Research on the problems and improvement measures of Beijing public rental housing households

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Abstract. Through the investigation of some public rental housing projects in Beijing, the family structure, rent, income and satisfaction of the public rental housing households can be revealed. Through the statistical analysis, we found the following problems: some public rental housing family structure does not match with the type of occupancy; the rental income ratio of part of the public rental housing is unreasonable; some of the households has low satisfaction; the income of part of the public rental housing exceeds the prescribed upper limit. In view of the above problems, this paper proposes solutions: strengthen the planning and design of public rental housing; improve the rent subsidy mode of public rental housing; strengthen the construction of supporting facilities for public rental housing; promote the relevant legislative work of public rental housing.

1. Introduction

In September 2020, the average price of second-hand housing in Beijing is as high as 57800 yuan per square meter, with a month on month decrease of 0.21% and a year-on-year decrease of 2.96%. Affected by the epidemic situation, the housing prices in Beijing have declined to a certain extent, but generally speaking, the housing prices are still high, and the pressure of the ordinary people to buy houses is still great, so the implementation of housing security policy is particularly important. In order to ensure housing for everyone, Beijing has successively launched a variety of housing security forms, such as low rent housing, affordable housing, price limited housing, public rental housing, owner occupied housing, directional resettlement housing in shantytowns transformation, and gradually established the form of monetary subsidy security, giving full play to the role of the rental market, and effectively solving the housing difficulties of low-income families. With the deepening of housing security work in Beijing, the public rental housing security mode has been gradually recognized by the masses, the implementation of market rental housing subsidies is increasing, the "rent-based" housing security supply system in Beijing is gradually formed, and the housing supply structure is increasingly optimized.

Public rental housing refers to the public rental housing provided by the government, which is not owned by individuals, but owned by the government. The public rental housing is rented to the group meeting the application demand at a price lower than the market price or affordable by the lessee. As a super large city in the first tier, the constraints of land and environmental resources continue to be large, and the relationship between housing supply and demand is still tense. The public rental housing accounts for the highest proportion of the security housing, and it has become an urgent problem to deeply understand the current situation of families living in public rental housing, put forward...
improvement measures, optimize the way of housing security, and improve the efficiency of housing security. This paper mainly investigates the basic situation of the current families living in public rental housing project of Beijing, including the location of the public rental housing project, the population structure, income, and subsidy receiving of the households. Through collecting the survey data and analyzing the survey results, the current situation of the families in public rental housing is summarized, and the improvement measures are proposed according to the survey results, in order to provide the basis for the formulation of public rental housing related policies.

2. Basic data
The scope of investigation is the Ministry of Beijing Public rental housing projects. In order to enhance the reliability of the results, 23 public rental housing projects distributed in different administrative regions of the city were selected, including Chaoyang District, Fengtai District, Shijingshan District, Daxing District, Fangshan District, Miyun District and Pinggu District. The survey was conducted from July to August in 2017.

3. Statistical analysis of survey results
A total of 435 questionnaires were distributed to 19 projects in 7 administrative districts of Beijing. After screening, the unqualified questionnaires were removed. Finally, 376 valid questionnaires were screened, with a pass rate of 86.4%.

3.1. Distribution of research projects
The residential areas surveyed are distributed in Chaoyang District, Fengtai District, Shijingshan District, Daxing District, Fangshan District, Miyun District and Pinggu District. From the perspective of functional zoning, it covers urban functional expansion area, new urban development area and ecological conservation development area. Projects in Fangshan District has the highest proportion of 25%, and projects in Miyun District of 5%. The proportion of projects in Chaoyang District and Daxing District is both 20%, and each of other three Districts has a proportion of 10%. The proportion of projects in each district is shown in Figure 1.

![Figure 1. proportion of projects in each district](image1)

![Figure 2. proportion of registration distribution](image2)

3.2. Household registration distribution of public rental housing residents
The results of this survey show that there are 257 people of Beijing nationality, accounting for 68.35%, 119 people of non Beijing nationality, accounting for 31.65%. The population of Beijing nationality is about twice that of foreign population, which is mainly because the public rental housing application policy is bias to the families with urban household registration in Beijing. The proportion of household registration distribution is shown in Figure 2.

3.3. Statistics of population size of households living in public rental housing
According to the regulations of Beijing public rental housing management measures, public rental housing is allocated according to the population size of families. One person household corresponds to
single apartment type, two person family corresponds to small apartment type, three person household corresponds to medium apartment type, and four person household corresponds to large apartment type. In this incomplete statistics, most of the family population is 2-3 people. According to the regulations, the corresponding flat type should be small apartment type and medium apartment type. The number of households living in public rental housing is shown in Figure 3.

![Figure 3 statistics of the population of households](image)

3.4. Statistics of occupancy area of public rental housing

According to the technical guidelines for the construction of public rental housing in Beijing, the current construction standards of public rental housing in Beijing can be divided into four categories according to the area: single apartment with 30 m², small apartment with 40 m², medium apartment with 50 m² and large apartment with 60 m². According to the results of the survey, there are more small and medium-sized households. The distribution of occupancy area of this survey is shown in Figure 4.

3.5. Statistics of rent of public rental housing

According to statistics, the average rent of public rental housing in Beijing is about 25-45 yuan per square meter per month. Combined with the standard of house type, the monthly rent of public rental housing is about 1000-3000 yuan. The statistical results are shown in Figure 5.

3.6. Statistics of income level of public rental housing households

According to the notice on strengthening the construction and management of public rental housing in this city (Jing Zheng Fa [2011] No. 61), the income of families with application qualifications is as follows: the annual income of families with less than 3 people is less than 100000 yuan (including), and the annual income of families with more than 4 people is less than 130000 yuan (including). The statistics of household income of public rental housing is shown in Figure 6.

3.7. Statistics of rent subsidy receiving of public rental housing households

According to the notice on strengthening the construction and management of public rental housing in the city, the rent subsidy standards for families living in public rental housing are shown in table 3-6. In the actual implementation process, in addition to the household receiving subsistence allowances and low-income families, the proportion of other families receiving subsidies is relatively low. In this
survey, 134 families received subsidies, accounting for 35.64%, and families without subsidies accounted for 64.36%. The statistics of rent subsidy receiving of public rental housing is shown in Figure 7. Among the families receiving rent subsidies, 10% of the families received subsidies with the standard of 95% and 90% of the total rent, and about 5% of the families received subsidies with the standard of 70% and 50% of the total rent, about 24% of the families received subsidies with the standard of 25% of the total rent, and 7% of the families received subsidies with the standard of 10% of the total rent. More than half of the respondents did not want to disclose the situation of receiving subsidies. The statistical results showed a certain degree of dispersion and randomness (table 1).

Table 1 rent subsidy standard for households living in public rental housing

| Subsidy target                                                                 | Subsidy ratio |
|--------------------------------------------------------------------------------|---------------|
| Urban minimum living guarantee families and poverty-stricken people with scattered support recognized by civil affairs departments | 95%           |
| Urban low income families recognized by Civil Affairs Department               | 90%           |
| Families with an average monthly income of 1200 yuan or less                   | 70%           |
| Families with per capita monthly income between 1200 yuan (excluding) and 1600 yuan (inclusive) | 50%           |
| Families with per capita monthly income between 1600 yuan (excluding) and 2000 yuan (inclusive) | 25%           |
| Families with per capita monthly income between 2000 yuan (excluding) and 2400 yuan (inclusive) | 10%           |

3.8. Statistics of the satisfaction of families living in public rental housing

Among the 376 people who participated in the survey, 295 people were satisfied with the current living conditions, accounting for 79%; 24 people were OK, and 57 people were not satisfied, accounting for 15%. Among the respondents with low satisfaction, 50% of them were not satisfied with the high rent, and some other respondents were not satisfied with the environment. The statistics of the satisfaction of families living in public rental housing is shown in Figure 8.

4. Conclusions of the investigation

Based on the survey and statistics of 376 questionnaires of 19 public rental housing projects in Beijing, this paper draws three conclusions: first, there is a mismatch between the population size of households and the type of apartment. Some single person households live in small and medium-sized apartments, which leads to greater rent pressure. Second, the rent income ratio of public rental housing households is relatively high, which has been alleviated after receiving subsidies. Third, the satisfaction of households living in public rental housing is relatively high, however, there are still some problems to be improved.

4.1. There is a mismatch between the family structure and the type of public rental housing
Through the cross analysis of the population size of family and the type of household distribution, we can see that there is a mismatch between the family population and house types. The specific statistical results are shown in Figure 9.

The above data show that, in general, about 50% of households with 1 person, 2 people, 3 people and more than 4 people live in the fit type matching with the family population. However, there are still 50% of the family has the problem that living area does not match the population size, in which one person household is the most prominent. About 53% of the households with one person live in single apartment (30 m²), about 44% live in small apartment, and about 3% live in large apartment, which results in the mismatch between the population of households and the type of apartment. On the one hand, it leads to the pressure of rent for one person household, on the other hand, the per capita living area is too large. In the case of shortage of land resources in Beijing, land resources are wasted to a certain extent.

4.2. The rent income ratio of some public rental housing households is unreasonable

The reasonable rent is the rent matching with the income, and the reasonable rent of the market rental housing is the rent that the family can afford. The ratio of rent to income is usually used as the standard of rent bearing capacity.

From a horizontal comparison, the reasonable rental income ratio is basically 20%-30%. For example, the National Housing Commission of the United Kingdom stipulated in 1991 that if the rent of a tenant exceeds 20% of their income, the rent level is not payable. In 1993, the ratio was increased to 22%. The United States rent subsidy standard is that low income families only need to pay rent for 25% of their household income. Later, the ratio was adjusted to 30%. The difference was made up by government voucher. In 1996, the median housing rent in Hong Kong accounted for an average of 10.7% of household income, of which public housing was 8.6%, and private housing accounted for 25.0%.

There is a close relationship between Engel coefficient and housing consumption. Internationally, this indicator is usually used as an indicator to judge housing payment difficulties. The higher the household income is, the smaller the proportion of the total expenditure for buying food is, and the higher the proportion that can be used for housing consumption is. According to a study by UN-Habitat, for every 1% decrease in Engel's coefficient, residential housing consumption expenditure will increase by 0.46%. According to the experience of more than 60 countries, countries and regions with an Engel coefficient of 20%-39% have an average housing expenditure ratio of 20%-30%. In 2018, the Engel coefficient of urban households in Beijing was 23.8%. Based on this calculation, The upper limit of the reasonable housing consumption ratio of Beijing is about 29%.

According to the statistics of this survey (Figure 10), among households with an annual income of less than 100,000, about 50% of households have the lowest rent level of 1,000-1,500 yuan; among
households with an annual income of 100,000-130,000, about 50% of households have a rent level of 2,000-2,500 yuan in the mid-range; among families with an annual income of 130,000 yuan or more, about 50% of families have a rent level of 2,500-3,000 yuan in the high-end. Calculated by averaging, the rent-to-income ratios of the households above are all between 20%-30%, which is in line with the housing consumption ratio standards of Beijing. However, families of all income levels have the problem of living in the public rental house with higher rents. According to the same method, the rent-to-income ratio of the above-mentioned families is as high as 60-70%. Although it has been relieved to some extent by receiving subsidies, the rental income ratio is difficult to drop to a reasonable range according to currently Beijing's public rental housing rent subsidy standard.

Figure 10. Statistics of income-to-rent ratio of households in public rental housing

Through the cross-analysis of the number of households and annual family income (Figure 11), it can be seen that about 72% of households with one person have annual income of less than 100,000, and about 67% of households with two people have annual income of less than 100,000. About 63% of households have an annual income of less than 100,000, and about 42% of families with 4 or more people have an annual income of less than 100,000.

A cross-analysis of the population of households and monthly rent (Figure 12) shows that in 1-person households, more than 67% of households have monthly rent of 1050-1500 yuan, and about 22% of households have monthly rent of 2000-2500 yuan; In 2-person households, about 37% of households have monthly rent of 1050-1500 yuan, and about 24% of households have monthly rent of 2000-2500 yuan; in 3-person households, about 30% of households have monthly rent of 1050-1500 yuan, about 26% of households have monthly rent of 2000-2500 yuan; in 4-person households, about 28% of households have monthly rent of 2000-2500 yuan.

Figure 11. Cross-analysis results of the population of households living in public rental housing and their income
A cross-analysis of the population of households and monthly rent (Figure 12) shows that in a 1-person household, more than 67% of households have monthly rent of 1050-1500 yuan, and about 22% of households have rent of 2000-2500 yuan; In 2-person households, about 37% of households have monthly rent of 1050-1500 yuan, and about 24% of households have monthly rent of 2000-2500 yuan; In 3-person households, about 30% of households have monthly rent of 1050-1500 yuan, about 26% The monthly rent for households is 2000-2500 yuan; in a 4-person household, about 28% of households rent for 2000-2500 yuan.

Based on Figure 11 and Figure 12, it can be seen that the current rent-to-income ratio is the highest for families with an annual income of less than 100,000 and a monthly rent of 2500-3000 yuan. From the perspective of family population structure, a 4-person household with the same income level has the greatest life pressure, and the specific rental income ratio is related to the specific family income.

4.3. Some families living in public rental housing are dissatisfied with supporting facilities
Statistics show that most families are relatively satisfied with the current occupancy situation, and a small number of families are not satisfied with the current occupancy situation. Dissatisfaction comes from the rent level on the one hand and the supporting facilities on the other hand. At present, the supply of public rental housing in Beijing is single and does not fully consider the housing needs of different security groups, and cannot meet the diverse housing needs of waiting families. The supporting facilities are mainly reflected in the transportation aspect. A considerable part of the public rental housing projects are located in remote areas, and the construction of supporting facilities has not been completed, which has caused a certain degree of inconvenience to the family's travel.

4.4. The family income of some public rental houses exceeds the prescribed upper limit
The survey results show that among the 376 people who participated in the survey, 36 people have a family income of more than 130,000, accounting for about 10%. According to the "Notice on Strengthening the Construction and Management of Public Rental Housing in this Municipality" (Jingzhengfa [2011] No. 61), the income of eligible families is as follows: families with 3 or less people have an annual income of less than 100,000 yuan (inclusive), The annual income of a family of 4 or more is less than 130,000 yuan (inclusive). According to the regulation, families with an annual family income of more than 130,000 yuan are not eligible to apply for public rental housing. There may be two reasons: First, because some public rental houses currently have relatively remote locations and low occupancy rates, for the reasonable allocation of resources, the application standards for public rental houses with remote locations and low occupancy rates have been appropriately relaxed. Second, some households did not vacate in time when their incomes improved and no longer met the occupancy standards of public rental housing, resulting in unreasonable use of resources.

5. Suggestions and solutions
In response to the above problems, improvements should be made in four aspects: first, strengthen the planning and design of public rental housing; second, improve the rent subsidy standard for public rental housing; third, strengthen the construction of supporting facilities for public rental housing; fourth, promote relevant legislative work on public rental housing.

5.1. Strengthen the planning and design of public rental housing

First, according to the current situation of housing security needs, increase the number of small suites for 1-person households and reduce the area of 1-person suites. On the basis of meeting the basic living space, kitchens, living rooms and other facilities can be set to share to achieve reduction 1-person apartment needs.

Second, considering the rational use of resources and protecting the needs of families, the supply of public rental housing in Beijing should be diversified to meet the functional needs of different families. It is recommended to introduce individualized public rental housing such as youth apartments and elderly apartments according to age levels, to more effectively meet the housing needs of different security families and increase the distribution rate of public rental housing.

5.2. Improve public rental housing rent subsidy standards

According to the current public rental housing rent subsidy standard (Table 3-6), the public rental housing rent subsidy standard mainly depends on the per capita income level, and the size of the family has not been considered, which caused insufficient subsidies for the larger families. At present, only Haidian District in Beijing’s administrative districts combines the subsidy standard with the number of households, which has raised the subsidy standard for families with a large population to a certain extent. The income standards of applying for rent subsidies for public rental housing in Haidian District are: in the 12 months before the application month, the per capita monthly income of a family of 1 person is no more than 5,000 yuan, the per capita monthly income of a family of 2 persons is no more than 3,200 yuan, and the per capita monthly income of a family of 3 or more people is no more than 2400 yuan. Combined with factors such as the population and income of the public rental housing family, the proportion of subsidies for tiers is formulated.

Haidian District has set subsidy standards based on the number of households and increased the subsidy for families with multiple populations, which has significantly reduced the gap in the rental income ratio of households with 1-person households, 2-person households, and 3-person households, and the subsidy standard is higher than the city-wide standard, so the household rental income ratio is further controlled. The establishment of rent subsidies for public rental housing in Beijing should refer to the experience of Haidian District, and set subsidy standards based on the population of households to increase subsidies for families with multiple populations, to further realize the fairness of public rental housing rent subsidies, and reduce the rent pressure on families living in public rental housing.

5.3. Strengthen the construction of supporting facilities for public rental housing

In response to the survey results, the dissatisfaction of families living in public rental housing is reflected in two aspects: first, the traffic is inconvenient; second, the community environment is poor. In response to traffic inconvenience, for example, No. 1 of Yunxiu Road in Miyun District, which is located at the intersection of Jingshen Road and Miguan Road, it is more convenient to drive by car, but public transportation is relatively lacking. It is recommended to increase the public transportation lines nearby, to ease the travel pressure of residents in the community to a certain extent. In view of the poor environment of the community, it is mainly reflected in the urban area such as No. 2 of Shuangying Road in Chaoyang District. The road paving and greening of the community is relatively lacking. For road problems, on the one hand, the road planning and design should be strengthened and considered. For safety, plan and transform the road in community with pedestrian system separated from vehicle system. On the other hand, the design of activity venues is strengthened to provide
sufficient entertainment space for residents in the community. Aiming at the problem of greening, the landscape planning and design of the community should be strengthened, the greening rate of the community should be increased, and the residents should be provided with a good living ecological environment.

5.4. Promote legislation related to public rental housing

For the later management of public rental housing, the provisions of the `Administrative Measures for Public Rental Housing'' should be strictly implemented. For families that do not meet the requirements for public rental housing applications and have owed rents for more than 6 months, they must be vacated. For those who refuse to vacate, prosecute according to law. In addition, it is recommended to promote housing security related legislation, strengthen the implementation of public rental housing management policies, and have laws to follow in the later management to promote the sustainable use of public rental housing.

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