

Study on Community Resource Accessibility and Residential Community Satisfaction of Urban Public Rental Housing

Taking Xi'an City as a Case*

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Abstract—The accessibility of community resource space layout and the satisfaction of residents' communities are the important signs which directly reflect the quality of urban residents' living space. This paper firstly takes the main urban area of Xi'an as the research scope, and uses Arcgis software to conduct evaluation as well as analysis on the spatial distribution of four kinds of community resources such as education, commerce, medical care and parks' green space in Xi'an. Secondly, through the questionnaire survey of the community's residents' satisfaction about the urban public rental housing community, this paper conducts evaluation on the housing conditions of the public rental housing community, the community environment and the residents' sense of belonging. The study finds that the community accessibility level of the overall public rental housing in Xi'an is low, and the satisfaction of the residents in the public rental housing community is low. Therefore, the quality of community living space is poor, making the "people-oriented" spatial justice difficult to be realized.

Keywords—public rental housing community; community resources; resident satisfaction; Xi'an

I. INTRODUCTION

With the continuous development of social economy and urbanization, the social classes with different economic incomes, occupational levels and cultural levels have gradually become different in the level of living space [1]. The groups with similar identity characteristics are gathered in the same specified area, while the heterogeneous groups are separated from each other. The urban living space is constantly moving towards communalization [2] and the

urban living space's differentiation phenomenon becomes more and more serious. As a space carrier for people's activities of daily life [3], the community is an important influencing factor for the formation of residents' sense of belonging in addition to providing the geographical space for production and life for people in the region [4]. As the houses that the government provides for the low-income housing families with a limited standard, limited price or rent, indemnificatory housing is an important way of housing security in China [5], whose construction and development are closely concerned by people. With the continuous promotion of the construction of indemnificatory housing, the problems that the local governments chooses remote location [6] [7], and the supporting facilities are imperfect [8] and other issues have become increasingly prominent. At the same time, the indemnificatory housing has neglected the demands of residents themselves and carried out the construction and creation of community resources in the corresponding space, which leads to the lack of community attachment of low-income people.

II. LITERATURE REVIEW

Community resources refer to the social and natural environment facilities or places which influence and provide the health of community's residents. Among them, the elements such as entertainment facilities, health services, public transportation and communications, shopping and commercial facilities, educational services, social and cultural services, etc. are the infrastructure entities which constitute the quality of the living space in the community (or neighborhood) [9] [10]. These six kinds of resources are not only the space carriers which carry the living materials of the community's residents, but also supply the community's residents with a

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place for social and cultural contact and communication [11]. Its spatial distribution and accessibility degree exert an influence on people's material and cultural life. Relevant research scholars propose that the accessibility of community resources refers to the spatial opportunity structure of community resources or the spatial opportunity model so as to offer people with the possibility of the community's healthy and sound life [12]. The level of accessibility directly influences the convenience and soundness of the daily life of the community's residents, which have become an important symbol for reflecting the quality of urban living space of residents [13] [14] and which is an important factor that influences the formation of the sense of belonging of urban residents and whether they are strong or not. Thus, the study of social resource accessibility has become the focus of western geography, urban spatial geography and sociology, which mainly focuses on three aspects: firstly, make use of community resource accessibility to evaluate system and to analyze the accessibility level of different community resources in urban cities [15] [16] [17] [18]; secondly, the study of the deprivation of community resources [19] [20] [21] [22]; thirdly, the study of the quality of residential urban space through the closeness of community resources [23] [24], such as spatial justice, residents' feeling of happiness and so on. At present, the research of this field is mostly from the macro level as well as the construction of the research content framework, and the empirical research from the micro-region is still in the lacking state. Therefore, this paper adopts the combination of objective and subjective research methods and conducts studies on the accessibility of community resource space and the satisfaction of community's residents in the sample public rental housing in Xi'an. Therefore, this paper adopts a combination of objective and subjective research methods to study the accessibility of community resource space and the satisfaction of community residents in Xi'an sample public rental housing, and then analyze the quality level of the urban public rental housing community, which is the urban planning department. And the city management department provides useful insights into the spatially balanced allocation of community resources and the satisfaction of community residents.

III. RESEARCH DESIGN

A. Research Scope

In 2014, Xi'an launched the supply of home with joint property rights officially, that is the government and security object have joint property rights of public housing. It also introduced a series of asset management measures for leased affordable housing so as to further standardize and strengthen the management and use of public rental housing. In 2017, Xi'an provided 19,661 public rental housing listings and put forward a public rental housing program. In this way, urban public rental housing has become an important measure to deal with the periodical housing difficulties of college students as well as migrant workers. The research scope of this paper is the main urban area of Xi'an, which includes Xincheng District, Beilin District, Lianhu District, Weiyang District, Yanta District, Baqiao District and Changan District (referred to as the Seventh District). The development of public rental housing in the main urban area of Xi'an is relatively early and the layout is relatively concentrated. This article uses the online

crawling technology (Baidu POI) to obtain the public rental houses in the main urban area of Xi'an through the inquiry and field investigation of Shaanxi Housing Security Information Network (Supplementary Website) and Xi'an Housing Security and Housing Administration website public rental housing information. Through the coordinate correction of the latitude and longitude, obtain its accurate geographical coordinates, and finally obtain a total of 46 public rental housing as a research case. Therefore this paper conducts community resource space accessibility studies. (See "Fig. 1")

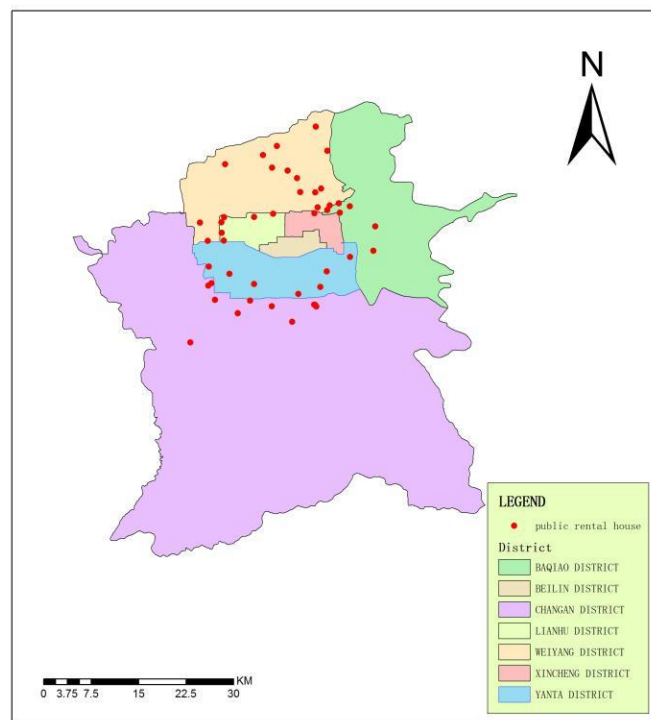


Fig. 1. Spatial distribution map of public rental housing in Xi'an urban area.

B. Research Method

1) *Buffer Analysis*: The analysis of buffer is a major spatial analysis method. That is as for any data A in space, the buffer $Z = \{X | d(X, A) \leq r\}$, where d is the Euclidean distance and r is the radius. The level of accessibility directly influences the convenience as well as the soundness of the daily life of community's residents. According to the relevant research results at home and abroad, the walking speed of normal adults is 80 m/min. The walking time of residents is ≤ 5 minutes, and the accessibility of public resources is the highest. Within 6-10 minutes when the residents walk, the public resources of the community can reach a higher level; if the residents walk 11-30 minutes, most people prefer mobile traffic; while if the residents' walking time is > 30 minutes, the community access to public resources is poor. Basically, no one prefers to walk. [25] [26] (See "Table I" for details)

TABLE I. CORRESPONDENCE BETWEEN WALKING TIME, PATH DISTANCE AND SERVICE FACILITY

		Distance accessibility				
Straight line distance from community resources (m)		≤300	300—600	601—1200	1201—1800	>1800
Travel time (minutes)	Walking	≤5	5—10	11—20	21—30	>30
Willingness to travel		Highest	Relatively good	Ordinary	Reluctantly	Low

According to the relationship between the travel distance of residents and the accessibility of community resources, this paper uses the multi-ring buffer analysis in ArcGIS 10.2, with 46 public rental houses as the center and the radius of 300 meters, 600 meters, 1200 meters and 1800 meters as the multi-ring buffers respectively. Each of buffers represents the pedestrian accessibility status of different public rental community resources.

2) *Thiessen polygon*: According to “Fig. 1”, this paper uses 46 public rental houses as the center. First, it determines the linear distance range boundary of each public rental house (“Fig. 2”), then establishes a Delaunay triangulation according to the discrete public rental scatter, and then make perpendiculars bisector for each side of each Delaunay triangle. A bisector, a continuous polygon surrounded by two vertical bisectors connecting two adjacent public rental houses, that is, a Thiessen polygon, and there is only one public rental room site inside each Thiessen polygon. The straight-line distance buffer of the public rental housing community is defined and intersected with the Thiessen polygon, and finally the community resources of each public rental housing can be accessible.

C. Data Collection and Processing

Urban business, health care, education and leisure resources are the most important indicators for evaluating the quality of community living spaces [26]. Therefore, this paper chooses to measure the quality of space living in the public rental housing community in Xi'an by the accessibility of the above four types of community public resources. The first type is city commercial resources. Urban commercial facilities play a significant part in people's lives. Big shopping malls and chain shopping supermarkets are important pattern of manifestations of urban commercial facilities. Through the octopus reptile technology, this paper has collected information of the large shopping malls and chain shopping supermarkets in Xi'an, such as Huarun Wanjia, Renrenle, Yonghui Supermarket, etc., and obtained 150 target city commercial shopping outlets. The second type is medical institutions resources. As top-level hospitals in China, Class A hospitals are essential for treating diseases and protecting people's health. Thus, this paper finally screens 25 three-level hospitals as research objects through the review of the Shaanxi Provincial Health and Fertility Planning Committee official website. The second type is educational resources. This paper finally screens 677 public schools and primary and secondary schools as research objects through the inspection of the official website of the Xi'an Municipal Education Bureau. The fourth type is leisure recreation places. It mainly refers to urban public parks and green spaces. Through making use of the Octopus reptile software, the park

green spots in the 7th district Baidu map of Xi'an City are searched, and a total of 88 target resting places are obtained.

The team went to public rental housing communities of Xi'an to conduct research activities from June to August 2017. It adopts a variety of measures such as household interviews, questionnaire surveys, and street interviews, which focuses on investigating the residential satisfaction of residents in the public rental housing communities and the important factors which influence their intention to choose their residence and sorts the importance of the influencing factors to personally experience the above, such as the overall environment, facilities, and cultural atmosphere of the rented community, and accumulated research data through recording, photographing, and text recording. After entering August, the research team conducts a questionnaire survey on “Environmental Satisfaction of community's residents in Public Rental Housing” with a random investigation manner. The residents of the public community are selected as questionnaires to issue questionnaires. A total of 200 questionnaires are distributed and 192 valid questionnaires are collected with the recovery rate of 96%. By using SPSS20.0 software, the reliability of the questionnaire is analyzed for coefficient analysis. The result shows that the cloned Bach Alpha is 0.766. According to the Colognebach Alpha test interval table, it is in the interval of {0.700-0.799}. The questionnaire is reliable and the data is credible.

IV. RESEARCH RESULTS

A. Research on the Accessibility of Public Resources in Public Rental Housing in Xi'an City

1) *Analysis of accessibility of public primary and secondary school resources*: As is shown in “Fig. 2”-A that there are 41 public rental housing communities in the 46 urban public rental housing communities in Xi'an City, which are distributed in the primary and secondary schools within a linear distance of 1,800 meters. The overall accessibility level of the public primary and secondary schools around the public rental housing community is good. Among them, the eight public rental housing communities such as Kairui Apartment have the highest accessibility of educational resources and its walking distance is less than 300 meters. The public housing and primary schools of 11 public rental housing such as Qujiang Public Rental Apartment have good accessibility and its walking distance is 301-600 meters; while other public rental housing communities are far away from public primary and secondary schools, and their walking distance is more than 600 meters, and the accessibility is ordinary.

2) *Accessibility analysis of large shopping malls*: It can be seen from “Fig. 2”-B that the large-scale shopping malls

around the 46 target public rental housing communities in the main urban area of Xi'an have poor overall accessibility and they are difficult to meet the demand of comprehensive daily consumption activities of the community's residents. Among them, only the Tianciyuan public rental housing community in Lianhu District can reach the large shopping mall with the walking distance of 300 meters; only the high-tech district Lanbo apartment core circle, the holy and home garden two Period - Southern District Public Rental Housing Community can reach the large shopping mall with the walking distance of 301-600 meters. There are also 10 public rental housing communities which can reach large shopping malls with the walking distance of 600-1200 meters, and the willingness to travel of the residents is "ordinary".

3) *Accessibility analysis of large hospitals:* As is shown in "Fig. 2"-C, the accessibility level of the large hospitals around the 46 target public rental housing communities in the main urban area of Xi'an is the worst. There are only 3 public rental housing communities with large hospitals distributed within a straight line of 1800 meters.

4) *Analysis of accessibility of urban parks and green space resources:* It can be seen from "Fig. 2"-D that the availability level of urban parks and green space resources in the 46 target public rental housing communities in Xi'an main city is generally average. There is no public rental housing community with park green space within 300 meters' walking distance; there are only 4 communities such as Poly Tongtongyu Public Rental Housing Community, Weinhe County Public Rental Housing Community, Qujiang Fengming Community and Qujiang Apartment have public parks and green space resources around the public rent two parks within 600 meters' walking distance; there are 8 public rental housing communities with public parks and green space resources within walking distance of 1200 meters-1800 meters; while most other public rental housing communities are lack of parks as well as green space resources. The distance is far away, which leads to the residents' low willingness to travel. (see "Fig. 2")

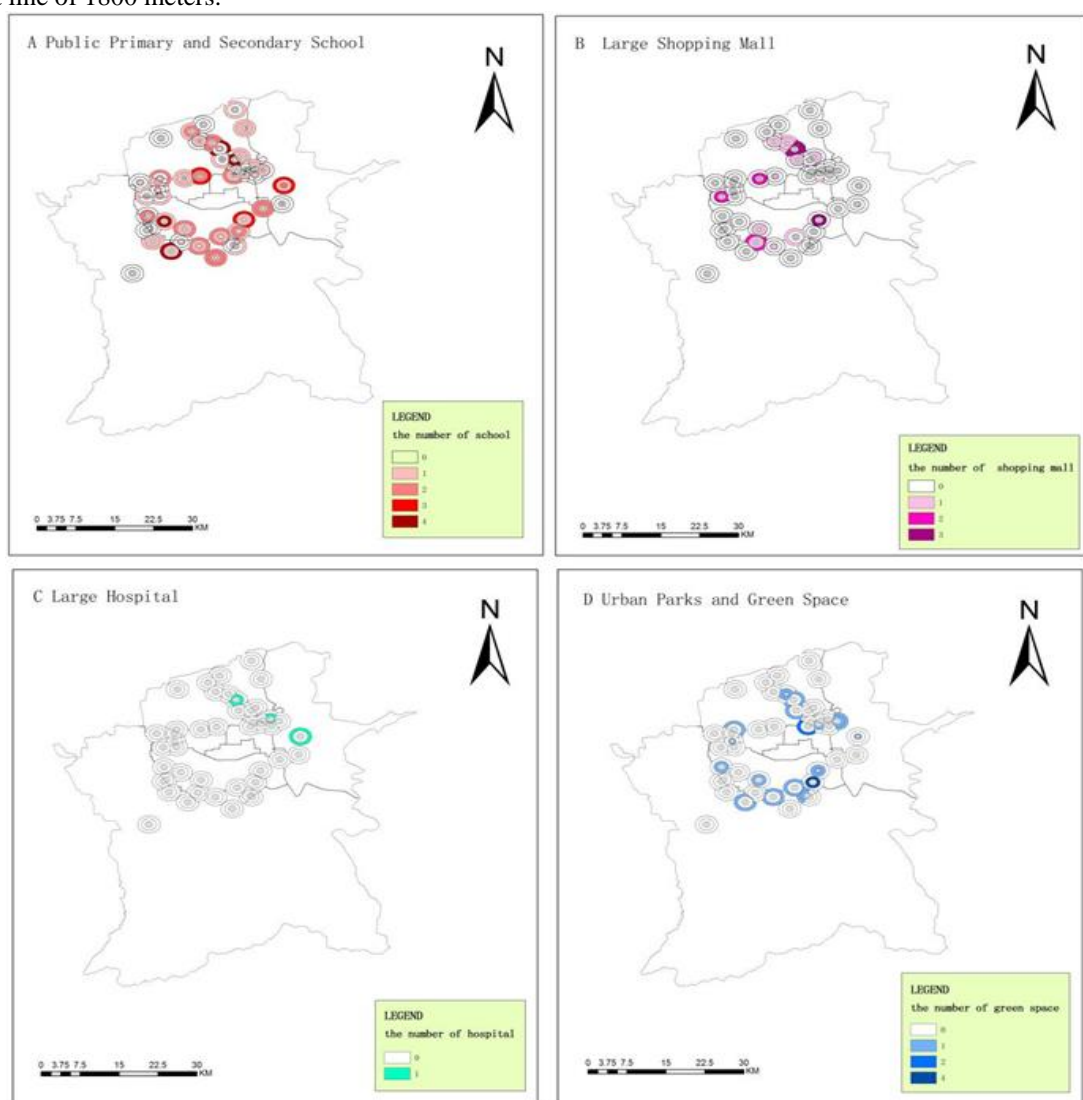


Fig. 2. Accessible Spatial Layouts of Xi'an Public Rental Housing Community Resources. (A: Schools; B: Shopping Malls; C: Hospitals; D: Parks)

B. Satisfaction Analysis of Residents in Public Rental Housing in Xi'an City

1) *Evaluation of housing quality satisfaction in public rental housing community:* The housing conditions of public rental housing mainly include three aspects: housing rent, housing area and housing quality. Using the mean method calculation (as is shown in "Table II"), the overall average rent of the house is 3.54, which is greater than the overall average of 2.8, which indicates that the public rental housing residents are more satisfied with the monthly rent of the public rental housing. In the actual investigation, it is also found that the monthly rent of most public rental houses is between 10-20 yuan/square meter, which is greatly lower than the market price and is largely accepted by the residents of the public rental community. The housing area (average score of 2.61) and the quality of the house (average score of 2.3) are lower than the overall average of 2.8, which indicates that the residents of the public rental housing community are dissatisfied with the planned area of public rental housing and the quality of housing. The main reason is that during the rental period, the need for housing area increases because of marriage, childbirth, etc. However, because of the factors such as the lag of housing and public rental housing renting policies, the housing area of public rental housing community has not been dealt with in time. The poor evaluation of housing quality mainly focuses on the hardware facilities in the housing like wall peeling, pipe leakage and tile damage.

TABLE II. AVERAGE SCORE OF COMMUNITY'S RESIDENTS' SATISFACTION INDEX

Satisfaction influencing factors	Number of cases	Minimum value	Maximum value	Average value
Monthly rent	200	0	5	3.54
House quality	200	0	5	2.30
House area	200	0	5	2.61
Community Security	200	1	5	3.51
Residential greening coverage	200	0	4	2.41
Property management	200	0	5	2.30
Community health	200	1	4	3.61
Overall average value	200			2.80

2) *Environmental satisfaction evaluation of community's residents in public rental housing:* The community environment of public rental housing consists of community greening, community security, property management, community health and other four variables. Through using the mean method to calculate (as is shown in "Table II"), it can be seen that the community's residents are more satisfied with community policing (3.51) and community health (3.61). The average value of the two

variables is higher than 2.80. This is mainly because the security of the public rental housing community in Xi'an is generally strict, and the system of access control and visitor registration documents is adopted. The community's residents are more satisfied with the community security of public rental housing. In the research which is carried out among the research group, it is found that the public rental housing community in Xi'an generally carries out the garbage disposal. The community is clean and tidy, and the garbage bins are properly set. There are no discarded garbage on the ground, corridors and stairs in the community. There are no large amounts of advertisements in the elevators as well as walls. Some communities have specially set up pet drinking water and defecation points, and the sanitary environment is more pleasant. It can be seen from Table 2 that community residents are not so satisfied with community greening (2.41) and property management (2.3), mainly because some public rental houses are lack of community facilities such as community plazas and artificial pavilions, and the plant coverage rate is not high. The environmental quality of the rented community is general; the reason why the community residents are not satisfied with the property management is mainly because the property management personnel show poor attitude to the residents in their daily management, and the maintenance and treatment is not conducted in time, and the daily needs of the residents cannot be met in time.

3) *Evaluation of the residents' sense of of community in public rental housing:* The sense of belonging refers to the residents' recognition and attachment to the people as well as places in the region [28]. It refers to the psychological state in which the community's residents put themselves into a collection of a certain regional population, and is the main reflection of the residents' emotional satisfaction. Sociologists have found that residents' social network relationships within the community are positively related to the time they live in the community, the frequency of the community's activities, and the sense of belonging. [29] [30]. Through investigations, it is found that 30% of the total number of people in the public rental community "hope that new neighbors can move in" and "exist contradiction", and that the negative emotions are obvious. The lack of neighborhood communication, which indirectly influences the sense of belonging and the residents' will of living in the community. From the survey, it can be seen that the residents who have strong sense of belonging and willingness to live account for only 26% of the total, and some residents with a sense of belonging and no sense of belonging account for 74% of the total. A survey of willingness to live shows that the proportion of residents who are not willing to live for a longer time (53%) is higher than the proportion of residents who have long-term living willingness (47%). It can be seen from the comprehensive view that the residents of the public rental housing community have relatively low sense of belonging and

willingness to live in the community, which seriously influences the emotional satisfaction of the residents, further reflecting the quality of life as well as the attitude of the residents in the community of the survey.

V. CONCLUSION

Through the analysis of the accessibility of public housing resources in Xi'an, this paper shows that the community accessibility of Xi'an's overall public rental housing is low. Except for the accessibility of educational resources, medical facilities, shopping facilities and park green space are all in a low accessibility state. The lower accessibility of community resources not only directly influences the satisfaction of residents' living space, but also causes the sense of spatial deprivation of low-income community's residents, which also greatly impedes the formation of sense of belonging, leading to the result that the residents of Xi'an public rental housing community have strong desire to move. Through the questionnaire survey of the public rental housing community, it is found that the residents of Xi'an public rental housing community are not satisfied, and the quality of community living space is not optimistic. From the perspective of material environment, public rental housing communities face hard problems such as housing quality and housing area, and the number of daily life facilities is lacking and single type, which seriously influences the habitability as well as comfort of community's residents' lives; From the psychological point of view, due to the lack of social activities, the spatial isolation and lack of community culture, it has impeded the social interaction of the residents of public rental housing. In the absence of both physical and cognitive environments, it is ultimately difficult to achieve "people-oriented" spatial justice, which further aggravates the formation and promotion of the sense of belonging of the public rental housing community. In order to achieve the spatially balanced allocation of public resources, people should attach more emphasis on the fair and reasonable coverage of various types of residential population in the construction of public service facilities in urban planning, especially the vulnerable groups in the city — which will effectively enhance the residents of public rental housing communities so as to let the public resources gain equality, enable public resources to be more equitably allocated and acquired in the society, which can effectively improve the sense of belonging and as well as the livable level of residents who live in public rental housing communities.

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