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The Construction of Safe and Epidemic Prevention Community from the Perspective of Public Health Safety

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Abstract

Through the construction of a safety and epidemic prevention community indicator system, this paper aims to identify the key issues facing the current community development from the perspective of public needs, and propose a planned response strategy. This paper adopts a fuzzy evaluation method that emphasizes the subjective feelings of residents, and obtains data through questionnaire surveys on the spot. The results show that the comprehensive fuzzy evaluation results of healthy communities are general. Among them, community residents pay the most attention to evaluation factors such as environmental sanitation quality, community recreational facilities and public health safety awareness; they are most satisfied with the lighting and ventilation of their houses, while they are most dissatisfied with the configuration of community health facilities and community recreational facilities. Therefore, it is suggested that in community planning, priority should be given to improving the "high concern-low satisfaction" factor.

Keywords

Safety and epidemic prevention community; index system; public demand; fuzzy evaluation method; community satisfaction.

1. Introduction

Since the beginning of 2020, the new crown pneumonia epidemic has ravaged the world and has spread to more than 200 countries and regions on five continents including China, the United States, Japan, South Korea, and Italy[1]. The epidemic broke the usual fast pace and pressed the "pause button" for people's daily production and life, which caused a great impact on the global economy. After the outbreak, it is a big test of our country's governance system and governance capabilities. In view of the shortcomings and deficiencies exposed by the epidemic, we must seriously sum up our experience, learn lessons, and continuously improve our ability to overcome major public health emergencies.

The construction of resilient communities is an important way to enhance the sense of public safety. However, traditional resilient cities and communities are more oriented towards areas of self-heating disasters such as floods, droughts, mudslides, earthquakes, etc[2-4]. For public health emergencies such as infectious diseases The research and strategy of the incident are relatively insufficient. Therefore, the construction of resilient communities from the perspective of public health security will become an important issue in the post-epidemic era. We also urge us to transform from housing renovation and construction to comprehensive community governance as soon as possible.

The public is the main body of the city. Only by fully understanding the public's understanding and needs for the construction of safe and epidemic prevention communities from the perspective of public health can we find the weak aspects of the construction of safe and epidemic prevention communities, and provide for the next step of government policy

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regulation and community planning. A certain degree of reference. Therefore, this article aims to investigate the public's demand for resilient community construction based on the fuzzy evaluation method, build a safe and epidemic-preventing community evaluation system from the perspective of public health security, and propose suggestions to improve the level of community resilience.

2. Related Concepts and Their Differentiation

There is no public health in the world. Public health was born out of human suffering. It serves the health of all people and grows in times of social crisis. This is the simplest history of public health. The currently accepted definition of "public health" all over the world comes from Professor Charles Winslow, the founder of the Department of Public Health at Yale University. He published an article entitled "The Virgin Land of Public Health" in 1920. The article mentioned: , Is the science and technology of public and private organizations, large and small communities, and all individuals in the whole society to prevent diseases, extend life and promote health through organized efforts and informed choices[5]. This concept can be understood as three parts, namely, how to prevent the disease before it occurs; how to detect, treat, and recover as soon as possible when the disease has occurred; how to improve the quality of life every day regardless of whether the disease occurs. World Health Organization(WHO) is that health is not only the elimination of disease or weakness, but also the state of complete physical, mental, and social health[6]. Each of these aspects is the focus of public health attention, the focus of research and the end of practice. Therefore, it can be seen that public health includes not only the prevention of infectious diseases, but also many things related to public health, such as improving the quality of life and health promotion.

The community is the basic unit of city operation. Based on the analysis of the above-mentioned basic concepts, the resilient community from the perspective of public health security requires the community to have the resilience of self-recovery after experiencing a public health emergency. Community resilience refers to the scope of a community that can establish, maintain or regain an expected function in the face of frequent disasters or after sudden disasters, and the operational effect of this function is the same as or improved before the disaster. This is both a community disaster prevention process and a community renewal process. By building resilient communities, it is conducive to maintaining the normal operation of the community after a disaster, recovering from harmful effects, realizing the normal operation of urban facilities, community life, and community functions, realizing the sustainable development of urban communities, and improving the quality of urban residents' living environment.

3. Evaluation of Safety and Epidemic Prevention Communities based on Fuzzy Evaluation Method

3.1. Basis for the Construction of the Indicator System

3.1.1. Social Governance Resilience

Emergency management is an important part of the national governance system and governance capabilities. Communities are the carriers of various public emergencies and the frontier for preventing and responding to public emergencies. The function of community emergency response directly affects government emergency management Ability improvement[7]. At the time of the outbreak, many communities were generally not accurate enough to grasp the basic situation such as population, which seriously affected the effect of epidemic prevention and control in the early stage of the epidemic prevention war[8].

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Therefore, the refined management of the community should be strengthened and the community should be Implement grid-based and intelligent management.

According to the “China Public Disaster Prevention Awareness and Disaster Reduction Knowledge Base Survey Report” released by the China Foundation for Poverty Alleviation in 2015, less than 4% of urban residents have made basic disaster prevention preparations, and 24.3% of the interviewees paid attention to disaster knowledge. There is still a lot of work to be carried out in the co-governance, sharing and joint construction of major public health incidents[9]. Community governance is the foundation and cornerstone of national governance, and is also called the "last mile" of urban governance [6]. However, when the epidemic suddenly hit, many medical staff and security personnel in the community rushed into battle, lacking For professional training, there is an urgent need to strengthen the training and drills of grassroots community workers.

From the perspective of the national governance system, in order for resilient communities to form a governance community in which neighbors face each other and support each other, it is necessary to improve the diversified community construction mechanism and encourage community groups, community residents, expert teams and social organizations to participate in community construction. Participate together to form social cohesion, improve the self-management and self-help capabilities of the community, and build a governance system of "party committee leadership, government responsibility, social coordination, and public participation"[10]. National mobilization, people-centered, multi-party coordination, forming a mechanism and pattern of group prevention and group control, and joint prevention and control.

Therefore, the evaluation factors to determine the resilience of social governance are a complete community emergency management plan, smart grid management, public health safety awareness, the professionalism of grassroots community professionals, and a community governance mechanism with multiple participation.

3.1.2. Material Space Toughness

The configuration of adequate community sanitation facilities directly affects the community’s ability to withstand the epidemic. Therefore, attention should be paid to the construction of community sanitation facilities at the community scale to enrich the function of a front-line fortress for epidemic prevention[10].The 15-minute living circle should be used as a carrier to combine community governance with health and epidemic prevention. Based on the urban spatial structure and population distribution, it should be divided into large districts and small communities, and the function of seeking diagnosis and diagnosis should be delegated to designated community hospitals. Quickly stabilize the suspected isolation observation in the home space, and the nearest diagnosis can reduce the spatial contact area of suspected cases and speed up the speed of case screening, exchange the space for the overall treatment time and opportunity, reduce the probability of cross-infection, and share the center to the greatest extent The pressure of treatment in the hospital[9].

In addition, a disaster prevention space should be built to provide prevention, isolation, treatment, and assistance during the epidemic[11]. After the epidemic, the most important thing to consider is to change the renovation project of the old community to the comprehensive treatment project of the old community, and increase the software and hardware measures related to public health safety emergency management through comprehensive management, such as improving epidemic prevention and control Necessary monitoring and isolation environment, improvement and enhancement of waste classification implementation and management measures, designation or reservation of spare space or equipment for emergency resource allocation, planning and reservation or designation of fine placement or procurement of necessities for community residents during special periods of

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epidemic The necessary security space or channels, and qualified communities can also set up emergency close contacts to leave their opinions[12].

The team of academicians Zhong Nanshan and Li Lanjuan respectively confirmed the presence of live viruses in the stools of patients with new coronary pneumonia. In addition to suggesting that there may be a “fecal-oral transmission” route, there is another situation that needs our attention, that is, human excretion can produce gas. During the SARS period in 2003, 73% of households were infected by the virus spreading through the sewers of a building in Hong Kong[13]. However, most rural communities did not have closed sewers, and sewage flowed down the road. Flowing around increases the risk of the spread of infectious diseases.

Poor indoor ventilation may increase the concentration of carbon monoxide, which will affect the development of the fetus [14.15]. Insufficient indoor light can promote the growth of mold, affect the health of the respiratory system [16], and increase the incidence of cough, wheezing and asthma [17].

When an infectious disease breaks out, the infection is closely related to the physical fitness of the individual; in the absence of specific medicine treatment, the complete cure of viral infectious diseases can only rely on the improvement of self-immunity. Most of the susceptible people for new coronary pneumonia are middle-aged and elderly people, and most of the critically ill people have basic diseases, which proves that "strengthening physical exercise and improving physical fitness" is an eternal topic in the public health field[18]. Therefore, well-planned community recreational facilities are important public assets of the community and are vital to residents' physical exercise and health[19].

Therefore, the evaluation factors to determine the resilience of physical space are community sanitation facility configuration, disaster prevention space construction, environmental sanitation quality, enclosed sewer pipes, lighting and ventilation of houses, and community recreational facilities.

Based on the above theoretical review, it is finally determined that the resilient community evaluation system from the perspective of public health security should include two dimensions of social governance resilience and material space resilience, with a total of 11 evaluation factors (Table 1).

Table 1. Evaluation index system for safety and epidemic prevention communities

Target	Evaluation index	Evaluation factor
Safe and epidemic prevention community	Social governance resilience	Complete community emergency management plan
		Smart grid management
		Public health safety awareness
		Professionalism of grassroots community professionals
		Community governance mechanism with multiple participation
	Physical resilience	Community health facilities configuration
		Construction of disaster prevention space
		Environmental hygiene quality
		Closed sewer pipe
		Lighting and ventilation of housing
		Community Recreation Facilities

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3.2. Data Collection and Processing

In May 2020, the residents in the Tushanji Administrative Village community were surveyed through household surveys. A total of 70 questionnaires were received. Questionnaires with the same option selected at the time of completion were eliminated. The samples that were screened and passed the consistency test were: There were 53 copies, and the effective rate of the questionnaire was 75.71%. Through SPSS to analyze the reliability and validity of the sample data, it can be seen from Table 2: The reliability coefficient value is 0.948, which is greater than 0.8, which indicates that the reliability of the research data is high; the KMO value is 0.909, and the KMO value is greater than 0.8. Data validity is very good and can be used for further data analysis. The ratio of men to women in the survey sample is 2:3, with the majority of young people (58.49% under 40).

Table 2. Data set reliability and validity analysis

Cronbach reliability analysis			KMO and Bartlett validity analysis		
Number of items	Sample size	Cronbach alpha coefficient	KMO value		0.914
11	53	0.948	Bartlett's sphericity test	Approximate chi-square	501.881
				df	55
				p value	0.000

3.3. Residents' Fuzzy Comprehensive Evaluation of Safe and Anti-epidemic Community

Table 3. Fuzzy relation matrix and comprehensive weight of comment set

Evaluation factor	Very dissatisfied	Not satisfied	general	satisfied	Very satisfied	Weight
Complete community emergency management plan	0.094	0.057	0.434	0.359	0.057	0.062
Smart grid management	0.094	0.132	0.396	0.302	0.076	0.088
Public health safety awareness	0.113	0.076	0.321	0.396	0.094	0.106
Professionalism of grassroots community professionals	0.076	0.170	0.434	0.245	0.076	0.093
Community governance mechanism with multiple participation	0.094	0.113	0.415	0.302	0.076	0.054
Community health facilities configuration	0.076	0.113	0.528	0.245	0.038	0.101
Construction of disaster prevention space	0.113	0.038	0.472	0.302	0.076	0.094
Environmental hygiene quality	0.113	0.113	0.396	0.340	0.038	0.122
Closed sewer pipe	0.113	0.094	0.321	0.415	0.057	0.075
Lighting and ventilation of housing	0.019	0.076	0.151	0.491	0.264	0.093
Community Recreation Facilities	0.113	0.321	0.453	0.094	0.019	0.112

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In 1965, Professor Zade from the University of California in the United States successfully used precise mathematical methods to describe fuzzy concepts in his paper "Fuzzy Sets" for the first time, thus proclaiming the birth of fuzzy mathematics theory. Fuzzy comprehensive evaluation method is a comprehensive evaluation method based on the above-mentioned fuzzy mathematics theory. This method transforms subjective qualitative evaluation into quantitative evaluation according to the membership theory of fuzzy mathematics, that is, it uses linguistic variables instead of numerical variables to deal with the constraints of many factors The subject makes an overall evaluation. [20] The evaluation of safety and epidemic prevention communities has a strong subjective color. The introduction of fuzzy comprehensive evaluation method to evaluate healthy communities has greater advantages than the traditional multi-element comprehensive method and analytic hierarchy process.

According to the evaluation factors of the above two dimensions, the evaluation factor set is first constructed, the fuzzy relationship is established from the factor set to the comment set, and the membership degree of each evaluation factor is calculated. After obtaining the fuzzy evaluation vector of the factor, the fuzzy relation matrix R can be obtained by combining.

Since the contributions of various factors to the final evaluation result are not equal, different weights should be assigned. In this paper, the comparative ranking method is used to allow residents to select the most important 6 from 11 evaluation factors, and then assign scores to them. Then, according to the proportion of each factor score to the total score of all factors, the weight of the factor is obtained. The specific formula is:

$$W_j = \sum_{i=1}^{n} k_{ij} / Z$$

In the formula, i is the i-th evaluator; j is the j-th evaluation factor; kij is the score obtained by the i-th evaluator after sorting the j-th evaluation factor; n is the number of evaluators (ie the number of valid samples) ; Z is the number of times to fill in this question (ie the number of valid samples); Wj is the weight of the j-th evaluation factor. Therefore, the weights of all evaluation factors form a fuzzy vector on U: A=[0.062 0.088 0.106 0.093 0.054 0.101 0.094 0.122 0.075 0.093 0.112]. Using matrix multiplication and normalization, the fuzzy comprehensive evaluation vector B=A·R can be obtained, and the results of residents' satisfaction with the resilient community can be obtained. The results are shown in Table 4.

Table 4. Safety and epidemic prevention community evaluation results

Evaluation results	Very dissatisfied	Not satisfied	general	satisfied	Very satisfied	Score②
Safe and epidemic prevention community	0.093	0.124	0.393	0.312	0.078	56.864

The analysis shows that the residents' overall evaluation of the safety and epidemic prevention community is "general", with an overall score of 56.864 (100 points). It should be noted that the fuzzy comprehensive evaluation method aims to highlight the "short board" issues related to "safety and epidemic prevention" within the community, and the score does not represent the true level of resilient communities.

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4. Countermeasures and Suggestions for the Development of Safe and Epidemic-Proof Communities

4.1. Residents' Attention to Each Evaluation Factor

The degree of concern reflects the degree of importance the residents attach to this factor. The questionnaire survey is measured by the method of comparative ranking, which reflects the degree of demand of different residents for each evaluation factor. As shown in Figure 1, residents pay more attention to the dimension of physical space resilience, among which the three evaluation factors of environmental sanitation quality, community recreation facilities and public health safety awareness are the most concerned.

Different from traditional cognition, residents pay less attention to smart grid management, closed sewer pipes, complete community emergency management plans, and a diversified community governance system. This may be due to residents' concerns about grid management. Management, community emergency plans, and community governance systems with multiple participation are relatively unfamiliar. However, after the epidemic, from the perspective of professionals, attention should still be paid to these aspects and promote the construction of a safe and epidemic prevention community.

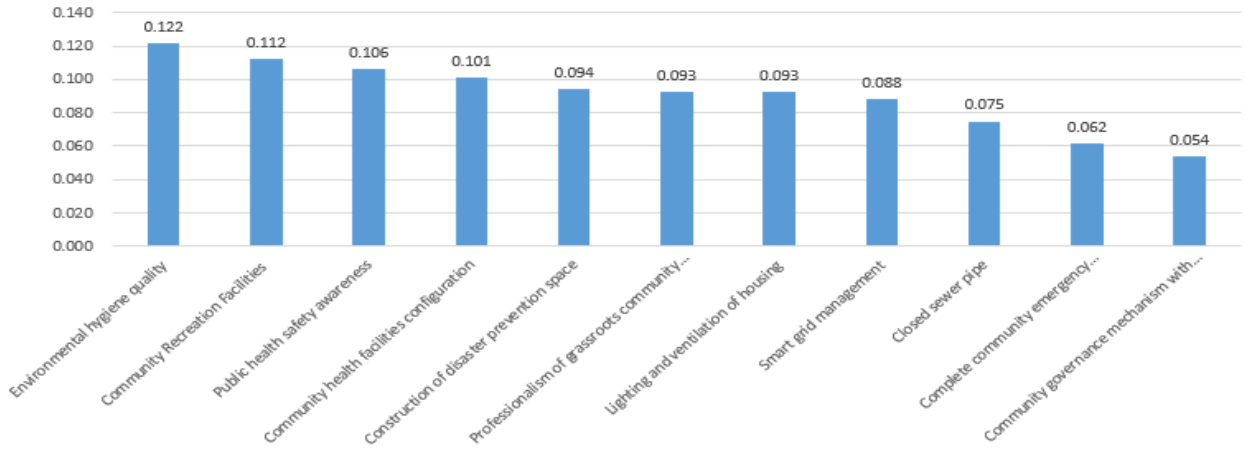

Figure 1. Residents' attention in the evaluation factors of safety and epidemic prevention community

4.2. Residents' Satisfaction with Each Evaluation Factor

Satisfaction③ reflects the degree of residents' recognition of the surrounding built environment, which can be used to obtain improvements and enhancements in the next planning and design. As shown in Figure 2, residents are most satisfied with the lighting and ventilation of their houses, followed by public health safety awareness and a complete community emergency management plan. In addition, residents have made more positive comments on factors such as the construction of closed sewer pipes, disaster prevention spaces, and the multi-participatory community governance system. The most dissatisfied are the quality of environmental sanitation, community sanitation facilities, and community recreation facilities.

4.3. Priorities and Strategies for Improving the Level of Community Epidemic Prevention

Mark the standardized satisfaction and attention④ on the two-dimensional axis (Figure 3). From the distribution of factors, most of the factors are distributed around the horizontal axis, and are mostly concentrated in the quadrant of "high attention-low satisfaction". This is the main reason for the low fuzzy results (56.864) of the evaluation of safety and epidemic prevention communities.Specifically, the residents' satisfaction ratings for the most concerned

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environmental sanitation quality, community recreational facilities, community sanitation facility configuration, and the professionalism of grassroots community professionals are all negative. Only the lighting and ventilation factors of housing are highly satisfied. . Therefore, the investigation based on the fuzzy evaluation method can better reflect the understanding and value judgment of community residents on "safety and epidemic prevention", and it is also more sensitive to identify and diagnose community shortcomings.

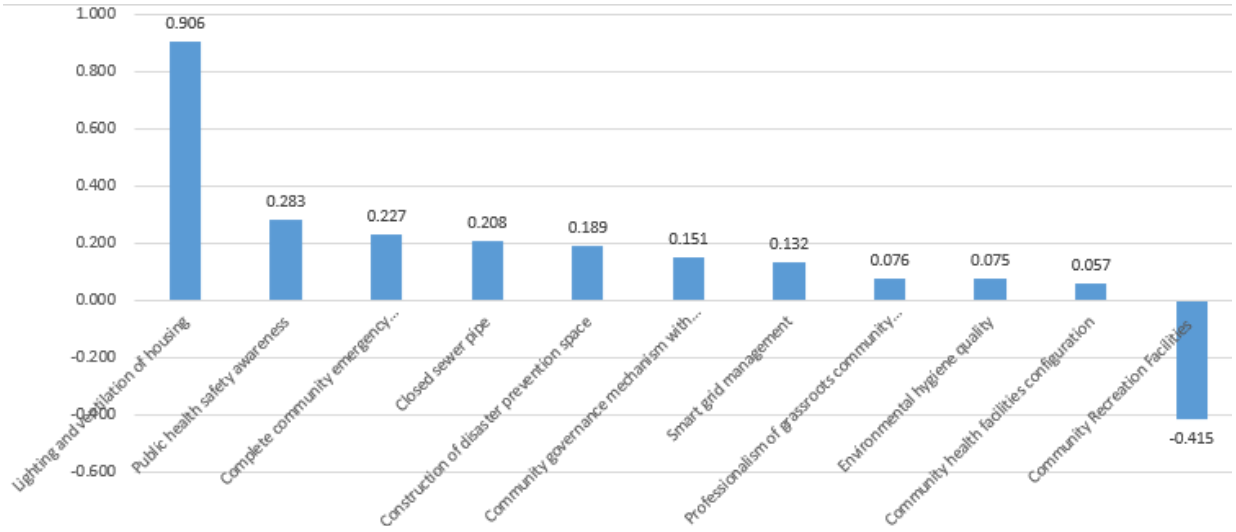

Figure 2. Resident Satisfaction in the Evaluation Factors of Safety and Epidemic Prevention Community

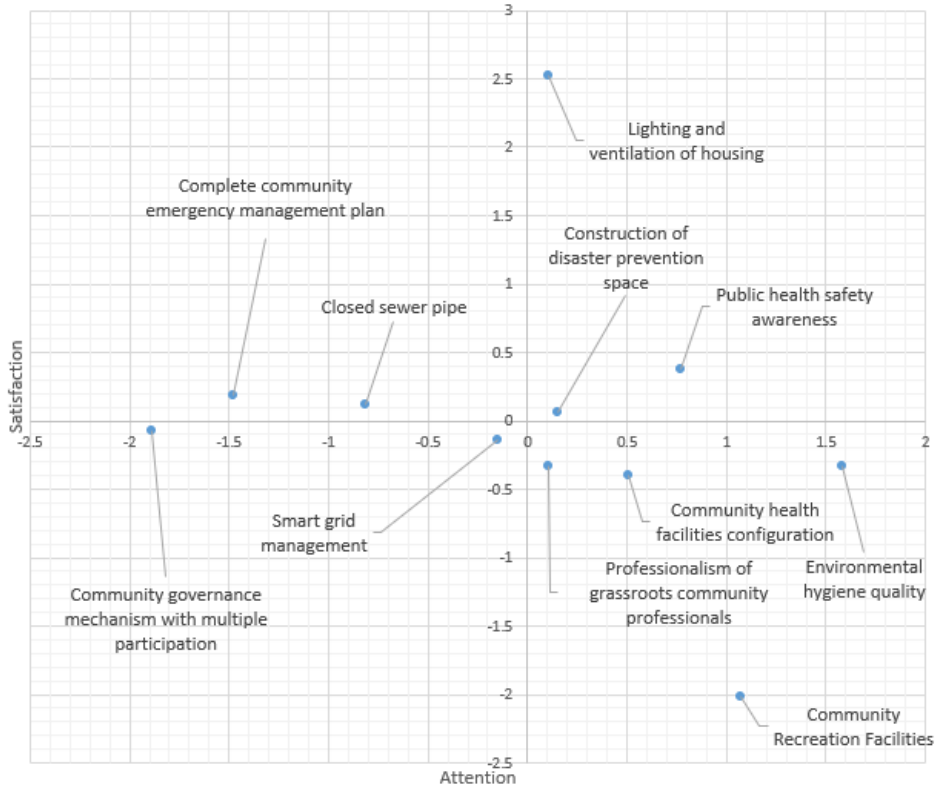

Figure 3. The distribution of evaluation factors in the two-dimensional coordinate system of satisfaction and attention

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Based on this analysis, in the planning practice, the level of safety and epidemic prevention in the community should be improved with a problem-oriented approach. The priority of action strategies should be clarified and different improvement strategies should be adopted: 1) The factor of high concern-low satisfaction is given priority by community planning Considered, the improvement of these factors plays a vital role in improving the level of community epidemic prevention. 2) Low attention-low satisfaction factors. This type of factor unit invests in manpower and material resources to bring less income costs, so a gradual improvement model should be adopted. 3) The factor of high attention-high satisfaction is the current advantage of the community, which should be consciously strengthened in the future development. 4) The factor of low attention-high satisfaction may not be the focus of planning in the near future. As this level of satisfaction is also low, it should be strengthened.

5. Comment

① The scoring principle is: the average comprehensive score is calculated based on the ranking of the options by all fill-iners, and it reflects the comprehensive ranking of the options. The higher the score, the higher the comprehensive ranking; the first place is once Get 19 points (kij=19), the second place gets 18 points once (kij=18)..., and so on, the sixth place gets 14 points once (kij=14).

② The scoring principle is: very satisfied (100), satisfied (80), average (60), dissatisfied (40), very dissatisfied (20); the higher the score, the higher the evaluation.

③ The scoring principle is: very satisfied (2), satisfied (1), average (0), dissatisfied (-1), very dissatisfied (-2); the higher the score, the better the evaluation.

④ Standardized data = (original data-average)/standard deviation. For example, the comprehensive score of satisfaction with environmental hygiene quality is standardized to -0.333= (0.075-0.172)/0.291.

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