

The value of edible community gardens for the elderly in the specific environment condition, during the epidemic: using a case of Nanjing, in China

Yue Jin, Hee Sun (Sunny) Choi, Daniel Elkin

MDes (Urban Environments Design), School of Design, The Hong Kong Polytechnic University

Abstract

An ever-increasing number of individuals are attempting to fabricate edible community gardens because of Corona Virus Disease 2019 and the Chinese government's control of the regions where the epidemic happened, the restricted access to daily demand of food, and the unfamiliarity of the elderly with web-based shopping technology. Therefore, this research selects three representative communities in Nanjing as case studies by adopting a combination of qualitative and quantitative research methods. More specifically, GIS, mapping to construct a map of the food system in Nanjing. In addition, direct site observations, questionnaires, and interviews have also been conducted in the research. Moreover, the research adopts univariate and multivariate approaches to analyze the data to find out that most elderly demand and value edible community gardens, especially during the epidemic. Also, community gardens could provide opportunities to make new companions and enjoy leisure moments, so, an edible landscape enhances the ornamental value and interactivity of the communities. The edible community gardens are beneficial for sustainable food production from the perspective of future development of the community, including ecological environment, economic benefits, social regeneration, and local development.

Keywords

Edible community garden; Elderly; Food supply; Social regeneration

1. Introduction

The Chinese government controls and regulates the outbreak area so that people were unable for outdoor shopping while the government dishes out daily food to people based on their basic requirements during the epidemic of the novel coronavirus (from 2019 to present). Nevertheless, the lives of people were significantly affected during the period, especially the elderly because most of them do not know how to shop online, causing the problems of both food shortage and the psychological stress of prolonged epidemic control on seniors. Community gardens were helpful and eased their mind to a certain extent when they encountered these difficulties, so some people tried to grow vegetables by themselves during this period. COVID-19 decreased the opportunity for people to go out for nature contact, so people started moving nature to their balconies which is the perfect place for vegetable gardens (Chen, 2022). In the epidemic era, urbanites began to “grow vegetables for self-help”(Qing, 2020)

Consequently, this paper examines the impact of edible community gardens on the food supply to the elderly before and after the epidemic by analyzing the relationship between community gardens and the elderly, identifying how and to what extent gardens affect them, and subsequently why some elderly grow vegetables in their community gardens. Specifically, the research will answer the following questions: (1) What is the relationship between community gardens and the elderly during the epidemic? (2) What is the value of community gardens that

could be provided to the elderly during the epidemic?

The research mainly used both the qualitative method and the quantitative method. the qualitative method includes different techniques, such as interviews, newspapers, reports, social media applications, literature and observation. The questionnaire contributes to the quantitative method significantly, there are various data consisting of the questionnaire including the source of food supply, the convenience of daily food shopping, the frequency of purchasing, the proportion of vegetables in purchasing, the production of the community garden, the types of vegetables, the proportion of food consumption in the community garden, and the degree of stress relief from the community garden. subsequently, the questionnaires will be analyzed to identify the influences of community gardens on the daily food supply as well as the psychological influence on the elderly.

The research used GIS to select the residential cases because it considers various aspects including the location of the case, the neighborhood infrastructure, the greenery rate, the number of households, and the house age. In addition, interviews were conducted with the property in the neighborhood to identify the approximate percentage of elderly in the neighborhood.

2. Literature review

2.1 Benefits of Community Gardens

The section aims to categorize the evolving defi-

Study classification	Methods	Aims	Contents
Qualitative methods	Interview	To comprehend the basic situation of the community and the willingness towards the survey	<ol style="list-style-type: none"> 1. Proportion of the elderly in each community, 2. Willingness to be investigated, 3. Suggestions for the gardens.
	Newspaper report	To understand the lockdown policies and problems in the residential area during epidemic	<ol style="list-style-type: none"> 1. The policies of Chinese lockdown during the epidemic, 2. People’s daily life and emotional changes during the epidemic.
	Social media apps		
	Reading literature	To acknowledge the background of keywords	<ol style="list-style-type: none"> 1. The definition of community garden, 2. The benefits of community garden, 3. The influences of the lockdown policy.
	Observation	To find some problems about food supply during the epidemic	<ol style="list-style-type: none"> 1. Observation of edible community gardens.
Quantitative methods	GIS	Help to choose the different characteristic communities as cases in Nanjing	<ol style="list-style-type: none"> 1. Location, 2. Infrastructure, 3. Volume ratio, 4. Greenery ratio, 5. Community size, 6. Number of households.
	Mapping		
	Questionnaire Survey	To find out the relationship between elderly and community garden	<ol style="list-style-type: none"> 1. Source of food supply before and during the epidemic, 2. Production and consumption of community garden before and during the epidemic, 3. Benefits of community garden during the epidemic.

Table1. The contents of research methods (self-drawn by author)

definition and value of community gardens through reviewing the major theories of community gardens and exploring whether and how community gardens could provide any beneficial towards to people. First, Poulsen et al. (2011) and Wakefield et al. (2007) identified social benefits referring that community gardens not only provide physical and psychological benefits to people, but also provide places for people to interact and entertain (Poulsen et al., 2014; Staeheli et al., 2002), and the interpersonal relationships

between people becoming closer (Zhu et al., 2020; Wesener & McWilliam, 2019; Maconachie et al., 2012; Austen et al., 2006; Saldivar & Krasny, 2004). Second, Litt et al. (2011) and Poston et al. (2005) considered that community gardens have food benefits and they help residents to satisfy their physical demands. Besides, community gardens allow residents to consume hand-grown fruits and vegetables, increasing food safety significantly (Corrigan, 2011). The socially disadvantaged families would be eas-

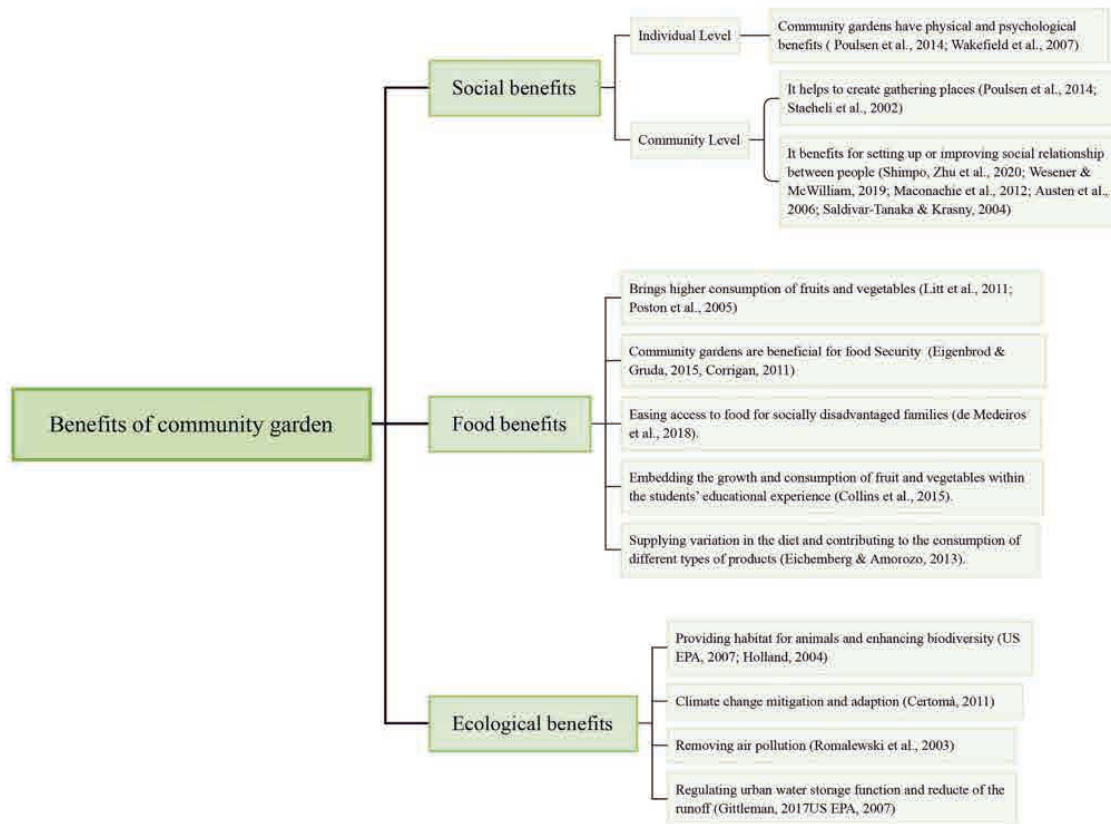


Fig1. The diagram of the benefits of community garden (self-drawn by author)

ier access to food is one of the merits of food benefits(de Medeiros et al., 2018), nevertheless, embedding the growth and consumption of fruit and vegetables within the students’ educational experience would be another merit of such wonderful garden (Collins et al., 2015), and the supplying variation in the diet and contributing to the consumption of different types of products (Eichemberg & Amorozo, 2013). Third, studies have demonstrated the ecological benefits of community gardens, such as purifying the air (Romalewski et al., 2003), enhancing species diversity (US EPA, 2007; Holland, 2004), regulating local micro-climates (Certomà, 2011), and acting as rain gardens, or as a part of sponge cities which proposed to establish infrastructure in the city, including water management, preservation, purification, transmission and distri-

bution, and recycled utilization of water (Grochulska et al., 2021). Considering the Chinese background, Chen et al. (2020) recommended that productive landscapes could be combined with horticultural therapy for community-based elderly care. In summary, community gardens have three fundamental benefits: social benefits, food benefits, and ecological benefits.

2.2 Effects of Epidemic Lockdown on the Elderly

There are two aspects to address the effects of Coronavirus on the elderly, firstly, from the psychological point of view, Armitage and Nellums (2020) considered that COVID-19 has serious consequences of isolating the elderly. Besides, life satisfaction, persistent anxiety, and well-being were influenced (Bidzan et al, 2020). Fur-

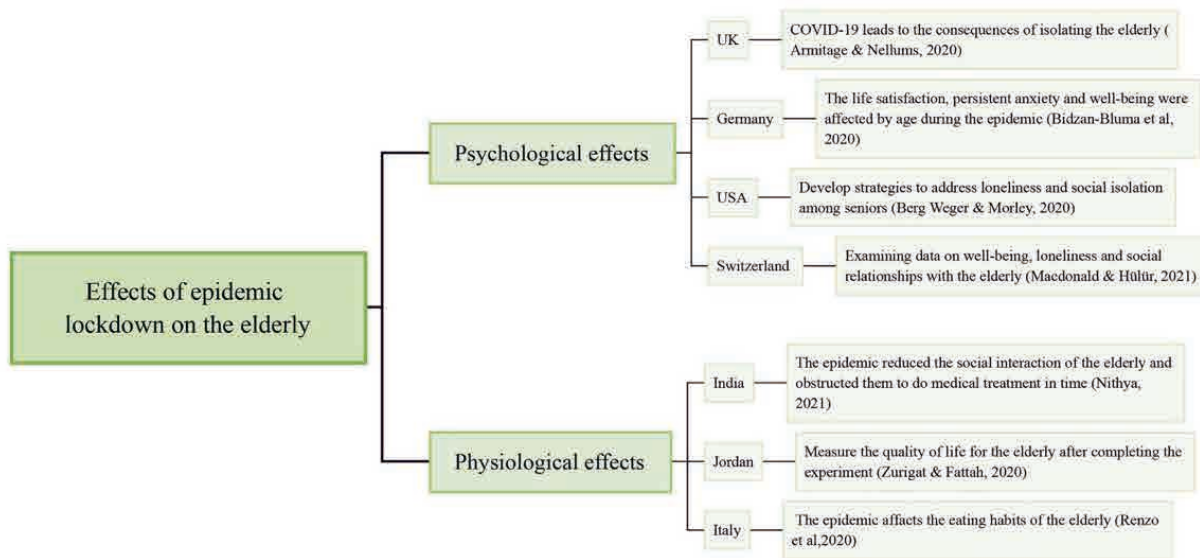


Fig2. The diagram of the effects of epidemic on the elderly (self-drawn by author)

thermore, the epidemic caused loneliness and social isolation among seniors (Berg & Morley, 2020), and their emotional well-being is undermined consequently (Macdonald & Hülür, 2021). Secondly, from the physiological point of view, Nithya (2021) suggested that the epidemic decreased the social interaction of the elderly and obstructed them to make their regular medical examination on time which may cause serious consequences to their physical health. In Jordan, Zurigat and Fattah (2020) estimated the degree of influence of the epidemic on life quality for the elderly after the completion of the experiment. In Italy, some researchers believed the epidemic affected the dietary habits of the elderly (Renzo et al., 2020). In general, the previous study concluded that the epidemic has influenced both the physical and psychological aspects of the elderly.

2.3 Definitions of Community Garden

The definition of “community garden” has been evolving into different key theories over time, which are summarized in table 2.

The definition of a community garden has evolved and varied over time. The community garden was rarely used before the 1900s; then it was emerged and introduced by the community after the 1900s; In 2020, edible urban commons were wildly accepted and prevailed as a way of mitigating the negative influences of the pandemic. This paper explored the relationship between edible community gardens and the elderly during the pandemic.

2.4 Summary of the Literature Review

There are three summarized aspects, the benefits of community gardens, the effects of epidemic lockdown on the elderly, and the definition of community gardens, those aspects make a great contribution to further research. Only a few scholars have studied the epidemic background, the definition of ‘community gardens, and their effects on the lives of residents, particularly the elderly in China. Li et al. (2020) provide an overview of the development of edible landscapes at home and abroad but do not mention their current situation or dilemmas under the context of the epidemic; In addition, some articles examine community gardens based on the Chinese context but do not combine community gardens with edible landscapes (Liu et al., 2022). Therefore, this paper examines the relationship between community gardens, the elderly, and lockdown policy.

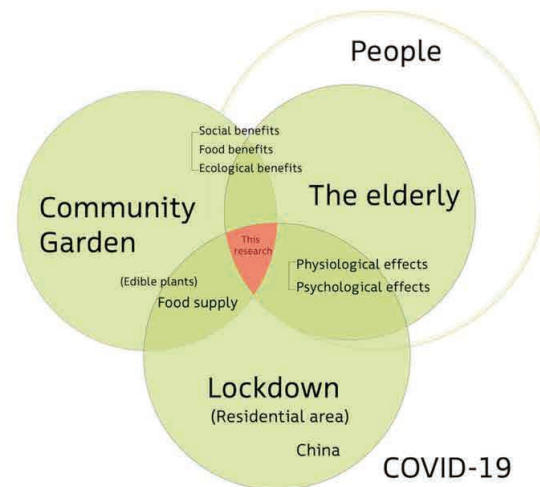


Fig3. The summary of the literature review (self-drawn by author)

Terms	Time of rise	Definition	Literature
Urban Agriculture	1890s	It aimed to improve poor environmental conditions in cities while also providing a self-help approach for unemployed laborers through gardening on shared plots of land.	Lawson, 2005
Community and Home Gardens	World War II	It made important contributions to food supplies and civilian morale.	Lawson, 2005
Community Gardening	1970s	It arose in response to rise food prices, as well as to concern about the destructive impact of agricultural technologies on the environment and the health consequences of pesticides on food.	Lawson 2005:219
Community Gardens	1990s	A community garden is a green space managed (and may be developed) by a neighborhood community in which urban agricultural activities take place. The community needs not to own it, but to possess the land tenure is vital to the long-term survival of the scheme.	Shell Better Britain Campaign, 1999; Irvine et al., 1999
Community Gardening/Edible landscape	2000s+2010s	It is a type of open space that is planted collectively with either vegetables or flowers by neighborhood individuals. It emphasizes its nature as public behavior on public lands for mutual interests.	Holland, 2004; Kingsley et al., 2009; Guitart et al., 2012; He & Zhu 2018
Edible Urban Commons	2020s	Edible urban common is a unit of an edible green infrastructure within city and peri-urban limits, that contains naturally growing edible plants and mushrooms, and makes great use of edible urban commons to alleviate the negative impacts of the pandemic and enhance the resilience of food systems.	Sar Deshpande et al.,2021
Edible Community Gardens for the Elderly during Epidemic)	2022	There are various existing gardens in the community where vegetables could be grown, including the balcony, roof, and public green space in the community.	Yue JIN

Table 2. The definition of community garden (self-drawn by author)

3. Case study

3.1 Location Background

Nanjing is located in the east of China, in the lower reaches of the Yangtze River, near the river and offshore. It is the capital city of Jiangsu Province and a significant national gateway city that is reached from the Yangtze River Delta to drive the development of the central and western regions. It has a northern subtropical monsoon climate with four distinct seasons and abundant rainfall.

Based on Nanjing’s geographical location and climatic conditions, twenty-four different types of vegetables are suitable for the local area. The first category is the short growth cycle of vegetables, the average harvest period is three to four months, some vegetables that mature in summer are pepper, eggplant, and gourd; among them, the rate of harvesting is frequent, which could be reached once a month; some vegetables with less frequent harvest rate are sweet potato, chrysanthemum brain, leek; another category is the relatively long growth cycle, the average harvesting period about five to six months, some vegetables that mature in summer are loofah and winter melon. In addition, green vegetables, coriander, and spinach could be harvested in winter; scallion and garlic are suitable for planting in autumn because the temperature is lower than in summer. So, every season has its featured vegetable in the area, therefore Nanjing is the optimal choice for the case study area.

3.2 Food Supply System in Nanjing

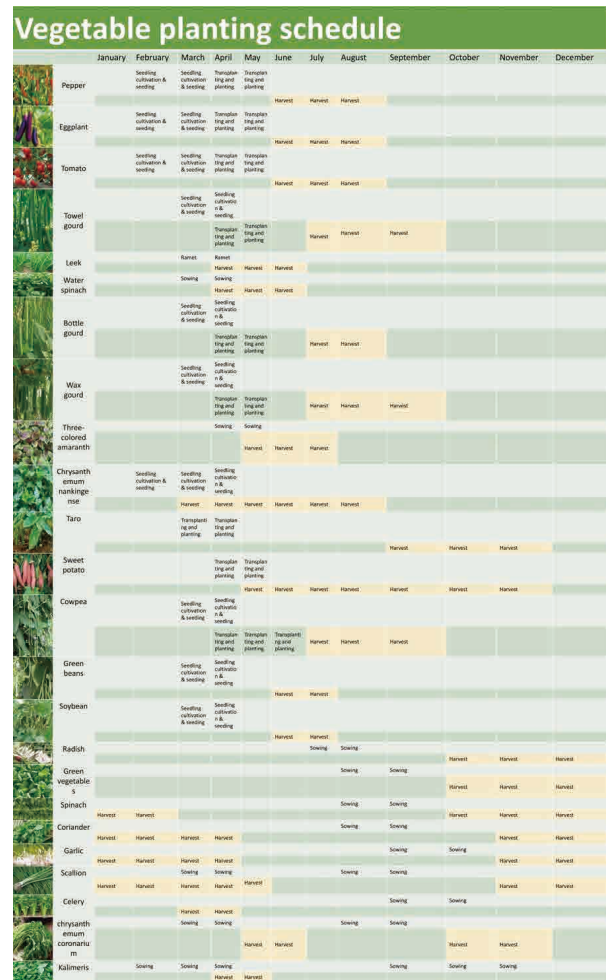


Table3. The vegetable planting schedule in Nanjing (self-drawn by author)

The food is transported to Nanjing from all over China, for example, Shandong, Hainan, and Yunnan. And then those food is transported to large warehouses and wholesale markets in the city, e.g., Neiqiao Market, Lihong Market, Zongcai Wholesale Market, etc. The food

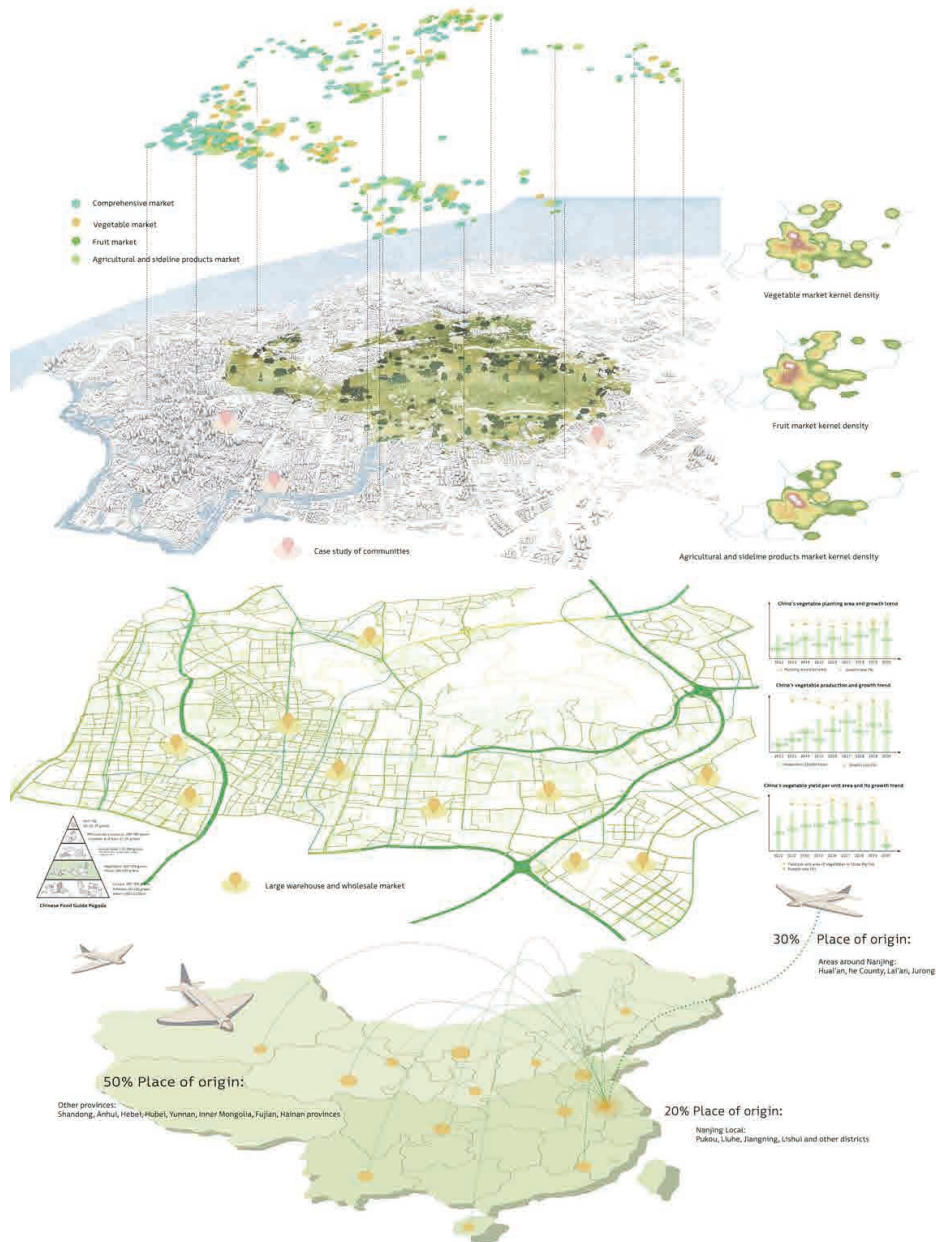


Fig4. Food system map in Nanjing (Source: GIS self-drawn by author)

is distributed to different types of markets subsequently, such as supermarkets, fruit markets, vegetable markets, and agricultural markets. Finally, the food is purchased by consumers in various neighborhoods in the city, such as the Shenghe community, Shangri-La Garden community, and Hongmiao community, which are chosen for the research. (See Figure 4)

3.3. Cases Selection Criteria

The three communities represent as many dif-

ferent types of communities in Nanjing as possible, including old residential areas located in the downtown, high-end residential areas closer to the downtown (within 5 km), and residences that are located at the edge of the city and far away from the downtown (more than 10 km).

To be specific, the Shenghe community is far from the downtown and has a greater number of households, besides it has a relatively greater proportion of the elderly; the Shangri-La Garden community is closer to the downtown and has a

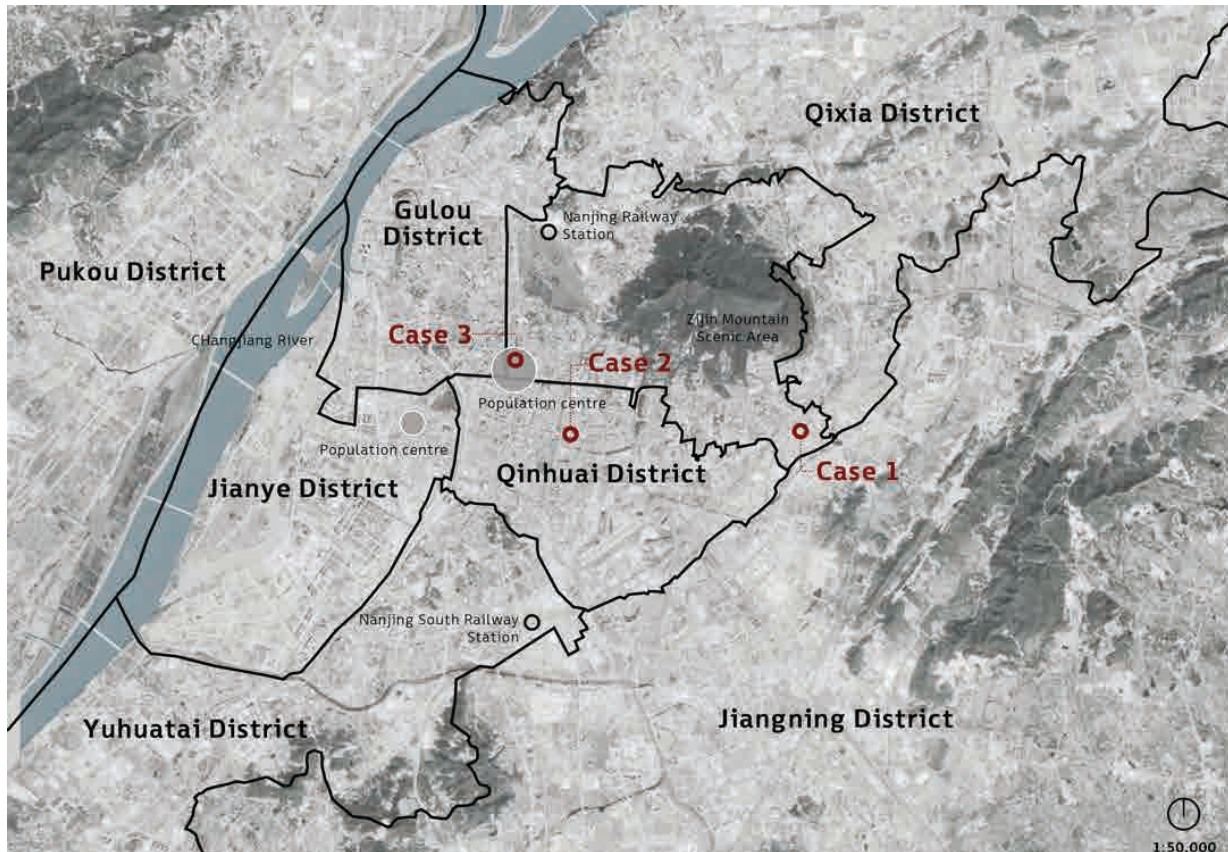


Fig5. Locations of three cases (Source: Satellite map)

Name of residential area	Construction time	Community size	Volume ratio	Greenery ratio	Number of households	The total number	Proportion of elderly	Location
Shenghe Community	2012	8000 m ²	2.2	21%	1294	3363	(14%)	No. 318, Magao Road
Shangri-La Garden Community	2003	3600 m ²	2.4	40%	706	2185	(10%)	No.113, Da Guang Road
Hongmiao Community	1988	1800 m ²	1.1	12%	658	1711	(18%)	No. 4, Hongmiao Road

Table4. The criteria of three cases (self-drawn by author)

greater proportion of green area; the Hongmiao community is in the downtown but has been built for a long time, so it has a low plot ratio and less green area.

3.4. Characteristics of Building typology and Edible Gardens

Through field research and observation, four types of gardens where people create their edible garden were 1) Garden on the ground. 2) Roof garden. 3) Balcony. 4) Terrace. To be specific, on the balcony, people could harvest vegetables continuously, such as leeks and sweet potatoes. Besides, people could plant some climbing plants on the balcony, such as loofahs and cucumbers; On the terrace, people use professional planting pots for cultivation.

4. Data Collection and Analysis

There are four gradual aspects to analyzing the role and value of edible gardens 1) Age distribution of the elderly. 2) Shopping-related behavior. 3) Influence of the epidemic. 4) The elderly's perceptions and value of community gardens.

4.1 Univariate Data Analysis

4.1.1. Age Distribution of the Elderly

Firstly, from the perspective of age, among these three communities, more than half(51.92%) of the elderly in the Shenghe community are 70 years old and above; and there is 77.56% of the elderly aged 55-70 and above in the Shangri-La Garden community; however, the age distribution is more even in the Hongmiao community

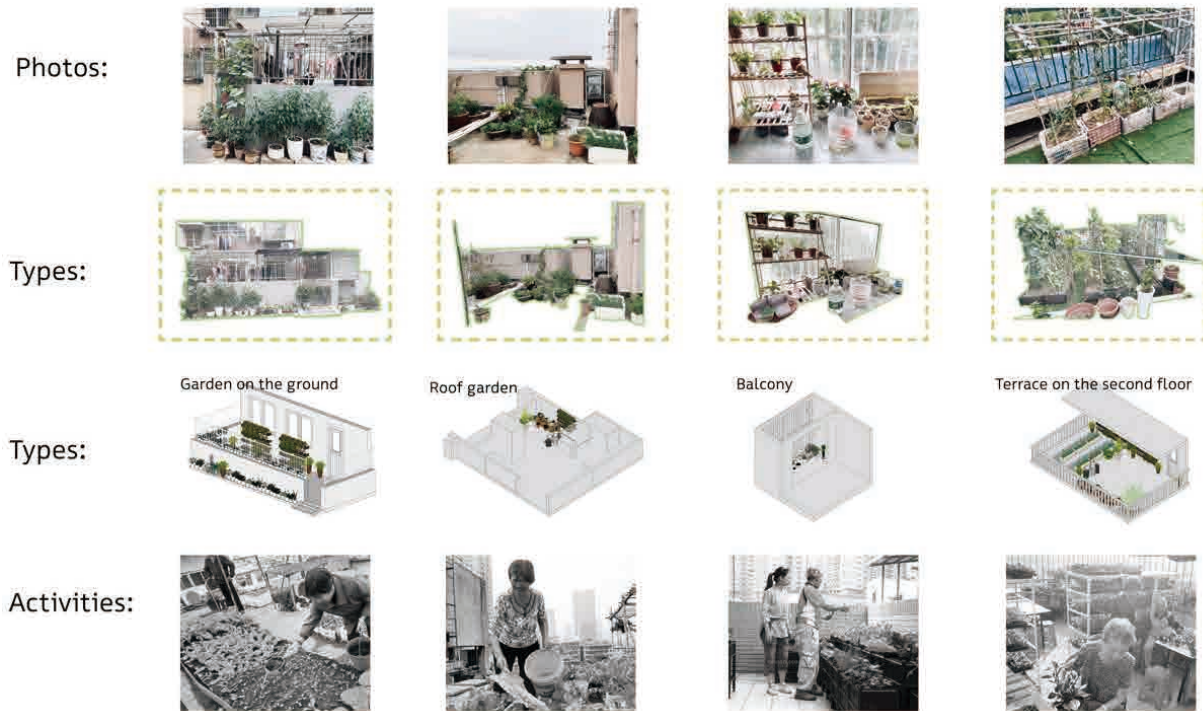


Fig6. Typology of growing vegetables (Source: site investigation video)

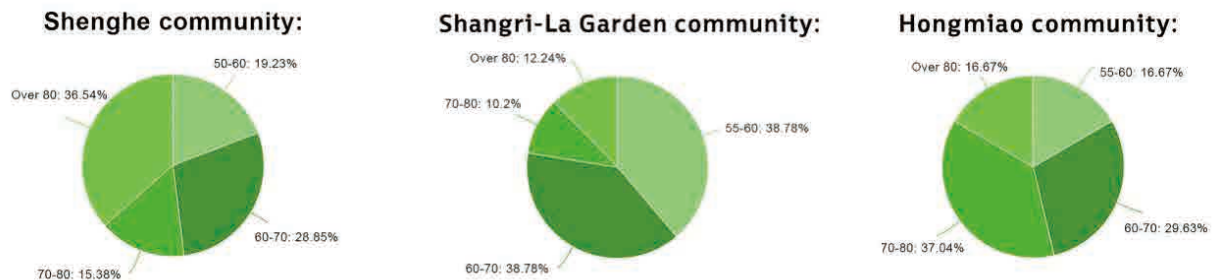


Fig7. Age differences in three cases (self-drawn by author)

since 66.67% of seniors aged 60-80.

4.2 Shopping-Related Issues

Figure 8 shows that the elderly in all three com-

munities prefer to shop at the vegetable market and supermarket. 73.08% of the elderly in the Shenghe community choose to shop in supermarkets; 57.14% of the elderly in the Shan-

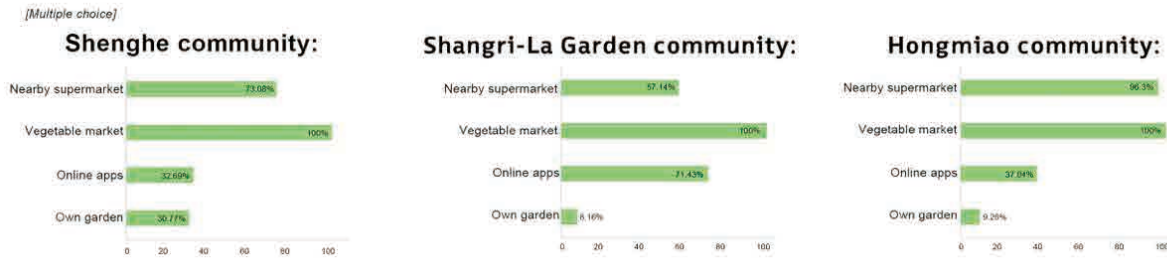


Fig8. Sources of daily shopping in three cases (self-drawn by author)

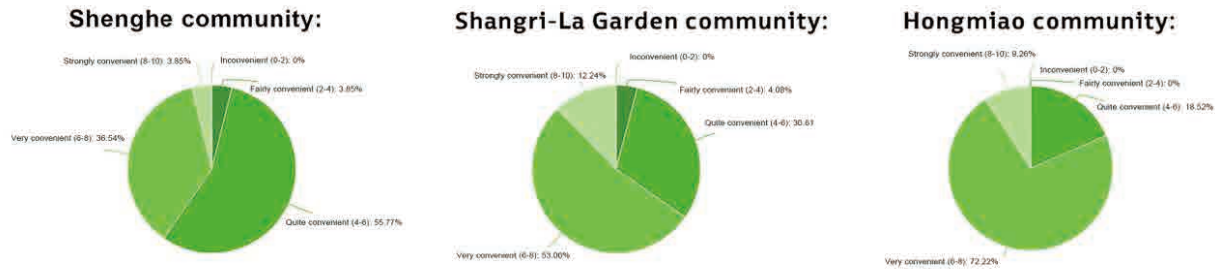


Fig9. The convenience of offline shopping in three cases (self-drawn by author)

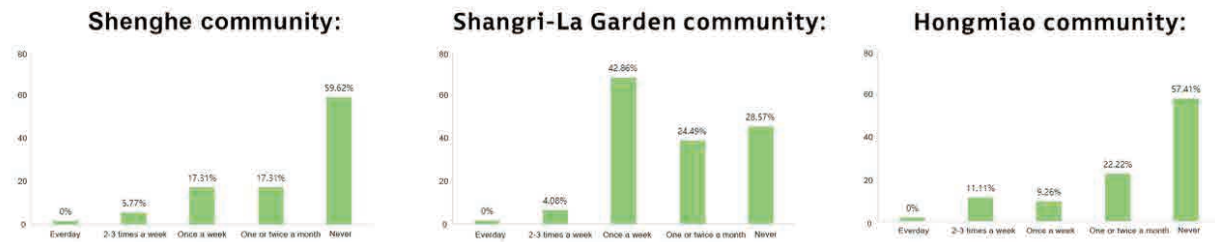


Fig10. Frequency of online shopping with apps in three cases (self-drawn by author)

gri-La Garden community choose to go to supermarkets; 96.3% of the elderly in the Hongmiao community choose to go to supermarkets. Moreover, 100% of all elderly choose to shop at vegetable markets in all three communities.

community consider that the average convenience ratio of going to the nearby supermarkets and vegetable markets from the community is 5.81/10; The average convenience ratio is 6.14/10 in the Shangri-La Garden community, while the elderly in the Hongmiao community

Figure 9 shows that the elderly in the Shenghe

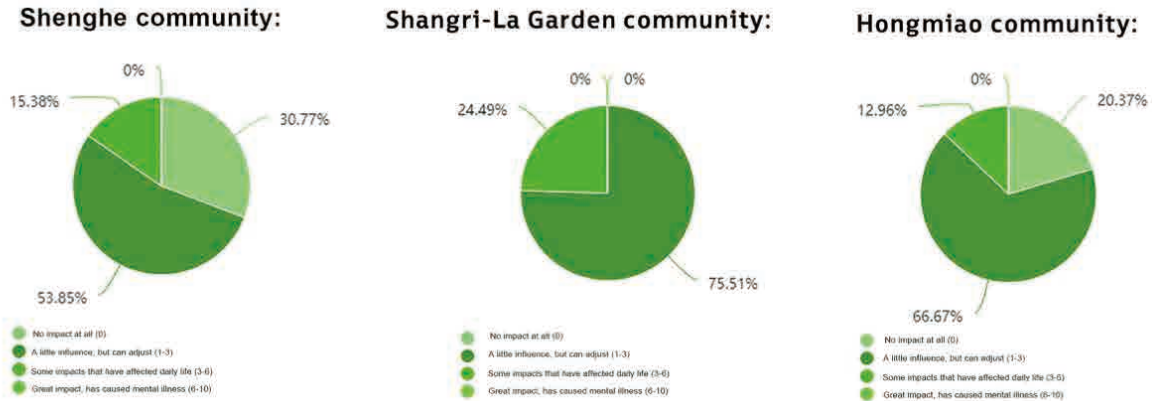


Fig11. Impact of epidemic on the psychology in three cases (self-drawn by author)

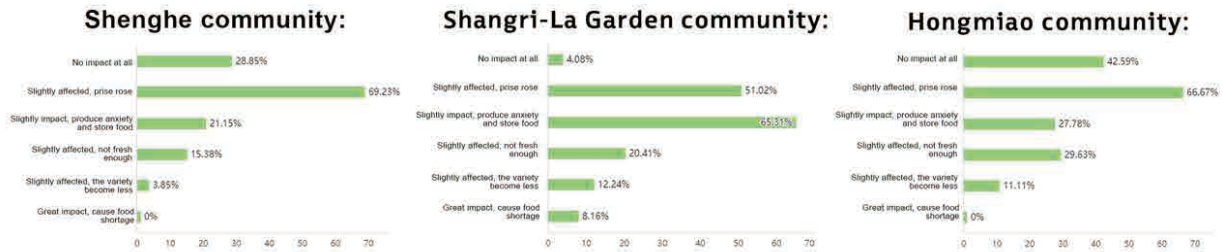


Fig12. Impact of epidemic on daily shopping in three cases (self-drawn by author)

report the average convenience ratio is 6.84/10.

In Figure10, the proportion of elderly in the Shenghe community who never use online apps for shopping is 59.62%; the proportion would be 28.57% in the Shangri-La Garden community. And it's 57.41% of the elderly have never used online shopping apps in the Hongmiao community.

4.3 The influence of the epidemic on the elderly

From the perspective of psychology, the figure11 indicates that 53.85% of the seniors in the Shenghe community are concerned that the epidemic had a mild impact on them psychologically because they could accommodate themselves in the new environment; 75.51% of the elderly in the Shangri-La Garden community believe it in the same way; similarly, 66.67% of the seniors in the Hongmiao community felt the same way as the other communities. Consequently, the epidemic still has a psychological influence on the elderly.

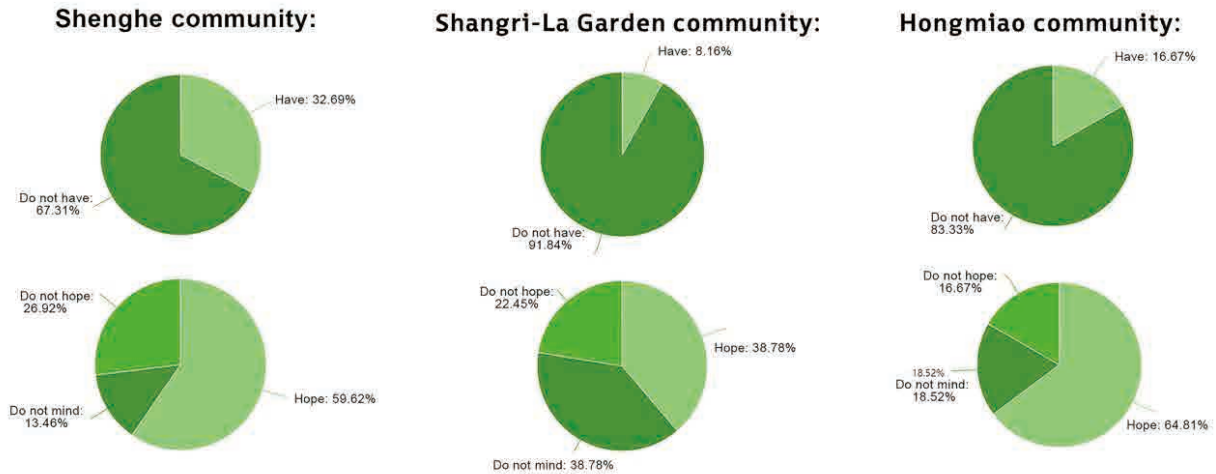


Fig13. Current status and willingness of the elderly to community gardens in three cases (self-drawn by author)

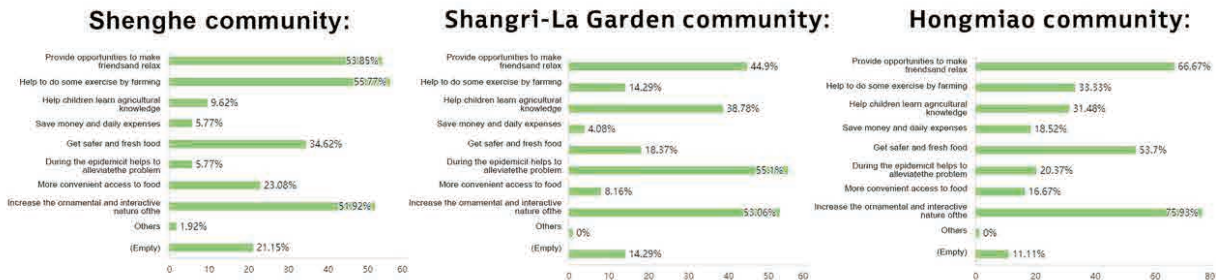


Fig14. The expected functions of edible community garden (self-drawn by author)

From the perspective of whether the epidemic has influenced daily shopping, most seniors in the Shenghe community believe that the epidemic has affected their daily purchases, and 69.23% of elderly believe that the epidemic has increased food prices slightly; in the Shangri-La Garden community, 65.31% of the elderly felt that it had a slight impact on food storage and 51.02% of seniors said that the epidemic had caused a mild increase of food prices. In

the Hongmiao community, 66.67% of them felt that there is a trivial increase in food prices. Therefore, the epidemic has affected the daily shopping of the elderly, but the influence is insignificant.

4.4 The Elderly’s Perceptions of Community Gardens

As the chart above shows, 32.69% of seniors

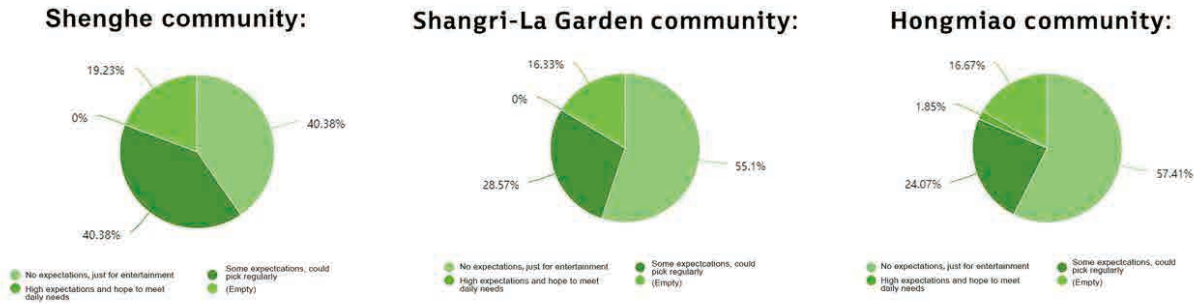


Fig15. People’s expectation for the output of edible community garden (self-drawn by author)

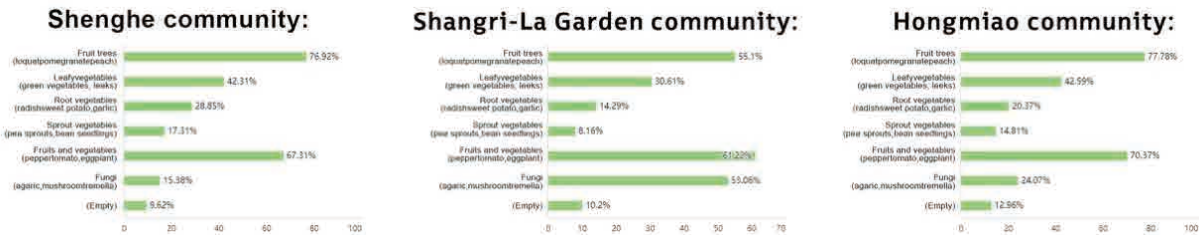


Fig16. People’s wishes for the kinds of vegetables in the edible community garden (self-drawn by author)

in the Shenghe community now have their vegetable gardens and 59.62% of them would like to have theirs; 8.61% of seniors in the Shangri-La Garden community have vegetable gardens and 65.31% of them have a neutral or supportive attitude towards creating edible community gardens; in the Hongmiao community, 16.67% of seniors have their gardens and 64.81% of them have a supportive attitude towards the establishment of edible gardens in the future. Therefore, it’s not difficult to predict that seniors are mostly willing to have edible community gardens.

From the viewpoint of the expected functions of the edible community garden. In the

Shenghe community, more than half(53.85%) of the seniors believe that community gardens could provide opportunities to make companions and help people to enjoy their leisure moment, 55.77% think gardens could help them do some daily exercise to improve their healthy, some elderly(51.92%) estimate the gardens could provide a unique ornamental value and an interactive landscape; In the Shangri-La Gardens community, more than half elderly(55.1%) believe that the gardens would alleviate the problem of food shortages during the epidemic, and majority of them(55.77%) convinced that it would help them do some daily exercise as well, while some other elderly(53.06%) consider that the garden would improve and update

the ornamental and interactive aspects of the landscape; In the Hongmiao community, the majority(75.93%) convinced that the community garden improve and update the ornamental and interactive aspects of the landscape, while a large proportion of elderly(66.67%) consider that the gardens are useful in relaxing them and providing them with opportunities to make companions.

The results of the questionnaire for the questions on the output of the community garden are shown above. 40.38% of seniors in the Shenghe community have low expectations of yield and expect the community garden for recreational purposes only; Similarly, 55.1% of them in the Shangri-La Garden community have low expectations of the output as well and only ask for it for entertainment; furthermore, 57.41% of the elderly in the Hongmiao community would have the community garden for entertainment only.

The choice of tree species for community gardens is shown in figure 16 above. 76.92% of the elderly in the Shenghe community prefer fruit trees, such as loquat trees and peach trees, and 67.31% favor the fruits and vegetables, such as peppers and eggplants; the fruit trees are the primary option of 55.1% of seniors in Shangri-La Garden community, 61.22% of them prefer fruit and vegetables and 53.06% favor mushrooms; in the Hongmiao community, 77.08% of the seniors prefer fruit trees, and 70.37% fancy fruits and vegetables, such as peppers.

4.5. Multivariable Summary

The research discovers that the three communities have different proportions of current ownership by analysis of the data of three different communities, and the age distribution and shopping convenience are the vital factors causing the such situation. In addition, the three factors of age distribution, distance from the communities to downtown, and the impact of the epidemic on daily shopping would affect the willingness to have a community garden.

From table 5 above, firstly, the Shenghe community has more community gardens than the Shangri-La Garden community because the elderly in the Shenghe community is older than those in the Shangri-La garden community, so the shopping convenience of the Shenghe community is less convenient, therefore, they would like to access to food as convenient as possible. Besides, the elderly of the Shenghe community are more willing to possess the community gardens than those in the Shangri-La Garden community because the distance from the Shenghe community to downtown is much further than the Shangri-La Garden community's, so the members of the Shenghe community are unwilling to go shopping because of the inconvenience of traffic, therefore, they are more willing to have their gardens. Nevertheless, there is a greater proportion of seniors in the Shenghe community who believe that the epidemic has caused an increase in food prices, so the Shenghe community would like to plant their vegetables by themselves to save the expenses.

Secondly, there are fewer seniors in the Hongmiao community have gardens compared with

	Proportion of the elderly who now have community gardens	Age distribution of the elderly	The convenience of daily shopping	Willingness for community gardens	Age distribution of the elderly	Distance from the communities to the city center	Impact of the epidemic on daily shopping
Shenghe Community	Who now own: 32.69%	51.92% of the elderly aged 70 and above, 44.23% of the elderly aged 60-80	Average convenience of shopping: 5.81/10	Hope to have: 59.62%, Do not mind: 13.64%	51.92% of the elderly aged 70 and above, 44.23% of the elderly aged 60-80	Community on the edge of the main city center that are farther away (more than 10 km)	69.23% of seniors said food prices had increased
Shangri-La Garden community	Who now own: 8.16%	77.56 % of seniors aged 55-70 and above, 22.44% of the elderly aged 70 and above	Average convenience of shopping: 6.14/10	Hope to have: 26.53%, Do not mind: 38.78%	77.56 % of seniors aged 55-70 and above, 22.44% of the elderly aged 70 and above	High-end residential area closer to the city center (within 5 km)	51.02% of the elderly said food prices had increased
Hongmiao community	Who now own: 16.67%	46.3% of the seniors aged 55-70, 66.67% of the elderly aged 60-80	Average convenience of shopping: 6.84/10	Hope to have: 64.81%, Do not mind: 18.52%	46.3% of the seniors aged 55-70, 66.67% of the elderly aged 60-80	Old residential area located in the city center	66.67% thought there was a small increase in food prices

Table5. The table of multivariable summary (self-drawn by author)

the Shangri-La Garden community because the elderly in the Hongmiao community is younger than those in the Shangri-La Garden community, and the younger elderly are more convenient to go shopping by themselves rather than feed-

ing by self-support community gardens(greater level of shopping convenience). In addition, the elderly in the Shangri-La Garden community is less willing to have community gardens, and the distance of the Shangri-La Garden community

to the downtown is insignificant to the willingness to possession of community gardens. But the Shangri-La Garden community is a high-end community that pays more attention to life quality, and the community gardens may cause a series of management problems in the future and sabotage the present landscape of the community. Besides a less percentage of the elderly in the Shangri-La Garden community consider that the epidemic has caused food prices to rise, so the Hongmiao community would like to own their gardens.

Thirdly, fewer elderly in the Hongmiao community have their community gardens presently because the elderly in the Hongmiao community are older than those in the Shenghe community, indicating that the greater level of shopping convenience in the Shenghe community. Furthermore, the Hongmiao community has a greater willingness to possess a community garden, theoretically, the elderly in the Shenghe community should be more willing to have community gardens because their community is further away from downtown which significantly influences their outdoor shopping habits. However, the infrastructures of the Hongmiao community are obsolescence, and its environment and facilities needed to be improved and updated, the community gardens not only provide environmental benefits but also economic benefits to renewing the old community.

5. Conclusion

In conclusion, it is significant that the edible community gardens could provide valuable resources for the elderly during the epidemic

since they inject new blood or ideas into the renewal and renovation of community. In addition, the research found that the preferred plant species would help designers to use community gardens as an innovative method to renew the community. Besides, the research findings could be used as the foundation for the construction of community gardens in communities, and provide recommendations for the potential urban resilience strategies in future community development.

From the perspective of future development, edible gardens are beneficial to the establishment of sustainable food production in cities, which could generate ecological and economic benefits for cities and improve the sustainability of people participating in social activities. Therefore, edible gardens could be used as an urban resilience design strategy for the regeneration of communities. Furthermore, the idea could be applied to every area of the city and then promote to the whole country by analyzing the different requirements for community gardens in different types of communities; and then constructing and renovating these gardens by elaborate tailored to drive the 'sustainable but evolving types of resilience cities' wave.