# Analysis of Community Elderly Care Facility Demand Levels and Functional Grouping Insights: A Case Study of Xueyuan Road Street in Haidian District, Beijing

GUO Yuhan, CAO Ying*

(School of Mechanics and Civil Engineering, China University of Mining & Technology-Beijing, Beijing 100083, China)

**Abstract**  This study focuses on the elderly population in Xueyuan Road Street of Haidian District in Beijing. Through KANO questionnaires and the theory of attractive quality, it investigates the demand levels and degrees for different community elderly care services. It introduces the Anderson behavioral model to analyze the influencing factors, categorizes different demographics, and examines the needs of elderly individuals with varying characteristics, proposing suggestions for the improvement of future community elderly care service facilities.

**Keywords**  Community elderly care, Demand levels, KANO model, Anderson behavioral model

**DOI**  10.16785/j.issn 1943-989x.2025.3.006

Since the 19th National Congress of the Communist Party of China, the general direction of China's elderly care policy has always been to strengthen the importance of home-based and community-based elderly care, with institutional elderly care playing a supporting role, while emphasizing the needs of the elderly as the starting point[1]. During offline visits and research, it is found that the problems behind the surge in elderly care service facilities have become increasingly serious. For example, some facilities have limited space and cannot provide services that meet the needs of the elderly[2]; some services cannot accurately meet the needs of the elderly, resulting in idle space[3]; some facilities abandon operations due to the same service content and excessive competition pressure[4]. The main reason for the above dilemma is the incomplete understanding of the actual needs of the elderly. Through actual survey questionnaire, based on the needs of the elderly, their needs are classified into levels, and the influencing factors behind them are studied as the basis for population segmentation, providing a basis for the construction of future elderly care service facilities.

## 1  Study area

Xueyuan Road Street in Haidian District, Beijing is chosen. Among the permanent residents of Xueyuan Road Street, there are 31,000 elderly people aged 60 and above, accounting for 15% of the total population. In addition, there are currently 9 community elderly care service stations and 1 street elderly care service center in Xueyuan Road Street, Haidian District, providing rich elderly care services. This large elderly population provides a rich sample basis for studying the demand for elderly care services, which can deeply explore the diverse needs of elderly people in different age groups and health conditions, and provide a basis for accurate supply of elderly care services (Fig.1).

## 2  Research methods
### 2.1 Charm quality theory and KANO model

The charm quality theory and KANO model are theoretical models that prioritize product functions based on user needs[5]. They were first proposed by Noriaki Kano at Tokyo Institute of Technology in 1984 and were first applied in the field of management[6]. Later, they were widely used in design[7], nursing[8], library and information science[9], and other fields, to study user needs and satisfaction analysis, and determine different levels of user needs for different products or services. This theory divides user needs into 5 categories (Table 1). The KANO model divides service quality into six categories: essential attribute (M) refers to functions or services that must exist and are indispensable. The expected attribute (O) refers to the higher the degree of satisfaction, the higher the customer satisfaction. The charm attribute (A) refers to unexpected features or services that customers may not feel dissatisfied with if they are not provided, but once they are provided, they will surprise customers and significantly increase satisfaction. The indifference attribute (I) refers to the lack of significant impact on customer satisfaction, regardless of whether the functionality is implemented or not. The reverse attribute (R) refers to the requirement that is contrary to the usual situation, and providing it may actually lead to a decrease in customer satisfaction. The suspicious result (Q) is due to the user's misunderstanding of the question options.

### 2.2 Customer satisfaction coefficient

The KANO model mentioned above has determined the levels of different demand items, but it is unable to divide each demand item of the same level. Therefore, some scholars have proposed satisfaction coefficient (SI) and dissatisfaction coefficient (DI). The calculation formulas are as follows:

$$SI=(A+O)/(A+O+M+I)$$
$$DI=(-1)\times(O+M)/(A+O+M+I)$$

The A, O, M, and I in the formula correspond to the expected attribute (O), essential attribute (M), charm attribute (A), and indifference attribute (I) of the service, respectively.

The satisfaction coefficient is expressed as a positive number, which means the change in consumer satisfaction when providing a certain service, and the value is directly proportional to consumer satisfaction. The dissatisfaction coefficient is represented by a negative number, which means the change in consumer dissatisfaction when a certain service is not provided.

**Table 1  KANO need level evaluation**

| Cannot provide this service | Can provide this service | | | | |
|---|---|---|---|---|---|
| | Very satisfied | It should be | Indifferent | Tolerable | Dissatisfied |
| Very satisfied | Q | R | R | R | R |
| It should be | A | I | I | I | R |
| Indifferent | A | I | I | I | R |
| Tolerable | A | I | I | I | R |
| Dissatisfied | O | M | M | M | Q |

The absolute value of the dissatisfaction coefficient is directly proportional to consumer dissatisfaction.

Subsequently, some scholars proposed the average satisfaction coefficient to compare the importance of various service items[10].

ASC=|SI|+|SI|/2

|SI| and |DI| represent the absolute values of satisfaction coefficient and dissatisfaction coefficient for each service item, respectively.

## 2.3 Anderson behavior model

The Anderson behavior model, proposed by Professor Ronald Anderson in 1968, is mainly used for the different effects of different factors on demand. It was first applied in the field of medicine[11-12], and later widely used in architecture[13], sociology[14], service science[15] and other fields. This model divides the different factors that affect demand into three aspects, namely propensity factors, enablement factors,

and demand factors.

Tendency factors include demographic characteristics, social characteristics, belief characteristics, etc.; enabling factors include personal and family resources, as well as social resources; demand factors include perceived demand and evaluated demand[16-17].

## 3 Research process on demand for elderly care service facilities

The questionnaire is divided into two parts. The first part is the basic characteristics of the respondents and a five-level scale questionnaire on their different elderly care needs, and the second part is the KANO questionnaire.

### 3.1 KANO questionnaire design

The most important step in the KANO questionnaire is to determine the service demand items for community elderly care facilities. After searching for "community elderly care"

and "elderly care services" through the Beijing Elderly Care Service Network (https://www.beijingweilao.cn/), 21 items of services are obtained. Through offline dialogue research and screening, the following 4 major items and 18 minor items are finally obtained (Table 2).

The KANO model is applied to analyze 18 items of second-level requirements mentioned above, and data are obtained from the "positive and negative" directions of the problem (Table 3).

### 3.2 Division of demand influencing factors

According to the five-level scale questionnaire, a correlation analysis is conducted on the basic characteristics and demand results of the questionnaire. Pearson correlation experiments show that the factors with high correlation are age, physical condition, income, residential status, and distance from children. On the basis of Anderson behavioral model, the factors that affect demand are divided into three dimensions: personal factors, family factors, and economic factors, to analyze the demand characteristics of different characteristic groups.

### 3.3 Data collection and result analysis

This study started in December 2024, with elderly people from Xueyuan Road Street, Haidian District, Beijing as the survey subjects. Both online and offline survey questionnaires were used, and suspicious questionnaires were eliminated. Finally, a total of 206 questionnaires were obtained, with an effective rate of 91.63%. The questionnaire was conducted through random sampling in various communities of Xueyuan Road Street. According to preliminary statistical results, the valid samples collected in this questionnaire were mostly those who was young (43.81%), had good abilities (52.38%), lived with a spouse (44.76%), and had a retirement income of 5,001−8,000 yuan (43.81%).
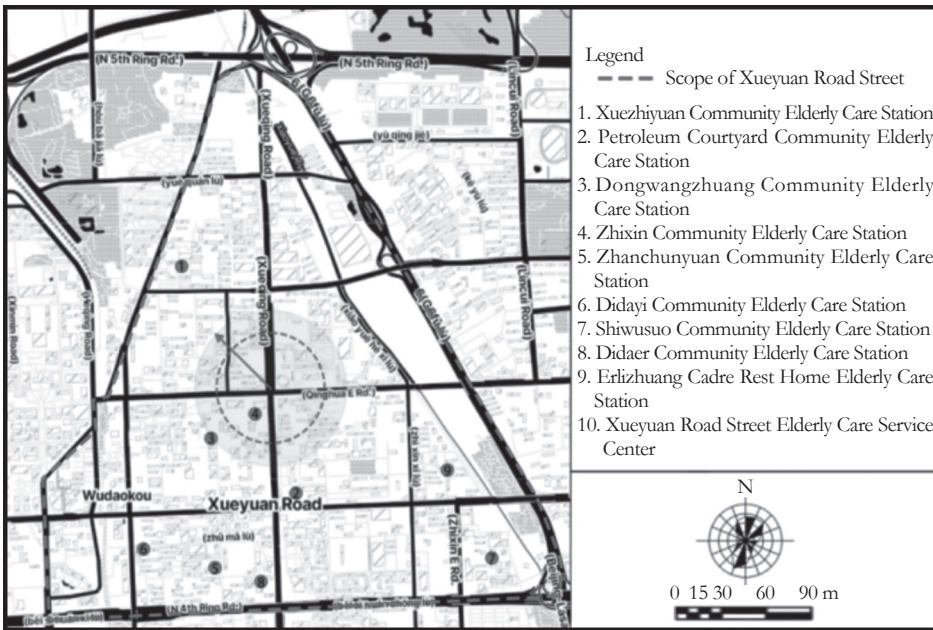
## 4 Analysis of demand levels for community elderly care service facilities

The data obtained from the KANO questionnaire are analyzed for reliability and validity using SPSS software. In terms of reliability, the Cronbach α coefficient for the forward question is 0.951, and the Cronbach α coefficient for the reverse question is 0.944, both higher than 0.8, indicating high reliability quality and suitability for further analysis. In terms



**Fig.1   Location of Xueyuan Road Street, Haidian District, Beijing**

**Table 2   Requirement item code of KANO questionnaire**

| First-level demand | Second-level demand |
| --- | --- |
| A life care | $A_1$ meal supply $A_2$ personal cleaning ($A_{21}$ bathing assistance service $A_{22}$ barber service $A_{23}$ hand and foot care) $A_3$ daytime care $A_4$ custody and accommodation |
| B health care | $B_1$ professional medical $B_2$ health guidance $B_3$ health and rehabilitation $B_4$ psychological comfort |
| C culture, sports, education, and entertainment | $C_1$ culture, sports, and entertainment $C_2$ education for the elderly |
| D home care | $D_1$ household cleaning assistance $D_2$ entrusting agency $D_3$ assistive services ($D_{31}$ accompanying out $D_{32}$ transportation pick-up and drop off) $D_4$ home care $D_5$ home aging adaptation renovation |

**Table 3   Question design of KANO questionnaire**

| Item | 1 | 2 | 3 | 4 | 5 |
| --- | --- | --- | --- | --- | --- |
| $A_1$ if meal service can be provided, what is your evaluation | Dissatisfied | Tolerable | Indifferent | It should be | Very satisfied |
| $A_1$ if meal service is not provided, what is your evaluation | Dissatisfied | Dissatisfied | Dissatisfied | Dissatisfied | Dissatisfied |

of validity, the KMO value is 0.883, making the research data very suitable for extracting information.

The satisfaction coefficient, also known as the Better-Worse coefficient, is calculated to classify the service needs of elderly people in the survey area for community elderly care facilities. The above steps are repeated to obtain the KANO attribute classification for 18 service requirements (Table 4). One essential attribute, namely meal supply service, is identified by up to 60 respondents as mandatory. The six expected attributes are daytime care, professional medical care, health guidance, health rehabilitation, cultural and recreational activities, and accompanying outdoor services. Five charming attributes include psychological comfort, household cleaning assistance, transportation pick-up and drop off, family care, and aging friendly renovation services. The rest are undifferentiated attributes.

From the average satisfaction coefficient, the demand levels of elderly people in the surveyed area for the four major elderly care services are divided into: healthcare (0.709)>cultural, sports, education, and entertainment (0.528)>home services (0.474)>life care (0.429).

Among them, for daily care needs, average satisfaction coefficient of daytime care (0.739)>meal supply (0.462)>hairdressing services (0.424)>bathing assistance services (0.353)>daycare check-in (0.308)>hand and foot care (0.291); for health care needs, average satisfaction coefficient of professional medical (0.838)>health rehabilitation (0.779)>health guidance (0.775)>psychological comfort (0.446); for the demand for cultural, sports, education,

average satisfaction coefficient of entertainment, cultural, sports, and entertainment (0.729)> elderly education (0.343); for home service needs, average satisfaction coefficient of accompanying outings (0.763)>home aging adaptation (0.472)>home care (0.446)>household cleaning assistance (0.407)>transportation pick-up and drop off (0.380)>entrusted agency (0.376).

# 5 Analysis of demand levels for community elderly care service facilities based on "portraits of the elderly"

In order to further explore the inherent differences in the service needs of different elderly populations for community elderly care facilities, based on the correlation analysis in the previous text, the service demand levels of different "elderly portraits" are studied from three levels: individual, family, and economy.

## 5.1 Analysis of demand levels for community elderly care facility service based on personal factors

According to the correlation analysis of the five-level scale, individual factors are extracted to divide the population into four categories: intact ability, mild disability, moderate disability, and severe disability (Fig.2).

According to Fig.2, the two groups of people with good physical condition, namely those with intact abilities and those with mild disabilities, have a higher demand for offline social activities such as sports, entertainment, and elderly education provided by community elderly care facilities. As their physical condition declines, especially for severely disabled elderly people, they are more likely to seek physiological

help, such as day care, professional medical care, health guidance, and other services.

## 5.2 Analysis of demand levels for community elderly care facility service based on family factors

Under family factors, the population is divided into four categories for analysis: living alone, living with spouse, living with children, and living with multiple generations (Fig.3).

According to Fig.3, in terms of daily care, the demand levels of the four groups of people are roughly the same, with the highest levels being daytime care and meal supply. The demand for healthcare is strongest among individuals living alone and those living with multiple generations. The demand level of the two groups of people living with spouses and children in cultural, sports, education and entertainment is far behind that of the remaining groups. In terms of home care services, the needs of the elderly living alone in accompanying outings, entrusting agents, and providing family care are far greater than those of the remaining three groups, highlighting the loneliness of the elderly living alone.

## 5.3 Analysis of demand levels for community elderly care facility service based on economic factors

According to the correlation analysis of the five-level scale, the following groups are obtained according to the monthly total income: monthly total income below 3,000 yuan, monthly total income between 3,001–5,000 yuan, monthly total income between 5,001–8,000 yuan, and monthly total income above 8,000 yuan (Fig.4).

According to Fig.4, in terms of daily care, people with a monthly income of less than

**Table 4  Analysis results of KANO model** %

| Function/service | A | O | M | I | R | Q | Classification results | Better | Worse | |
|---|---|---|---|---|---|---|---|---|---|---|
| Meal supply | 9.00 | 8.00 | 60.00 | 15.00 | 8.00 | 0.00 | Essential attribute | 18.48 | −73.91 | Life care |
| Bathing assistance service | 12.00 | 15.00 | 18.00 | 40.00 | 15.00 | 0.00 | Indifference attribute | 31.76 | −38.82 | |
| Barber service | 21.00 | 17.00 | 17.00 | 30.00 | 15.00 | 0.00 | Indifference attribute | 44.71 | −40.00 | |
| Hand and foot care | 18.00 | 8.00 | 13.00 | 42.00 | 19.00 | 0.00 | Indifference attribute | 32.10 | −25.93 | |
| Daytime care | 8.00 | 62.00 | 10.00 | 16.00 | 4.00 | 0.00 | Expected attribute | 72.92 | −75.00 | |
| Custody and accommodation | 17.00 | 11.00 | 14.00 | 44.00 | 14.00 | 0.00 | Indifference attribute | 32.56 | −29.07 | |
| Professional medical | 7.00 | 68.00 | 5.00 | 15.00 | 5.00 | 0.00 | Expected attribute | 78.95 | −76.84 | Healthcare |
| Health guidance | 7.00 | 61.00 | 9.00 | 12.00 | 11.00 | 0.00 | Expected attribute | 76.40 | −78.65 | |
| Health and rehabilitation | 6.00 | 75.00 | 5.00 | 10.00 | 4.00 | 0.00 | Expected attribute | 84.38 | −83.33 | |
| Psychological comfort | 60.00 | 6.00 | 11.00 | 16.00 | 7.00 | 0.00 | Charm attribute | 70.97 | −18.28 | |
| Culture, sports, and entertainment | 8.00 | 62.00 | 5.00 | 21.00 | 4.00 | 0.00 | Expected attribute | 72.92 | −69.79 | Culture, sports, ducation, and entertainment |
| Education for the elderly | 20.00 | 15.00 | 11.00 | 43.00 | 11.00 | 0.00 | Indifference attribute | 39.33 | −29.21 | |
| Household cleaning assistance | 51.00 | 7.00 | 9.00 | 24.00 | 9.00 | 0.00 | Charm attribute | 63.74 | −17.58 | Home care |
| Entrusting agency | 14.00 | 16.00 | 18.00 | 37.00 | 15.00 | 0.00 | Indifference attribute | 35.29 | −40.00 | |
| Accompanying out | 2.00 | 68.00 | 7.00 | 18.00 | 5.00 | 0.00 | Expected attribute | 73.68 | −78.95 | |
| Transportation pick-up and drop off | 51.00 | 5.00 | 11.00 | 28.00 | 5.00 | 0.00 | Charm attribute | 58.95 | −16.84 | |
| Home care | 53.00 | 10.00 | 10.00 | 20.00 | 7.00 | 0.00 | Charm attribute | 67.74 | −21.51 | |
| Home aging adaptation renovation | 63.00 | 8.00 | 6.00 | 13.00 | 10.00 | 0.00 | Charm attribute | 78.89 | −15.56 | |

3,000 yuan have a stronger demand for low-cost services such as hairdressing services, hand and foot care services, and bath assistance services. In terms of healthcare, all populations show significant demand, and those with a monthly income greater than 8,000 yuan have a stronger demand for professional medical care and health rehabilitation. Through offline research and consultation, it is found that this group of people is not only satisfied with the medical services provided by the community, but also go to rehabilitation centers and regular professional hospitals for check ups to meet their diverse needs. In terms of culture, sports, education, and entertainment, the demand of people with monthly income less than 3,000 yuan is more vigorous. In terms of home care services, people with a monthly income greater than 8,000 yuan have a stronger demand for household cleaning assistance, entrusting agency, transportation pickup and drop off, home care, and other services, further confirming that this group of people will participate in services other than community elderly care, such as hiring nannies and caregivers.

## 6 Enlightenment of requirement level on functional grouping con– figuration

### 6.1 Functional grouping configuration principle

In the actual construction of community elderly care facilities, due to various factors, not all functions are conditionally satisfied, but are selectively satisfied[18]. In order to obtain more satisfaction from the elderly, according to the analysis of demand levels in the previous text, more functional spaces with high demand from the elderly are arranged.

### 6.2 Overall functional group confi– guration for the elderly population

Based on the previous requirements, it is divided into three modules: life care, healthcare, and cultural, sports, and entertainment. Different modules are designed according to the level of requirements, and different configuration options are divided into essential configuration items, expected configuration items, attractive configuration items, and optional configuration items. Specific functions can be selected according to the actual situation, as shown in Fig.5.

For the life care module, priority should be given to providing meal supply services. It is recommended to use both dine in and delivery services, and determine the food to kitchen ratio based on specific circumstances and relevant standards. It can be divided into two ways: dine in and private dining, to meet different needs. As

an expected configuration option, daytime care is recommended to improve the satisfaction of the elderly. It is suggested to set up nursing stations for timely observation of the elderly, as well as entertainment, reception, leisure and other areas. The demand for personal cleaning and daycare

check-in in community elderly care facilities is relatively low and can be configured accordingly.

In the healthcare module, professional medical care, health rehabilitation, and health guidance are all expected options. However, the actual average satisfaction coefficient is the
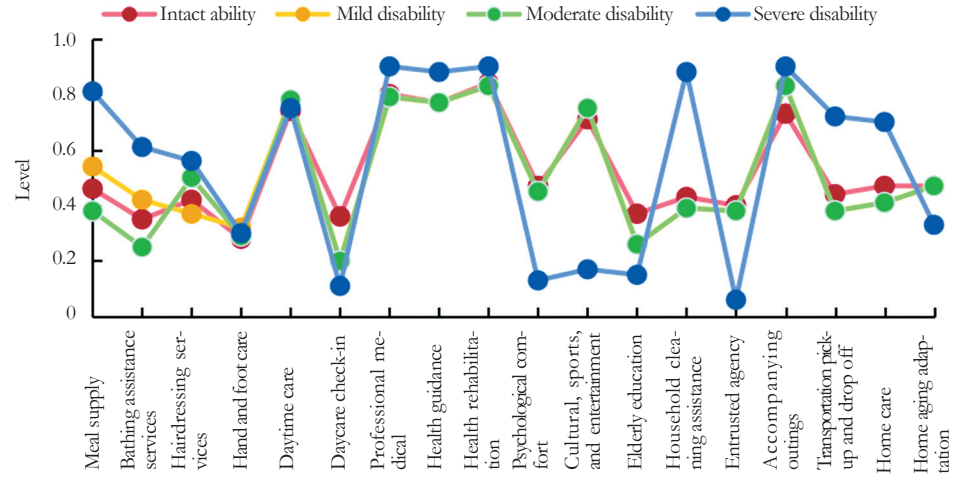


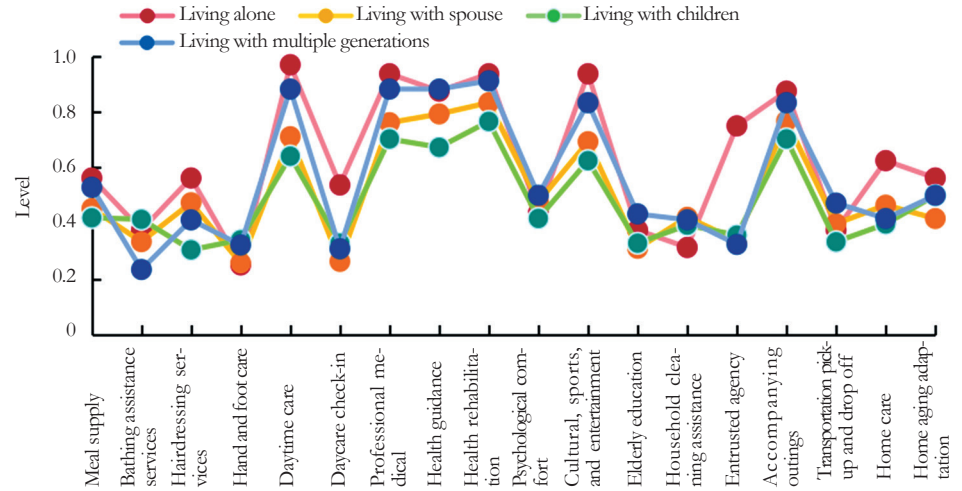**Fig.2   ASC diagram of demand level based on personal factors**



**Fig.3   ASC diagram of demand level based on family factors**
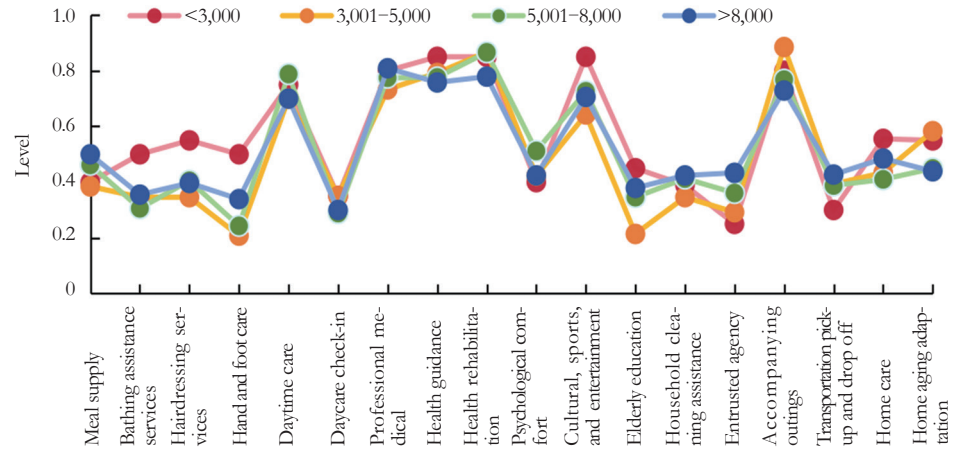


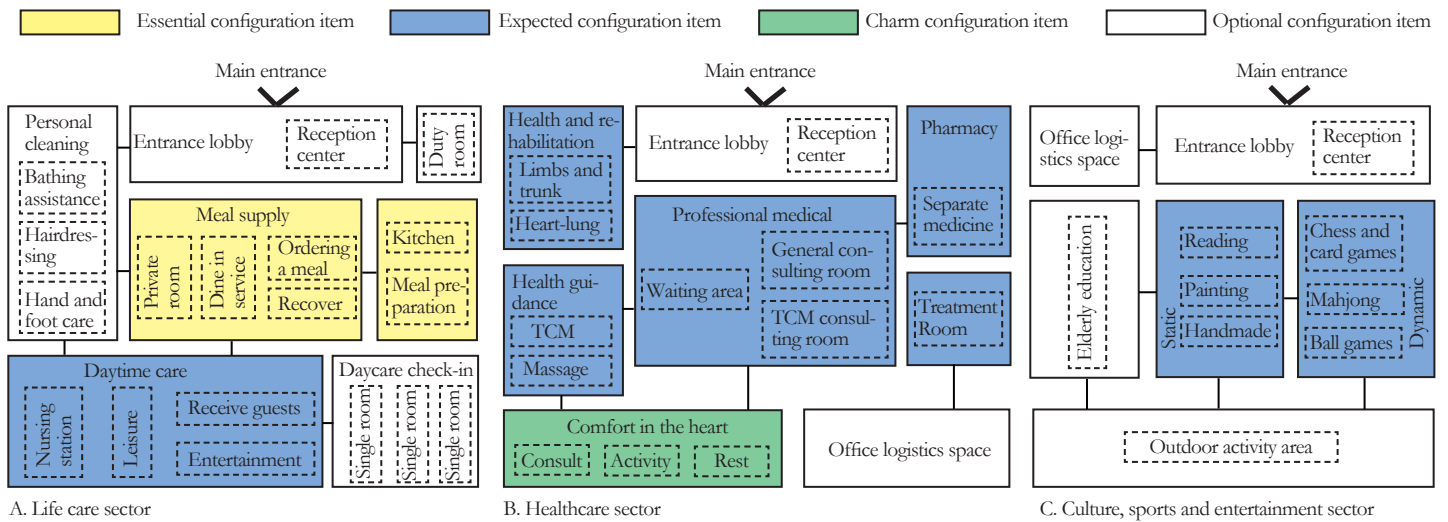**Fig.4   ASC diagram of demand level based on economic factors**

**Fig.5  Overall elderly functional configuration**

highest for professional medical care. Referring to relevant standards, priority should be given to configuring pharmacies, general practice clinics, and traditional Chinese medicine clinics. Considering the special physical conditions of the elderly, waiting areas should be set up to facilitate their timely rest.

In the cultural, sports, and entertainment module, considering the diversity of entertainment functional needs among different groups of people, it is divided into two parts based on movement and stillness. Specific functions are configured according to actual situations, and spatial organization should avoid independent small spaces. It is recommended to configure open and flexible spaces for flexible changes. Elderly education is an optional configuration item that can be configured according to the actual situation.

### 6.3 Functional grouping configuration based on "elderly portrait"

Based on the above "portraits of the elderly", two typical groups are extracted. The first class is those who are under 70 years old, have good physical condition, and live alone; the second class refers to individuals who are not less than 70 years old, in poor physical condition, and live with their children or spouse. Two sets of data are extracted from the overall data for analysis. It is found that there is not much difference between the two groups in the healthcare module and the overall demand level of population, indicating that each group has a strong demand for healthcare module. Therefore, for the subsequent two groups of people, only the aspects of daily care and cultural, sports, and entertainment are discussed (Fig.6–7).

As shown in Fig.6, the physical condition of the first group of people is relatively good,
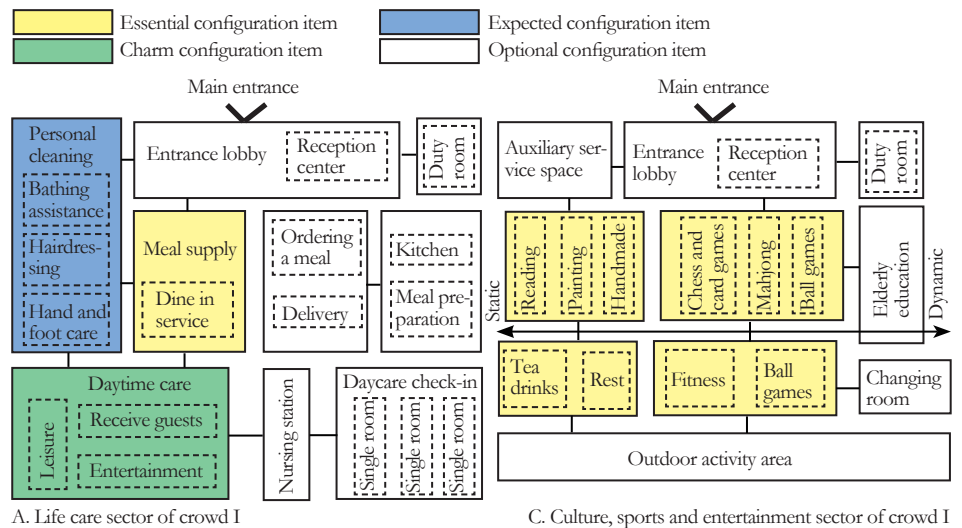


**Fig.6  Functional group configuration for Class I population**
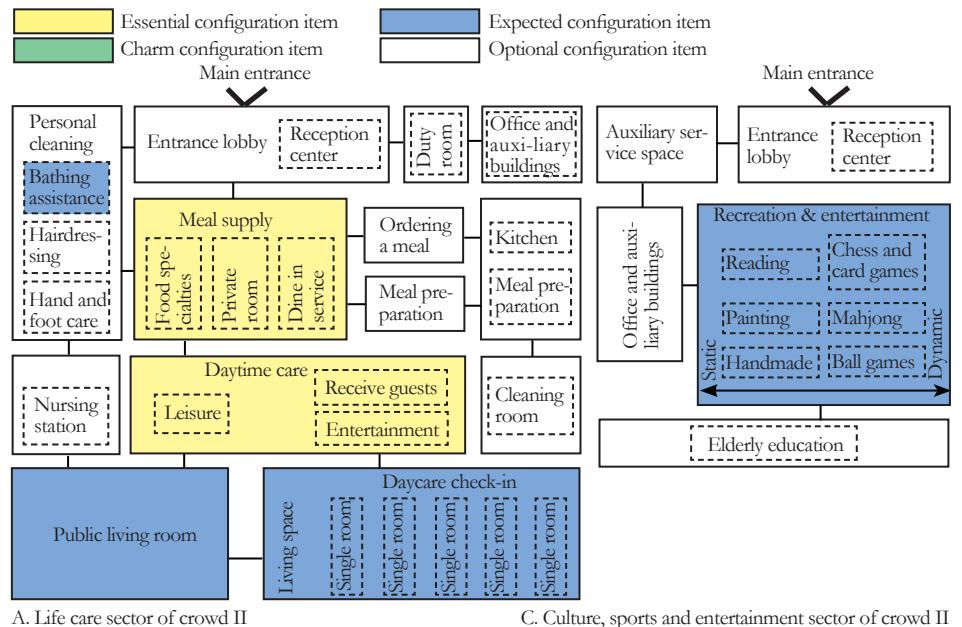


**Fig.7  Functional group configuration for Class II population**

and their demand for daytime care has decreased to the level of charm configuration item. Their needs are more reflected in cultural and entertainment aspects. Most of this group has low income, so they are more interested in low-cost services that offer social attributes such as hairdressing and hand and foot care. Due to their physical condition, social attributes of the second group of people are greatly reduced, and they are more concerned about daytime care and daycare check-in. This is because they live with their children or spouses, and their children work during the day while their spouse's physical function gradually declines. Therefore, they consider daytime care as a necessary attribute and daycare check-in as an expected configuration item.

## 7 Conclusion

Through the offline visits and research, it has been found that there is a serious deviation and functional mismatch between the supply and demand of current elderly care facilities. In this paper, the Anderson behavior model is added to the traditional KANO model. Based on exploring the overall needs of the population, it further investigates the influencing factors of the needs of different populations, and divides them into different groups to analyze the differences in their elderly care needs. Finally, it falls on the functional configuration level to provide inspiration for the construction of current community elderly care service facilities.

## References

[1] Chen, X. Q., Jin, S. (2018). A multi-dimensional analysis on the location distribution of community elder-care facilities in center district of Beijing. *Design Community*, (2), 32-41.

[2] Liu, Y., Hu, J. L. & Yu, G. (2020). Discussions on the transformation of community-based elder care facilities in core districts of Beijing. *New Architecture*, (5), 16-20.

[3] Li, J. N., Cheng, X. Q. & Li, S. Y. et al. (2024). Research and insights on the demand levels for community based elderly care facilities: A case study of central district of Beijing. *World Architecture*, (6), 41-46.

[4] Wei, B. B., Tian, Y. (2019). Optimization of home care services and facilities in existing communities: A case study of Qingshan District in Wuhan. *Huazhong Architecture*, *37*(2), 40-43.

[5] Jiang, W. B., Jiang, Y. M. & Gao, Y. F. et al. (2024). Feasibility analysis of outpatients' omni-directional and whole-process service management based on KANO model. *Chinese Hospital Management*, *44*(5), 5-9.

[6] Zhao, T., Wang, B. B. (2024). Research on the aging design of outpatient public space in class A tertiary hospitals based on KANO model requirement analysis. *Architectural Journal*, (S2), 169-175.

[7] Li, Z. R., Li, H. J. & Chen, S. Y. et al. (2023). Health needs of smart home for the lonely elderly based on Kano model. *Packaging Engineering*, *44*(16), 145-153.

[8] Yuan, D., Li, B. & Zhang, C. J. et al. (2024). Research progress on application of Kano model in the field of nursing. *Chinese Nursing Management*, *24*(9), 1432-1437.

[9] Chen, H. B., Zhao, X. L. (2021). Research on the elements of green financial security intelligence service based on Kano model. *Journal of Intelligence*, *40*(7), 58-65.

[10] Jang, H. Y., Song, H. & Park, Y. T. (2012). Determining the importance values of quality attributes using ASC. *Journal of Korean Society for Quality Management*, *40*(4), 589-598.

[11] Zhou, L. X., Yang, W. Y. & Jiang, Z. X. et al. (2023). Research on rural residents' grassroots medical treatment behavior based on Anderson model. *Modern Preventive Medicine*, *50*(9), 1630-1636.

[12] Yang, J. L., Luan, Y. M. & Wang, M. Q. et al. (2023). Analysis on influential factors of inpatient care for the elderly in a residential area in Minhang District, Shanghai based on Andersen's healthy behavioral model. *Chinese Journal of General Practice*, *21*(6), 992-995, 1025.

[13] Liu, Y. S., Liu, C. H. & Yang, H. W. et al. (2024). Research on demand identification and spatial configuration of urban community-based elderly care facilities in urban communities: A case study based on central urban area of Tianjin. *South Architecture*, (2), 94-104.

[14] Zeng, Q. Y., He, Z. P. & Zeng, Y. C. (2023). Study on the preference patterns of home-based care services for the elderly and its influencing factors. *Northwest Population Journal*, *44*(5), 58-69.

[15] Wang, T. Q., Zhang, Y. & Yao, Y. R. (2023). Research on influencing factors of Internet medical service utilization based on Anderson model. *Medicine and Philosophy*, *44*(4), 40-44.

[16] Liu, Y., Zhao, Y. Z. & Lin, X. R. et al. (2024). Research on the utilization status and influencing factors of psychological health education for elderly migrant population in China based on Anderson model. *Modern Preventive Medicine*, *51*(14), 2517-2522, 2540.

[17] Guan, C. Y., Huang, L. & Zhang, F. J. et al. (2025). Current situation and influencing factors of care perception among urban older adults living in communities. *Journal of Nursing Science*, *40*(1), 8-11.

[18] Ma, B. J., Zhang, K. & Lin, K. W. et al. (2019). Research on demand characteristics of community aged service facilities: A case of Hefei investigation data. *Urbanism and Architecture*, *16*(11), 41-43.