

Exploration of Optimization Path of Elderly Cultural Facilities in Xishan District, Kunming Based on Data Mining and GIS

Jing Luo

Dianchi College, Yunnan University, Kunming 650228, China

Abstract

The research adopts Python language, adopts data mining technology, takes the urban elderly cultural service in Xishan District of Kunming City as the research object, grabs the urban elderly cultural facilities in Xishan District with coordinate information from the Internet, based on the massive big data of POI in the above cities, adopts GIS data analysis, spatial analysis and other methods, and starts from the construction of elderly cultural facilities in Xishan District, mainly studies the content of "five parts and three modules", including supply characteristics, demand analysis, system construction, layout research, Five research parts, including safeguard measures.

Keywords

Data mining, Python, GIS, Urban elderly cultural facilities, Xishan District.

1. Introduction

Aging has become an irreversible development trend in my country. By the end of 2020, the elderly population aged 60 and above will reach 264 million, accounting for 18.73% of the total population; the elderly population over 65 will reach 191 million, accounting for 13.5% of the total population. Problems and social pressures are also becoming increasingly prominent.

The proportion of elderly population in Kunming is higher than the average level of the province. The aging growth rate is fast, the population base is large, and the aging process is ahead of the economic development level. Problems such as "getting old before getting rich" and aging are prominent, and the proportion of elderly dependents continues to increase. rise. As of the end of 2020, there were 1,218,200 permanent residents over the age of 60 in Kunming, accounting for 14.4% of the city's total permanent population.

Xishan District is an important area in the main urban area of Kunming. For Kunming, which has millions of elderly people, the number of cultural facilities for the elderly is far from enough. It is an important goal of this study to implement the national strategy of actively responding to population aging, improve the system and work, and promote the diversification and development of cultural undertakings for the elderly, so that all the elderly can grow old happily and securely.

2. Research Ideas and Technical Routes

2.1. Research ideas

The study adopts Python language, uses data mining technology, and takes Xishan urban elderly cultural services as the research object, grabs Xishan urban elderly cultural facilities with coordinate information from the Internet, based on the massive POI data of the above cities, uses GIS data analysis, spatial Analysis and other methods are used to analyze and evaluate the current situation of cultural facilities for the elderly in Xishan District.

The specific research content includes the following aspects: ①Investigation and analysis of the status quo of urban elderly cultural facilities in Xishan District (supply characteristics);

②Demand analysis of the scale and characteristics of urban elderly population in Xishan District (demand analysis); ③Urban elderly cultural facilities in Xishan District Research on the system and supporting index model (system construction); ④ Research on the spatial layout of urban elderly cultural facilities in Xishan District (layout research); ⑤ Suggestions on safeguard measures such as construction models and land policies for elderly cultural facilities (safeguard measures).

2.2. Technical routes and solutions

Taking the Xishan District of Kunming City as an example, the research is based on the massive big data of urban POIs (cultural facilities for the elderly, bus stop data, park green space/square data, medical facility data, etc.), combined with the demographic data of the elderly and the willingness survey data of departments/groups, using GIS data analysis, spatial analysis and other methods are used to analyze and study the construction of urban elderly cultural facilities, and provide a theoretical basis for the construction of urban elderly culture and elderly cultural service systems in Xishan District.

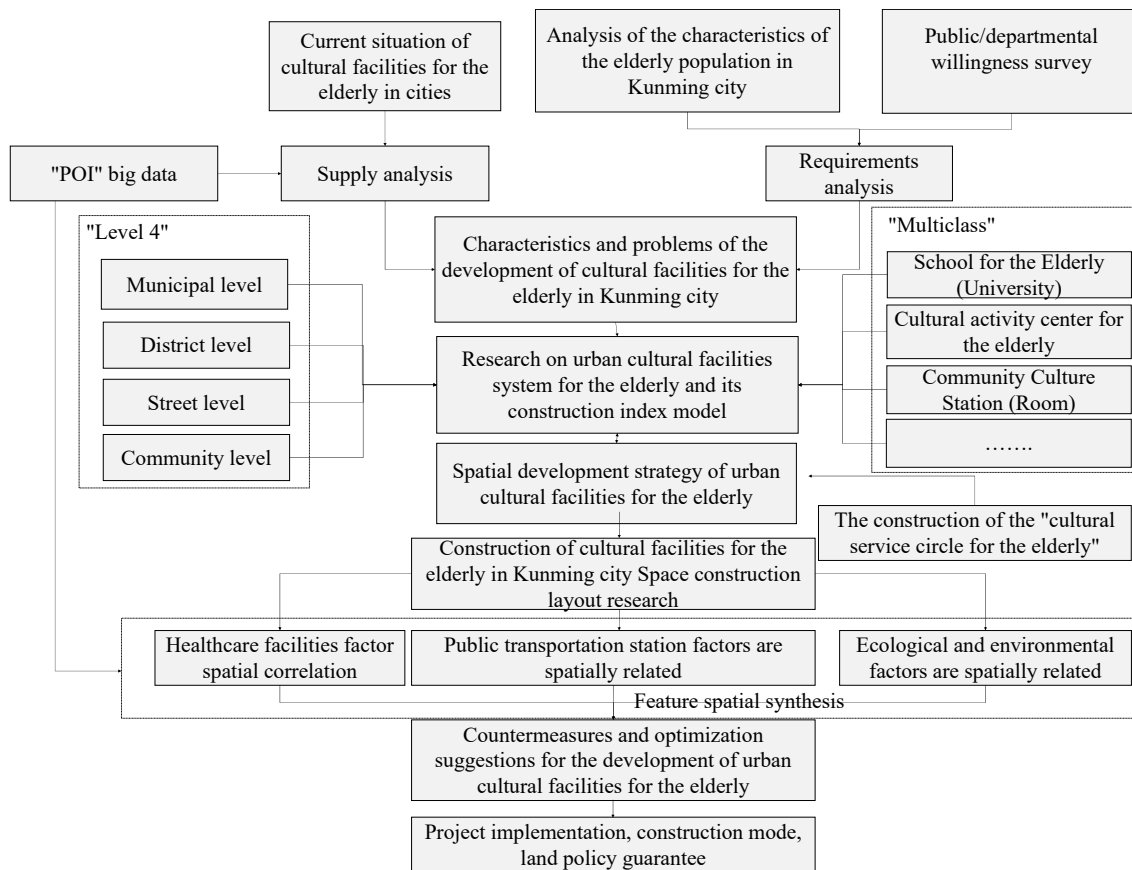


Figure 1. Research Technology Framework

3. Massive Data and Information Mining of Cultural Facilities for the Elderly in Xishan District

Taking the urban cultural services for the elderly in Xishan District as the research object, the cultural facilities for the elderly in Xishan District with coordinate information were scraped from the Internet, and based on the massive big data of urban POI, GIS data analysis, spatial analysis and other methods were used to analyze and evaluate the current situation of cultural facilities for the elderly in Xishan District.

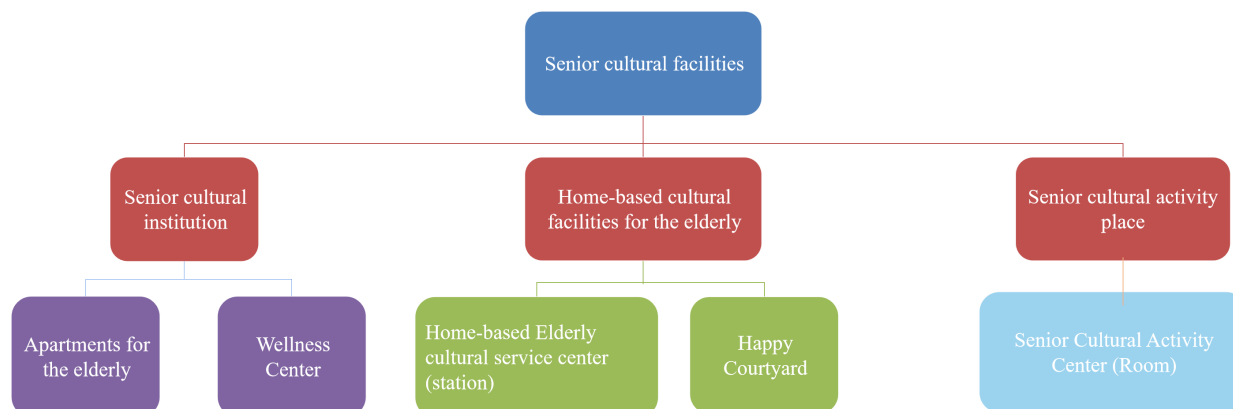


Figure 2. Schematic diagram of the elderly cultural facilities system in Xishan District

4. Research on the System of Cultural Facilities for the Elderly in Xishan District and the Construction Index Model

This article starts from the current construction of elderly cultural facilities in Xishan District, and mainly studies the content of "five parts and three modules", including five research parts, including supply characteristics, demand analysis, system construction, layout research, and safeguard measures, as well as current characteristics and problems Three main research modules, namely, the system construction of urban elderly cultural facilities, and the spatial layout of elderly cultural facilities. Focus on the following aspects: ① Improve the "four-level and multi-category" elderly cultural facilities construction system; ② Build differentiated policy zoning and allocation principles.

4.1. Current status characteristics and problem modules

The effectiveness of the supply of elderly cultural facilities limits the diverse cultural needs of the elderly, and the redundancy and lack of "quantity" and "quality" restrict the development of elderly culture. Through stock planning, differentiated allocation, key improvements, and intensive support Focus on the analysis of the following aspects: ①combination of supply and demand; ②combination of scale and service; ③combination of increment and stock.

4.1.1. Current status of cultural institutions for the elderly

The research uses Python language, using data mining technology, based on Baidu POI data, and making corrections based on the actual situation. There are currently 28 cultural institutions for the elderly in Xishan District, including 1 at the provincial level and 1 at the municipal level.

Table 1. Statistical Table of the Current Situation of Cultural Institutions for the Elderly in Xishan District

Indicator	Number of Institutions (site)	floor area (square meters)	construction area (square meter)
Quantity	28	747120.19	345648.19

According to big data information mining and related data, there are 2 provincial and municipal cultural institutions for the elderly, 1 district (county) level cultural institution for the elderly, and 25 community (village) level cultural institutions for the elderly.

Table 2. Statistical table of the status quo of cultural institutions for the elderly at All levels in Xishan District

Index	Number of Institutions (site)	floor area (square meters)	construction area (square meter)
Provincial and municipal cultural institutions for the elderly	2	4880	11921
District (county) level cultural institutions for the elderly	1	4880	11921
Street (township) level cultural institutions for the elderly	0	0	0
Community (village)-level cultural institutions for the elderly	25	122135.63	72420.19

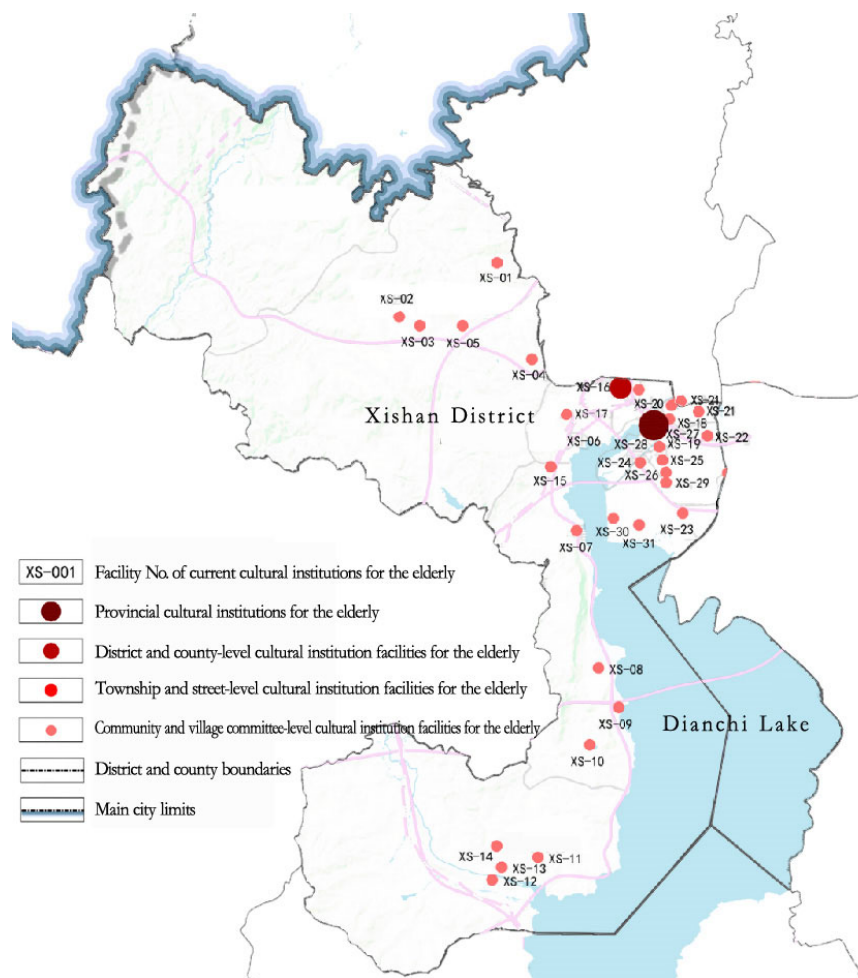


Figure 3. Current status of cultural institutions for the elderly

4.1.2. Current status of cultural facilities for the elderly at home

There are 41 cultural service facilities for the elderly at home in Xishan District, all of which are community-level (village) level cultural service facilities for the elderly.

Table 3. Statistics table on the status quo of cultural facilities for the elderly at home in Xishan District-community (village) level

Index	Number of facilities (Site)	Construction scale (square meter)
Community (village)-level home-based cultural facilities for the elderly	41	18215

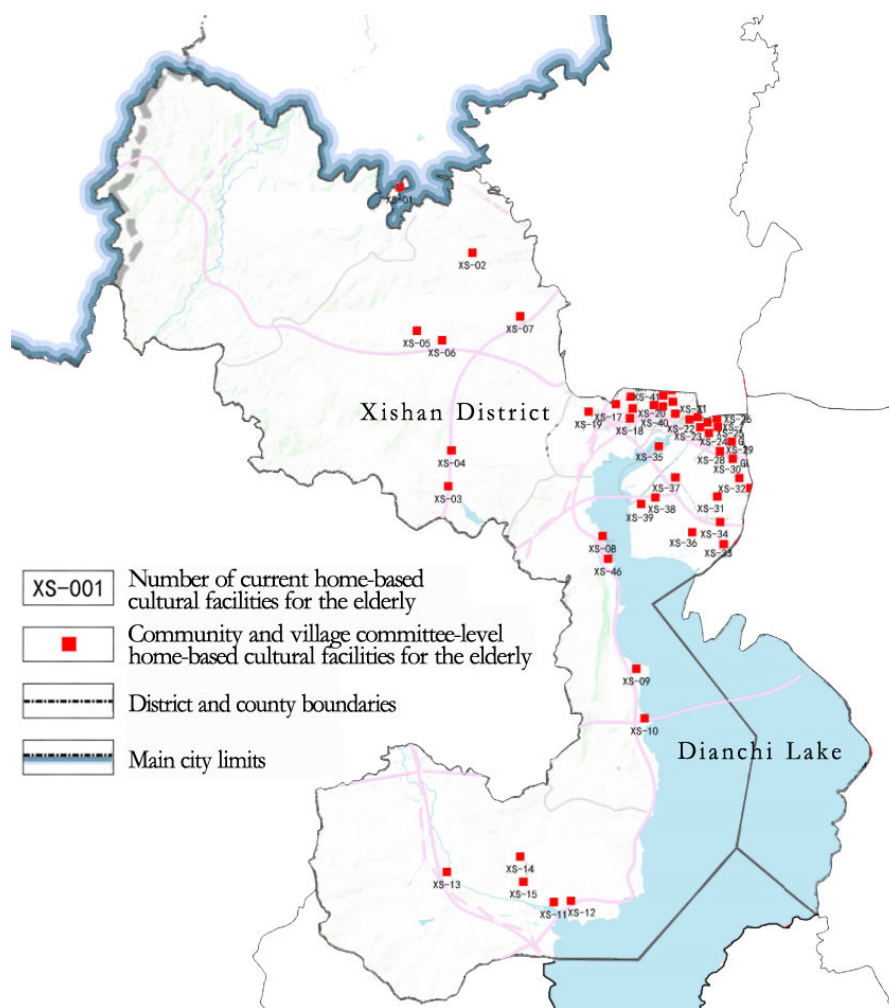


Figure 4. Current situation map of home-based cultural facilities for the elderly in Xishan District

4.1.3. Current status of facilities for elderly cultural activities

At present, there are 144 elderly cultural activity centers in Xishan District, all of which are community-level and village (community)-level cultural activity facilities for the elderly. The coverage rate in the part around Yunnan is good, and the rest of the area is insufficient.

Table 4. Status quo of facilities for cultural activities for the elderly

Index	Number of facilities (Site)
Senior cultural activity place	144

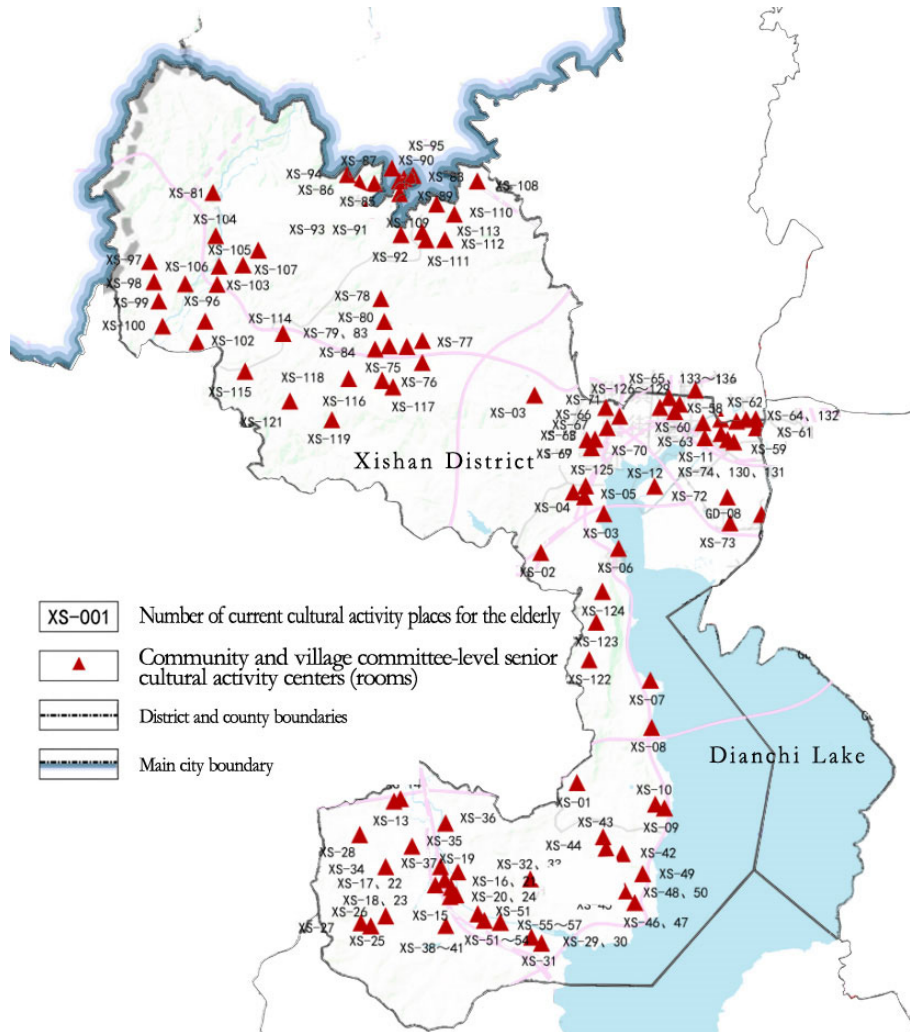


Figure 5. Current situation map of facilities in cultural activity venues for the elderly in Xishan District

4.2. Building blocks of urban cultural facilities for the elderly

Establish a "multi-objective system" for the construction of cultural facilities for the elderly, and provide principles and goals, as well as supporting methods and indicators for the construction of cultural facilities for the elderly, as well as various cultural facilities. Focus on the following aspects: ① Improve the "four-level and multi-category" elderly cultural facilities construction system; ② Build differentiated policy zoning and allocation principles.

4.2.1. Aging prediction

According to the aging numerical series of counties, cities, and districts over the years, a variety of mathematical functions are used to simulate. The results show that the fitting conditions of linear functions, growth functions, and exponential distribution functions are all good.

Table 5. Based on the fitting function of the aging level of each region and the total population of each region, the aging level is calculated as follow.

Index	Parameter	Constant	Aging level	
			Recently	Future
value	0.708	-1410.725	19.4	30.1

4.2.2. Population projections and projections of the elderly population

The number of elderly foreigners in Xishan District accounts for 10% of the total elderly population. Considering the strategic positioning of Kunming as an important elderly care city

and travel destination in China during the planning period, it is predicted that the elderly from outside the province to Xishan District will account for 12% of the predicted scale of the stable growth of the permanent population in the near future, and 20% in the long term, and the size of the elderly population in Xishan District is as follows:

Table 6. Prediction of the size of the elderly population in Xishan District

The proportion of the elderly population in Xishan District		The scale of the elderly population in Xishan District	
Recently	Future	Recently	Future
21.70%	36.10%	22.39	42.38

4.2.3. Set standard studies

Carry out differentiated policy divisions for the supporting system of facilities for the elderly. According to the urbanization level of each street, town and township and the agglomeration and demand of the elderly population, the layout of cultural facilities for the elderly below the municipal level that undertake cultural services for the elderly is given spatial guidance, which is divided into four types of policy areas:

Table 7. Classification guidance for the layout of cultural facilities for the elderly

category	Regional characteristics	Plan your strategy	Guidance requirements	Recommend facility size
Optimize and perfect streets/towns	Mainly mature urbanization areas, regional population and demand are relatively stable.	Complete the supplement	Encourage the use of existing land or the organization of elderly care facilities through mixed use. Encourage the allocation of market-led cultural facilities for the elderly.	Small, medium-sized facilities
Key configuration streets/towns	At present, it is still in the rapid urbanization area (such as new city and new district), which is the key area for the next stage of population development.	Focus on configuration	Encourage the allocation of market-led cultural facilities for the elderly.	Medium and large facilities
Reserved configuration streets/towns	It mainly refers to the streets/townships that have the ability to develop healthy old-age care, but the overall demand for old-age institutions is not strong.	In the near future, the township station will be set as the main one, and a certain space will be reserved in the long term	Encourage the allocation of market-led cultural facilities for the elderly.	Medium and large facilities
Limited configuration class streets/towns	It mainly refers to specific functional areas, such as municipal centers or sub-centers, industrial blocks, employment concentration areas, etc., and the future population is mainly young and middle-aged areas.	Limited configuration	It can be coordinated with the adjacent street town. Encourage the allocation of market-led cultural facilities for the elderly.	Small, medium-sized facilities

4.3. Spatial Layout Module of Cultural Facilities for the Elderly

Elderly cultural facilities should choose locations with convenient public transportation, convenient medical rescue, and good ecological environment, with good accessibility, safety, and landscape. The research establishes the following aspects: ①Based on the principle of “Balanced Mainly, Appropriate Dispersion” to form a “15-minute” elderly cultural service circle; ②Build a spatial pattern that combines “network” and “divergent”; ③ Select areas with convenient transportation, medical care and good environment to arrange cultural facilities for the elderly.

4.3.1. Layout planning

District/county-level cultural institutions for the elderly are arranged in a centralized manner according to functional divisions and spatial characteristics, and are allocated in combination with medical resources; the names of others, such as apartments for the elderly, social welfare homes, and homes for the elderly, are not limited, and the specific land use is subject to the overall land and space planning of each district/county According to market demand, large-scale institutions can be set up in a centralized manner, or they can be set up in a decentralized manner to meet the requirements of Xishan District.

Table 8. List of facility planning of cultural institutions for the elderly - district/county level unit: individual

Level	Current situation	Newly added in the near future	Newly added in the long term	Total amount at the end of the planned period
District/county level	1	1	1	3

Table 9. Detailed Planning Form for Facilities of Cultural Institutions for the Elderly - District/County Level

Level	Status quo (Institute)	Land area (square meters)	Recently added (Institute)	Land area (square meters)	Forward new (institute)	Land area (square meters)	Total amount at the end of the planning period (Institute)	Site area (square meters)
District/county level	1	4880	1	12084	1	59132	3	76096

4.3.2. Principle of distribution

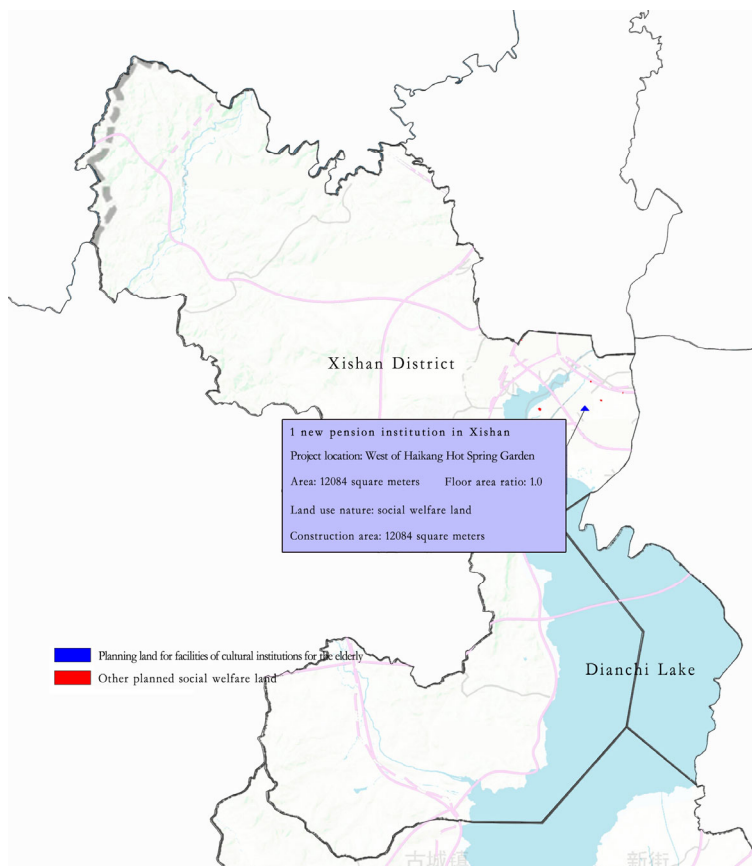


Figure 6. Facilities layout planning of cultural institutions for the elderly

The distribution points within the planning area shall be subject to the territorial spatial planning of Kunming City, and the distribution points within the city area shall be subject to the territorial spatial planning of each district and county.

4.3.3. Planning of facilities for cultural institutions for the elderly - subdistrict/township level layout

(1) Plan for the near future

Layout of new facilities: street/township-level elderly cultural institutions are distributed according to the number of streets/townships under their jurisdiction, with a coverage rate of 60%, mainly comprehensive service centers, and the specific land use is subject to the overall land space plan of Xishan District.

(2) Planning for the long term

Layout of new facilities: cultural institutions for the elderly at the street/township level are distributed according to the number of streets/townships under their jurisdiction, with a coverage rate of 100%.

Table 10. List of facilities planning of cultural institutions for the elderly - subdistrict/township level Units: pcs

Level	Current situation	Newly added in the near future	Newly added in the long term	Total amount at the end of the planned period
Street/town	0	1	1	2

Table 11. Detailed Plan of Facilities for Cultural Institutions for the Elderly - Street/Township Level Principles of layout

Level	Status quo (Institute)	Land area (square meters)	Recently added (Institute)	Land area (square meters)	Forward new (institute)	Land area (square meters)	Total amount at the end of the planning period (Institute)	Site area (square meters)
Street/town	0	0	1	10200	1	6584	2	16784

1) In the long-term planning, street/township-level cultural institutions for the elderly will be distributed according to the number of streets/towns under their jurisdiction, with a coverage rate of 100%;

2) In principle, the sub-district/township resident office shall be arranged as an ancillary building, and no land shall be occupied separately;

3) If the sub-district/township resident offices do not have the construction conditions, priority shall be given to the commercial land, cultural land, and urban residential land that are compatible with the social welfare land for the elderly in the national land space planning;

4) The distribution of points within the planning area shall be subject to the land and space planning of Kunming City, and the distribution of points within the city area shall be subject to the land and space planning of Xishan District.

4.3.4. Planning of facilities for cultural institutions for the elderly - community/village level layout

(1) Plan for the near future

Layout of new facilities: Community/village-level elderly cultural institutions are distributed according to the communities/villages under the jurisdiction of each street/township, with comprehensive service centers as the mainstay, and the specific land use is subject to the overall land space plan of each district/county.

(2) Planning for the long term

New facility layout:

Community/village-level cultural institutions for the elderly are distributed according to the communities/villages under the jurisdiction of each subdistrict/township.

Table 12. Senior Cultural Institution Facility Planning Form - Community/Village Level

Level	Current situation	Newly added in the near future	Newly added in the long term	Total amount at the end of the planned period
Community/village level	25	10	56	91

Table 13. Detailed Form of Facilities Planning of Cultural Institutions for the Elderly - Community/Village Level

Level	Status quo (Institute)	Land area (square meters)	Recently added (Institute)	Land area (square meters)	Forward new (institute)	Land area (square meters)	Total amount at the end of the planning period (Institute)	Site area (square meters)
Community/village level	25	122135.63	10	69323	56	375250	91	566709

Principles of layout

- 1) Arranged with ancillary buildings in the community/village resident office, no separate land occupation;
- 2) If the community/village resident office does not have the construction conditions, the commercial land, cultural land, and urban residential land that are compatible with the social welfare land for the elderly in the land space planning shall be given priority for layout;
- 3) The distribution of points within the planning area shall be subject to the land and space planning of Kunming City, and the distribution of points within the city area shall be subject to the land and space planning of Xishan District.

4.3.5. Planning of cultural facilities for the elderly at home - overall layout

(1) Plan for the near future

Layout of new facilities: Community/village-level home-based cultural facilities for the elderly are distributed according to the number of communities/villages under the jurisdiction of each street/township, with a coverage rate of 60%, and the specific land can be combined with the office and idle housing of the community and village committee, or it can be combined with community/village-level cultural institutions for the elderly.

(2) Planning for the long term

Layout of new facilities: Community/village-level home-based cultural facilities for the elderly are distributed according to the number of communities/villages under the jurisdiction of each street/township, with a coverage rate of 100%, and the setting requirements remain unchanged.

Table 14. Planning list of home-based cultural facilities for the elderly Unit: unit

Level	Current facilities (places)
Community/village level	35

4.3.6. Facility planning of cultural activity venues for the elderly - overall layout

Optimization of the existing facilities: Elderly entertainment and activity equipment can be added to the qualified elderly cultural activity venues.

Layout of newly added facilities: Community/village-level cultural activity venues for the elderly shall be distributed according to the number of communities/villages under their jurisdiction, and the coverage rate will be 100% by the end of the planning period. Specifically, the layout may be combined with the open spaces of communities, village committees, and villager groups.

Table 15. Planning list of facilities for cultural activities for the elderly Unit: unit

Level	Current situation	Newly added in the near future	Newly added in the long term	Total amount at the end of the planned period
Community/village level	144	0	0	144

5. Conclusion

Aging has become an irreversible development trend in China, and the problem of old-age care and social pressure have become increasingly prominent. Xishan District is an important area in the main urban area of Kunming, and the number of cultural facilities for the elderly is still far from enough. This study, starting from the construction of cultural facilities for the elderly in the current situation of cities in Xishan District, mainly studies the content of "five parts and three modules", including five research parts: supply characteristics, demand analysis, system construction, layout research, and safeguard measures. It has a certain role and significance for implementing the national strategy of actively coping with the aging of the population, improving the system, improving the work, promoting the diversified and diversified development of the cultural undertakings for the elderly, so that all the elderly can age happily and in peace.

Acknowledgments

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