

## **A Study on Per Capita Housing Status and Living Quality Enhancement in Dashilan Historical and Cultural Block**

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Funded by "Concentric Urban Renewal Education Fund of SEU"(TXGXJJ-2025003P)

### **Abstracts**

Firstly, the experience of improving living quality in the UK, Japan and Hong Kong, China is systematically collated, and based on the experience, the minimum living standards of eight countries, namely, the US, Canada, the UK, Italy, Germany, Japan, South Korea and China, are also collated. Secondly, combining the data from the 7th National Population Census, residents' interviews and field research, we quantitatively assessed the current per capita housing situation in Dashilan in terms of spatial size, basic functional spaces, architectural performance and basic equipments, and the living environment, and found out the gaps between them and the minimum standards of domestic and foreign countries. Finally, it puts forward suggestions for improving the living quality from the aspects of standard setting, housing survey and supervision, dynamic database platform construction, and sustainable updating mechanism.

**Keywords:** historic and cultural block; per capita housing status; living quality; minimum living standards; residentially vulnerable groups

### **1. Introduce**

With the increase in the total amount of housing construction in China and the continuous improvement of the housing system, the per capita area of housing in cities and towns has reached 40.8 m<sup>2</sup>(National Bureau of Statistics, 2021), which is one of the highest in the world, and has basically solved the problem of insufficient housing. However, in the face of the reality of rapid urbanisation and urban population growth, the quality of housing for the urban population is poor, with more than 30% of the resident population lacking a safe, healthy and dignified living environment, a phenomenon that is particularly prominent in historical and cultural districts. Beijing Dashilan Historical and Cultural Block is such a typical neighbourhood, which is confined to multiple reasons such as property rights, cultural preservation, location and funding, making it difficult for the population to be relocated and for the foreign population to gather, in addition to the fact that the current renewal planning is still limited to public space and street facade improvement, and that there is a lack of quantitative assessment of the current housing situation per capita, which does not have a clear grasp of the bottom-line housing needs of the residents, thus influencing the renewal timetable.

<<Universal Declaration of Human Rights>> states that "Safe and affordable housing is a fundamental human right." UN-HABITAT calls on countries to: "Prioritise the needs of the vulnerable groups of people living in housing, establish minimum standards of accommodation acceptable to the occupants and build safe, healthy and sustainable human settlements." To sum up the background, this study quantitatively assesses the current housing situation per capita in the Dashilan Historical and Cultural Block by drawing on the experience of 3 countries in upgrading the quality of housing and the minimum living standards of 8 countries, and makes recommendations.

### **2. International Experience in Residential Quality Improvement and Minimum Living Standards**

#### **2.1 Experience of improving the quality of living in the UK**

The UK housing system consists of three types of housing: owner-occupied housing, social housing and private rented housing. Today, the number of people living in overcrowded, unsafe and unhealthy housing in the UK is decreasing, with overcrowding in only 9 of London's 250,000 homes in 2021 (London, 2021), as a result of the UK Government's efforts in the following 4 areas:

(1) Setting minimum living standards to guarantee a minimum level of safe, healthy, and dignified living. In 1935, minimum space and room standards (collectively referred to as overcrowding standards) were set out in the-

Housing Act-(HA) to guide the assessment of privately rented housing (WILSON W, 2020).The application of the HA was expanded in 1985 to guide all types of housing assessment.In 2004, the <<Housing Health and Safety Rating>> (HHSRS) was added to the HA, supplementing the minimum standards for basic functional space, building performance and basic equipment, and the living environment (GOV.UK, 2022).In 2005 the-Minimum Living Home Standard-(Shelter England, 2005). 2012 saw the launch of a review of standards, repealing (with the exception of the standards in HA) all previous minimum standards. The nationally harmonised-Nationally Described Space Standard-(NDSS) was introduced in 2015 (GOV.UK, 2015). 2021-The Human Habitation Act-re-emphasises the overcrowding standards in HA and the HHSRS as minimum standards for human habitation.

(2) Regular housing surveys based on minimum living standards.Since 1967, the UK government has conducted surveys on housing stock and living environment, once every 5 years before 2000, and once every year thereafter. English Housing Survey (EHS) is organised by local governments, and since 2007, it has been commissioned to a professional survey team, CADS (GOV.UK, 2019).The scope of the EHS survey covers the whole country, with a sample of 6,200 dwellings randomly sampled by region, and residents can also apply for the survey voluntarily through the EHS helpline.The EHS consists of a physical survey and a household questionnaire interview, with approximately 130,000 households interviewed each year.Finally, the results of the survey are evaluated according to the minimum standards in the HA, and then housing security policies are formulated to improve the quality of living.

In 2006, the UK government also introduced the “Housing Health and Safety Rating System”, in which local environmental health officers assess the likelihood and severity of the existence of 29 types of potential health and safety hazards in housing once every 2 years, and the system is relatively simple, and households can also make their own assessments in Table 1.According to the severity of the hazards, they are classified into 4 types of risks. For housing with Type 1 risks, a demolition order is issued, and the government is responsible for demolishing the housing and rehousing the occupants who have become homeless due to the demolition of the housing; for housing with Type 2 risks, a no-occupation order is issued, and the government is responsible for repairing and stating that the use of the housing in violation of the rules is a criminal offence; for housing with Type 3 and 4 risks, a “Repair Notice” and a “Danger Awareness Notice” are issued to remind the occupant to carry out repairs to the property, and the property is reassessed after 28 working days (GOV.UK, 2022).

**Table 1:** Housing health and safety rating system indicators

|                              |                                                                                                                                                                                                                                                                                                           |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| physiological requirements   | 1.damp and mould growth; 2.excess cold; 3.excess heat; 4.asbestos and MMF; 5.biocides; 6.carbon monoxide and fuel combustion products; 7.lead; 8.radiation; 9.uncombusted fuel gas; 10.volatile organic compounds                                                                                         |
| psychosocial requirements    | 11.crowding and space; 12.entry by intruders; 13.lighting; 14.noise                                                                                                                                                                                                                                       |
| protection against infection | 15.domestic hygiene, pests and refuse; 16.food safety; 17.personal hygiene, sanitation and drainage; 18.water supply                                                                                                                                                                                      |
| protection against accidents | 19.falls associated with baths; 20.falling on level surfaces; 21.falling on stairs; 22.falling between levels; 23.electrical hazards; 24.fire; 25.flames, hot surfaces; 26 collision and entrapment; 27.explosions; 28.position and operability of amenities; 29.structural collapse and falling elements |

(3)Focusing on vulnerable groups of residents.For low-income families, it has introduced a “savings deposit, rent-and-buy” policy, under which they can acquire home ownership by paying rent for a limited period of time until the total amount of rent paid equals the total amount of the property; and a “shared ownership” policy, under which they can purchase a part of the house and shared ownership”, where by a person buys a part of a house and pays a lower rent for the remainder, with the ownership shared between the Government and the individual; and the provision of housing for older people to help them live independently and reduce social care and health costs (London, 2021).

(4) Effective use of vacant housing. A requirement that homes cannot be left empty for more than 6 months or they will be compulsorily acquired for use as social housing; and incentivising the re-use of empty homes through the introduction of a council tax vacancy premium (London, 2021). According to statistics, the number of empty homes in London in 2021 will be less than 1% of the total housing stock.

## 2.2 Japan's experience in improving living quality

Japan's housing development can be broadly divided into 3 phases: the phase of housing supply before 1975, the phase of improving the quality of living from 1975 to 2006, and the phase of meeting the diversified housing needs of residents after 2006.

(1) Housing supply phase: "The Public Housing Supply Programme" was implemented to make it the responsibility of local governments to solve the housing difficulties of low-income people, and to systematically provide low-rent public housing for the underprivileged.

(2) Stage of improvement of living quality: housing survey, establishment of minimum living standards, and effective use of vacant housing. In 1950, the Japanese government conducted a housing survey once every 5 years on housing stock and housing use (Ministry of Land, Infrastructure, Transport and Tourism, 2018). In 1976, the Ministry of Land, Infrastructure, Transport and Tourism established the Minimum Living Standards as the basis for the housing survey, and gradually reduced the proportion of households that were below the minimum standards (Ministry of Land, Infrastructure, Transport and Tourism, 1976). The 1977 housing survey was supplemented with surveys on satisfaction with housing and the surrounding living environment, the existence of plans for residential improvement, and intentions for residential improvement. The scope of the survey was general housing nationwide, and 10,000 households were randomly sampled from the Housing and Land Statistics Survey and interviewed by questionnaire.

The vacant house survey was started in 1980 and is conducted once every 5 years to obtain basic information on vacant houses nationwide (Ministry of Land, Infrastructure, Transport and Tourism, 2019). Based on the results of the vacant house survey, empty houses that affect the surrounding living environment are scrapped; the government and communities provide a counselling mechanism for owners of vacant houses to reduce the proportion of vacant houses; the government is responsible for repairing and repurposing empty houses with unknown owners into special housing for the elderly, shared housing, temporary housing, or space for public activities, etc.; and support is provided to civil society organisations to collect information and conduct research and study activities through empty houses, and education and publicity activities to propose countermeasures for the reuse of empty houses.

(3) Stage of diversified housing needs: 2021 Introduced the <<Basic Plan for Residential Life>>, raised the <<Minimum Living Standard>>, and specified that in the post-epidemic era, in order to secure remote workspaces and regional workspaces, etc., within residences, we will promote the construction of an integrated residence and home learning environment, as well as promoting the construction of a non-contact environment by promoting the installation of express lockers and automatic faucets, etc. (Ministry of Land, Infrastructure, Transport and Tourism, 2021).

## 2.3 Hong Kong, China's experience in upgrading living quality

Public housing in Hong Kong is equivalent to subsidised housing in inland China. Public housing is divided into 2 major categories, namely public rental housing and public subsidised sale housing. Public rental housing includes low-cost housing (highly subsidised, low rent) and public rental housing (rent is set according to the cost of the project and the income of the tenants), while public subsidised sale housing mainly consists of Home Ownership Scheme flats and Sandwich Class Housing Scheme flats which are sold at cost, with a low downpayment and no interest payment.

To ensure fair allocation of public housing, Hong Kong has established a stringent application, allocation and

transfer system.The “Spacious Household Policy” stipulates that households with living space exceeding the prescribed standards should be relocated to PRH flats of suitable size, with priority given to seriously over-occupied generously sized households in accordance with the criteria set out in Table 2, by removing from the list of generously sized households families with disabled members or elderly persons aged 70 or above, and placing families with elderly persons aged 60-69 at the bottom of the list of generously sized households to be relocated.The Government has been working on the following measures to improve the living conditions of the elderly“The Rent Allowance for Elderly Scheme” provides cash rent allowance to elderly applicants for renting private flats in lieu of public rental housing allocation.”The Shared Elderly Persons Priority Scheme” provides for immediate allocation of public housing to 2 or more elderly persons who agree to share a public housing unit.”The Harmonious Families Priority Scheme” requires young families and at least 1 elderly parent or dependent elderly relative to choose to share 1 flat or 2 nearby flats, depending on the choice of districts and the number of flats suitable for the family’s circumstances.In 2021, the “Living Space Improvement Transfer Scheme” stipulates that public housing tenants with a per capita living space of less than 7 may apply for transfer, while families with a living space of less than 5.5 are called “crowded households” and are subject to mandatory transfer; for families with persons who are pregnant for more than 16 weeks, wheelchair users, quadriplegics, or those who need long-term dialysis, an additional family member can be counted in the calculation of the per capita area (Housingauthority, 2021).

**Table 2:** Spacious household standard

| Family size (persons)                                 | 1  | 2  | 3  | 4  | 5  | 6  |
|-------------------------------------------------------|----|----|----|----|----|----|
| Spacious Household Standard (m <sup>2</sup> )         | 25 | 35 | 44 | 56 | 62 | 71 |
| Priority treatment standard for spacious households ( | 30 | 42 | 53 | 67 | 74 | 85 |

### 2.4 International minimum standards of accommodation

Facing the reality of rapid urbanisation and urban population explosion, in order to effectively solve the housing problems of middle and low-income people, the United States, Canada, Italy, Germany, South Korea and other countries have also formulated the minimum living standards, see Table 3.Each country takes the bedrooms, kitchens, toilets, and bathrooms as the mandatory functional spaces, and the availability and working condition of the structural solidity, water supply, drainage, power supply, heating and other equipment as the mandatory indicators.And ventilation, lighting, noise, indoor temperature and air quality have been the focus of housing assessment and investigation in all countries (Zhao, J., 2024).In addition, the UK and South Korea take gender and age differences into account when allocating bedrooms. The overcrowding standard in the UK HA stipulates that married or cohabiting couples, adults aged 21 years and above, a pair of same-sex adolescents aged 10-20 years old, and a pair of children aged under 10 years old (irrespective of gender) should be allocated a separate bedroom; in Korea, the-Minimum Living Standard-stipulates that couples share a bedroom, children over 6 years of age are separated from their parents, children of opposite sexes over 8 years of age are separated from each other, and elderly parents have a separate bedroom.

**Table 3: Minimum residential standards in force at home and abroad**

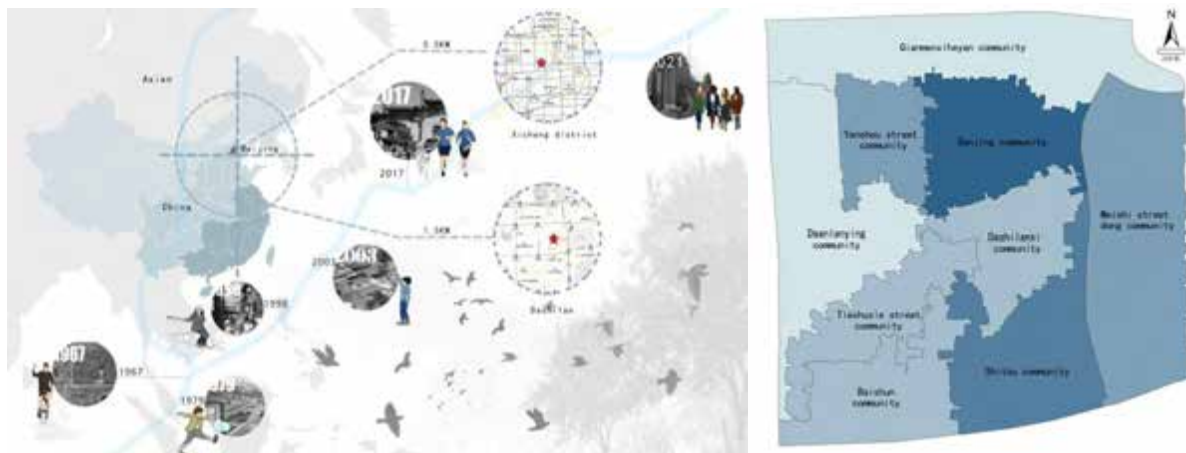
| Nations     | Standard time and name |             | Living area            |                      |                   |                          |                   |                             |          |
|-------------|------------------------|-------------|------------------------|----------------------|-------------------|--------------------------|-------------------|-----------------------------|----------|
|             |                        |             | Family size (persons)  | 1                    | 2                 | 3                        | 4                 | 5                           | 6        |
| America     | 1994MPS                |             | Total living area      | 14                   | 23                | 33                       | 40                | 47                          | 54       |
|             |                        |             | Bedroom area           | 6.5                  | 11.2-9.8-         | 15.9-13-                 | ---               |                             |          |
| Canada      | 2012MHHS               |             | Total living area      | 13.5                 | 22                | 32                       | 39                | 46                          | 54       |
|             |                        |             | Bedroom area           | 4.5-3.5-             | 9-6.5-            | 13.5-9.5-                | ---               |                             |          |
| UK          | 2015NDSS               |             | Total living area      | 30{35.5}             | 38                | 46                       | 53                | 65                          | 74       |
| Italy       | 1975IM                 |             | Total living area      | 21                   | 28.5              | 36                       | 43.5              | 51                          | 58.5     |
|             |                        |             | Bedroom area           | 6.8-3.5-             | 10.5              | 14.2                     | ---               |                             |          |
|             |                        |             | Living room area       | ---                  | 6.7               | 10.5                     | 10.5              | ---                         |          |
|             |                        |             | Kitchen area           | 3.3                  | 3.3               | 4.5                      | 4.5               | ---                         |          |
|             |                        |             | Toilet area            | 4.2                  | 4.2               | 6.8                      | 6.8               | ---                         |          |
| German      | 2018HBO                |             | Area of use per capita | 9-6-                 |                   |                          |                   |                             |          |
| Japan       | 1976                   | City centre | Total living area      | 13.5[18.8]           | 21                | 28.5                     | 36                | 42                          | 50       |
|             |                        | Suburbs     |                        | 28[32]               | 41                | 56                       | 68                | 78[92]                      | 84[97]   |
|             | 2021                   | City centre |                        | 18.8                 | 22.5              | 30-26-                   | 37.5-34-          | 45-41-                      | 52.5-49- |
|             |                        | Suburbs     |                        | 30                   | 41                | 56-49-                   | 71-64-            | 86-79-                      | 102-94-  |
| South Korea | 2004                   |             | Total living area      | 12                   | 20                | 29                       | 37                | 41                          | 49       |
|             | 2011                   |             | Total living area      | 14                   | 26                | 36                       | 43                | 46                          | 55       |
|             |                        |             | Family composition     | Single               | Couple            | Couple + children        |                   | Parents + couple + children |          |
|             |                        |             | Number of bedrooms     | 1                    | 1                 | 2                        | 3                 | 3                           | 5        |
|             |                        |             | Bedroom area           | 5.7                  | 8.1               | ---                      |                   |                             |          |
|             |                        |             | Kitchen area           | 2.4                  | 3.0               | 3.0                      | 3.0               | 3.5                         | 3.5      |
|             |                        |             | Kitchen form           | K                    | DK                | DK                       | DK                | DK                          | DK       |
|             |                        |             | Toilet area            | 4.1                  | 6.5               | 6.5                      | 9.2               | 10.5                        | 13.2     |
| China       | 2010Beijing            |             | House type             | Single dwelling type | Small sleeve type | Intermediate sleeve type | Large house style | ---                         |          |
|             |                        |             | Total living area      | 22                   | 29                | 36                       | 43                | ---                         |          |
|             | 2010Shenzhen           |             | House type             | Type A               | Type B            | Type C                   | Type D            | Type E                      | ---      |
|             |                        |             | Total living area      | 26                   | 36                | 49                       | 60                | 68                          | ---      |
|             | 2011Shanghai           |             | House type             | Type                 |                   |                          | ---               |                             |          |
|             |                        |             | Total living area      | 26                   | 26-38             | ≤45                      | ≤45               | ---                         |          |
|             | 2023Hongkong           |             | Area of use per capita | 7                    |                   |                          |                   |                             |          |

Note: Note: ① The full name of MPS is Minimum Property Standards; MHHS is Minimum Housing and Health Standards; IM is Istruzioni Ministeriali; HBO is Hessische Bauordnung. ② The unit of area is m<sup>2</sup>. ③ In (), it means that there are children living in the house, [] there are elderly people, and {} there are wheelchair users. ④ Total living area in the US and Canada includes bedroom, living room, kitchen-cum-dining room, and bathroom; PM includes bedroom, living room, kitchen, bathroom, and storage space; NDSS includes bedroom, living room, kitchen-cum-dining room, bathroom (toilet and shower), and storage space; Italy includes bedroom, living room, kitchen, bathroom, and storage space; Japan includes bedroom, living room, kitchen, dining room, bathroom, and storage space; South Korea includes bedroom, living room, kitchen, dining room, bathroom, and storage space; and Japan includes bedroom, living room, kitchen, dining room, bathroom, and storage space. Korea includes bedroom, living room, kitchen (or kitchen-cum-dining room), bathroom; China includes bedroom, living room, kitchen, dining room, bathroom. ⑤ "K" refers to kitchen, and "DK" refers to dining room and kitchen; ⑥ the 1976 Japan and 2004 Korean minimum standards are intended to be compared with the current standards.

### 3. Per capita housing situation in the Dashilan Historical and Cultural Block

#### 3.1 Study area and data

Dashilan is the most central block of the Chinese capital and the traditional commercial centre of old Beijing, as well as one of the first batch of Chinese Historical and Cultural Block, adjacent to Tiananmen Square and the National Centre for the Performing Arts, and an integral part of Beijing's Central Axis, in Fig. 1. Dashilan covers an area of about 1.26km<sup>2</sup>, and there are 3886 courtyards and 114 hutongs in the neighbourhood, which have retained the intact spatial texture of the courtyards and the hutongs. By the end of 2020, the resident population in Dashilan will be about 29,000 (including 58% of aborigines and 42% of foreigners), with the household population 1.75 times the resident population, the elderly aged 60 or above accounting for about 26% of the resident population, and the population with bachelor's degree or above accounting for only 20%, so that ageing and low education have turned Dashilan into a depression of human capital.



**Fig. 1** Location map of Dashilan

This study used 3 types of data: the 7th National Population Census (the 7th Census), resident interviews and field research. The 7th Census took the zero hour of 1 November 2020 as the standard time point to census the population of mainland China, and the data of the 7th Census used in this study were provided by the Bureau of Statistics of Xicheng District, Beijing. Between November 2021 and June 2022, the research team visited households and organised more than 20 resident interviews, to obtain the opinions and needs of the residents.

This study mainly adopts the GIS analysis method, which imports the spatial units of the compounds during the 7th Census survey into GIS and transforms them into the form of shp data, and associates the population and spatial data based on the community code (Adcode) and the building code (BuildingNo), and then accurately assigns the population information to the compounds in which they reside, in order to assess the current status of the per-capita housing in each compounds.

#### 3.2 Space size

##### 3.2.1 Per capita living space

The living space of Dashilan residents is seriously insufficient, overcrowding is common, in Fig. 2., and living in an overcrowded environment for a long period of time will seriously jeopardise the physical and mental health of the residents (Susanto, D., 2022). The per capita living area of the resident population in Dashilan is 6.98m<sup>2</sup>, and the median per capita living area is 7.5m<sup>2</sup> and the plural is 7.5m<sup>2</sup>. Compared with the per capita minimum standards of various countries, it is lower than the America's 14 m<sup>2</sup>, Canada's 13.5 m<sup>2</sup>, the UK's 22 m<sup>2</sup>, Italy's 21 m<sup>2</sup>, Germany's 9 m<sup>2</sup>, Japan's 18.8 m<sup>2</sup>, South Korea's 14 m<sup>2</sup>, Hong Kong, China's 7 m<sup>2</sup>, of which about 50% of the residents' per capita living space is lower than Hong Kong's "squeezed households" standard of 5.5 m<sup>2</sup>. Of these, about 50% of the residents have a living space per capita that is less than the Hong Kong "crowded household" standard of 5.5 m<sup>2</sup> and 86% of the residents have less than the standard parking space area of 12.5 m<sup>2</sup> for a private car. In addition, China's statistical yearbook shows that in 1989, China's urban per capita living area of 10.4 m<sup>2</sup>, 2021 Beijing urban

per capita living area of 25 m<sup>2</sup>, Dashilan as the location of China's capital city's most central block, the average per capita area even less than China's average level in 1989.

There is a big difference in the per capita living space of different groups, in Fig. 3. The per capita living space of the aborigines is 8.1 m<sup>2</sup>, while the per capita living space of the foreign population is only 5.7 m<sup>2</sup>, and the living space of the foreign population is even more narrow compared to that of the aborigines. The per capita area of households with infants and young children under the age of 6 is 6.3m<sup>2</sup>, that of households with elderly people over the age of 60 is 9m<sup>2</sup>, that of households with elderly people over the age of 80 is 11.8m<sup>2</sup>, and that of households with disabled people is 7.6m<sup>2</sup>. Among the disadvantaged groups, the living space of the senior elderly is relatively spacious, but it is still below the minimum standard of each country.

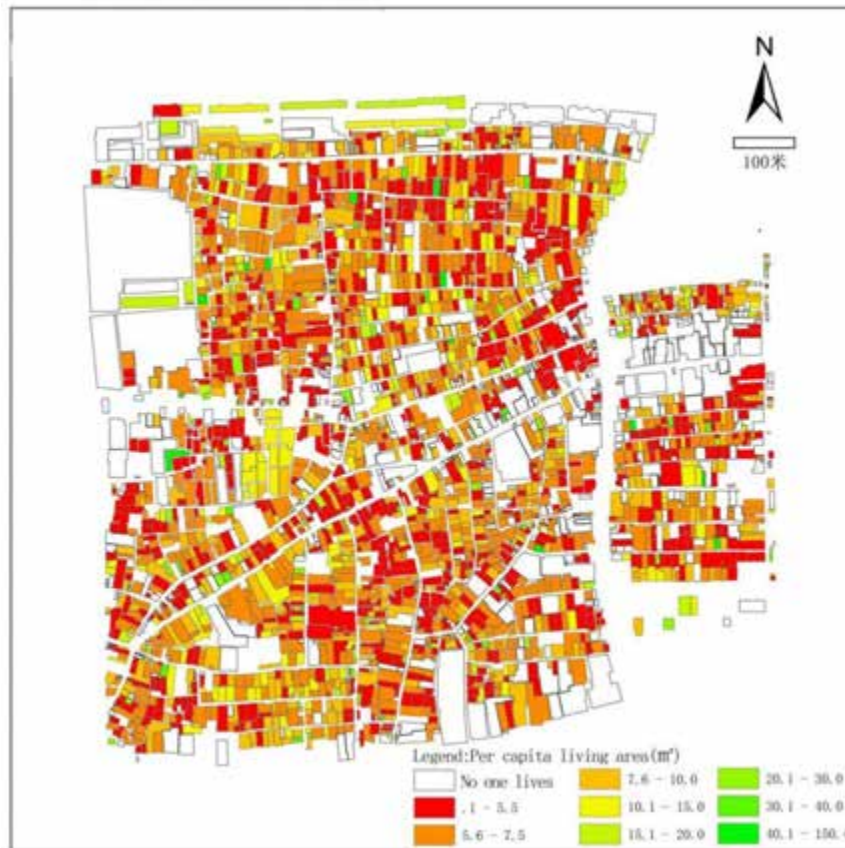


Fig. 2 Distribution map of per capita living area in courtyard

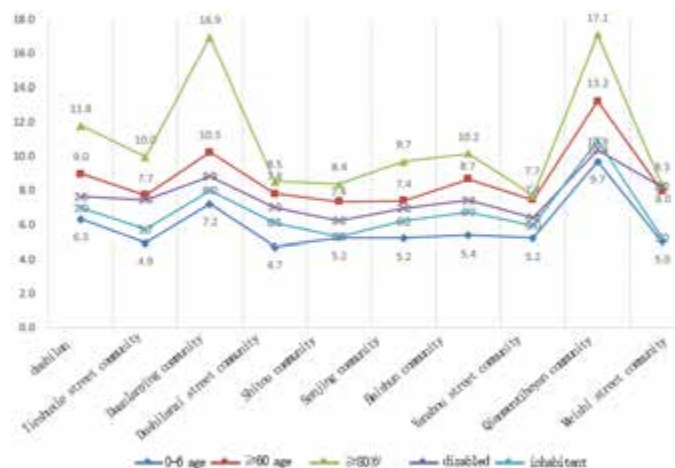
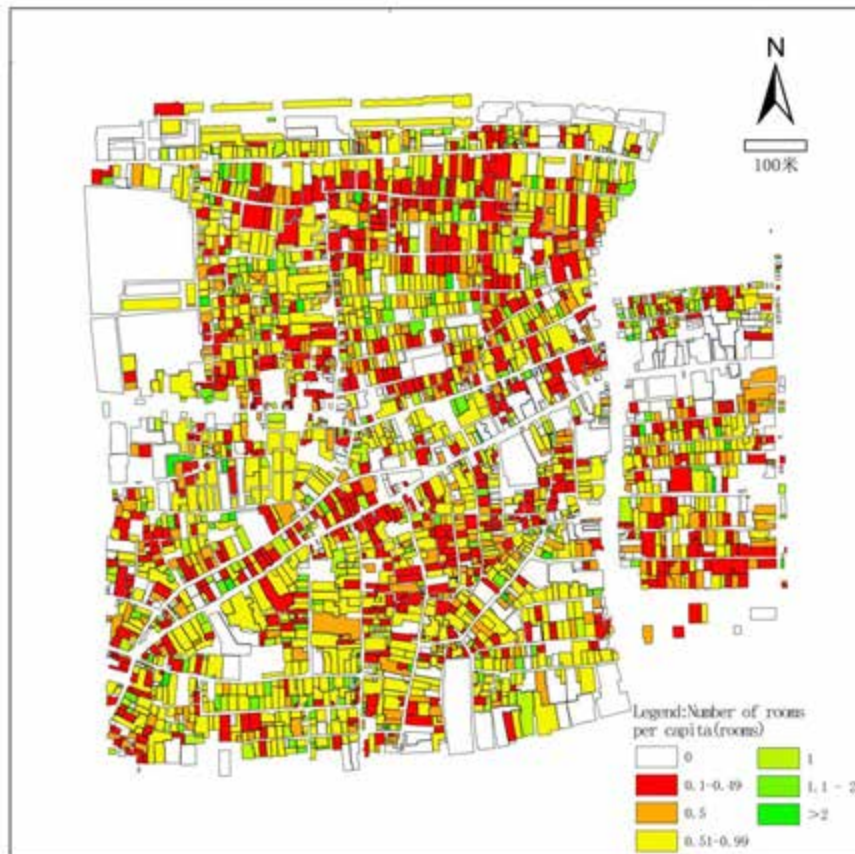


Fig. 3 Per capita living area of different groups

### 3.2.2 Number of rooms per capita

The overcrowding in Dashilan is again reflected in the number of rooms per capita, which is 0.55, with 79 of the resident population failing to meet the minimum standard of one room per capita, as shown in Fig. 4. In addition, as shown by the number of rooms per capita, which is 0.55, households do not take into account the differences in age and gender in the allocation of rooms; after all, not all people living in Dashilan are couples.

There are also differences in the number of rooms per capita among different groups, as shown in Fig. 5. The number of rooms per capita for the indigenous population is 0.6, while the number of rooms per capita for the foreign population is 0.5, and both the per capita living area and the number of rooms per capita of the foreign population are smaller than those of the indigenous population. The number of rooms per person in households with infants and young children under 6 years of age is 0.5, the number of rooms per person in households with older persons over 60 years of age is 0.7, the number of rooms per person in households with older persons over 80 years of age is 0.8, and the number of rooms per person in households with persons with disabilities is 0.7. Among the vulnerable groups, only infants and young children have rooms per person that meet the minimum standards of each country.



**Fig.4** Distribution of the number of rooms per capita by courtyard

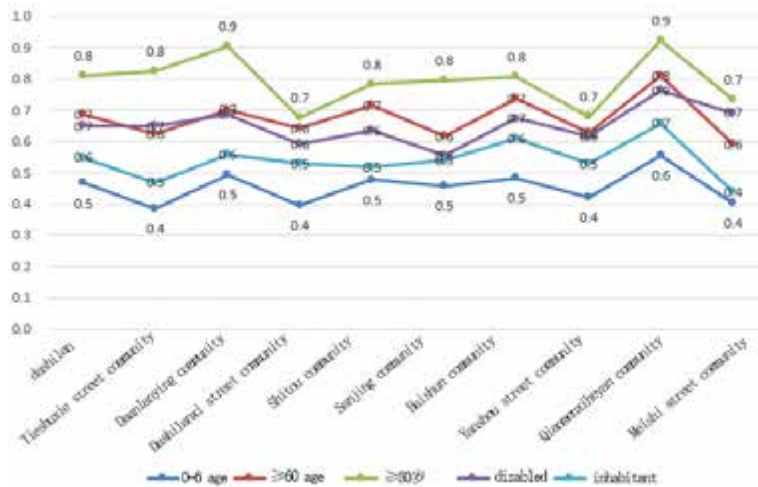


Fig. 5 Number of rooms per capita for different groups

### 3.3 Basic functional space

#### 3.3.1 Kitchen

In all countries, separate kitchens are a mandatory basic functional space, while only 50 of households in Dashilan have a kitchen. Households in Dashilan are predominantly 2-3 person in size, with 0.55 rooms per person, indicating that a high proportion of households with kitchens have kitchens integrated with bedrooms. In addition, the field study found that some households have kitchens in the hutongs because of limited living space; if such kitchens were not counted, less than half of the households in Dashilan would have independent kitchens.

#### 3.3.2 Toilet and bathing facilities

States have also made toilets and bathrooms mandatory basic functional spaces and stipulated that at least one separate toilet should be guaranteed in every housing unit. Only 18 of households in Dashilan have a separate toilet, and 75 have bathing facilities, but bathing facilities are not the same as separate bathrooms. In the symposium on "whether to support the inclusion of toilets in the courtyard/household", 11 residents expressed their views, of which 10 did not support the inclusion of toilets in the courtyard/household and 1 was neutral. The reasons for this are, on the one hand, that the living space is too small, and on the other hand, that the public toilets in Dashilan can cover all the courtyards within 80 m, in Fig. 6. Therefore, whether or not to promote the use of toilets in courtyards/households in the near future should be assessed in the light of the needs of the residents and the availability of funds.

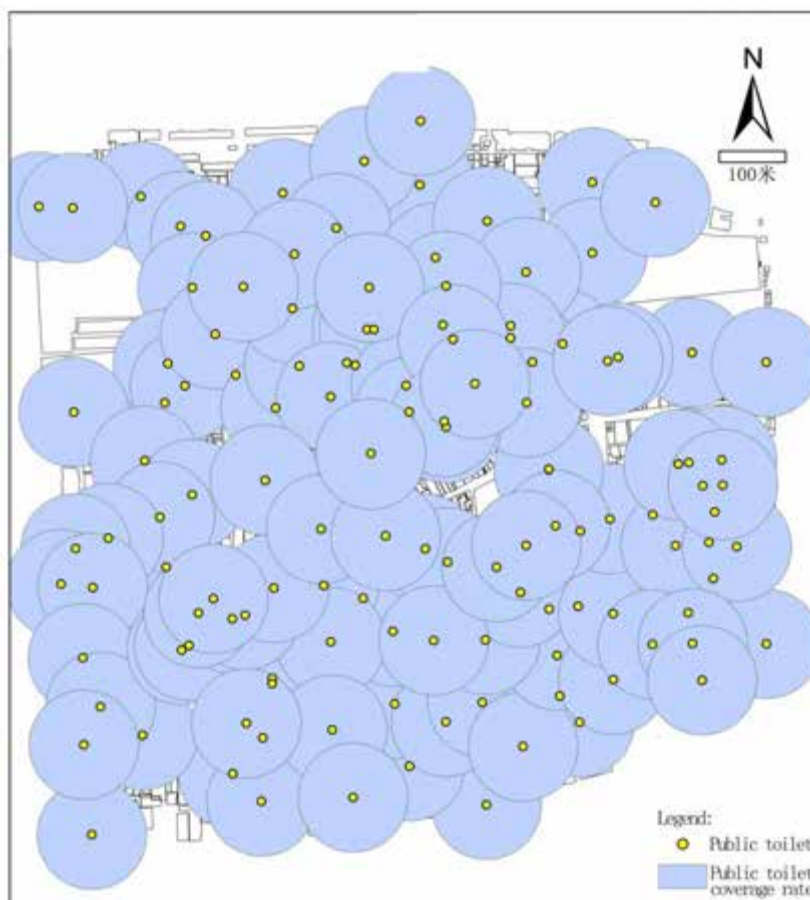


Fig. 6 80m coverage of public toilets

### 3.4 Building performance and basic equipment

#### 3.4.1 Structural safety

Dangerous housing refers to the structure has been seriously damaged or load-bearing components have been dangerous components, at any time may lose the structural stability and load-bearing capacity, can not guarantee the safety of residence and use of the house, based on the degree of damage to the house will be divided into 5 categories of dangerous houses, 1 category of dangerous houses with the greatest degree of damage. Dashilan has 1,406 dangerous houses, accounting for 37% of the total compound of Dashilan (4, 5 types of dangerous houses mainly), private houses in dangerous houses accounted for a slightly higher proportion of about 51%, public houses accounted for 49%. In 87% of the dangerous houses, there are still residents living there, 27% of the dangerous houses have infants and young children living there, and 23% of the dangerous houses have elderly people over 80 years old living there, in Fig. 7.

Detailed analysis of the 61 randomly selected courtyards in the field study found that due to the long-term lack of maintenance and risk prevention awareness, some buildings in the block have more serious roof leakage phenomena and component collapse hazards, and the tilt rate of some building walls is even greater than 2%, which seriously exceeds the upper limit of the hazardous conditions stipulated by various national norms, and is very likely to damage the persons and properties safety of block residents in the event of torrential rains, high winds, continuous rain and other weather conditions.

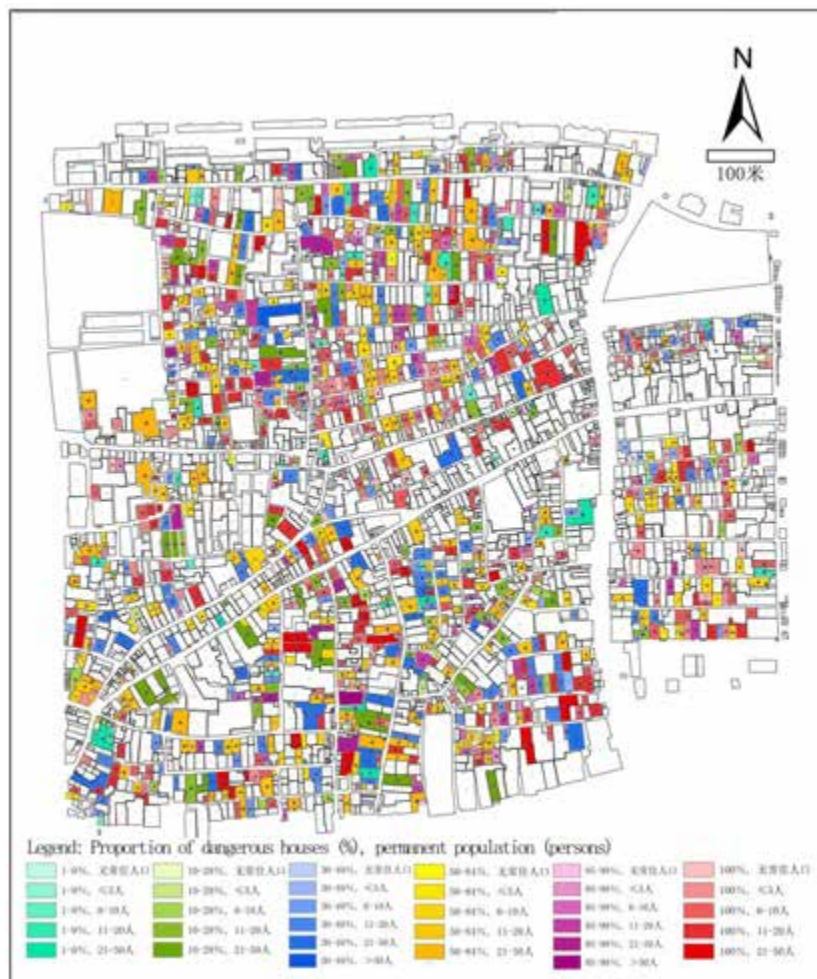


Fig. 7 Proportion of resident population in courtyard with different degrees of dangerousness

### 3.4.2 Water supply and heating equipment

Minimum standards in each country stipulate that water supply is a basic requirement for normal residential life, and the water supply in Dagestan is good, with 93% of households having piped water and 7% having no piped water.

Studies have shown that living in temperatures below 16°C for long periods of time during the winter months increases the risk of respiratory and cardiovascular diseases significantly in older people (Appolloni, 2021). We compared the indoor temperatures in a random sample of 10 compounds with those in urban buildings and found that the average indoor temperature in Dashilan in winter was only 5°C. The reason for this is that Dashilan was converted from coal to electricity in 2019, but some residents only heat their homes at night when they sleep because they cannot afford the high cost of electricity.

### 3.5 Living environment

The overall living environment in Dashilan is poor. Through household visits and resident meetings, we collected a total of 2,613 residents' opinions and demands on the living environment, and used GIS to group residents' opinions into the courtyard units they lived in, in Fig. 8. Residents mainly reflected indoor humidity, poor indoor lighting, frequent termite and rat infestation, waste accumulation encroaching on the courtyard, water accumulation and ice in the courtyard, noise nuisance from commercial operations and housing construction, and poor neighbourly-known neighbourhood relations. etc. For example, one resident reported: "The interior is very humid, the walls are mouldy, the air does not circulate, and you can only turn on the lights during the day when you can't see the light."

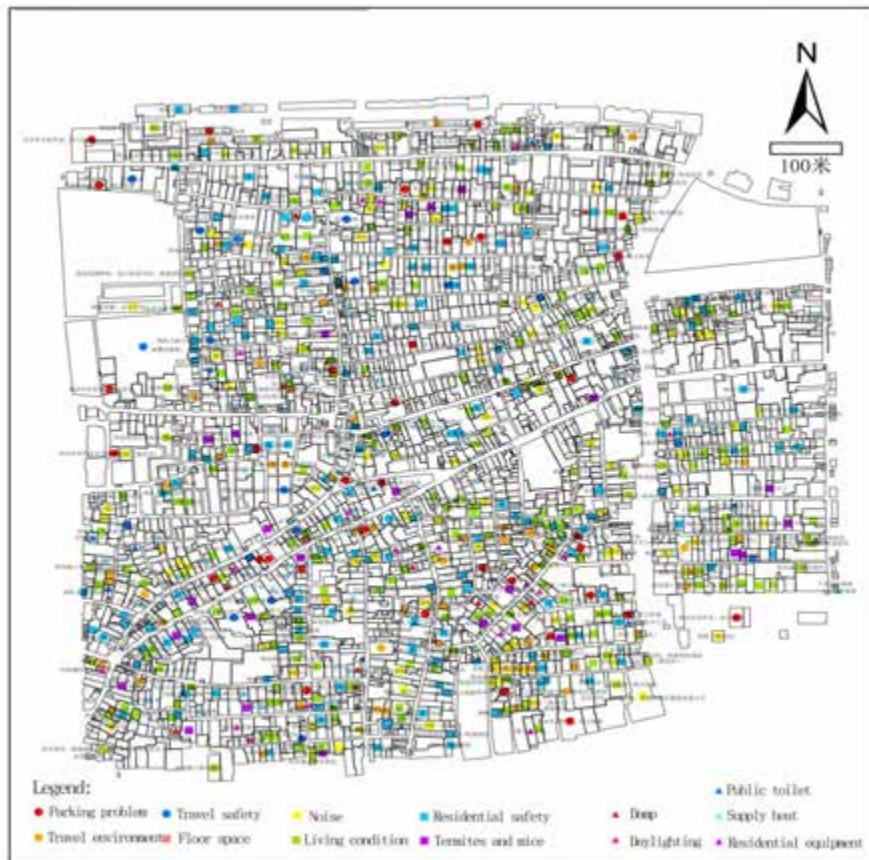


Fig. 8 Distribution of views of the people

## 4. Suggestions for improving the living quality of Dazhalan Historical and Cultural Quarter

### 4.1 Establishment of minimum occupancy standards for historic and cultural districts

Due to the lack of minimum living standards for historic and cultural block the minimum standards for ordinary urban housing in various countries were used for the assessment. However, it should be noted that housing in historic and cultural block has a unique historical background, spatial texture and structure, so the minimum living standards for historic and cultural block should be formulated by taking into account the special spatial form of the housing in historic and cultural block, the housing stock, as well as the human body size, activity characteristics and family structure of the inhabitants. Based on the current per capita housing situation, housing stock, spatial form of Dashilan, as well as the family structure and needs of the residents, this study initially proposes the minimum living space standards in Table 4, taking bedrooms, kitchens, bathrooms (including toilets and baths), and storage spaces as the mandatory basic functional spaces.

Table 4: Minimum living space standards for Dashilan

| Family size (persons) | Bedroom area (m <sup>2</sup> ) | Kitchen area (m <sup>2</sup> ) | Toilet area (m <sup>2</sup> ) | Storage space area (m <sup>2</sup> ) | Area per capita (m <sup>2</sup> ) |
|-----------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------------|-----------------------------------|
| 1                     | 4.5                            | 2.5                            | 2                             | 1                                    | 10                                |
| 2                     | 10                             | 2.5                            | 2                             | 1.5                                  | 8                                 |
| 3                     | 15.6                           | 3                              | 2.4                           | 1.5                                  | 7.5                               |
| 4                     | 21.9                           | 3.7                            | 2.4                           | 2                                    | 7.5                               |
| 5                     | 28.6                           | 3.7                            | 3.2                           | 2                                    | 7.5                               |

### 4.2 Housing survey and supervision

A survey on the current status of housing per capita is conducted every 2 years based on the minimum living

standards, including spatial size, basic functional space, building performance and basic equipment, living environment, and housing opinions and needs. At the same time, a survey of vacant housing is conducted once a year. Residents and social organisations are allowed to assess the current housing situation on their own, as well as to conduct surveys of vacant houses.

The minimum living standards will be used as the basis for the vacating of housing in historic and cultural districts (including application for rent refund, application for rent exchange, and application for improvement). For example, in the case of application for rent exchange, 3 categories of families will be divided into those who are far below the minimum standards, those who happen to meet the minimum standards, and those who are far above the minimum standards, and a differentiated housing area subsidy policy will be formulated; in the case of application-based improvements, reference is made to Hong Kong's public housing allocation system, with priority given to improving the living conditions of households below the minimum standard and those belonging to disadvantaged groups, and mandatory relocation is made for households that seriously fall below the standard.

Use the minimum standard of accommodation as the basis for tenancy management, prohibit the renting of housing below the minimum standard, and impose administrative penalties or fines on landlords who rent out housing in violation of the regulations.

#### 4.3 Dynamic database platform construction

Using GIS to build a dynamic database platform for different subjects to use together. Overlay the spatial mapping map, census information, housing survey information, etc., and build a street-lane-courtyard-house-people database platform. The street office and the responsible planner are responsible for regularly updating the database platform, dynamically monitoring, scientifically planning and accurately managing, and quantitatively evaluating the per capita housing situation in Dashilan for a long time, so as to realize "one base map" and promote the improvement of living quality.

#### 4.4 Sustainable updating mechanism

The Government is playing a leading role in upgrading residential quality, and is constantly improving the mode of public participation, implementing updates that reflect public opinion and respond to people's livelihoods, and integrating "top-down" and "bottom-up" approaches. The Government will also insist on population depopulation, while at the same time resolving the problem of "separation of people and households", optimising the age structure of the neighbourhoods, and introducing excellent industrial resources such as high-end cultural and creative industries, scientific and technological innovations, residence and tourism, so as to enhance the economic vitality of the block. Promote the revival of Dashilan's history, culture and common people's spirit, and promote the "cultural industry in the community" and "cultural activities in life" mode of block renewal.

### 5. Conclusion

This study systematically collates the experience of the UK, Japan and Hong Kong, China in improving living quality, and finds that they are all based on bottom-line thinking, and improve living quality by setting minimum living standards, housing surveys, paying attention to the disadvantaged groups of people living in the area, and making effective use of vacant housing. Based on this, we also collated the minimum living standards of various countries and assessed the current per capita housing situation in Dashilan, and found that there is still a big gap between the per capita housing level and the international minimum standards, and then put forward 4 aspects of enhancement suggestions.

This study hopes to reveal the housing problems that exist in Beijing's historical and cultural blocks by assessing the current per capita housing situation in Dashilan, a typical historical and cultural block, and suggests that a minimum housing standard should be guaranteed through housing surveys and regulation based on minimum living standards. The limitation of this study is that it only focuses on the housing problems that exist in the actual physical space, and does not explore the housing problems that exist in the areas where the government has

introduced the “housing vacate” policy and the “symbiotic courtyard” and “translocation courtyard” policies, and we should further explore the fundamental demands behind the residents’ apparent discourse in the future.

#### Note

- ① All the areas in the text are the actual use areas calculated according to the horizontal projection lines of the walls inside the house.
- ② The pictures in the text are all drawn by the author
- ③ Tables 1-3 are sequentially derived from the literature (GOV.UK,2022), (Housingauthority,2021), (Zhao, J., Xiong, W. and Rong, Q.,2024)

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