ORIGINAL RESEARCH ARTICLE

A study on the spatial distribution and optimization strategies of day care centers for the elderly: an ArcGIS analysis based on the data of Xuhui District in China

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Keywords: Day Care Center; Spatial Distribution; Arc GIS; Optimization Strategy; Elderly;

ABSTRACT

Background: At present, the degree of ageing in China is becoming severe, especially in Shanghai, which is the largest city with the highest degree of aging in China. How to adjust the community to effectively meet the needs of the elderly groups has become the focus of social attention.

Objectives: In this study, spatial analysis was used to explore the matching degree of the elderly population with the distribution of day care centers in Xuhui District, Shanghai, China, to explore the problems, and to propose optimization strategies with a view to providing feasible suggestions for the construction of old-age daycare.

Methods: This research adopts the methods of literature study, map analysis, questionnaire survey, especially tries to use the spatial analysis software of Arc GIS in order to set up a spatial database of Xuhui District's elderly population based on street administrative territorial entity.

Results: The results show that the quantity and quality of the day care centers in Xuhui District can not meet the actual needs of the elderly. Secondly, the services provided in daycare centers deviate from the actual needs of older population. Thirdly, the day care service content lists are quite homogeneous, which neglects the diversified and personalized needs .

Main Contribution to Evidence-Based Practice: From the perspective of spatial distribution study, this article enriches the theory of the construction and management of the elderly care facilities in urban areas, and provides reference for the formulation of aging policy. Meanwhile, it gives some suggestions on optimizing the spatial distribution of community facilities to fulfil the actual needs for optimal matching of the elderly care resources.

International Healthcare Review (online)
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eISSN: 2795-5567
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How to Cite
Chen, Y., Cui, X., & Li, H. A study on the spatial distribution and optimization strategies of day care centers for the elderly: an ArcGIS analysis based on the data of Xuhui District in China. International Healthcare Review (online). https://doi.org/10.56226/69
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Published online: 3/Novemberr/2024
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What do we already know about this topic?
Currently, the severe density and high proportion of aging are the characteristics in China . In view of the actual situation, there are some negative factors which may have affects on the development of service facilities, such as the construction of community facilities for the elderly is relatively unitary, the divergent opinions about the location selection are existing, and the provided services can not cope with the real needs.

What is the main contribution to Evidence-Based Practice from this article?
The study is a practical survey and analysis in the field of community-based day care centers for the elderly. In order to establish a community and street-based administrative territorial entity spatial database of Xuhui District according to the ageing population, a large number of primary source were collected through the ArcGIS spatial analysis platform and questionnaires survey, which will provide information and data support for follow-up evidence-based practices.

What are this research's implications towards health policy?
This paper expands the academic research perspective by adopting spacial distribution analysis method, and enrich the theories of the construction and management of elderly day care facilities in urban areas. It provides a basis for the policy-making about the distribution of day-care centers, for promoting the optimization of the layout of community-based institutions for the elderly. In practice, it helps to reach the optimal matching of the supporting elderly resources and the actual service needs of the elderly population, so as to enhance the level of health and the attitude of happiness.

Authors' Contributions Statement:
YC conceptualized and designed the study. XC and HLL analyzed the data. All discussed, drafted and amended the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Introduction

At present, the ageing degree of Chinese population is increasingly prominent. "Not rich before old" has become an urgent social problem to be solved. The ageing will bring about profound changes in economic and social development which have not reach the level of developed countries. How to match the supporting elderly resources with the population's needs has become the focus of social attention. Actually, there is a serious mismatch between the service supply and the actual demand of the institutions in many areas. At the same time, with the high-quality and diversified needs of the elderly, the traditional old people's home or the elderly institutions cannot satisfy the demands of the aging society. As a burgeoning mode of providing for the aged, community-based elderly day care can pool the services of family-based care and institution-based day care together.

With the gradual miniaturization of China's family structure, there is a more diverse and greater demand for community-based elderly day care services. However, as a new model, there are some problems needed to be faced and to be solved. In terms of spatial distribution, there is a serious imbalance between the spatial distribution of community-based elderly day care facilities and the distribution of the elderly population due to the lack of analysis of the spatial distribution of the elderly population and the actual demand. In terms of service level, China's community day care for the elderly started late, and there are many problems in the process of development, such as a single type of service, lack of service management, lack of professional and personalized services, and discrepancies between the services provided by day care centers and the actual needs of the elderly. In terms of institutional norms, the relevant rules of urban facilities for the elderly

are still defective, with most supporting elderly facilities divided equally according to administrative divisions which leads to an imbalance in the spatial layout of facilities and in the spatial distribution of the elderly population. In addition, there is a lack of standardization in the grading standards, service quality standards and spatial distribution standards for community-based elderly facilities.

Based on the data of the resident population in Xuhui District in 2010 and the resident population data in 2020, this study focused on the day care centers for the elderly in Shanghai. According to the spatial location of day care centers, the matching degree with the distribution of the elderly population and day care centers was analyzed. To explore the spatial distribution of day care centers in Xuhui District through spatial analysis, and then to establish a standard classification of day care centers to clarify the service content of various types of day care centers, finally, the paper puts forward the optimization strategy of the spatial distribution of day care centers in Xuhui District.

Literature Review

Community Aged Care Study. The earliest study of public facilities in the West was conducted by Taitz, who argued that public facilities should promote a combination of equity and efficiency, and that construction needs to take into account both time and economic costs. The development of the elderly care model in developed countries or regions has roughly gone through a series of processes, such as "hospital elderly care - institutional elderly care - family elderly care - community elderly care"(Dear M,1992).Western developed countries have developed two main types of community care facilities for the elderly. The first is the establishment of geriatric care facilities to support the lives of the elderly in accordance with the concept of "community care"; the second is the establishment of community activity centers for the elderly and community temporary care service based in accordance with the concept of "caring communities". So, a service system has been formed, in which family care for the elderly is the mainstay and community care for the elderly is supplementary (Zhang Zheng, 2007). As far as China is concerned, the construction of community aged-care facilities at the present stage is relatively homogenous, and the services provided are not able to match the actual needs of the service demand, which is not conducive to the targeted development of the facilities and services (Jiao Yang,2017). Community day-care centers for the elderly started relatively late, and currently provide only daytime services. There is a dearth of elderly care organizations that provide long-term residential and home-based services. This has led to a limitation on the carrying capacity of community-based elderly care services, and has also restricted the development of community-based elderly care organizations (Yu Mina & Sun Vina, 2013).

Public Facility Siting Study. The siting of public service facilities is a long-developing research theme. The location of public facilities directly affects the quantity and quality of public service facilities. Research on the siting of public facilities in Western countries emerged in the 1990s, with a diversity of research topics. The researches focus on the construction cost and service quality of facilities(Yanmin Zhou & Jingyi Lin,2015). Bigman and Recelle also studied public service facilities from an economic perspective. They argue that facilities should be located with the principle of efficiency in mind, emphasizing that the greatest number of people should be served by the fewest number of facilities (Bigman D &

Revelle C,2010). Mumphrey argues that site selection should take full account of the needs of the population. He explores the psychological needs of users as a means of understanding how residents feel about public service facilities that have a neighborhood effect (Mumphrey A J & Wolpert J,1973). Marianov conducted a comparative analysis of the siting of public and nonpublic facilities. These comparative methods include linear programming, genetic algorithms, weighted Minimax criteria, GIS-based spatial analysis, and network analysis(Marianov V& Ríos M, Taborga P,2010).

Community Elderly Policy Study. The ageing of China's population continues to deepen, and the issue of old age is increasingly receiving widespread attention from the central government and the society. As the most suitable model for China's national conditions, community care for the elderly is getting more and more attention. China has issued a series of policies and norms for the construction of community-based elderly care facilities. However, the wide variety of norms and the lack of uniformity in their content have had a poor impact on the planning and the services of elderly care. On December 30, 2021, China's State Council issued the "14th Five-Year Plan for the Development of the National Aging Career and Pension Service System", which proposes to actively respond to population ageing and establish an institutional framework for the national strategy. On this basis, it promotes the effective synergy and high-quality development of the aging business and industry. It also accelerates the improvement of the elderly service system, which is coordinated with home-based community organizations and combines medical care and recreation(Circular of the State Council on the Issuance of the 14th Five-Year Plan for the Development of the National Aging Career and the Pension Service System).

Official documents have also been introduced. The main ones include the Planning and Design Code for Urban Residential Areas, the Planning Code for Urban Facilities for the Elderly (GB50437-2007), and the Construction Standards for Community Day Care Centers for the Elderly (JB143-2010). The Planning and Design Code for Urban Residential Areas provides the main construction standards for the construction of facilities for the elderly. At the level of community elderly service facilities, the latest version of the Urban Residential Area Planning and Design Code (GB5018-2018) stipulates that five-minute living circle residential areas should include elderly activity stations and day care centers for the elderly (Zhang C,2015). Day-care centers for the elderly should provide day-care services for the elderly, such as food, entertainment, fitness and medical care. The service radius should not exceed 300ms. Residential neighborhoods should be equipped with activity areas for the elderly, and the service radius should not be greater than 300ms. However, it lacks normative standards on the layout of community elderly service facilities and the number of service providers. The Planning Code for Urban and Town Facilities for the Elderly (GB50437-2007) divides facilities for the elderly into urban, residential, and neighborhood levels according to the scope of services and the nature of the area in which they are located. Elderly service facilities at the community level include activity centers for the elderly, service centers for the elderly, and day-care centers (Wang Qingqing & Wang Yan,2017). This normative document specifies the number, size, layout and service radius of urban facilities for the elderly. However, it does not specify the target group, service radius and number of people to be served. The Standard for the Construction of Community Day Care

Centers for the Elderly (JB143-2010) specifies in detail the contents of the construction of community elderly care centers, the scale of construction and indicators of area, site selection and planning layout (Zhang Zheng & Mao Baohua, 2007). This standard divides day care centers for the elderly into three categories according to the size of the community's population. However, it does not specify the service radius of the day care centers or the number of staff of the facilities. It also does not address the grading and site planning criteria for home-based elderly care facilities.

Study Objects

Elderly population. According to age stratification, the elderly population can be broadly categorized into three groups, with 60-69 years of age being the lower-aged elderly population, 70-79 years of age being the middle-aged elderly population, and 80 years of age and above being the upper-aged elderly population. According to health conditions, the elderly population can be broadly categorized into self-care elderly, semi-disabled elderly and totally disabled elderly. Self-care elderly people refer to those who are mentally and physically healthy, able to perform basic activities of daily living, eating and drinking independently without the aid from others and other assistive devices. Semi-disabled elderly people are those who are conscious and independent, but are in poor physical condition and rely on the help of other people, or on the assistive devices, such as crutches, wheelchairs, so they have more difficulty in completing daily life and social activities independently. Totally disabled elderly people include those who have blurred mental consciousness and deteriorated physical functions, and are unable to survive and live independently, relying entirely on the care of others for their basic living.

Population ageing. It means a dynamic process in which the proportion of older persons in the total population is increasing, and it can indicate that the age composition of the population has changed to the old-age type. The elderly population is a static state at a certain age and is the result of the continuous development of population ageing. According to the international standard, the proportion of the population aged 60 or 65 and above to the total population represents the level of population aging in a country or region. When the proportion of the elderly population aged 60 and above to the total population exceeds 10%, or when the proportion of the elderly population aged 65 and above to the total population exceeds 7%, it is an aging society. In this study, the elderly population aged 60 years or older is used as a criterion for the degree of ageing, and with regard to the degree of ageing, it can be divided into four stages: the proportion of the population aged 60 years or older to the total population of less than 5 percent is known as the young age group; the proportion of the population aged between 5 and 10 percent, the adult age group; 10-16 per cent, the old age group; and more than 16 percent, the senescent age group.

Community Care Model. China's current elderly care model is mainly divided into family care, community care and institutional care. The community-based elderly care model refers to the provision of daytime services for self-care and semi-incapacitated elderly people through community public facility services, including meal supply, medical rehabilitation, daily recreation, personal care and other activities. Community care for the elderly is centered on home care for the elderly, supplemented by community care for the elderly homes, to satisfy the daily needs of the elderly in the most convenient way. The community care

model is different from family care and social care, combining the advantages of both, and is a new and emerging way of coping with ageing in the period of social transformation in China, in line with China's national conditions. Day care centers. Day care centers are usually affiliated to the community elderly institutions. The concepts of day care center are slightly different according to different documents. The day care center is defined as: "Elderly care service facilities providing food supply, personal care, rehabilitation and health care, spiritual comfort and health consultation for the self-care and semi-self-care elderly in the community" in the "Community Elderly Day Care Center Service Basic Requirements" Document(GB/T33168-2016). In the Construction Standards for Community Day Care Centers for the Elderly and the Norms for Day Care Services for the Elderly in the Community (SZDB/Z240-2017), a community day care center for the elderly is "an elderly care facility that provides daytime services such as meal supply, lunch breaks, personal care, health rehabilitation, recreation, and transportation for the semi-disabled elderly in the community who are unable to take care of themselves at all and who are in need of daily life care".

Overview of Xuhui District's Elderly Population
General demographic characteristics
The composition of the elderly people in the total population is to analyze the internal composition of the population by using age as an indicator, which reflects the distribution and proportion of the population in different age groups. According to the child population coefficient, the old population coefficient, the ratio of old to young, the age composition of the population is generally divided into three types: young, adult and old. If there is any inconsistencies in the conclusions of the four indicators, usually a majority standard will be applied.

Table 1 Criteria for classifying the type of age composition of the population[1]

Typology	Child population coefficient（%）	Elderly population coefficient（%）	Old-meets-young ratio（%）	Median age（year）
Young type	40+	Under 4	Under 15	Under 20
Adult type	30-40	4-7	15-30	20-30
Old type	Under 30	7+	30+	30+

Table 2 Main Indicators of Age Composition of Population in Xuhui District[2]

Targets	2010s	2020s
Child population coefficient（%）	11.3	28.37
Elderly population coefficient（%）	19.8	71.96
Old-meets-young ratio（%）	1.75	2.54
Typology	Old type	Old type

Through the analysis of population data in 2010 and 2020, we can find that Xuhui District's elderly population coefficient rose from 19.8% in 2010 to 71.96% in 2020, the ratio of young to old rose from 1.75% in 2010 to 2.54% in 2020, which indicating that the population ageing level in Xuhui District is deepening. In 2010, the population of Xuhui District was 910851, of which 216450 were over 60 years old, accounting for 23.76% of the total population. In 2020, there were 932029 registered residents in Xuhui District, of whom 334791 were over 60 years old, accounting for 35.92 percent of the total population. According to the data of the 6th and 7th Xuhui District Population Census, Xuhui District of Shanghai has entered the aging stage.

Demographic characteristics of the different streets

Based on the data of the 6th Chinese Population Census in 2010 and the 7th in 2020, a spatial database of Xuhui District's elderly population based on street-level administrative territorial entity was established on ArcGIS platform. According to the population quantity in the map of population spatial distribution, the old population in each street is divided into five grades and distributed from high to low, the spatial distribution of the elderly population in Xuhui District can be visualized.

Research Methodology and Technical Approach

In order to establish a community-based,

[1] Data source: Baidu Encyclopedia.
[2] Data source: China's sixth and seventh national population census data.

street-based administrative territorial entity spatial database of Xuhui District population ageing, this research is carried out on the ArcGIS spatial analysis platform with the official data as the main information carrier which is supplemented by the random questionnaire. The official data sources are from the 6th and 7th National Population Censuses in 2010 and 2020, which is mainly extracted from the Xuhui District Statistical Yearbook. The geographic coordinate system is GCS_China_Geodetic_Coordinate_System_2000 （CGCS2000） The projected coordinate system is CGCS2000 120E and the central meridian is 121.4.

The steps for Arc GIS analysis are in the following.

Step 1: Key down the map of Xuhui District from the downloaded block, by selecting it by attribute in the selection; name=Xuhui District.

Step 2: Geo-process the base map, by transferring the element categories to shapefiles, then save as.

Step 3: Put the found map of Xuhui District into the shape folder and add it to the right data

Step 9: Convert the data in the excel sheet to points, operate in the XY table to points in geo-processing, and the coordinate system is unified as GCS_China_Geodetic_Coordinate_System_2000.

Step 10: Unify the coordinate system by defining the projection, including the map, each street layer, and the day care center layer, then convert the coordinate system to the projected coordinate system CGCS2000 120E Central meridian: 121.4.

Step 11: Draw the surface, by using capture plus modification to draw each street section.

Step 12: Add the content of the day care center attribute table, such as the picture, price, size, beds and other information.

Step 13: Collect the data of day care centers in Xuhui District and organize them into an excel column.

Step 4: Add control points by means of geographic alignment, so that the base map of Xuhui District and the map overlap, zoom to the layer.

Step 5: Open the coordinate system conversion app, batch convert the Xuhui District street addresses to latitude and longitude, export the excel sheet, and put the sheet into the folder for refreshing.

Step 6: Convert the data in the excel sheet to points, operate in the XY table to points in geoprocessing, and the coordinate system is unified as GCS_China_Geodetic_Coordinate_System_2000.

Step 7: Convert the coordinate system to the projected coordinate system CGCS2000 120E Central Meridian: 121.4 by defining the projection.

Step 8: Open the coordinate system conversion app, batch convert the Xuhui District Day Care Center address to latitude and longitude, export the excel sheet, and put the sheet into a folder for refreshing.

table, which includes the number of people over 60 years old in each street in 2010, the number of people over 60 years old in 2020, the degree of aging of the population in 2010, the degree of aging of the population in 2020, the density of the population over 60 years old in 2010, the density of the population over 60 years old in 2020, the day care in each street centers, and the number of day care centers per 10,000 elderly people.

Step 14: Put the excel sheet into the Arc GIS analysis software and create a link between the map and the sheet by adding links.

Step 15: Analysis of the data, the number of elderly population in each street, the degree of population aging, the density of elderly population and the number of centers in each street and the number of day care centers per

10,000 elderly people in 2010 and 2020 by using the graded colors and graded symbols in the symbol system.
Step 16: Manage the layers and create new layer groups to categorize them.
Step 17: Export the drawn map, then add scale, compass and other elements.
Questionnaire survey is also applied in this study. A total of 43 valid questionnaires about the needs of community-based day care services were collected from the randomly selected streets of Ling Yun, Xuhui District. No software but some simple calculation is used to analyse the quantitative data.

Results
1.About the spatial distribution of population
From 2010 to 2020, the number of people over 60 years old in Xuhui District increased greatly. From the perspective of spatial distribution, the distribution of the elderly population is still more in the north than in the south, more in the west than in the east. In 2010, the streets with a high number of elderly population were Tianping Road Street and Fenglin Road Street, while the streets with a lower number of elderly population were Hongmei Road Street, Huajing Town Street and Longhua Street. In 2020, the number of elderly people in the streets increased significantly, with Longhua and Kangjianxincun streets being the most prominent. In 2020, the number of the elderly over 60 years old is the largest in Fenglin Road, Meilong Road and Huajing town. Among the streets of the over-60-year-old population, Fenglin Road streets nearly 40,000.

Figure 1: Spatial distribution of population aged 60 years or above in Xuhui District, Shanghai, 2010

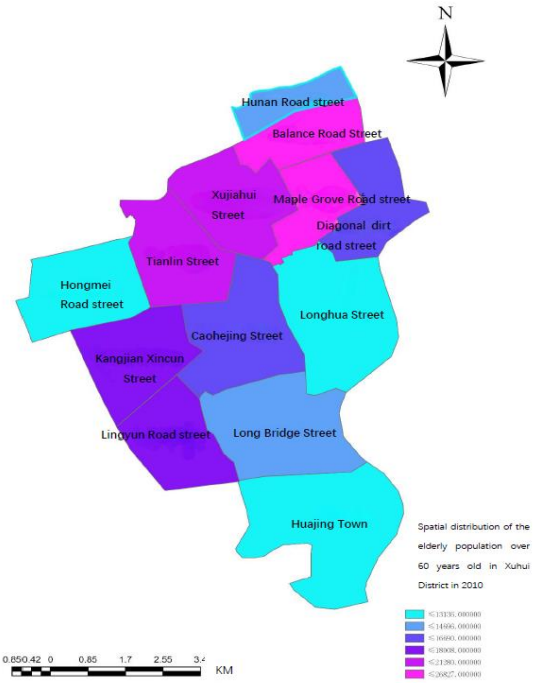
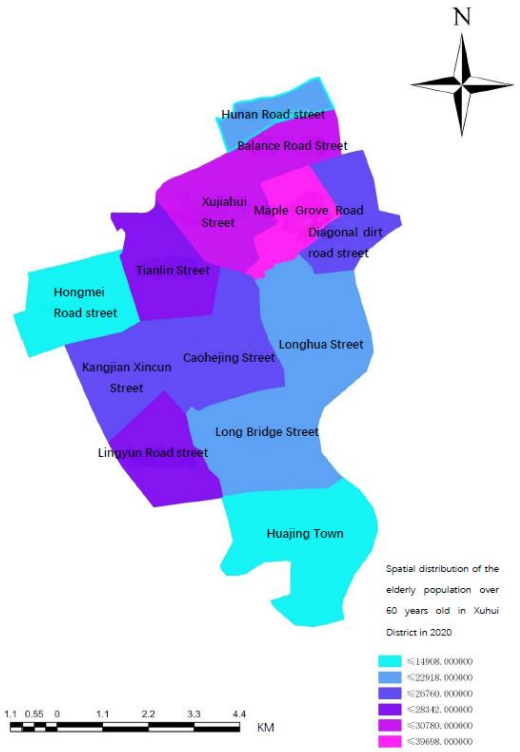


Figure 2 Spatial distribution of population aged 60 and above in Xuhui District, Shanghai, 2020



2.Degree of aging (60 years +) for different streets

Based on the literature on the criteria for the classification of ageing, population ageing can be divided into four stages: young (5% of the population aged 60 years and over) , adult (5% to 10%) , senile(10% to 16%), and more than 16% senescent. In 2010, 24% of Xuhui District's residents were aged, with Lingyun Road being the least aged (19%) and Hunan Road the most aged (29%). The streets of Xujiahui were the least aged at 31% ,while the streets of Hunan Road and Longhua were the most aged at 43% .In 2020, Xuhui District's population was 36 percent older than in 2010, the population ageing increases.

Figure 3 Degree of aging (60 years old) by street in Xuhui District, Shanghai, 2010

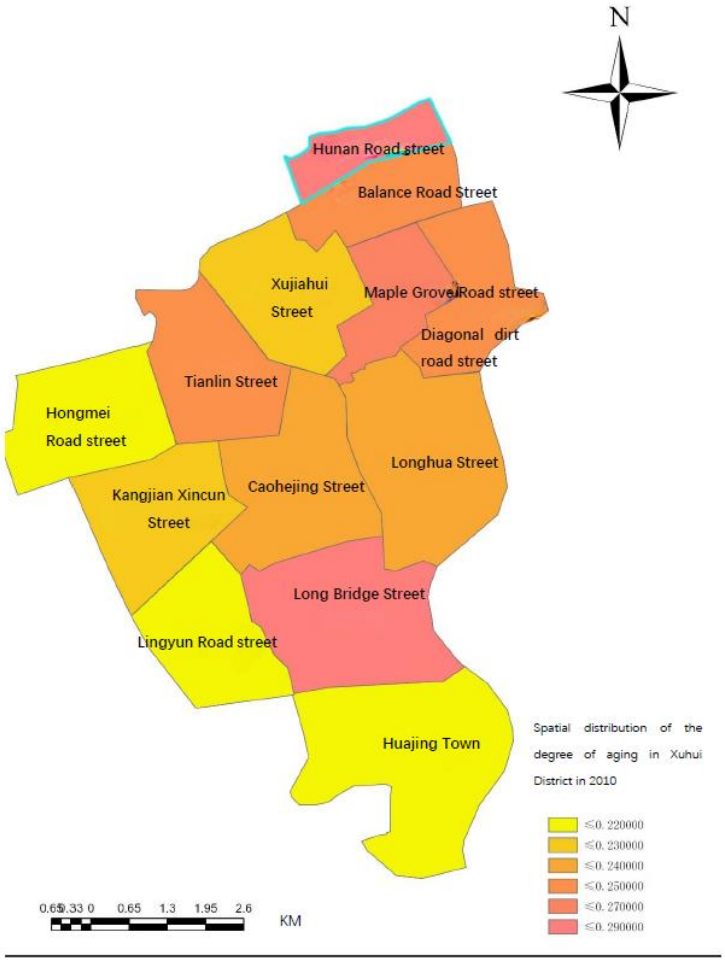
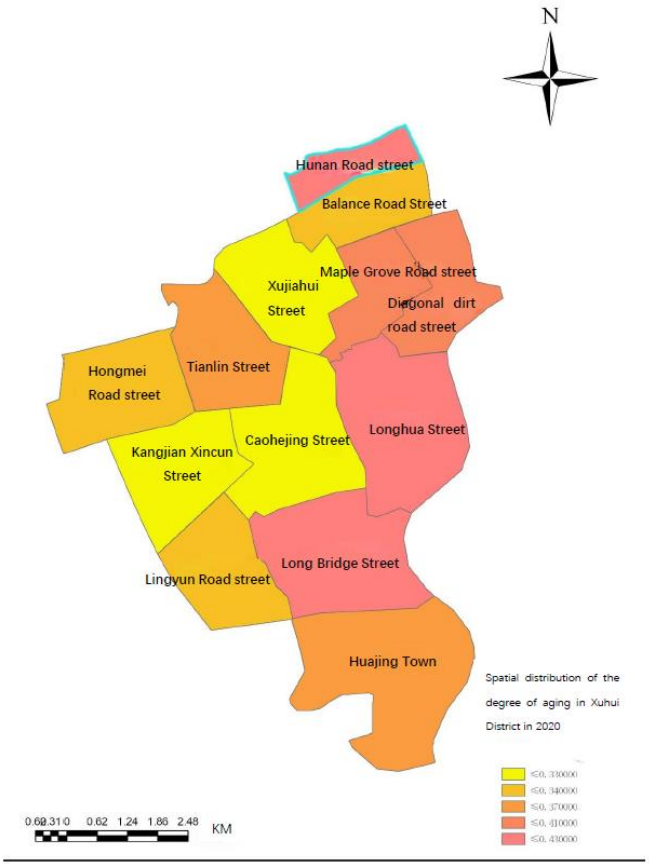


Figure 4 Degree of aging by street in Xuhui District, Shanghai, 2020 (60 years old)



3.About Population density of people over 60 years old

The density of the elderly population is the number of elderly people living on a piece of land at a given point time and is used to analyze how dense the elderly population is. In Xuhui District, the density of the elderly population aged 60 years and older increases from 3,942 persons/km2 in 2010 to 6,097 persons/km2 in 2020. Fenglin Road Street has the highest elderly population density in both 2010 and 2020. The density of the elderly population in Xuhui District varies considerably, with Huajing Town consistently having the lowest elderly population density.

Figure5 Population density of people over 60 years old in each street of Xuhui District, Shanghai, 2010

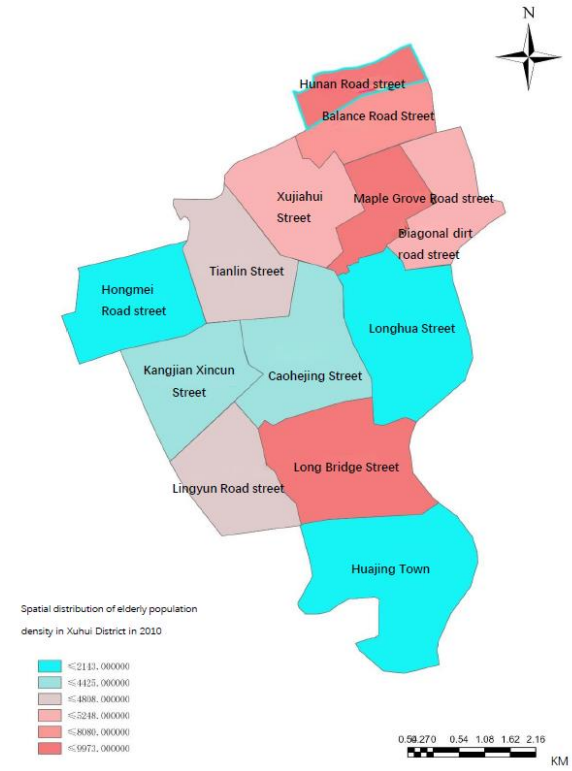
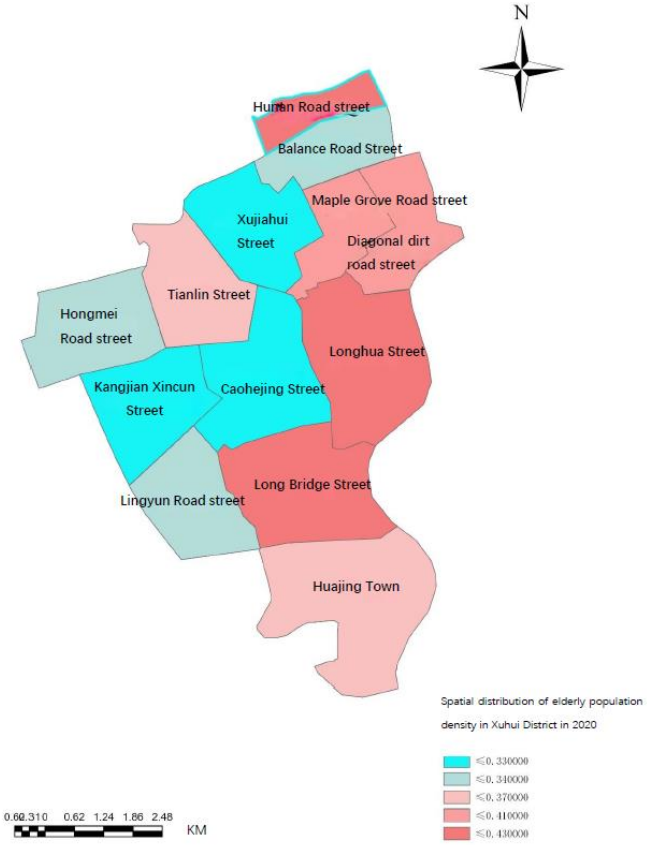


Figure 6 Population density of people over 60 years old by street in Xuhui District, Shanghai, 2020



4.About the the elderly needs for community care

Community day care centers for the elderly should meet the needs of most of the urban elderly, who not only have the common characteristics of the general urban residents, but also show different characteristics from other age groups. In order to better understand the needs of urban elderly, it is necessary to analyze the characteristics of urban elderly groups.

According to the physical health condition of the elderly, they can be divided into self-care elderly, semi-disabled elderly, completely disabled elderly people. Different types of elderly people have different needs for elderly care services. Targeted planning strategy can meet the needs of personalized, and ultimately promote the community facilities for the elderly services. Due to different physical conditions of the elderly, the needs for services, such as the layout and the design of facilities for the elderly, are quite diversified. For example, most self-care elderly people are healthy, so they can move freely, and can take care of themselves completely. Therefore, the demand for physical life care and medical care is relatively low, but the demand for emotional services, leisure space and cultural entertainment is high. Most of the semi-disabled elderly have hearing, perception, discrimination and movement problems, and their range of activities gradually reduced, so the need for outdoor places is quite low, but the demand for living care and medical and health facilities is increasing. Most fully disabled older people experience severe deterioration in hearing, vision and mobility. They cannot live independently, so they have a strong demand in medical conditions, nursing services, life nursing services and so on.

A total of 43 valid questionnaires were collected on the streets of Ling Yun, Xuhui District. Of the respondents, 39% were younger than 30, 56.7% were 30-60 and 4.3% were older than 60. Men accounted for 27 per cent of the responses and women 73 per cent.

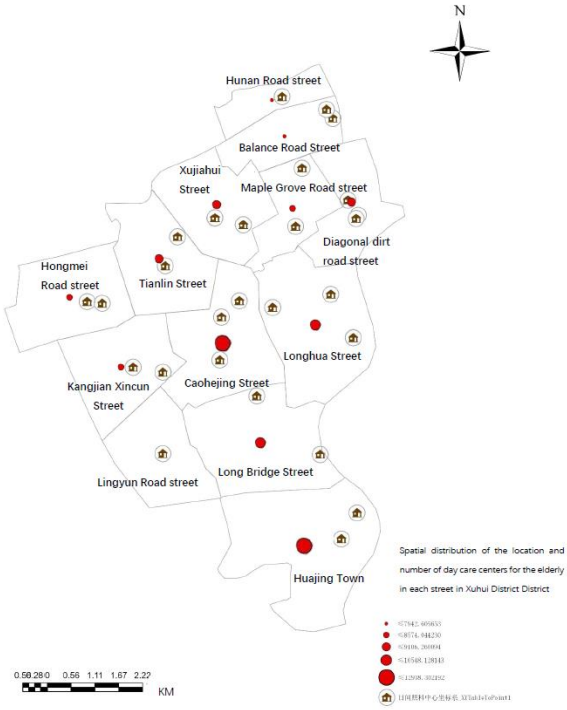
Under normal circumstances, families between 30 and 60 years old have elderly care needs, and the respondents have the right to decide in the family, so it is considered that the age range of the answer paper represents the elderly family. A total of 22 valid questionnaires in the age range of 30-60 years were obtained by preliminary screening (excluding the questionnaire with no need for old people in Shanghai or deceased). Among them, 7(31.8%) had received day care services. Families aged 30-60 who have received day-care center services and those who have not received day-care center services are surveyed on their needs. Taking into account the representativeness of the sample, a needs survey was conducted among the larger group of persons who had not received services from day-care centers, and on this basis, the respondents' families are divided into two categories: the elderly with care needs and the elderly without care needs. After analyzing the questionnaire data, the main reasons why families with older persons in need of care do not choose day-care centers are as follows: there are no good day-care centers near the family home and they are not aware of such institutions.

5.About the day care centers in Xuhui District

The subjects of this study covered 13 streets, 28 day care centers for the elderly were built and operated by the end of 2022, providing a total of 672 beds. There are 4 Caohejing Streets, 4 Fenglin Road Streets, 2 Hongmei Road Streets, 1 Hunan Road Street, 1 Huajing Town, 2 kangjian new village streets and 1 Ling Yun Street, two in Tianlin County Street, two in

Xujiahui Street, two in Changqiao Street, two in Tianping Street and two in Ramp Road.

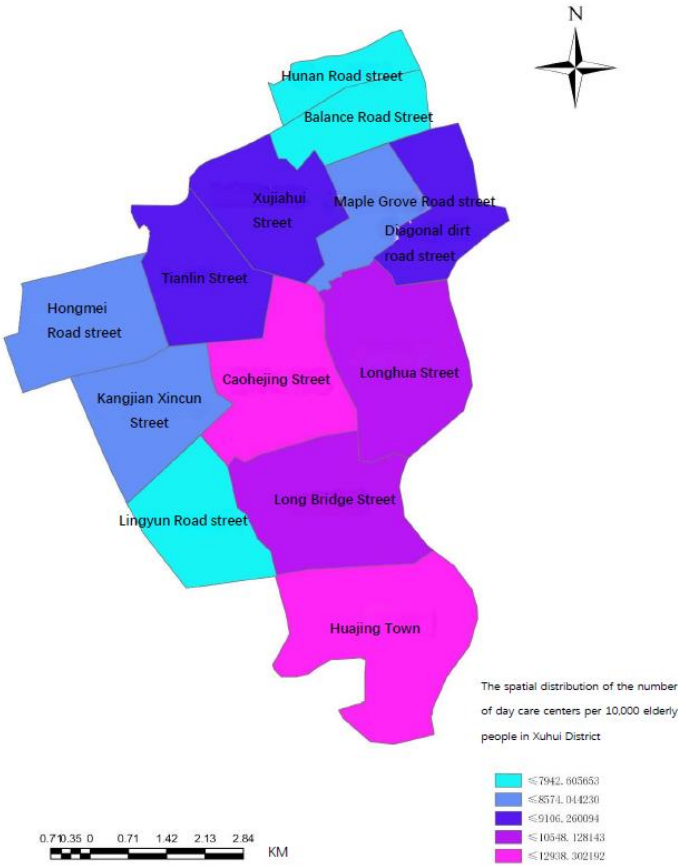
Figure 7 location and number of day care centers for the elderly in different streets of Xuhui District, Shanghai



As of 2020, there were a total of 216,450 elderly people over 60 years of age in Xuhui District, Shanghai, including 21,654 in Tianping Road Street, 14,696 in Hunan Road Street, 16,690 in Xietu Road Street, 26,827 in Fenglin Road Street, 19,927 in Changqiao Street, 19,730 in Tianlin Street, 4,324 in Hongmei Road Street, and 1,8008 in Kangjianxincun Street, Xujiahui Street 21,286, Lingyun Road Street 17,212, Longhua Street 13,136, Caohejing Street 16,346, Huajing Town 6,614. Fenglin Road Street has the largest number of elderly people over 60 years old, while Hongmei Road Street has the smallest number.

Comparing the map of the number of day care centers per 10,000 elderly people in 2020, it can be found that the distribution of day care centers in Shanghai's Xuhui District is not even relative to the elderly population. For example, Lingyun Road Street has close to 28,000 seniors but only one day care center; the number of day care centers per 10,000 people (population aged 60 years and above, the same below) is the lowest, at 0.363 day care centers per 10,000 seniors. Caohejing Street, with nearly 27,000 elderly people, has four day care centers, and the number of day care centers per 10,000 elderly people is 1.495 per 10,000 people. From the requirement of having day care centers per 10,000 elderly, the distribution of day care centers in Xuhui District of Shanghai is not even.

Figure 8 Number of Day Care Centers per 10,000 Elderly in Xuhui District, Shanghai



Discussion:

1.Problems in the spatial distribution of day dare centers in Xuhui District

In recent years, the state has increased its attention to and support for community elderly day care, and a large number of community elderly care facilities have been organized and constructed, which have alleviated the pressure on elderly care to a certain extent. Through the questionnaire survey and field research, it is found that there are some problems in the development of day care centers in Xuhui District, such as the lack of nursing function in the day care centers that undertake community elderly care, and the lack of demand for community elderly care, etc. The community-level elderly care facilities that are supposed to alleviate the pressure on the elderly society have not played the right role they are supposed to.

First, mismatch between demand and spacial distribution. Although Xuhui District in Shanghai has achieved full coverage of day care centers in all streets, still there is a structural imbalance between overcrowding and facility limitations in the day care centers. For example, the number of day care centers per 10,000 elderly people in Fenglin Road Street and Changqiao Street, where the elderly population is relatively large, is low. Hongmei Road Street and Huajing Town, which have a smaller elderly population, have a higher

number of day care centers per 10,000 elderly people, resulting in a waste of resources. For another example, Hongmei Road Street has the highest number of day care centers per 10,000 people (aged 60 and above) per 10,000 elderly people, at 2.67 centers per 10,000 people.
Second, classification confusion. The day care centers in Xuhui District, suffer from the problem of different names and unclear classification of levels. Through the questionnaire survey and spatial analysis, it can be seen that in the current classification of day care centers, due to the complexity of the names and the lack of individualized functional orientation, the actual services they can provide are similar in spite of different names. This overall classification system of day care centers leads to confusion of the rules. Moreover, there is no clear definition of the classification of day-care centers, which makes it difficult for older persons to make a choice on the basis of reference.
Third, simplification on planning standards. At present, most of the existing norms on senior care facilities are classified at the level of cities (regions), residential areas, residential districts, and the scale is divided according to the total population, rather than the number of older persons, the degree of ageing, the density of older persons and other indicators that are closely related to senior care. So the layout of facilities and the distribution of the elderly population is not coordinated, which in turn affects the enjoyment of the elderly on the community resources. Therefore, it is necessary to differentiate the layout of day care centers in each street according to the distribution characteristics of the elderly population in Xuhui District. For streets with higher numbers and densities of aging populations, the standards can be raised on a standardized basis, and for streets with smaller numbers of elderly populations, the number of institutions should be reduced.
Last, vague function location. The vagueness of function orientation is mainly embodied in the singleness of service object and service content list. The positioning standard of community day care centers for the elderly is mainly for the semi-disabled and the disabled. However, there are irregularities in the positioning of the functions of day care centers in Xuhui District, according to the questionnaire, only 56 per cent of the day care centers provide medical care and 15 per cent of the day care centers provide short-term overnight care, which is not sufficient to meet the needs of the majority of the disabled elderly. Community Care refers to the community to receive life care, the elderly home at night, it is mainly applicable to those who can not take care of themselves, can not live independently of the elderly. They are unable to receive care during the day, unable to live independently due to physical reasons and are reluctant to leave their homes for long periods of time. According to the survey, the main clients of day care centers in Xuhui District are the elderly who can take care of themselves. So the dilemma is that these elderly people prefer to staying at home,rather than in the day care centers. The main functions of day-care centers have been simplified into a place of activity and communication for older persons, and services such as nursing care can not be provided for semi-dependent older persons in need of day-care, the day care centers gradually deviate from its original function, and the supposed goal is difficult to achieve. Currently, the day care centers in Xuhui District can not provide professional services and only can be treated as “Activity Centers for the Elderly”.
2.Principles for optimizing the layout of day care centers in Xuhui District
First of all, the layout of day care centers should match the distribution of the elderly

population.
Currently, most of the existing norms on urban elderly care facilities are graded according to the levels of city (region), neighborhood, community and cluster, but the proportionality of each level is based on the total population rather than the number and proportion of the elderly population. This will lead to an uncoordinated layout ,distribution of the number of centers and the elderly population The irrationality of spatial distribution will ultimately affect the realization of the positive effectiveness of community day care.
Therefore, the distribution of community day care should be differentiated according to the characteristics of the distribution of the elderly population in the region; so, for regions with a smaller elderly population and a less serious degree of ageing, the number of day care centers can be appropriately reduced.
Next, the layout of day care centers should be graded and classified among themselves. Classification for public service facilities of the same level and type is the basic principle of public service facility allocation. At present, there is no standardized, official, standard grading rules and standards for day care centers for the elderly in Shanghai. The classification of day care centers can better refine the type and level of service, and build a more detailed system of community elderly service institutions. Therefore, the future development of day care centers should follow the principle of classification and grading, to build a system of senior care services for different levels, such as the city, district, street, community, neighborhood, and family, then take it as the overall direction to develop the characteristics of senior care in Shanghai.
Last, the layout of day care centers should achieve accessibility.
The spatial range of the daily activities of the urban elderly is manifested as the configuration structure of family, residential area, street and city (county and district) facilities from near to far, and the limited travel capacity of the elderly also determines that their daily activities are concentrated in the residential area, which is also the trend of most urban elderly. Older people are limited by their physical condition and limited travel distance. Therefore, the allocation of day care centers should take into full consideration of the travel distance for the elderly. Taking walking distance as a criterion, community-based elderly care facilities should generally be within a 10-minute (750-meter) walking distance. Older people's travel is generally home-based and forms a circle around the community, presenting a layered character
3.Optimization strategy of Day Care Center in Xuhui District
To establish a demand-oriented, problem-oriented service mechanism, the layout and the construction of day care center for the elderly should take into account the spatial distribution of the elderly population, population density and other factors. Based on the distribution and demand of the elderly population in Xuhui District, the present study examined the spatial distribution of day-care centers and the service problems of the elderly in Shanghai, the optimization strategy of day care center is defined from the aspects of classification, location standard, service radius, service number and service function.
First, classification and grading of the service facilities. The construction of community day care centers should fully meet the needs of the elderly. Taking into account the current distribution and needs of the elderly population in Xuhui District, day care centers for the elderly are classified into type I and Type II day care centers, the purpose of this paper is to make clear the orientation and service requirements of all kinds of day care

centers so as to maximize the utilization rate of endowment resources and meet the needs of all the elderly. Type I, short-time term care center, mainly for semi-self-care services for the elderly, should be equipped with shuttle bus. This type of facility is more professional and can meet the needs of the semi-dependent elderly. Type II day care centers mainly provide services for the self-care elderly and semi-self-care elderly. The services provided by this type of facility are not as professional as those provided by Type I. The main features of this type of facility are large number, small scope of service, and small number of service personnel provided by a single facility, which can meet the daily recreation, rehabilitation and health care of the elderly and the accessibility needs of facilities.

Second, the criteria of the facility position . Considering the limited travel distance of the elderly, we should pay attention to accessibility in the location, as close as possible to the subway stations, bus stations and other public transport points.

At the same time, the location of the center should be open and conspicuous, which is easy to find. If it is located in a closed property, there must be convenient and barrier-free public access to the outside world to facilitate the travel of the semi-disabled elderly. The distance and frequency of shuttle service should be increased in remote suburban day care centres. Facilities should be combined with surrounding supporting facilities, close to community public service centers, green Spaces, parks, etc., to facilitate the elderly's activities and exercise close to medical facilities, medical insurance designated hospitals or combined with nursing homes to set up the proposed surrounding supporting facilities in the suburbs.

Third, the standard of the service radius. The distribution of elderly population density in each street of Xuhui District of Shanghai is not balanced. Therefore, when planning the center, it should not be mandatory to set a uniform service radius. Instead, the service radius should be flexibly set based on the distribution of elderly people, graded according to the density of elderly population over 60 years old in the residential area, and the rigid requirements for each street should be set according to the density of elderly population to determine the different service radius levels.

Fourth, the stuff number for the facilities. Facility staffing refers to the maximum number of elderly people served by the old-age service facilities. By referring to the cases of international cities, we find that the ageing service facilities should have a certain facility staffing. For example, the average number of elderly persons served in elderly care centers in Hong Kong is around 40. In China, there is no clear provision on the number of persons to be accommodated in day care centers for the elderly, resulting in inefficient services. Thus, the precise layout of day-care centers can be achieved by regulating the number of staff in the institution. According to China's national conditions and relevant experience, this paper considers that it is reasonable to set the number of people in Type I day care center as 50-60, and the number of people in Type II day care center as 30-40.

Fifth, service function settings.

The service Settings of day care centers should match the needs of the elderly in the community. At present, the service objects of day care centers in Xuhui District of Shanghai are generally middle-aged and young elderly who are self-dependent, and the needs of the elderly and semi-self-dependent elderly are not met, so Type II class day care centers are mainly in operation. However, according to the actual needs, a class of day care centers should be set up in some communities with a large

number of disabled elderly people to provide short-term care services, and professional services should be provided for the elderly and semi-self-dependent elderly. All day care centers are divided into two categories according to their clients, and provide corresponding services according to their own characteristics and audience requirements.

Conclusion

At present, with the deepening of the aging degree and the continuous development of urbanization, how to reasonably build community elderly day care facilities has become an increasingly prominent problem in China's social and economic background. The community-based model maybe the best way to deal with the aging problem in China. But now, the construction of community facilities in China is still in the initial stage, and the contradiction between supply and demand is prominent. On this basis, from the perspective of optimizing the spatial layout of community elderly care, this paper analyzes the current situation and facility needs of the elderly population and day care centers, and discusses the planning strategy of day care centers in view of the prominent contradiction between supply and demand of the centers.

It is found that the layout of day care centers in Xuhui District of Shanghai does not match the distribution of the elderly population; the layout does not fully consider the distribution of the elderly population. In addition, there are also confusion in the classification of facilities, vague functional positioning, and the functions of Starlight House and community elderly activity center are similar, failing to meet the needs of high-demand elderly people. In view of the prominent contradiction between the supply and demand of day care centers, the layout principle of day care centers is proposed. On this basis, combined with the previous research results, the corresponding optimization strategy of day care centers in Xuhui District of Shanghai is summarized: the types of facilities to meet the diversified needs of the elderly, reasonable adjustment of facility supporting standards, optimization of facility spatial layout, improvement of service radius standards, service function setting standards and other contents. The service function of day care center should be divided into two categories according to the needs of the elderly. Type I of day care center mainly provides services for the semi-self-care elderly and has a high degree of professionalism. Type II of day care center mainly provides services for the self-care elderly and semi-self-care elderly, and the services provided by such facilities are not as professional as the first type, which can meet the daily recreation, rehabilitation and health care of the elderly.

RECEIVED:14/November/2023 ● ACCEPTED: 21/October/2024 ● TYPE: Original Research Article ●FUNDING: The authors received no financial support for the research, authorship, and/or publication of this article ● DECLARATION OF CONFLICTING INTERESTS: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. ● Availability of data and materials data is available from the corresponding author on reasonable request ● Ethics approval and consent to participate: Not required for the methodology applied

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