Demand Characteristics of Contracted Family Doctor Services for Functional Building Populations Based on the Kano Model (Postprint)

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Abstract

Background As the family doctor contract service system continues to deepen, extending effective family doctor contract services to populations in functional buildings has become a focal point, and understanding the demand characteristics of this population constitutes an important approach for formulating effective strategies.

Objective To investigate the demand for family doctor contract services among functional building populations and provide references for improving and optimizing such services in functional buildings.

Methods From March to April 2024, three functional buildings were selected in the jurisdiction where the research group is located using typical sampling, and 396 young and middle-aged individuals were recruited from functional communities using cluster random sampling for a questionnaire survey. The questionnaire included general demographic information, a KANO questionnaire on demand for family doctor contract services, the time period with the most frequent family doctor contract service utilization in the past 6 months, and willingness to pay. Reliability and validity analysis was performed on the KANO questionnaire, a Better-Worse matrix was constructed to analyze the KANO demand characteristics of 19 service items, and sensitivity analysis was conducted based on different service time periods and willingness to pay.

Results A total of 396 valid questionnaires were collected. The Cronbach' s α coefficient for the scale comprising 19 contract service items was 0.991. Preliminary classification according to the KANO model categorized all 19 items as indifferent attributes. The Better-Worse matrix further refined the demand attributes: two items in diagnostic and treatment services (“medication dispensing service” and “expert consultation service”) and nine items in

health management services (“physical examination report interpretation and health consultation” , “dry eye syndrome prevention and treatment” , “cervical spondylosis prevention and treatment” , etc.) were classified as one-dimensional attributes; the “extended prescription” service in diagnostic and treatment services was classified as an attractive attribute, while the remaining items were indifferent attributes. Sensitivity analysis revealed: the “long prescription” service exhibited the highest SR value during the 1-hour period before work and on weekends; the “traditional Chinese medicine constitution identification/tuina/moxibustion/cupping/scraping/acupuncture” service showed the highest SR value during the 1-hour lunch break; when willingness to pay was 0-50 yuan/person/year and $ $201 yuan/person/year, the “expert consultation” service had the highest SR value; when willingness to pay was 151-200 yuan/person/year, the “traditional Chinese medicine constitution identification/tuina/moxibustion/cupping/scraping/acupuncture”service had the highest SR value.

Conclusion The functional building population demonstrates high demand for specialized health management services under family doctor contracts, with diversified demand content. Family doctor-provided long prescription, medication dispensing, expert consultation, and other contract diagnostic and treatment services constitute the cornerstone for meeting the service needs of young and middle-aged populations. Service content design for this population should be further optimized and improved.

Full Text

Preamble

The Characteristics of Family Doctor Service Demand for Functional Building Population Based on KANO Model

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Abstract

Background: As the family doctor contract service system continues to deepen, how to effectively extend quality family doctor services to functional building

populations has become a key focus. Understanding the demand characteristics of this group is essential for developing effective strategies.

Objective: To understand the demand for family doctor contract services among functional building populations and provide references for improving and optimizing these services.

Methods: From March to April 2024, three functional buildings were selected using typical sampling in the study area. A cluster random sampling method was used to survey 396 working-age adults in functional communities. The questionnaire included general demographic information, a KANO questionnaire on family doctor service demands, the most frequent service time periods in the past six months, and willingness to pay.

Reliability and validity analysis was conducted on the KANO questionnaire. A Better-Worse matrix was constructed to analyze the KANO demand characteristics of 19 service items, with sensitivity analysis performed based on different service time periods and payment willingness.

Results: A total of 396 valid questionnaires were collected. The Cronbach' s α coefficient for the 19-item scale was 0.991. Initial classification using the KANO model categorized all 19 items as indifferent attributes. Further analysis using the Better-Worse matrix reclassified "medication dispensing service" and "expert consultation service" under diagnostic services, and nine items under health management services including "physical examination report interpretation and health consultation," "eye disease prevention," and "cervical spondylosis prevention" as "expected attributes." The "extended prescription" service was classified as an attractive attribute, while the remainder remained indifferent attributes.

Sensitivity analysis revealed that "long prescription" service had the highest SR value during the one-hour period before work and on weekends. "Traditional Chinese Medicine (TCM) constitution identification/massage/moxibustion/cupping/scraping/acupuncture" service had the highest SR value during the one-hour lunch break. "Expert consultation" service had the highest SR value when willingness to pay was 0-50 yuan/person/year and $ $201 yuan/person/year, while TCM services peaked at 151-200 yuan/person/year.

Conclusion: Functional building populations show high demand for specialized health management services under family doctor contracts with diversified content. Long prescription, medication dispensing, and expert consultation services form the cornerstone of meeting service demands for working-age adults. Service content design for this population should be further optimized and refined.

[**Key words**] Contracted family doctor services; Functional buildings; Health services demand; KANO model

Introduction

As the family doctor contract service system continues to deepen, coverage levels and utilization rates of family doctor services among urban and rural residents have steadily improved [1]. Currently, extending contracted services to functional community populations, particularly working-age adults in functional buildings, has become a priority for the next phase of family doctor service expansion [2]. In 2021, the Shanghai Municipal Health Commission issued the "Guiding Opinions on Promoting Community Health Services in Functional Communities,"exploring a service model that extends community health services to functional communities through family doctor contract services [3]. In recent years, pilot programs for functional community health services have entered an intensive implementation phase, with personalized family doctor service packages tailored to building-based working-age adults becoming the mainstream approach to attract this population [4]. In practice, effectively identifying service demands and continuously optimizing service content and delivery modes remains a research hotspot for advancing family doctor contract services in functional buildings. Existing research has primarily focused on demand identification and influencing factor analysis, but lacks systematic quantitative analysis of demand hierarchy and prioritization for this working-age building population [5-6].

The KANO model can precisely identify demand priorities through attribute classification (must-be, expected, attractive, etc.), providing a scientific basis for optimizing service delivery sequences [7]. Therefore, this study employs the KANO model [8-9] and its theoretical framework to conduct a demand-side survey among working-age adults in functional buildings, aiming to understand service demand characteristics and provide references for improving and optimizing family doctor contract service models in functional buildings.

Methods

1.1 Study Subjects

From March to April 2024, three functional buildings in the Weifang Community Health Center jurisdiction were selected using typical sampling based on the following criteria: (1) single-purpose office buildings; (2) $ $20 enterprises; (3) $ $300 employees. Cluster random sampling was then applied: floor plans were obtained, actual office floors were consecutively numbered, and 50% of floors were randomly selected using RAND function sequences. All full-time employees on selected floors were included. Inclusion criteria: (1) age $ $18 years; (2) working in the building for $ $6 months; (3) informed consent. Exclusion criteria: (1) non-full-time employees; (2) unable to complete the survey due to work or business travel.

1.2 Survey Instruments

Based on literature review and the research team' s experience in providing family doctor services to functional building populations, a questionnaire was designed using the KANO model framework. The questionnaire comprised four sections: (1) General demographic information including gender, age, marital status, education, living situation, medical insurance type, self-rated health status, and chronic disease status; (2) KANO questionnaire on family doctor service demand, containing 19 service items tailored to functional building populations (e.g., "long prescription service," "extended prescription," "medication dispensing") based on policy documents and preliminary practice. Following KANO model theory [9], each item included positive ("if this service is provided") and negative ("if this service is not provided") questions with five response options: "very dissatisfied," "dissatisfied," "neutral," "satisfied," and "very satisfied." A Better-Worse matrix was constructed for classification, where Better represents the satisfaction index (SI) calculated as SI = (A+O)/(A+O+M+I), with higher SI indicating greater improvement effect; Worse represents the dissatisfaction index (DSI) calculated as DSI = -1×(O+M)/(A+O+M+I), where larger absolute DSI values indicate more severe dissatisfaction from unmet needs; (3) Most frequent service time periods in the past six months (options: "1 hour before work," "1 hour during lunch," "1 hour after work," "weekends," "none"); (4) Acceptable annual out-of-pocket service fees (options: "0-50 yuan/person/year," "51-100 yuan/person/year," "101-150 yuan/person/year," "151-200 yuan/person/year," "$ $201 yuan/person/year").

1.3 Survey Procedure

A research team was established with unified training by the principal investigator. A pre-test of 12 questionnaires ensured clarity. After obtaining property management approval, surveyors conducted one-on-one interviews in functional buildings. The questionnaire was administered online via "Wenjuanxing" platform; participants scanned QR codes with smartphones while surveyors assisted with completion. Participants reviewed and confirmed their responses before submission. A total of 401 questionnaires were distributed, with 396 valid responses (98.8% valid response rate).

1.4 Statistical Analysis

Data were compiled using Excel 2019. Categorical data were expressed as percentages; normally distributed continuous data as (x±s). Following KANO model theory, demand analysis proceeded as: (1) Reliability and validity analysis of the 19-item KANO scale using Bartlett' s test of sphericity and KMO coefficient for content validity, plus Cronbach' s α coefficient; (2) Construction of KANO model demand attribute classification tables for each item (see Table 1), calculating frequency distributions across attributes; (3) Sensitivity analysis based on SR values, where SR represents the distance from the origin (0,0) in the Better-Worse matrix, calculated as SR = $\sqrt{(SI^2 + DSI^2)}$. Larger SR val-

ues indicate higher sensitivity and greater urgency for improvement. SR was calculated for different service time periods and payment willingness levels [10]. P<0.05 was considered statistically significant.

Results

2.1 General Characteristics of Functional Building Population

Among 396 functional building respondents, the male-to-female ratio was 1:1.04. The largest age group was 41-50 years (170, 42.9%). Most were married (304, 76.8%), held bachelor' s degrees (186, 47.0%), lived with spouses (280, 70.7%), and had urban employee medical insurance (334, 84.3%). Self-rated health was good in 168 (42.4%), and 276 (69.7%) had no chronic diseases. Notably, 242 (61.1%) had never received building-based services, and 162 (40.9%) were willing to pay 0-50 yuan/person/year (see Table 2).

2.2 Reliability and Validity of KANO Scale for Family Doctor Service Demand

Reliability and validity testing of the 19-item scale showed Cronbach' s α coefficients of 0.973, 0.987, and 0.991 for positive, negative, and total scales respectively (all >0.800), indicating high reliability. Validity analysis revealed KMO values of 0.961, 0.964, and 0.894 (all >0.600), with Bartlett' s test significance <0.001 and cumulative variance explanation rates of 88.052%, 85.368%, and 88.470% (all >50.000%), confirming good validity for further demand analysis.

2.3 Demand Attribute Analysis of Family Doctor Services

Demand attributes were initially classified by majority frequency (see Table 3). Using the average absolute DSI (0.260) and average SI (0.411) as dividing points, the Better-Worse matrix revealed refined classifications (see Figure 1 [Figure 1: see original paper]). Results differed slightly from initial classification due to exclusion of reverse (R) and questionable (Q) items, with the Better-Worse matrix results taken as final.

The refined analysis classified "medication dispensing service" and "expert consultation service" under diagnostic services, plus nine health management items including "physical examination report interpretation and health consultation," "eye disease prevention," and "cervical spondylosis prevention" as "expected attributes." The "extended prescription" service was classified as an attractive attribute, while others remained indifferent attributes.

2.4 Sensitivity Analysis of Service Demand

Within attribute categories, items were ranked by SR value (higher = more urgent): Indifferent attributes: 7>5>9>19>4; Expected attributes:

6>15>3>18>17>11>2>1>16>13>14>10>8>12.

Further sensitivity analysis by service time and payment willingness showed: "Long prescription" had highest SR value before work and on weekends; TCM services peaked during lunch hours; "Extended prescription" peaked after work; "Expert consultation" was highest when no services were received. For payment willingness: "Expert consultation" dominated at 0-50 yuan and $ $201 yuan; "Long prescription" peaked at 51-100 yuan; "Exercise rehabilitation guidance" at 101-150 yuan; TCM services at 151-200 yuan (see Table 4).

Discussion

3.1 Implementation of Family Doctor Contract Services in Functional Buildings Requires Deepening

Our findings show that 242 (61.1%) of functional building working-age adults had never received building-based family doctor services, consistent with Liu et al.'s survey of non-contracted residents in Shanghai [11]. Initial KANO classification categorized all 19 items as indifferent attributes, suggesting that low current utilization and weak service perception lead to unclear demand differentiation among working-age adults, similar to Zhang et al.' s findings [12]. Effective demand identification requires deep service implementation. Future efforts should expand coverage, optimize service packages, implement accountability systems, and enhance service perception to improve demand identification, aligning with high-quality development policies for family doctor services.

3.2 KANO Model Identifies Refined Demand Attributes for Functional Building Populations

Better-Worse matrix analysis revealed that "medication dispensing" and "expert consultation" in diagnostic services, plus nine items in health management services (e.g., physical examination interpretation, eye disease prevention, cervical spondylosis prevention) were expected attributes, while "extended prescription" was an attractive attribute. This indicates that working-age adults prioritize personalized health management services. According to KANO theory, comprehensive health assessment systems should be established with "one-person-one-file" management models, providing targeted consultations based on health evaluations, such as specialized physical examination interpretation, cervical spondylosis prevention education, eye disease prevention, and appropriate technology promotion to enhance service feasibility.

Additionally, while "downward referral" services showed low demand, "extended prescription" and "expert consultation" were attractive and expected attributes respectively. This may reflect that working-age adults typically seek care directly at secondary/tertiary hospitals [13], with unclear understanding of family

doctors' roles in providing priority access and specialist green channels. This suggests that contract services should actively integrate specialist resources, such as utilizing internet hospital platforms and referral green channels, to provide targeted specialist consultations that demonstrate the advantages of family doctor contracts and enhance attractiveness.

Digital health management items like "health record establishment/updates,""health knowledge promotion," and "personal smart device guidance" remained indifferent attributes, indicating low current demand within the family doctor service framework. Research shows that while health coaching, online consulting, and remote health education services are flourishing—primarily targeting functional community and building-based working-age adults—these services vary widely in quality with fragmented health information [14]. The indifferent classification does not imply these services are meaningless, but rather signals an urgent need for family doctor contracts to standardize these services and build trust before providing effective digital health management.

3.3 Sequential Service Provision Based on Demand Characteristics

To optimize service package design, sensitivity analysis was conducted across service times and payment willingness. Results showed that "long prescription,""extended prescription," and "medication dispensing" were consistently demanded across time periods, aligning with their expected attributes and consistent with Huang et al.' s findings [13]. Specialized services like "TCM constitution identification/massage/moxibustion/cupping/scraping/acupuncture" and "cervical spondylosis/periarthritis of shoulder/mouse hand prevention" were popular during lunch and after-work hours, while "expert consultation," "seasonal cold and headache prevention," and "eye disease prevention" were preferred on weekends and before work. This pattern suggests that technical, immediately effective services are needed during lunch and after-work hours, while communication-intensive services requiring health assessment and education should be scheduled on weekends, providing guidance for service delivery timing [15-16].

Payment willingness analysis revealed a "similar at both ends, different in the middle" pattern. Low-payers (0-50 yuan) and high-payers ($ $201 yuan) focused on diagnostic services like "long prescription," "extended prescription," and "medication dispensing," while middle-range payers (151-200 yuan) preferred personalized health management services like "exercise rehabilitation," "chronic gastritis prevention," and "body fat assessment/weight guidance." Low-payers, typically healthier, view these diagnostic services as convenient prerequisites for contracting. High-payers, likely with chronic conditions, demand higher-quality diagnostic services and medical resources [16]. The middle group, with diverse sub-health conditions, shows varied demands, suggesting need for personalized health assessments and targeted service provision.

Based on these findings, we recommend offering "long prescription," "extended prescription," and "medication dispensing" as foundational service packages for

functional building populations, with enhanced promotion to attract contract signings. During weekdays, targeted technical services with clear efficacy and good experience—such as TCM appropriate techniques and specialized services for building-specific health problems—should be provided based on population health profiles. On weekends, comprehensive health assessments, specialist resource integration, and health education should be delivered to establish diagnoses and drive precise weekday service delivery, creating a systematic, well-sequenced service system to improve utilization and satisfaction.

Limitations

As an exploratory feasibility study on service package design for functional building populations, this research only reflects local demand characteristics. Limited sample size prevented effective stratification by occupation, age, and social background—factors influencing service demand and package design. Future research should conduct broader, multi-dimensional surveys as contract services expand to provide evidence for clearly stratified, systematically implemented family doctor service packages.

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Conflict of Interest: The authors declare no conflicts of interest.

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Note: Figure translations are in progress. See original paper for figures.