



Study on the Functional Optimization of Existing Community Health Centers Based on Resident Characteristics: A Case Study of Xincai Community Health Center in Beijing

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Abstract. As urbanization in China progresses towards stability, the intersections between old districts and new areas within cities are becoming increasingly apparent. The functional distribution of various departments in community health centers is also evolving with urban renewal. With the goal of sustainable development in healthy urban areas, this study selects the Xincai CHC (community health center) as the research site. It focuses on an analysis of resident characteristics and needs within a 15-minute living radius, encompassing gender, age, family structure, and annual income, while mitigating the impact of adjacent medical resources. A computational model is developed to correlate basic resident information with departmental functional needs. This model calculates the optimized functional area for the existing community health centers and proposes targeted implementation strategies for these facilities.

Keywords: Community Health Centers; Functional Optimization; Resident Characteristics

1 Introduction

Since 1997, China has been advancing the construction of grassroots medical facilities^[1], increasingly prioritizing community-level medical institutions. The country has been enhancing the construction of a tiered diagnosis and treatment system and striving to provide more targeted comprehensive medical management. These efforts aim to ensure that the public can access high-quality healthcare services close to home^[2], as illustrated in Table 1.

Table 1. Overview of China's Healthcare Development.

Year	Document	Content
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1997	"Decision on Health Reform and Development"	It was clarified that grassroots medical care and public health services are vital focal points for people's livelihoods in China, and the establishment of community health institutions is a crucial component of the entire healthcare system
1999	"Guiding Opinions on the Development of Urban Community Health Services"	Further defined the overall objectives, functional positioning, service content, basic principles, community health system, standardized management, and supporting policies of community health services
2002	"Opinions on Accelerating the Development of Urban Community Health Services"	Made clear provisions regarding the organizational structure of community health services
2009	"Opinions on Deepening the Reform of the Medical and Health System"	Aimed to perfect a new urban healthcare system based on community health services
2015	"Guiding Opinions of the General Office of the State Council on Promoting the Construction of a Tiered Diagnosis and Treatment System" (State Office Issuance [2015] No. 70)	Proposed focusing on strengthening primary care to improve the tiered diagnosis and treatment service system ^[3]
2020	"Notice on Comprehensive Advancement of Community Hospital Construction"	Emphasized people-centered health priorities, addressing shortcomings, strengthening weak areas, and plugging gaps, while coordinating epidemic prevention and control with basic medical and health services, ensuring the public welfare nature of community health centers
2022	China's Fourteenth Five-Year Plan	"Promote the high-quality development of the urban and rural community health service system", aligning with "tiered diagnosis and treatment" to refine diagnostic and treatment processes; focus on "strengthening foundations and improving quality" as the core to solve the "bottlenecks" at the grassroots medical level

Since 2002, a large number of primary hospitals in China began to be gradually transformed into community health centers^[4]. The health care reform in 2008 marked a qualitative leap in the level of community health services and the scale of construction of community health centers. By the end of 2016, China's community health service system had essentially achieved nationwide coverage^[5]. By the end of 2022, there were 10,353 community health centers across the country, indicating that China's primary health care service system has been fundamentally established. The annual usage of community health centers has also been increasing year by year, rising from 347 million visits in 2010 to 670 million visits in 2022, reflecting a gradual increase in residents' demand for services^[6], as depicted in Figure 1 and Figure 2.

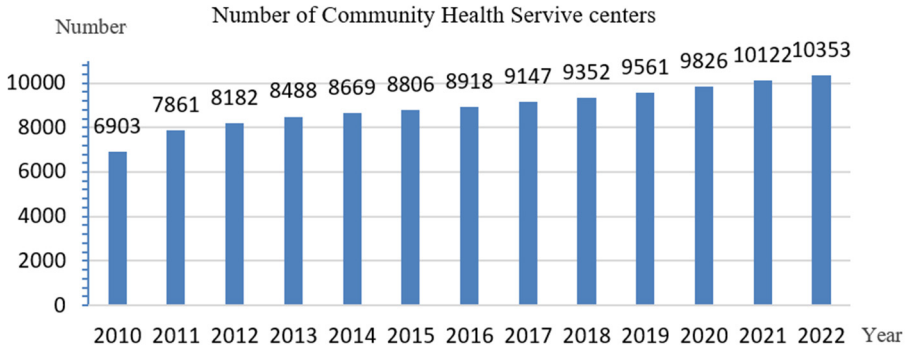


Fig. 1. Statistics on the number of community health centers from 2010 to 2022 in China^[7]

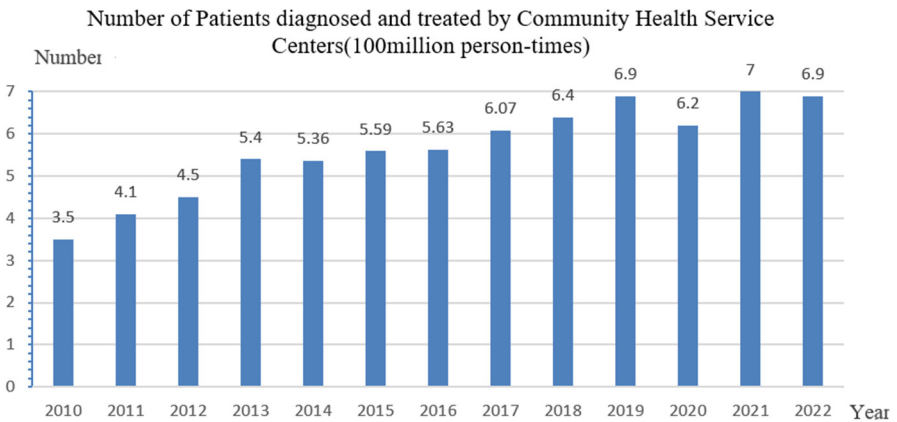


Fig. 2. Statistics on the number of community health centers from 2010 to 2022 in China^[7]

Moreno C. proposed “15-minute city” concept to improve living convenience^[8]. Tatton Brown and Goodman H.(1962) proposed the concept of "universal space," which involves co-locating multiple departments of a hospital on the same floor within a continuous large space to facilitate flexible functional transitions. Some scholars have considered the uniformity of regional coverage by community health centers, conducting big data analysis based on resident demographics to optimize the distribution of community health centers within a 15-minute living circle^[9]. However, with an increased focus on the unique characteristics of population structures, community types, and community infrastructures, scholars have reconstructed the functional configuration system of new community health centers through comparative case studies internationally and domestically, demand research analysis, and current status analysis^[10]. Within the context of healthy cities, adjustments are made to the spatial layout, quantity, and scale of community health centers^[11], designing targeted improvement plans for specific issues.

There is also a focus on age-friendly measures for elderly communities, forming a community living model that integrates medical and elder care services^[12], and making targeted renovations based on the current conditions of community health centers^[13]. Additionally, learning from the UK's referral system, exploration is conducted into a suitable referral process from primary and secondary hospitals to tertiary hospitals in China, aiming to establish an efficient referral flow and transformation direction^[14].

In summary, China's old urban districts are characterized by their long history, high building density, complex community types, and overlapping geographical locations, with a lack of urban space. Based on the already established urban areas in China, the goals are set for high-quality development, high-quality living, and high-efficiency governance, with an optimized layout of ecological spaces to achieve the goals of urban development transformation^[15]. Moreover, the "15-minute, 10-minute, and 5-minute living circle residential areas" have replaced the past hierarchical model of "residential areas, residential neighborhoods, residential groups"^[16]. The construction of community health service institutions in China will primarily focus on renovations, supplemented by new constructions.

China places greater emphasis on the family community medical system, gradually considering all family members, including pets. Community health centers need to accommodate various family models, including services for the elderly and children, thus gradually elevating the family's status.

Currently, while community medical centers broadly cover many areas, they exhibit significant homogeneity, lacking relevance to the community population structure, type, and infrastructure within their service range, leading to functional wastage in community health centers^[17]. Moreover, the actual effectiveness of the three-tier diagnosis and treatment system is low, with insufficient correlation in patient usage efficiency and community functional area configurations.

Therefore, the focus of this paper is the functional proportion adjustment of community health centers tailored to the specific characteristics of community residents.

2 Population Characteristics and Community Types Within the Service Area of Xincai CHC (Community Health Center)

Beijing's jurisdiction is vast, comprising sixteen districts, each with its unique characteristics and current medical service status. Urban residential areas are relatively dense and the population structure is diverse. Therefore, the article focuses on the six urban districts in Beijing. Community health centers were selected based on two criteria. The chosen building has 1000-2000 m² building area, and a service scope within a 15-minute walking circle with clear community boundaries and abundant surrounding resources^{[16][18]}.

Accordingly, we chose the Xincai Community Health Center on Xisanqi Street in Beijing as our research subject. The Xincai Community Health Center hereinafter referred to as Xincai CHC, is located 100 meters east of the Yuxin subway station. Its 15-minute living circle covers a radius of 1000 meters, encompassing the northeastern area

of Xisanqi Street in Haidian District and the southern area of Huilongguan Street in Changping District.

2.1 Community Characteristics within the Service Range of Xincai CHC

From Xincai CHC as a starting point, we mapped a 15-minute accessible walking route, subsequently extracting the communities on the path (all surrounding communities are gated), as show in Figure 3 and Figure 4. Finally like Figure 5, using the outer perimeter of these residential areas, we delineated the 15-minute living circle service range of Xincai CHC, as show in Figure 6.

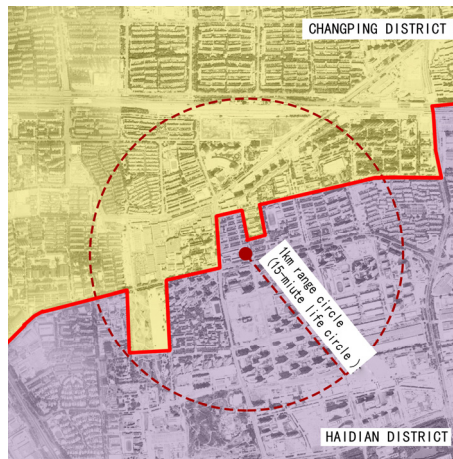


Fig. 3. Xincai CHC 15- minute walking circle service scope and administrative division boundary map



Fig. 4. Xincai CHC 15- minute walking route map



Fig. 5. Map of community served by Xincui CHC in 15- minute's walk

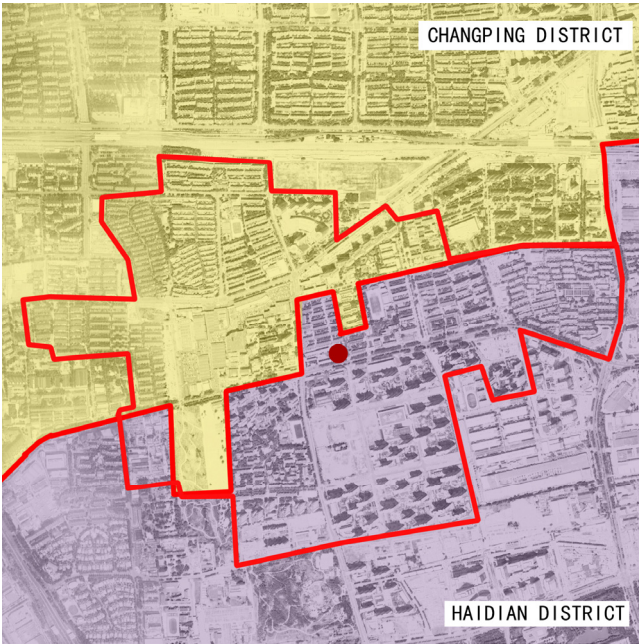


Fig. 6. Xincui CHC 15- minute walking path service area map

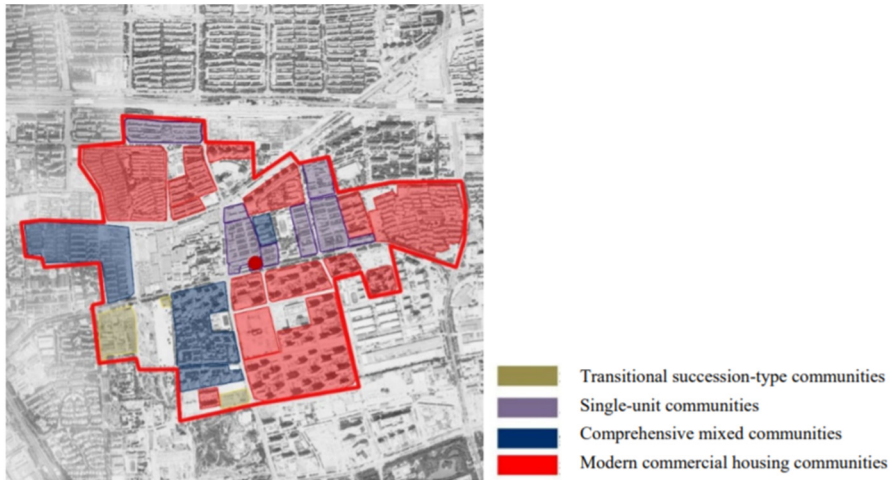


Fig. 7. Distribution map of community types within a 15-minute walking service range of Xincai CHC

A comprehensive analysis of the community characteristics within the service range of Xincai CHC reveals five distinct types: traditional neighborhood communities, transitional succession communities, single-unit communities, comprehensive mixed communities, and modern commercial housing communities^[19]. This region features a rich variety of community types with a wide span of construction eras, complex demographic structures, and significant differences in residents' usage habits of community health centers, community types clearer expression in the Figure 7.

2.2 Population Characteristics within the Service Range of Xincai CHC

Population Density

The service range of Xincai CHC encompasses 23 residential communities, displaying variations in population density but generally presenting a dense distribution. High-density tower residences such as Xinkang Garden and Haiyue Wutong have a larger population density, approximately 970 people per square kilometer. In contrast, slab-type residences like Beixin Jiayuan and Jiancaili City West Section One have a relatively lower population density, about 583 people per square kilometer. Thus, there is an uneven distribution of population within the community, which affects the overall impact values across the area and, consequently, influences the placement of community health centers.

Population Structure

In the service area of Xincai CHC, Xinkangyuan community and Yuxin community are designated as school district housing, representing modern commercial residential communities. These areas have a high turnover rate of property sales and rentals, which

affects the community residents' familiarity with and utilization of community health center. Beixin Jiayuan houses employees of the former Beixin Building Materials Group Co., Ltd., with a significant portion of residents having lived in the community for 20-30 years. These residents are relatively familiar with the local community health center's location and services.

Overall, 82.5% of the residents in these communities are workers and children, who typically leave the community during the day for work or school. This daily exodus conflicts with the operating hours of community health center, impacting their usage.

3 Characteristics and Issues of Community Health Institutions within the Service Range of Xincai CHC

3.1 Characteristics of Community Health Institutions within the Service Range of Xincai CHC

Characteristics of Medical Resource Distribution

The medical resources around Xincai CHC are rich and relatively evenly distributed across different levels. Figure 8 shows that in the vicinity, there is one third-tier hospital outpatient department, no specialty secondary hospitals, eight private clinics, nine medical insurance designated pharmacies, and four community health center. Delimiting the geographical coverage of the surrounding medical resources^[20], it is evident that the area has a high level of medical resources with a significant degree of overlap and uneven distribution, which severely diverts patients from the community health center.

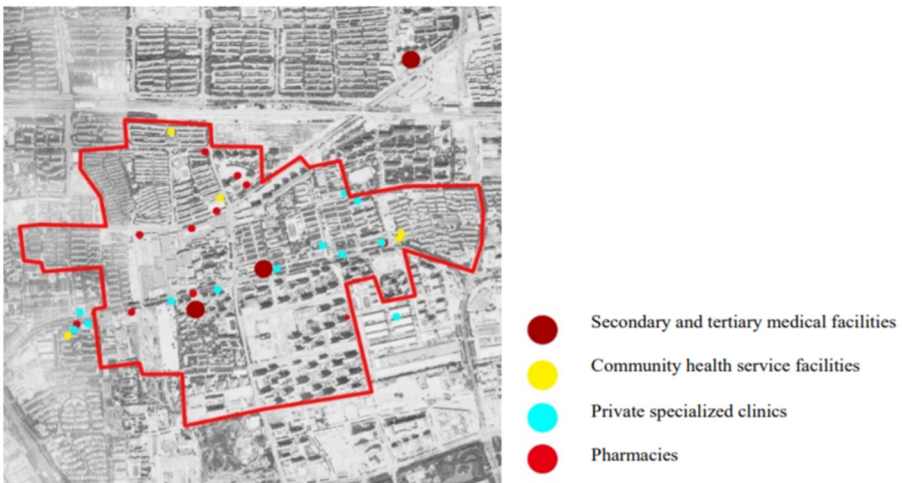


Fig. 8. Distribution map of medical resources around Xincai CHC

The Functional Distribution of Xincai CHC

The Xincai CHC, located in Xisanqi Street, Beijing, has a total building area of 2065.89 square meters, consisting of three above-ground floors. It is situated at the south entrance of Beixin Jiayuan. There are two entrances: one leading to the west of Jiancai Cheng West Road and the other internally connected to the Beixin Jiayuan residential area. The hospital was originally the healthcare facility for Beixin Building Materials Factory and was later upgraded to the community health center of the Jiancai Cheng area in Xisanqi.

The community health center comprises five categories of departments: clinical departments, medical technology departments, other departments, management departments, and service spaces, as depicted in Figure 9 to 17.

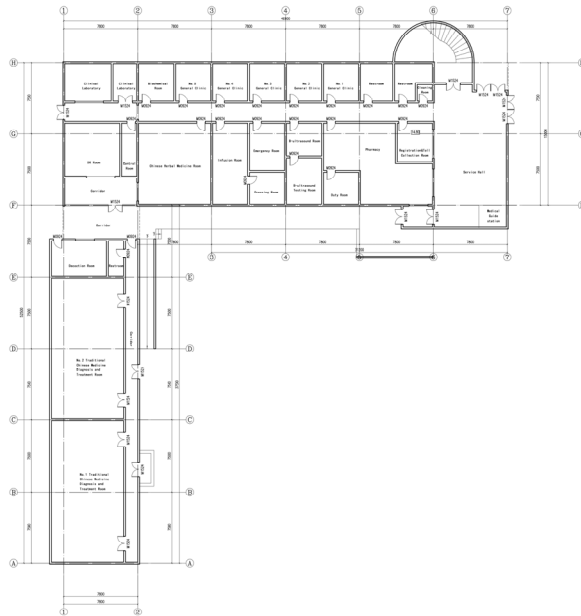


Fig. 9. First floor plan

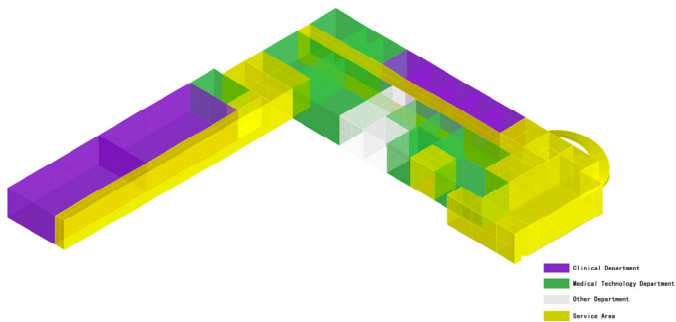


Fig. 10. Function zoning map of the ground floor of the first-level departments

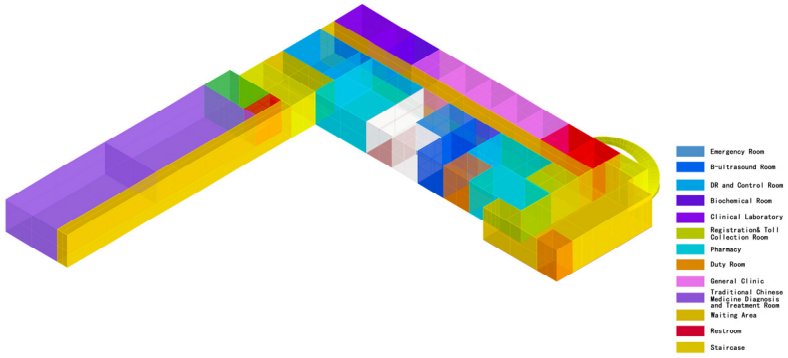


Fig. 11. Function zoning map of the ground floor of the second-level departments

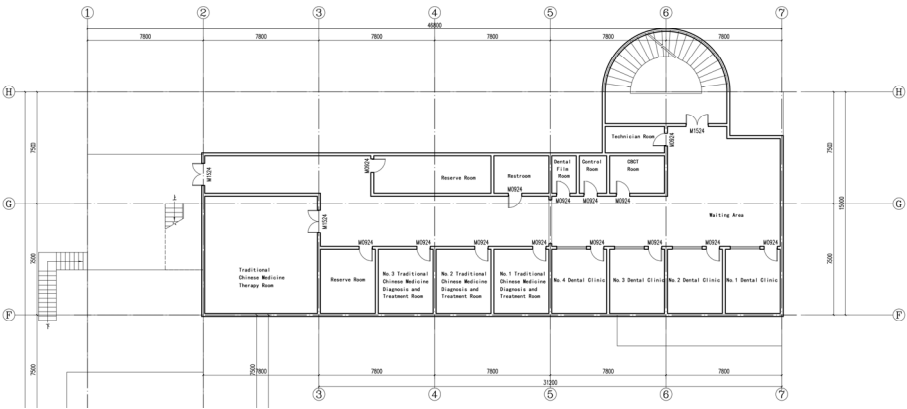


Fig. 12. Second floor plan

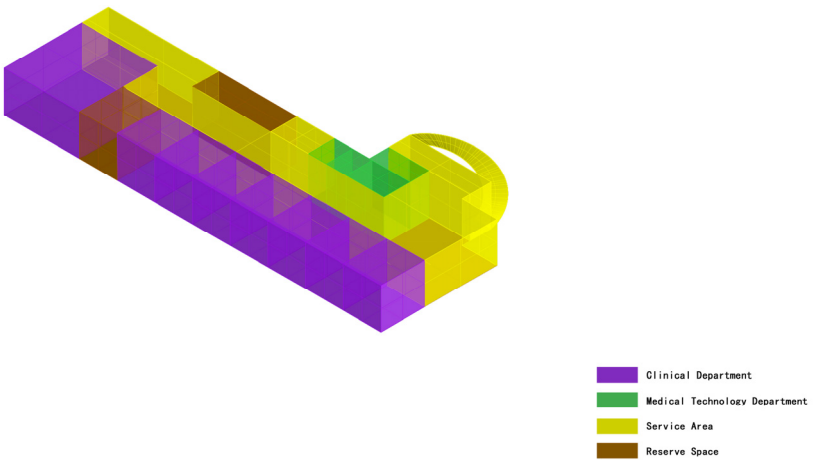


Fig. 13. Function zoning map of the second floor of the first-level departments

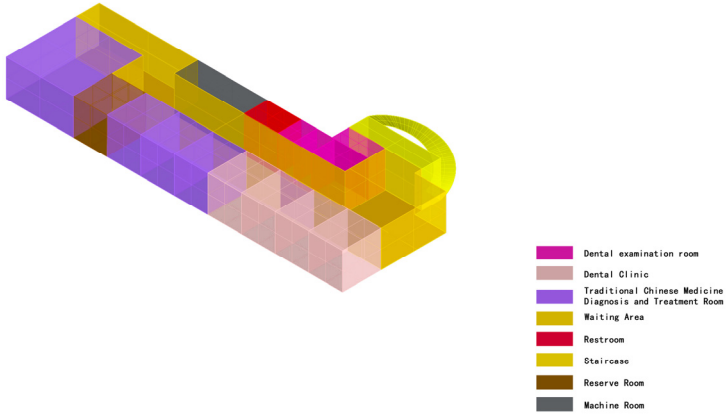


Fig. 14. Function zoning map of the second floor of the second-level departments

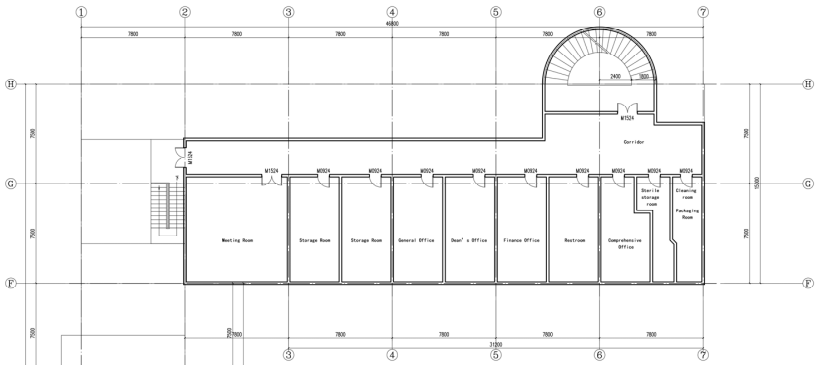


Fig. 15. Third floor plan

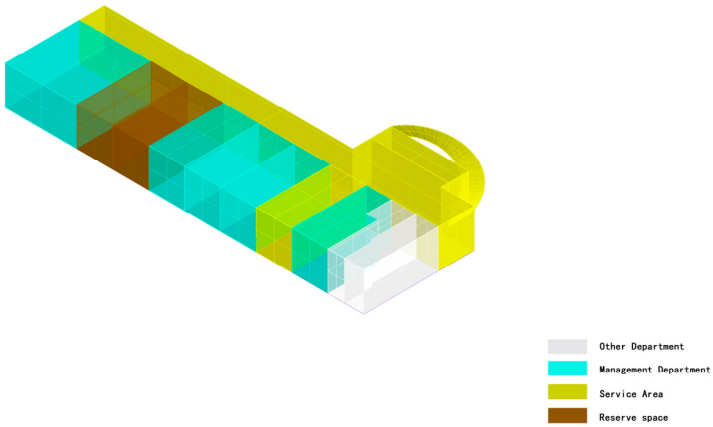


Fig. 16. Function zoning map of the third floor of the first-level departments

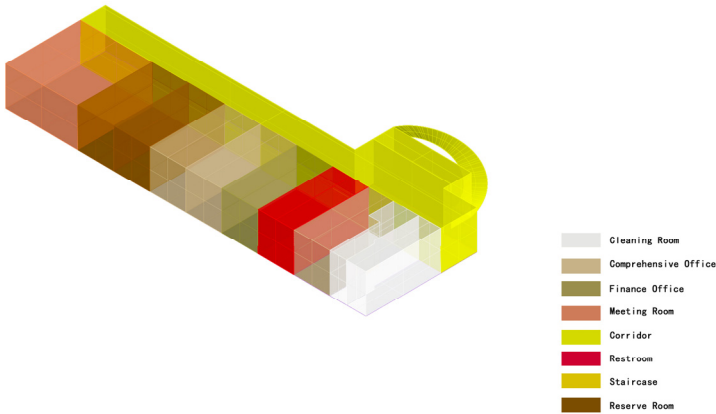


Fig. 17. Function zoning map of the third floor of the second-level departments

Table 2. Total area of each departments in Xincai CHC

	Clinical Department	Public Health Department	Medical Technology Department	Other Department	Management Department	Service Area	Total Area
Area	501.93	0	373.05	47.97	249.48	893.46	2065.89
proportion	24.30%	0%	18.06%	2.32%	12.08%	43.25%	100%

As depicted in Table 2. Analysis of the proportions of the five categories of departments reveals that the largest proportion is occupied by service spaces, which include waiting halls, sanitary spaces, and circulation spaces. This portion of space requires particular attention to spatial efficiency and comfort. Following closely are the clinical departments, accounting for 24.30% of the total, within which the Xincai CHC includes 5 general practitioner rooms, 4 dental rooms, 6 traditional Chinese medicine consultation rooms, and a traditional Chinese medicine therapy room. Additionally, the supporting medical technology departments account for 18.06% and encompass facilities such as the Chinese and Western pharmacy, ultrasound room, DF and control room, decoction room, and dental X-ray room. Simultaneously, management offices are primarily situated on the third floor, accounting for 12.08%, and include spaces such as meeting rooms, doctors' lounges, and finance offices.

Operational Service Characteristics of Xincai CHC

Xincai CHC operates on weekdays from 8:00 AM to 5:00 PM, with no operations on weekends. This scheduling conflict between Xincai CHC's operating hours and the home schedules of surrounding residents results in a significant portion of residents being unable to choose the community health center for medical care. Additionally, the scarcity of office space in the surrounding area leads to a lower probability of office workers utilizing the hospital's services.

Xincai CHC does not conduct external promotional or educational activities, which reduces awareness among the elderly population regarding the hospital's presence and functional capabilities within the community. Consequently, the elderly population is

more easily attracted to specialized private clinics in the vicinity, resulting in a decrease in the number of visits to the community health center.

Furthermore, Xincai CHC does not have a registration window on medical appointment platforms, diminishing the understanding of the hospital among young residents, such as tenants or families with young children residing in the area. This lack of visibility reduces the frequency of the community health center's services for basic illnesses among residents.

3.2 The Issue of Xincai CHC as a Medical Institution

The Intensive Concentration of Medical Resources Significantly Impacts Community health center

Analyzing the medical resources within a 15-minute living circle around the research object can help mitigate the impact of other categories of medical resources on the healthcare needs of the population, thereby forming a diversion effect on the patient population and adjusting the weighted increase or decrease of the service population. The calculation of the impact value of medical resource factors is as follows: Private clinics are assigned an impact value of 1, pharmacies 2, community health stations 3, secondary hospitals 4, and tertiary hospitals 5. Summarizing the number of hospitals at each level within the 15-minute living circle of each research object, multiplied by the corresponding ratio, ultimately yields the number of people in the total population of the old residential area who would be diverted and the total number of people who would choose the research object hospital.

Table 3. Calculation table for the impact of surrounding medical resources

Hospital Level	Third Level	Second Level	First Level	Pharmacy	Private Clinic	Amount
Number of Hospitals	1	0	4	9	8	22
Weight	5	4	3	2	1	
Proportion	5	0	12	18	8	43

The total population served by the Xincai CHC = (Total population of the community within the 15-minute living circle / 43) * 12/4 = 4858 people.

(Using the math in Table 3, Considering an average of three people per household, with 25% of people dispersing to neighboring medical facilities and 5% to tertiary hospitals in the city, and taking into account a total population of 69,638 people within the 15-minute living circle coverage area of the community.)

During the process of hospital renovation and construction, it is essential to consider the actual service population of the community health center due to the influence of other medical resources and the specialized medical services provided by neighboring specialized hospitals. This consideration aims to optimize the medical service functions carried out by the community health center. It can be observed that the dense concentration of high-quality medical resources and the proliferation of privately operated medical facilities offering decentralized services significantly reduce the utilization of official community health centers by residents.

The Function is Relatively Simple, and There is a low Correlation between Area Allocation and Demand

The functional distribution of the New Material Hospital is rather conventional, encompassing several major functions. However, during the investigation, it was found that on the first floor of the Traditional Chinese Medicine (TCM) department, two treatment rooms were expanded, each equipped with 10 beds, resulting in congestion and queuing. Conversely, on the second floor, there is one TCM physiotherapy room and three TCM treatment rooms, which are underutilized with sparse patient presence, indicating low efficiency. There is a significant disparity in the utilization rate of TCM consultation rooms. Overall, there are too many consultation rooms, which do not align with the demands of the surrounding community residents.

The waiting areas are located in the corridors on each floor, with uneven distribution of comfort. On the first floor, there are single-corridor double-row rooms with a corridor width of 1.9 meters, with few and narrow seats, resulting in inadequate waiting space for patients waiting for general consultations. However, on the second floor, the corridor width is 3.6 meters, also with single-corridor double-row rooms, where waiting seats are provided, yet there are hardly any patients waiting for the dental and TCM consultation rooms, and there is considerable space wastage at the ends, indicating low utilization efficiency. On the third floor, the corridor width is 2.5 meters, with single-corridor single-row rooms, which are hardly used, indicating moderate utilization efficiency.

Some departments suffer from unreasonable area allocation. For instance, the dental department has four rooms with a very high vacancy rate. The office space on the third floor occupies nearly 15% of the total area, without dedicated rooms for external education and promotional activities, resulting in low room utilization. Furthermore, there is a lack of gynecology consultation rooms, rehabilitation consultation rooms, and psychiatric consultation rooms, indicating functional deficiencies.

Residents' Awareness is low, Hindering the Utilization of Community Medical Resources

Figure 18 and Figure 19 lists the research detailed data clearly. research indicates that nearly 22% of respondents are unaware of the existence of the New Material Hospital in their residential community or are unclear about its operating hours. Additionally, 34% perceive the medical quality as poor, thus avoiding seeking medical care at the community health center. Furthermore, 67% are unfamiliar with the referral system and do not understand the bidirectional referral system of "minor illnesses treated at the community level, major illnesses treated at hospitals, and rehabilitation back to the community," thereby failing to leverage the advantages of hierarchical diagnosis and treatment and the coordinated utilization of social medical resources.

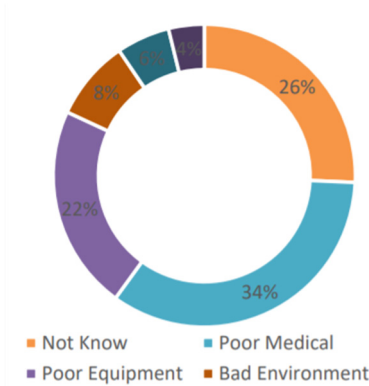


Fig. 18. Non diagnostic reasons for residents

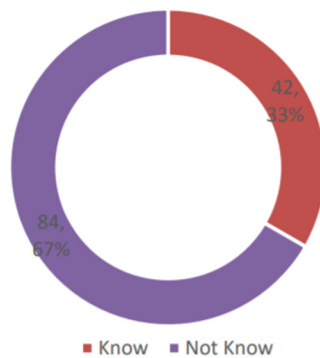


Fig. 19. Understanding of the dual referral system among residents

In summary, low awareness among community residents regarding community medical centers negatively impacts the formation of a complete hierarchical medical system and the efficient utilization of medical resources across society.

4 Characteristics and Needs Survey of Community Residents

4.1 Questionnaires

This survey distributed a total of 130 questionnaires and collected 124 valid responses, with an effective rate of 95%. The survey targeted residents of old residential communities within a 15-minute radius of Xincai CHC in Xisanqi Street, including but not limited to the Huangping Road No. 8 courtyard and Beixin Jiayuan communities, with questionnaires distributed randomly among these communities. The questionnaire primarily focused on six basic information categories of community residents: gender,

age, length of residence in the community, time spent in the community, family structure, and household income. It also summarized their reasons for using the Community health center. The survey aimed to achieve two main objectives: first, to understand the demographic composition of residents in old communities, and second, to accurately understand the preferences and needs of different groups for Community health center.

4.2 Analysis of Community Residents' Demand for Community Health Center

The survey showed that 81% of residents have a demand for Community health centers, with 25% of them visiting Community health centers regularly. Only 19% of the interviewees have never been to a community health center, with the majority citing reasons such as limited knowledge about hospitals, unclear understanding of the medical standards and service scope of Community health centers, or simply unaware of the existence of community health centers in the vicinity, as depicted in Figure 20.

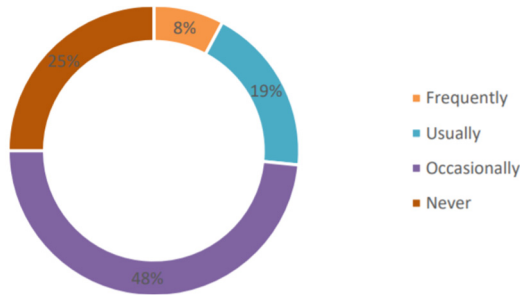


Fig. 20. Frequency of Usage of Community health center

4.3 Survey and Analysis of Departmental Needs of Community Residents

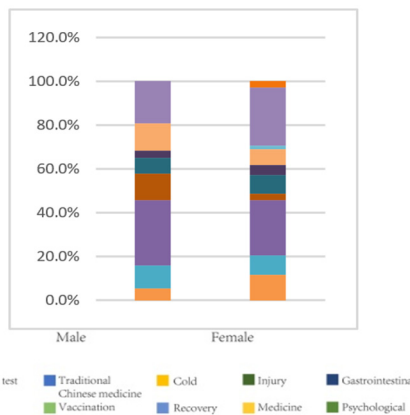


Fig. 21. Departmental Preference of Different Genders

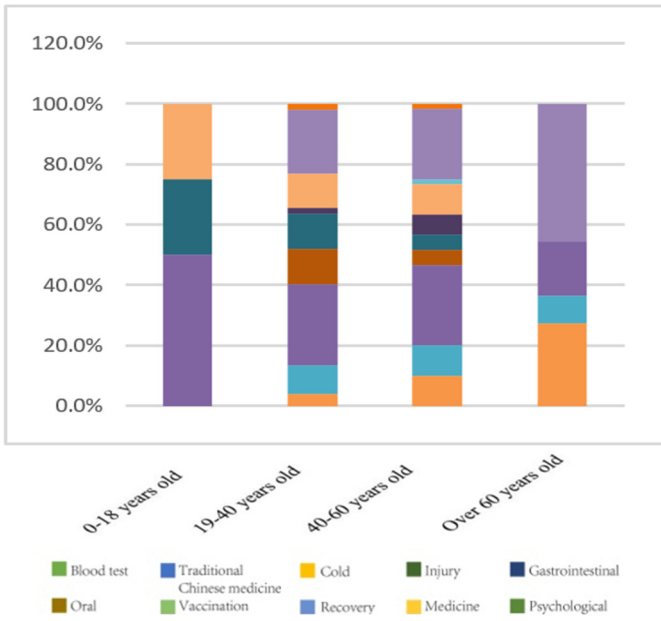


Fig. 22. Departmental Preference of Different Age Groups

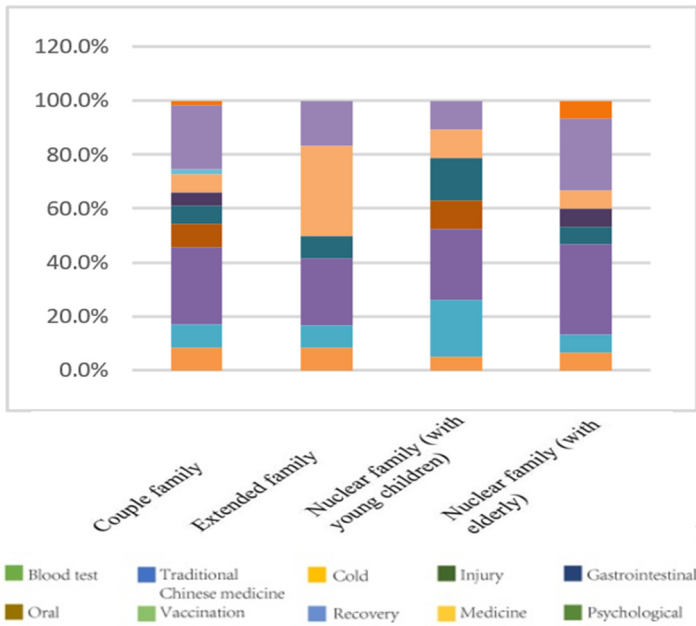


Fig. 23. Departmental Preference of Different Family Structure

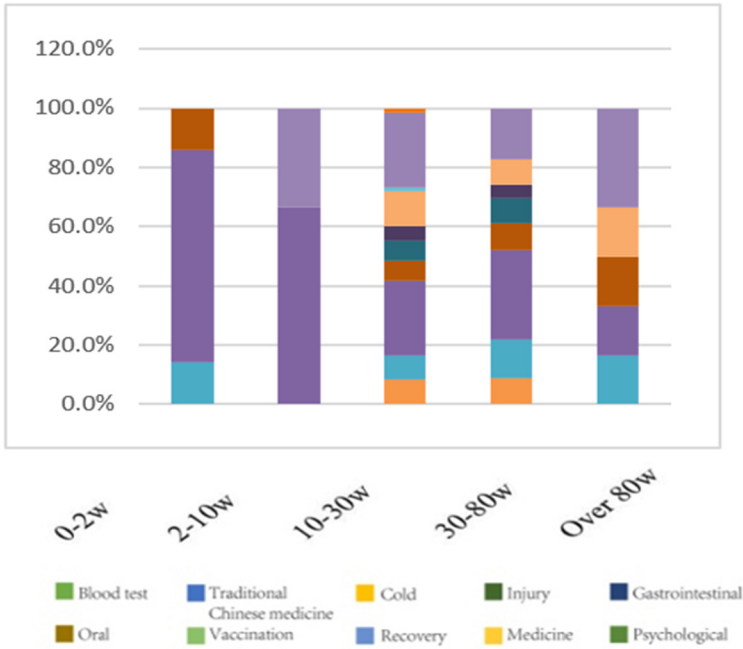


Fig. 24. Departmental Preference of Different Family Annual Incomes

Demand Trends of Different Gender Groups

The results indicate that both men and women have a high demand for treatment of colds and fevers, as well as for purchasing medicine. However, the demand for treatment of injuries and bruises is significantly higher among men than women. Women have a much higher demand for blood tests and laboratory examinations compared to men. The demand for other symptoms is generally similar between the two genders , as depicted in Figure 21. (See the Figure2 for details.)

Demand Trends of Different age Groups

The results indicate that children aged 0-18 have the highest demand for visiting Community health centers for colds and fevers, which gradually decreases with age. Children require parental accompaniment for vaccination. Adults have a demand for traditional Chinese medicine treatment. Elderly people aged 60 and above have a much higher demand for blood tests, buying medicine, and prescription medication than other age groups. The demand for other symptoms is generally similar across age groups , as depicted in Figure 22. (See Figure3 for details.)

Demand Trends of Different Family Structures

The results show that single-person households and large family households have a greater need to purchase medicine from Community health centers. Families with young children have a greater demand for vaccination. Families living with parents

have a greater demand for traditional Chinese medicine treatment. Single-person households are more likely to suffer from injuries and bruises. The demand for other symptoms is generally similar across different types of households, as depicted in Figure 23. (See Figure 4 for details.)

Demand Trends of Different Income Groups

Regarding the tendencies of different income groups, the results show that there is not much difference in the overall choice of diseases for treatment among households with different incomes, but higher-income groups tend to prefer traditional Chinese medicine treatment, as depicted in Figure 24.

Summary of Demand Trends Characteristics

In summary, residents of Xisanqi Street have a high demand for treatment of colds and fevers and for purchasing medicine. There is a strong demand for vaccination in households with young children. The demand for blood tests, traditional Chinese medicine treatment, treatment of injuries and bruises, gastrointestinal diseases, and oral examinations is relatively evenly distributed and moderate. There is a lower demand for rehabilitation training and psychological counseling.

4.4 Summary of Demand Trends Characteristics

Regarding the tendencies of different income groups, the results show that there is not much difference in the overall choice of diseases for treatment among households with different incomes, but higher-income groups tend to prefer traditional Chinese medicine treatment. (See Figure5 for details.)

5 Data Model for Functional Area Correlation Calculation of Community Health Centers

The data model for calculating the functional area correlation of community health service centers based on demand is as follows:

Formulate a data table based on the survey questionnaire on which diseases residents visit community health centers for treatment, to determine the number of people needing each function.

Calculate the proportion of the number of people needing each function to the total survey population.

Utilize the proportion of each functional area's demand in the total surveyed population to calculate the specific area of each functional area, based on the total area of clinical departments, public health departments, medical technology departments, and other departments in the community health service center.

Compare the results with the minimum design area requirements (see Annex II) and optimize the area of functional rooms that do not meet the minimum area requirements.

Output a table to prepare for optimizing the distribution of existing building functions.

In special cases, the vaccination and child health care functions are not needed in the public health department of the Xincai CHC because the nearby Huilongguan Epidemic Prevention Station is responsible for vaccination work in the Huilongguan and Xisanqi areas, overlapping with the functions of the public health department of the Xincai CHC, the calculation steps shows in Table 4.

In special cases, the vaccination and child health care functions are not needed in the public health department of the Xincai CHC because the nearby Huilongguan Epidemic Prevention Station is responsible for vaccination work in the Huilongguan and Xisanqi areas, overlapping with the functions of the public health department of the Xincai CHC.

Table 4. Weighted Demand Calculation Table

Demand	Number	Percentage	Functional Rooms	Required Area	Standard Minimum Area Requirement	Adjusted Area	Existing Area	Area Change
Blood Test	20	0.1	Laboratory	88.75	$18+12+12=42$	88.75	83.07	+5.68
Traditional Chinese Medicine Diagnosis and Treatment	16	0.08	TCM Consultation Room, TCM Therapy Room	71	12	71	349.83	-278.83
Common Cold and Fever	40	0.19	General Practice Room	177.49	$60+10+9+9+9+10+18=215$	337.23	194.22	+143.01
Injuries	12	0.06	Infusion Room	53.25				
Gastrointestinal Diseases	24	0.12	General Practice Room Treatment	106.49				
Oral Diseases	8	0.04	Room, General Practice Room Examination Room, etc.	35.50	$15+24=39$	39	98.37	-59.37
Vaccination	24	0.12	Dental Consultation Room, Dental Imaging Room and other	106.49	$60+24=84$	0	0	0
Rehabilitation Training	4	0.02		17.75	40	40	0	+40

			examination rooms					
			Vaccination and Epidemic Pre- vention Room, Child Health Room	230.74	16+16=3 2	230.7 4	162.6 3	+67.37
Purchase of Medicines	52	0.25						
			Rehabilitation Consultation Room, Rehabil- itation Therapy Room	35.50	-	35.50	0	+35.50
Psychological Counseling	8	0.04						
Total Number	20 8			922.95				

6 Implementation Strategy for Functional Proportion of Community Health Centers

6.1 Formulate a Comprehensive Functional Configuration Design Model Based on the Current Situation Assessment of the Community, Combined with the Constraints of Medical Building Design Requirements

Optimizing the ratio of building functions is crucial to improving the service level of community health centers. Community health centers should plan and allocate medical resources reasonably, which may include increasing or decreasing departments based on service needs and adjusting the area of departments. For example, some communities may need more chronic disease management services, while others may prioritize maternal and child health care. By properly layout and configuring the departments, the health needs of residents can be better met, and the medical experience can be improved. For example, the Xincai CHC lacks a gynecological examination department. Therefore, the area allocated for vaccination can be converted into a gynecological examination room and a treatment room. Additionally, a family planning guidance room and a health education room should be added, either combined with the original management office or by utilizing unused rooms in the building for renovation and expansion.

6.2 Clarify Management Responsibilities and Connect Two-Way Demands from the Bottom Up

Public service facilities are public products and services and cannot be completely governed by the market. The responsibilities of the government and the market should be clearly defined. Strengthening coordinated management, improving implementability

[21], forming a complete management system for community health service centers, unifying into big data management, effectively implementing the national people-oriented policies, optimizing resource allocation, and actively mobilizing community residents to positively intervene in the configuration of community health service centers, forming a targeted demand system, combining functional configuration analysis models, optimizing the service scope of community health centers, and building layouts.

6.3 Build a Complete Medical System and Improve Online and Promotional Registration Loops

Firstly, enhancing the publicity of community health centers is crucial. This not only helps increase residents' awareness of community hospital services but also facilitates residents to understand and use convenient services such as mobile phone appointments. Secondly, increase online remote big data registration methods. By providing an online registration platform, the waiting time for patients can be reduced, the efficiency of medical services can be improved, and the pressure of on-site registration at hospitals can also be alleviated.

6.4 Integrate and Optimize Surrounding Public Resources to Maximize Efficiency

Firstly, enhancing the publicity of community health centers is crucial. This not only helps increase residents' awareness of community hospital services but also facilitates residents to understand and use convenient services such as mobile phone appointments. Secondly, increase online remote big data registration methods. By providing an online registration platform, the waiting time for patients can be reduced, the efficiency of medical services can be improved, and the pressure of on-site registration at healthcan also be alleviated.

6.5 Set Up Flexible Development Space to Cope with Changes in the Characteristics of Community Residents

With the passage of time and social development, the characteristics of community residents change^[22]. Therefore, it is necessary to retain a certain degree of flexible development space and a foundation for transformation. First, ensure the flexibility of the functional space layout, allowing for functional conversion through changes in building space separation. Second, ensure the possibility of rapid transformation between different functions. Third, ensure the cross and mutual penetration between other types of public community service functions, to cope with the gradual changes in lifestyle and production behavior in the future.

7 Conclusion

With the rapid and comprehensive deployment of community health service centers and the deepening integration of green and efficient comprehensive planning into urban renewal and construction, new community hospitals are gradually becoming a part of the urban landscape.

Based on an analysis of residents within a 15-minute service radius of the New Materials Community Hospital and its surroundings, this study differentiated between four types of residents in the community and conducted a classification analysis based on gender, age, family structure, and income group. The study concluded that there are differentiated medical functional configuration needs: men have a higher demand for treatment of injuries, while women have a higher demand for examinations. The demand for traditional Chinese medicine increases with age, and there is a higher incidence of children's vaccination and respiratory diseases. There is also a higher demand for prescription medication. Higher-income groups have a higher demand for traditional Chinese medicine. The study also summarized the overall impact of the New Materials Community Hospital on surrounding comprehensive resources and calculated the actual number of service users. By analyzing the proportion of different functional demands of various groups and combining it with the total area, the study derived a table showing the change in the area ratio of the community hospital.

This paper mainly focuses on the optimization of functional ratios and proposes implementation strategies to improve the efficiency of community hospital utilization, including regional coordination, flexible design, and digital promotion. The aim is to improve the targeted medical resources of the community hospital and provide reference for future regional coordinated medical resource planning. However, the paper has not clearly analyzed the specific management ratio between the community hospital and surrounding medical resources, which could better improve resource utilization efficiency. Therefore, future research will focus on quantifying residents' demands for various levels of hospitals and medical resources and, in conjunction with existing planning and allocation standards, refine efficient and flexible differentiated allocation standards.

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