shenzhen

Field Investigations

In this part, field investigations and analysis on the outdoor space of existing residential areas in Shenzhen are conducted, to conclude the characteristics and demands of the behaviors of the old people and children in the existing residential areas, seek the planning and design scheme for improving the existing residential areas and explore the possibilities of residential regeneration and urban development. We divide the space where the interaction behaviors of the

old people and the children in the existing residential areas occur into road space and public activity space and extract the prototypes of such two kinds of space. We divide the road space in residential areas into five types, including straight line type, “convex” type, ring type, linear node type and cross node type. We divide the public activity space of residence into single activity includes open type, semi-enclosed type and pass type, and the compound type includes open type, semi-enclosed type and enclosed type (see Table 3)

Table 3
Pattern for Walking Space of Existing Residential

Types		Pattern of Spaces								
Street space	Linear type		Raised type		Round type		Linear node space type		Cross node space type	
	Public activity space		Open type		Semi-open type		Passing type			
			Open type		Semi-open type		Enclosure type			

The writer's group conducted the field investigations for 4 months, and the investigation period was from 7am to 7pm. They recorded and analyzed the characteristics of interaction behaviors of the old people and the children under two walking space systems through filed observation.

The first kind of analysis was conducted mainly on the interaction behaviors of the old people and the children in the road space, mainly including the pass behavior, care behavior and waiting behavior. First, pass behavior. In the road space, most of the pass behaviors of the old people and the children are during the time periods of going to school and going home after school and the specific behavior refers to that the old people accompany the young children to go to school or go home after school and pass the road space in the residential areas. Second, care behavior. The care behaviors of the old people and the children have different demands for the road

space environment, and the main behaviors includes the old people play with children together; in order to take care of babies, the old people choose to sit at leisure on the road in front of their housings extremely close to their home, and the flower bed beside the road may act as the temporary seat; the old people wear the shoes for the young children or feed them on the stone by the road. Even if there is a seat at a short distance, they generally choose to sit on the stone nearby for the convenience. Third, waiting behavior. The road space at the entrances to the kindergartens in the residential areas is relatively special. Parents gather at the entrances to send or pick up children from school, which grants the traffic space of school entrances with the waiting function. We chose OCT No.1 Kindergarten and Cuizhuyuan Kindergarten in the existing residential areas as the observation points. As for OCT No.1 Kindergarten, from 3:50pm, the old people successively hurried to the entrance to the kindergarten from all places of the residential area and sit on the rods warding off vehicles on the edge of the sidewalk to wait. When

approaching 4pm, the old people gradually go to the opposite of the road and gather at the entrance. They stand in random and scattered positions, and some parents stand in the middle of the road, which is a big potential safety hazard. The landscape stone beside the road of

the entrance is equal to common seats in height, so an old man uses it as a rest seat when he waits his child. The flowerbed and areas around trees on the sidewalk are the most popular space for the old people to stand and wait(as shown in Figure 4).

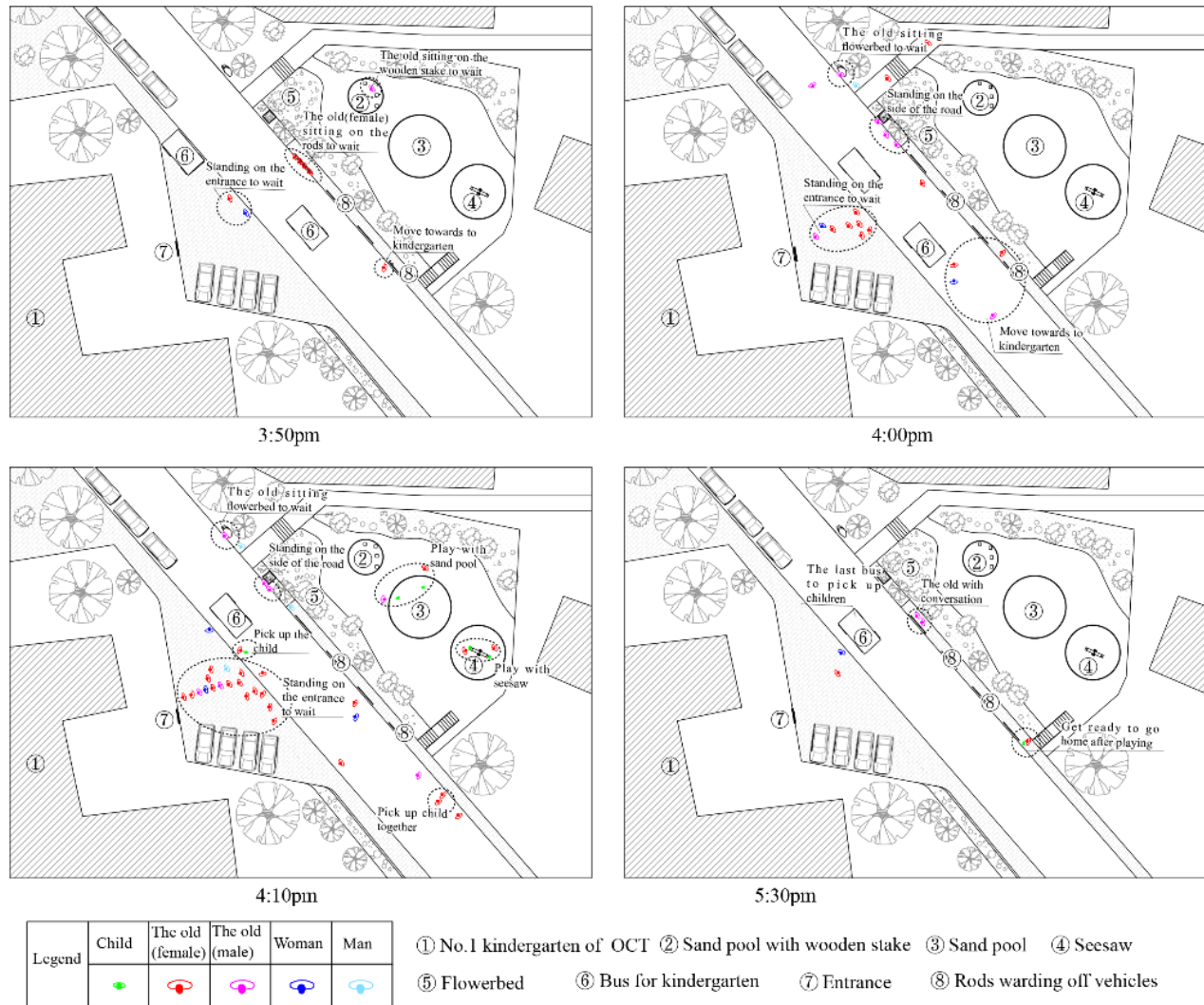


Figure 4: Thebehavior setting for No.1 Kindergarten of OCT

The road in front of entrance to Cuizhuyuan Kindergarten sets up the metal barricades, to prohibit the motor vehicles from passing, so its entrance is safer than that of OCT No.1 Kindergarten. The old people successively walk to the kindergarten from 4pm. and are scattered around the entrance first. Then, as the home time approaches, the old people gradually approach the entrance, and wait in line in proper order according to the telescopic isolation belt

set up at the entrance. Some old people stand on the sloped green land opposite the entrance to observe the situation of kindergarten after school with the help of the high terrain. The waiting time is long, so some old people choose to sit on the metal barricades or the curb(as shown in Figure 5).

The second analysis was conducted mainly on the interaction behaviors of the old people and the children in public activity space. It is found through the survey that the behaviors of the old people and

the children in the outdoor space of residential areas appear extremely frequently and randomly, so the public activity space is subdivided into three categories, that is, children’s activity space, space flexibly used as parent-child activity space and parent-child activity space formed spontaneously.

First, all four existing residential areas have the children’s activity space; “Tongle Paradise” of Overseas Chinese Town East Cluster is a

single children’s activity space, and the children’s activity space of other three residential areas is compound space, which is generally set in the same place with the fitness equipment and leisure tables and chairs. Through the observation records of the behaviors of the old people and the children in the children’s activity space of four residential areas, it is found that the intergenerational old parents who take care of children are more than the young parents (as shown in Figure 6).

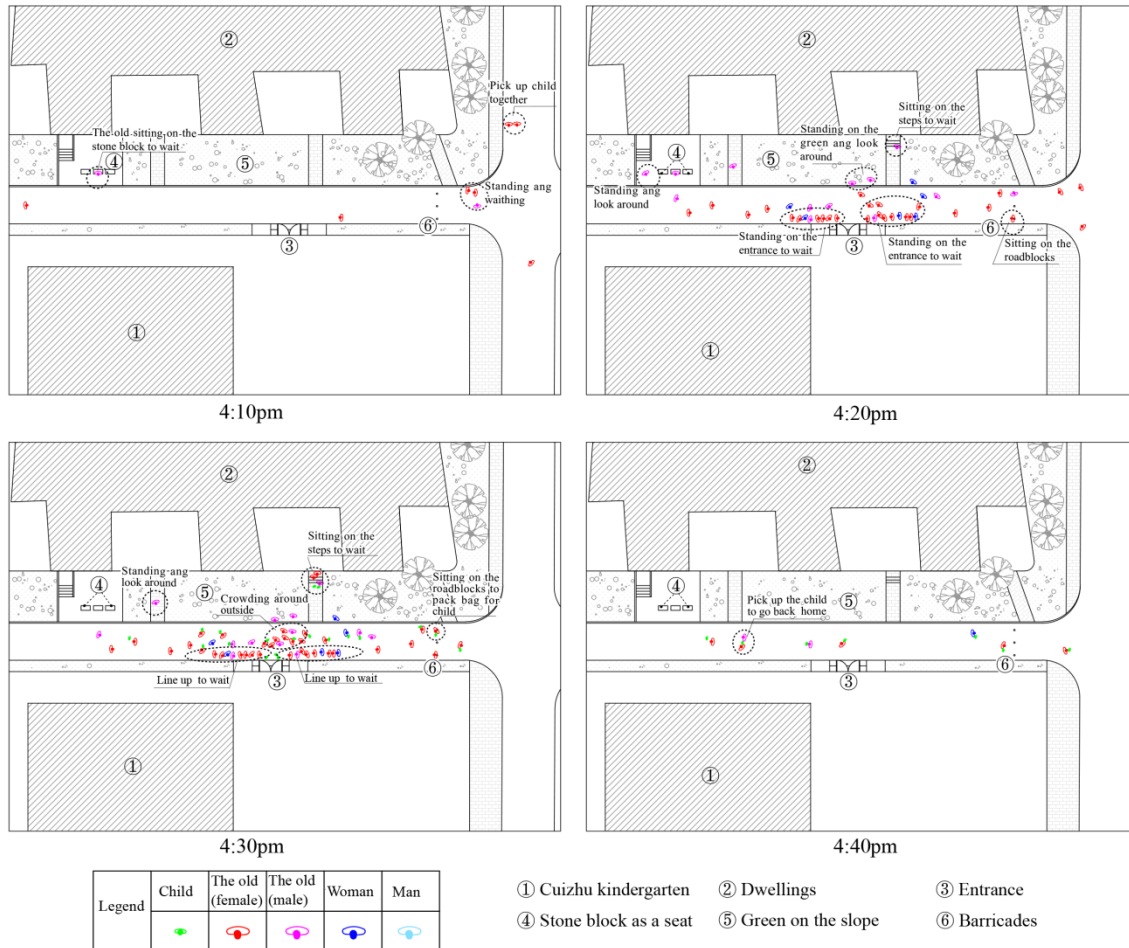


Figure 5: The behavior setting for Cuizhu Kindergarten

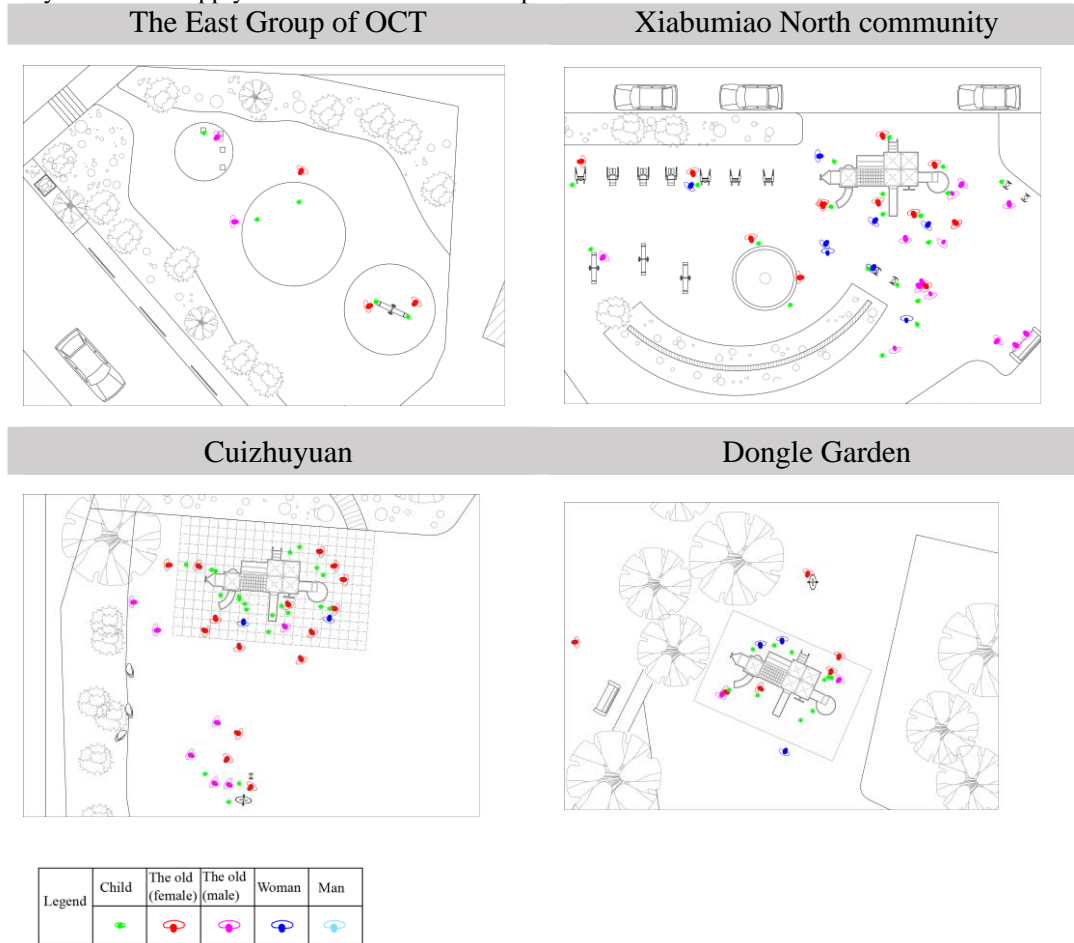


Figure 6: The behavior setting for children's activity space

A few people use the children's activity space of Overseas Chinese Town East Cluster, and they use it mostly after school of kindergarten children. The children only play here for a short time of no more than twenty minutes. Space utilization is low here before children leave school.

In the children's activity space of Xiabumiao North Community, there are not only children's slides and teeterboards but also the spring wooden horse seats, and this space has more abundant facilities for the children to play with than the other three space. For the older children, their parents will let them play. However, for the young children, their parents will follow them closely. The tree pool platform beside the children's slides and idle spring wooden horses act as the rest chairs for the parents, and the old parents will put the children's articles on the flower bed. Some old people also use the fitness equipment aside

while taking care of children. Relatively more people use the entire space.

In the children's activity space of Dongle Garden, most of the old people stand aside and take care of children, with the children's articles in hands, and some old people also lean on the slide for a rest.

In the children's activity space of Cuizhuyuan, there are many kinds of behaviors of the old people: some old people bend down to take care of children for walking; some old people stand or sit beside a slide to take care of children; and some old people push the baby carriages and walk. The space is large, with flat ground, so more parents push the baby carriages in this space than in other space.

Second, space flexibly used as parent-child activity space also widely exists in all residential areas. The exercise space in the existing residential areas is usually flexibly used as parent-child activity space, and children treat the fitness equipment as recreation facilities. In the exercise space, when children are in the safe state, the old parents choose to keep an eye on them aside, but when the children play with the

equipment and may be involved in danger, the old people will assist them in playing and protect the children's safety.

Space flexibly used as parent-child activity space includes the liner space and planar space. The old people and children have different activities in the space. In the linear traffic space, the old people and the children are in the zero distance contact state, which may enable the old people to timely protect the children when they predict the danger. In the planar exercise space, there is enough space for the young children to walk and play, and the lower part of the exercise space is rubber cushion, which can play a buffer role when children fall. At this moment, the old parents will keep a comfortable distance from the young children, so that the children may play in the abundant space, and the parents' intervention actions are reduced. At this moment, the old people will also use the fitness equipment, to relieve boredom through exercise while taking care of children. In the idle sports space with larger area, there is no obstacle or shelter on the site, so the children may run, play scooter and do other activities in it. At this moment, the distance between the old parents and the children will be longer, and the old people will trace the children's activity state through their eyes, without running closely after the children, but they will guarantee that the children play safely within the line of sight.

Space flexibly used as parent-child activity space is extremely common in the existing residential areas in Shenzhen, which is uncertain. The common exercise space and activity sites with larger area are flexibly used as parent-child activity space. Such space failed to consider the scene of sharing by the old people and the children at the beginning of design, so it lacked the basic rest facilities.

Third, parent-child activity space formed spontaneously is also common. The writer found in the survey that multiple residential buildings in Overseas Chinese Town East Cluster were far away from the children's recreation space, so the old parents purchased the toys (such as simple slide) by themselves and placed them in the vacant lot in front of the residential buildings to set up the temporary children's activity space spontaneously (as shown in Figure 7). At the same time, the facilities in such activity space are simple. The children's activity facilities, such as children's slide, are simply arranged mainly for the children's playing behaviors, lacking the design and consideration of intergenerational sharing facilities and lacking the rest facilities, so the old people who take care of children in the children's activity space can only stand for a long time. The space flexibly used as parent-child activity space is flexible space, which is mainly used by the adults, but will also attract the children and their old guardians to use it together.

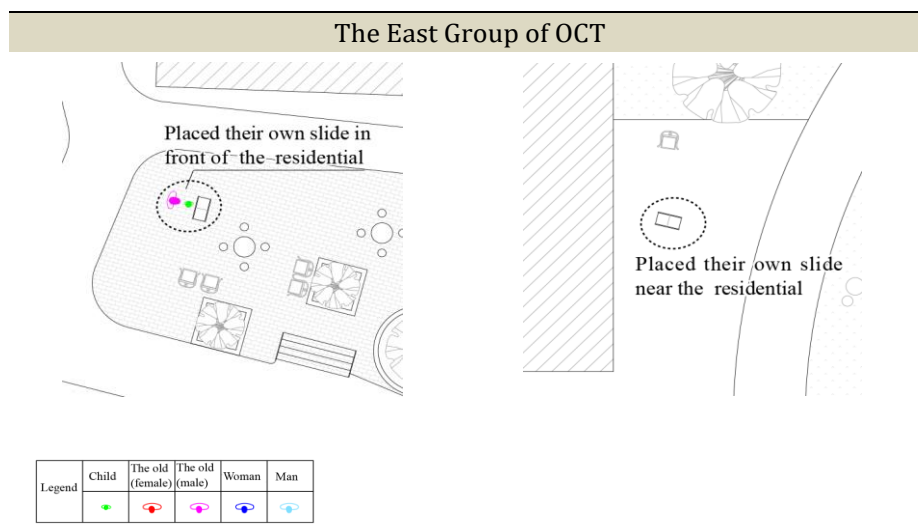


Figure 7: Space Flexibly Used as Parent-child Activity Space

Analysis

We may conclude that in the circumstance that the hardware conditions and overall quantity of existing residential areas in Shenzhen cannot be expanded, we shall pay more attention to improving the environment of existing residential areas; in particular, we shall pay attention to the issue of co-existence of the old people and the children in the cities and design the intergeneration-integrated outdoor space of residential areas, to meet the demand of residential regeneration and increase convenience for residents. In the design improvement of the intergeneration-integrated outdoor space of residential areas, the following demand characteristics shall be met: First, safety demand. For it, not only attention shall be paid to the safety design of road space and various facilities, but also the management of residential areas shall be improved to guarantee the safety of residential areas; Second, interest demand. Diversified and rich spatial environments may stimulate the children's nature of free creation, and the children may also interact and cultivate affection with the old parents through the environment; Third, integration and sharing demand. The intergeneration-integrated outdoor space needs to provide the sites for the old people and the children to participate in the activities together, and shall also be able to provide the old people with independent space to develop a hobby.

SUGGESTIONS

Relevant recommendations are given in this part, with a view to enhancing the regeneration of housing, advancing the further development of the real estate market, and meeting the needs for sustainable growth of the urban economy and the residents' welfare.

i. In the aspect of residential planning and design, aging-suitable residential design, which is conducive to interaction between the old and the young, should be vigorously developed, so that "the old can be well taken care of and the young can be raised well". First, public spaces in settlements should be more diverse. The spaces should be chopped up into multiple levels, dynamic ones and static ones

distinguished to reduce barriers, and they can be divided into two categories: caretaker type and participatory type. The former allows children to play under the supervision of the elderly and can be designed as a space where children play in the middle part and the elderly have a rest and watch over them besides. Activity facilities of different types can be set in the latter to provide different activity places for the old and the young in the same space, thus both can jointly participate in some activities. Second, comfort and security of space should be guaranteed. The differences between children and the elderly should be fully considered, and the barrier-free design should be carried out to ensure the convenience of use. Appropriate scale and proportion must be prepared. Third, it is necessary to make the outdoor activity space more interesting, thus attracting the elderly and children for parent-child activities. Some slabs describing cultural vignettes and interesting stories can be set up in the space.

ii. In terms of population placement, the concern for the living standard and life quality of the old and the young is necessary both economically and socially. With the limited land supply, the reasonable placement of the old and the young in families of employable age also hugely impacts talent inflow and the city's future development. Therefore, great benefits can be brought from the guarantee of the city's infrastructure and the effort to develop public service resources like retirement, education and medical care, both of which will become the core competitiveness driving the city's further development in the future.

iii. In terms of urban development, the global outbreak of COVID-19 has impacted and challenged development patterns of cities and communities. In Shenzhen, a mega-city, more attention should be paid to the livability and resilience of urban development. That means, the ability of the city to withstand disasters, mitigate disaster losses, and recover quickly from disasters by rational deployment of resources on its own. The community and neighborhood, as the basic units of the city, should play equally important roles to ensure residents of all ages have access to modern facilities, enjoy convenient life, as well as boost the ability to cope with disasters.

CONCLUSIONS

The characteristics of intergenerational coexistence of the old and the young in four major residential areas of Shenzhen are analyzed in the paper based on the phenomenon of excessive-priced housing from the perspective of misallocation between population flow and land resource in China, with the most typical city Shenzhen in China as the example. Field surveys, questionnaires and behavioral observations are adopted to elucidate the contradiction between the limited spatial environment of old residential areas and the demands of residents there, and an intergenerational integration type of regeneration strategy for the aging-suitable community is proposed. Additionally, recommendations are made on how to improve residents' welfare, how to develop a real estate market of excessive-priced housing constrained by land supply policies, and how to transform the mega-city model in the post-pandemic era from the perspectives of residential planning and design, population resettlement, and urban development.

Author Declaration

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