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Patient preferences and attitudes towards first choice medical services in Shenzhen, China: a cross-sectional study

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ABSTRACT

Objective This study aimed to explore the characteristics of Shenzhen residents' preferences and influencing factors regarding their first choice of medical institution at various medical levels, and to understand their attitudes towards community health services.

Design Cross-sectional survey.

Participants A total of 1612 participants at least 18 years of age were randomly sampled with stratification among 10 districts in Shenzhen. Data were gathered through a self-designed questionnaire. The effective questionnaire response rate was 93.05%. All patients participated in the study voluntarily, provided written informed consent and were able to complete the questionnaire.

Main outcome measures We measured and compared the participants' expected and actual preferences and influencing factors regarding their first choice of medical service at various medical levels.

Results More than 50% of the participants preferred municipal and district hospitals as their first choice, and 27.5% chose medical institutions according to specific circumstances. Univariate analysis indicated that age, education, income, medical insurance, housing conditions and registered permanent residence were significantly associated with the actual and expected preferred first medical institution. The main factors influencing participants' actual and expected preferred medical institution differed. With the actual preferred first medical institution as the dependent variable, education, monthly income, medical technology, convenience and providers' service attitude and medical ethics were the main factors (χ^2=212.63, p<0.001), whereas with the expected preferred first medical institution as the dependent variable, occupation, Shenzhen registered permanent residence, education and medical technology were the main factors (χ^2=78.101, p<0.001).

Conclusion The main factors influencing participants' preferred medical institution and their actual first visit differed. Patients with high education or income or registered permanent residence preferred high-level medical institutions for the first visit.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ We performed stratified sampling to recruit 1612 participants according to the outpatient records of the Shenzhen Medical System in 2017.
⇒ We established two logistic regression models to explore the factors in the actual and expected selection of medical institution.
⇒ Selection bias might have occurred as participants under the age of 18, inpatients or non-patients were not recruited.
⇒ Future research should include larger samples with various age groups and different disease severities.

INTRODUCTION

Hierarchical diagnosis and treatment is an important part of China's medical system reform, which, starting in 2015, has aimed to direct patient flow through changes in coverage and reimbursement rates.[1] Medical institutions were classified into three tiers according to priority and difficulty of treatment: primary medical institutions, secondary hospitals and tertiary hospitals.[2] This system aims to enable different tiers of medical institutions to undertake diagnosis and treatment tasks according to their specialised functions and service capacities. Thus, patients could be appropriately assigned to different tiers of medical institutions to mitigate difficulties in obtaining access to medical services.[3] Patients are encouraged to first visit primary institutions, where patients with severe diseases are referred to secondary or tertiary hospitals if necessary, and to return to primary medical institutions for rehabilitation when they are in stable condition. However, the Chinese healthcare system does not use a strict general practitioner and referral system, and patient preferences and choices regarding healthcare providers are influenced mainly by personal willingness to seek medical care. In addition, because the problems of barriers to medical insurance reimbursement, hospitals' distribution of benefits, patients' preferences for seeking medical treatment,[4 5] and the roles of primary medical institutions have not been fully exerted, and the hierarchical diagnosis and treatment system has not been fully established.

In some countries, health services are delivered in multi-level systems, through a patient referral procedure involving the coordination of health services among various levels of healthcare providers.[6] A notable example is in the UK, one of the first countries to strictly follow such a system, through the National Health Service (NHS) law, which established the NHS in 1948.[7] Although countries differ in their models used, all maintain a structure that clearly divides labour in the medical service system, with primary medical and health institutions at the core, and large hospitals as the auxiliary bodies.[8] Compared with countries in which the services of specialist doctors are sought directly, countries with 'gatekeeper' systems have a lower proportion of their gross national products comprising medical service costs.[9]

Shenzhen, the youngest first-tier city in China, may slightly differ from other first-tier cities. Beyond its impressive gross domestic product (GDP) growth and rapid economic development, unique challenges are posed by its population size, demographic structure and resource allocation. For example, with continual population growth, the non-resident population generally had low education, low income, low residential stability and young age,[10] and accounted for 63% of the entire population by the end of 2019. Because of high property prices, most non-residents purchase or rent self-built or village houses. The resultant spatial pattern that has gradually developed might cause differences in the choice of medical service between non-residents and residents.[11]

In addition, compared with regions with rapid economic and population growth, Shenzhen has a clear insufficiency of medical resources. The medical expenditure in 2018 was ¥28.1 billion, accounting for only 1.1% of the GDP, a proportion far below the national average (6.43%). The number of beds per 1000 people in Shenzhen at the end of 2019 was 3.83, far below the national average of 6.30. In China, healthcare is provided almost exclusively by state-owned public general hospitals at the primary, secondary and tertiary levels, and tertiary hospitals have the highest advanced services capacity, followed by the secondary hospitals and primary medical institutions. Under these circumstances, because residents are free to choose healthcare facilities without being restricted by a gatekeeping mechanism, they may bypass primary care and choose higher level facilities regardless of their disease severity.[12–14]According to the China health statistics yearbook, outpatient services at primary medical and health institutions increased by 2% and 49% for tertiary hospitals between 2013 and 2018.[15]

These statistics indicate that patients choose their doctors (from primary providers and large hospitals) in an unstructured manner, the service capacity at primary medical and health institutions is insufficient, and continued overcrowding exists in China's hospitals.[16 17]

There were 3492 medical and health institutions in Shenzhen in 2017, including 610 community health service centres.[18] Although 13.96 million people were covered by basic medical insurance, and more than 4 million residents signed family doctor service agreements, the proportion of residents who chose to seek medical treatment in community health service centre was relatively low, accounting for only approximately 38%.[19]

Many patients prefer to wait for treatment in higher-level hospitals than to visit nearby primary medical institutions. Thus, to improve the implementation efficiency of the hierarchical diagnosis and treatment system, understanding participants' preferences, of attitudes and factors influencing their choice of medical institution is necessary.

To our knowledge, previous studies on preferences or attitudes towards medical choice have focused mainly on actual health-seeking behaviour,[20–22] defined as the actions taken by individuals who perceive they have an illness to obtain a suitable remedy.[23] This behaviour involves a series of decision-making processes governed by individual characteristics and beliefs, as well as provider-related features. This process usually involves decisions regarding whether to seek treatment, from whom to seek treatment, what kind of treatment to seek and how many healthcare resources to use.

Thus, in theory, an individual's healthcare needs do not necessarily translate to effective demand. Similarly, the expected medical institution for an individual's first consultation may differ from the actual selection. The exploration of factors affecting the expected and actual first medical institution may aid in determining the differences between individual preferences/attitudes towards medical institutions and their actual healthcare-seeking behaviours. Such understanding is crucial for strengthening the hierarchical diagnosis and treatment system, because it concerns the effective allocation and rational use of medical resources.

A previous systematic review has analysed a considerable body of studies and identified factors affecting the selection of healthcare, such as individual, facility, context and composite factors, thereby influencing facility choice in China.[22] However, as China's youngest city, Shenzhen may differ from traditional cities because of its characteristics including living spaces and population composition. To better promote reform of the hierarchical diagnosis and treatment system, first understanding residents' choices of healthcare provider types and the associated factors is crucial. Therefore, the current study was aimed at (1) exploring residents' expected and actual preferences and influencing factors regarding the choice of first medical service at various medical levels; (2) understanding residents' attitudes towards community health services.

METHODS

Participants

Subjects were selected according to the outpatient records of the Shenzhen Medical System in 2017. According to a pilot study, the awareness rate of the hierarchical diagnosis and treatment system was 40%, with a

maximum permissible error of 2.5% and CI of 95%, and the required sample size was calculated to be 1475. To account for invalid questionnaires, the sample size was increased by 9%, and a total of 1612 participants were finally investigated. Stratified sampling was performed, and the number of participants varied according to the number of residents in each district. The final numbers of participants from each district were 210 (14.0%) in the Futian District, 210 (14.0%) in the Luohu District, 210 (14.0%) in the Nanshan District, 50 (3.3%) in the Yantian District, 260 (17.3%)in the Bao'an District, 260 (17.3%) in the Longgang District, 150 (10.0%) in the Longhua District, 50 (3.3%) in the Pingshan District, 50 (3.3%) in the Guangming District and 50 (3.3%) in the Dapeng New District. One resident at least 18 years of age was then selected from each household. The inclusion criteria were participants living in Shenzhen for ≥6 months and agreeing to sign an informed consent form, with good mental status and clear consciousness. The exclusion criteria were participants with severe mental illness or cognitive communication difficulties. All participants participated voluntarily and provided written informed consent.

Data collection

Selected participants were first contacted by telephone to ensure that they understood and agreed to participate in the survey. A questionnaire entitled 'Questionnaire on medical preference and behaviour of Shenzhen residents' was administered face to face. Items were initially identified on the basis of the literature and selected after three expert consultations. The final version of the questionnaire was determined after modification on the basis of a pilot study.

For measuring the expected preferred first medical institution, the question 'If conditions permit, what type of medical institution would you like to choose for the first consultation?' was asked, and the answers were as follows: '(1) municipal hospitals, (2) district hospitals, (3) street hospitals, (4) private medical institutions, (5) community health service centres, (6) other hospitals or (7) depends on the situation.' For measuring the actual preferred first medical institution, the question 'If you were unwell, what type of medical institution would you choose?' was asked, and the answers were as follows: '(1) municipal hospitals, (2) district hospitals, (3) street hospitals, (4) private medical institutions, (5) community health service centres, (6) other hospitals or (7) depends on the situation.' The investigation was conducted by uniformly trained investigators, and the quality was strictly controlled throughout the entire investigation.

Statistical analysis

All data were entered by two researchers simultaneously in Epidata V.3.02. SPSS V.25.0 was used for data cleaning, sorting and statistical analysis. Descriptive statistics were used to describe participants' characteristics. The relationships between medical service seeking preference and various factors were analysed with χ^2 tests. The difference between the understanding of the community first consultation system and the approval level of the community first consultation system was also determined with χ^2 and linear trend tests. Multivariate logistic regression analysis was then performed to explore the factors affecting the preferences regarding medical services, and all the potential independent variables were entered by the forced entry method. All tests were two sided, and the significance level was set at $p<0.05$.

Patient and public involvement

There has been no patient and/or public involvement in the study design, data analysis and writing of the current study. The brief results were emailed to each participant after the investigation.

RESULTS

Testing of the questionnaire

The reliability and validity of the questionnaire were good, with overall internal consistency, a Cronbach α coefficient of 0.826, Kaiser-Meyer-Olkin index of 0.791 and cumulative contribution rate of 6 factors of 81.959%.

Participant characteristics

The effective questionnaire response rate was 93.05%. The characteristics of the participants are shown in table 1. The average age was 34.3±10.0 years, and the age composition was close to that of Shenzhen residents in the 2010 population census.

Actual and expected preferred first medical institution

In terms of the actual first medical institution, because the proportion of choosing private medical institutions was very small, and a clearly stated medical preference would enable analysis of participants' needs and influencing factors, we excluded 25 participants choosing private medical institutions and 412 (27.5%) participants choosing medical institutions depending on specific circumstances. Further analysis was conducted on the remaining 1063 participants with specific preferences. The percentages of actual first medical institutions between sexes are shown in table 2. More than 50% of participants chose municipal or district hospitals as their first choice. No statistically significant difference was observed in the actual medical institution selection among municipal, district-level, street-level and community health service between sexes (χ^2=5.034, p=0.169).

Similarly, in terms of the expected preferred first medical institution, because no participants indicated that they would choose a private medical institution, and 396 indicated that they would choose according to specific circumstances, we excluded these 396 participants and conducted further analysis on the remaining 1104 participants with specific preferences. The percentages of the

Table 1 Basic characteristics of participants

Category	n (%)	Category	n (%)
Sex		Monthly incomes (¥)	
Male	733 (48.9)	<3000	158 (10.5)
Female	767 (51.1)	3000-	479 (31.9)
Age (years)		5000-	626 (41.7)
≤20	56 (3.7)	10 000-	158 (10.5)
21-	607 (40.5)	15 000-	53 (3.5)
31-	520 (34.7)	≥30 000	26 (1.7)
41-	204 (13.6)	Housing conditions	
≥51	113 (7.5)	Self-purchased housing	351 (23.4)
Educational level		Renting policy housing	114 (7.6)
Junior high school and below	222 (14.8)	Renting housing in urban villages	618 (41.2)
High school/technical secondary school	581 (38.7)	Renting commercial housing	170 (11.3)
Junior college	431 (28.7)	Dormitory	94 (6.3)
Undergraduate	242 (16.1)	Others	153 (10.2)
Post undergraduate	24 (1.6)	Medical insurance	
Occupation		Level 1	663 (44.2)
Public institutions	153 (10.2)	Level 2	336 (22.4)
Professional and technical personnel	224 (14.9)	Level 3	187 (12.5)
Enterprise managers	156 (10.4)	Uninsured	314 (20.9)
Enterprise staff	208 (13.9)	Marital status	
Individual industrial and commercial households	228 (15.2)	Single	435 (29.0)
		Married	1065 (71.0)
Worker	342 (22.8)	Registered permanent residence	
Unemployed	53 (3.5)	Yes	531 (35.4)
Others	136 (9.1)	No	969 (64.6)

expected preferred first medical institutions between sexes are shown in table 2. More than three-quarters of participants expected to choose municipal and district-level hospitals for the first visit. No statistically significant difference was observed among the 1104 participants with a specific first medical institution choice between sexes (χ^2=2.843, p=0.416).

Demographic characteristics and preferred first medical institution

The demographic characteristics, including age, education, income, medical insurance, housing condition, marital status and registered permanent residence, grouped by the selection of actual and expected preferred medical institutions, are presented in table 2.

Age

Significant differences were observed in the levels of both actual (χ^2=33.257, p=0.001) and expected medical institutions (χ^2=23.415, p=0.024) among the age groups. In terms of the actual first medical institution, the largest proportion of participants indicating municipal medical institutions as their first choice was observed in the age groups of 21- and 41- years. The largest proportion choosing community health service centres was observed in the 20-year age group, with a percentage of 68.7%. In terms of the expected first medical institution, with increasing age participants expected to choose higher level medical institutions. The proportion of participants choosing municipal hospitals was the largest in each age group, ranging from 46.0% to 65.2%.

Education

Participants with different educational backgrounds had varying preferences for actual (χ^2=67.169, p<0.001) and expected medical institutions (χ^2=20.079, p=0.017). Those with high educational levels were more inclined to choose high-level medical institutions for the first visit. Linear trends were observed between education levels and actual (χ^2=54.189, p<0.0001) or expected medical institutions (χ^2=9.998, p=0.002).

Income

Significant differences were observed in the levels of actual (χ^2=127.362, p<0.001) and expected medical institutions (χ^2=57.767, p<0.001) among participants with differing incomes. Linear trends were observed between monthly income and the actual (χ^2=62.024, p<0.0001)

Table 2 Selection of actual and expected preferred medical institutions in subjects with different demographic characteristics (n, %)

Variables		Actual selection					Expected selection				
		Municipal hospitals n (%)	District hospitals n (%)	Street-level hospitals n (%)	Community health service centre n (%)	Total n (%)	Municipal hospitals n (%)	District hospitals n (%)	Street-level hospitals n (%)	Community health service centre n (%)	Total n (%)
Sex	Male	154 (29.8)	143 (27.7)	73 (14.2)	146 (28.3)	516 (100. 0)	318 (59.6)	147 (27.5)	38 (7.1)	31 (5.8)	534 (100.0)
	Female	162 (29.6)	161 (29.4)	54 (9.9)	170 (31.1)	547 (100.0)	328 (57.5)	165 (29.0)	52 (9.1)	25 (4.4)	570 (100.0)
	Total	316 (29.7)	304 (28.6)	127 (12.0)	316 (29.7)	1063 (100.0)	646 (58.4)	312 (28.3)	90 (8.2)	56 (5.1)	1104 (100.0)
Age (years)	≤20	6 (18.7)	2 (6.3)	2 (6.3)	22 (68.7)	32 (100.0)	17 (46.0)	10 (27.0)	8 (21.6)	2 (5.4)	37 (100.0)
	21-	131 (32.1)	112 (27.5)	53 (12.9)	112 (27.5)	408 (100.0)	262 (59.3)	120 (27.1)	39 (8.8)	21 (4.8)	442 (100.0)
	31-	98 (26.2)	121 (32.4)	46 (12.3)	109 (29.1)	374 (100.0)	211 (55.5)	124 (32.6)	28 (7.4)	17 (4.5)	380 (100.0)
	41-	56 (35.4)	44 (27.8)	16 (10.1)	42 (26.7)	158 (100.0)	96 (62.7)	42 (27.5)	7 (4.6)	8 (5.2)	153 (100.0)
	≥51	25 (27.5)	25 (27.5)	10 (11.0)	31 (34.0)	91 (100.0)	60 (65.2)	16 (17.4)	8 (8.7)	8 (8.7)	92 (100.0)
	Total	316 (29.7)	304 (28.6)	127 (12.0)	316 (29.7)	1063 (100.0)	646 (58.4)	312 (28.3)	90 (8.2)	56 (5.1)	1104 (100.0)
Education	Junior high school and below	28 (20.0)	29 (20.7)	15 (10.7)	68 (48.6)	140 (100.0)	81 (53.0)	41 (26.8)	19 (12.4)	12 (7.8)	153 (100.0)
	High school/ technical secondary	102 (25.1)	123 (30.3)	46 (11.3)	135 (33.3)	406 (100.0)	232 (55.0)	134 (31.7)	35 (8.3)	21 (5.0)	422 (100.0)
	Junior college	95 (29.3)	99 (30.6)	47 (14.5)	83 (25.6)	324 (100.0)	196 (59.9)	97 (29.7)	20 (6.1)	14 (4.3)	327 (100.0)
	Undergraduate and above	91 (47.2)	53 (27.5)	19 (9.8)	30 (15.5)	193 (100.0)	137 (67.8)	40 (19.8)	16 (7.9)	9 (4.5)	202 (100.0)
	Total	316 (29.7)	304 (28.6)	127 (12.0)	316 (29.7)	1063 (100.0)	646 (58.4)	312 (28.3)	90 (8.2)	56 (5.1)	1104 (100.0)
Monthly income (¥)	<3000	37 (32.7)	28 (24.8)	9 (8.0)	39 (34.5)	113 (100.0)	74 (60.2)	29 (23.5)	13 (10.6)	7 (5.7)	123 (100.0)
	3000-	65 (19.0)	74 (21.6)	48 (14.1)	155 (45.3)	342 (100.0)	194 (52.3)	107 (28.8)	50 (13.5)	20 (5.4)	371 (100.0)
	5000-	123 (28.4)	158 (36.5)	54 (12.5)	98 (22.6)	433 (100.0)	246 (57.3)	149 (34.8)	19 (4.4)	15 (3.5)	429 (100.0)
	10 000-	54 (44.3)	37 (30.3)	12 (9.8)	19 (15.6)	122 (100.0)	88 (72.7)	17 (14.1)	7 (5.8)	9 (7.4)	121 (100.0)
	≥15000	37 (69.8)	7 (13.2)	4 (7.6)	5 (9.4)	53 (100.0)	44 (73.3)	10 (16.7)	1 (1.7)	5 (8.3)	60 (100.0)
	Total	316 (29.7)	304 (28.6)	127 (12.0)	316 (29.7)	1063 (100.0)	646 (58.5)	312 (28.3)	90 (8.2)	56 (5.1)	1104 (100.0)

Continued

Table 2 Continued

Variables		Actual selection					Expected selection				
		Municipal hospitals n (%)	District hospitals n (%)	Street-level hospitals n (%)	Community health service centre n (%)	Total n (%)	Municipal hospitals n (%)	District hospitals n (%)	Street-level hospitals n (%)	Community health service centre n (%)	Total n (%)
Medical insurance	Level 1	179 (36.2)	149 (30.1)	51 (10.3)	116 (23.4)	495 (100.0)	316 (65.2)	129 (26.5)	27 (5.6)	13 (2.7)	485 (100.0)
	Level 2	55 (21.1)	92 (35.2)	40 (15.3)	74 (28.4)	261 (100.0)	136 (50.9)	89 (33.3)	24 (9.0)	18 (6.8)	267 (100.0)
	Level 3	23 (16.7)	44 (31.9)	17 (12.3)	54 (39.1)	138 (100.0)	71 (45.2)	51 (32.5)	22 (14.0)	13 (8.3)	157 (100.0)
	Uninsured	59 (34.9)	19 (11.2)	19 (11.2)	72 (42.7)	169 (100.0)	123 (63.1)	43 (22.1)	17 (8.6)	12 (6.2)	195 (100.0)
	Total	316 (29.7)	304 (28.7)	127 (11.9)	316 (29.7)	1063 (100.0)	646 (58.4)	312 (28.3)	90 (8.2)	56 (5.1)	1104 (100.0)
Housing conditions	Self-purchased housing	110 (39.6)	92 (33.1)	25 (9.0)	51 (18.3)	278 (100.0)	168 (62.7)	71 (26.5)	15 (5.6)	14 (5.2)	268 (100.0)
	Renting policy housing	15 (20.1)	36 (48.0)	11 (14.6)	13 (17.3)	75 (100.0)	41 (54.0)	22 (28.9)	6 (7.9)	7 (9.2)	76 (100.0)
	Renting housing in urban villages	93 (21.9)	114 (26.8)	65 (15.3)	153 (36.0)	425 (100.0)	222 (49.8)	154 (34.5)	50 (11.2)	20 (4.5)	446 (100.0)
	Renting commercial housing	56 (39.2)	29 (20.3)	8 (5.6)	50 (34.9)	143 (100.0)	103 (70.5)	30 (20.5)	8 (5.5)	5 (3.5)	146 (100.0)
	Dormitory	13 (23.2)	14 (25.1)	4 (7.1)	25 (44.6)	56 (100.0)	51 (65.4)	17 (21.8)	6 (7.7)	4 (5.1)	78 (100.0)
	Others	29 (33.7)	19 (22.1)	14 (16.3)	24 (27.9)	86 (100.0)	61 (67.7)	18 (20.0)	5 (5.6)	6 (6.7)	90 (100.0)
	Total	316 (29.7)	304 (28.7)	127 (11.9)	316 (29.7)	1063 (100.0)	646 (58.4)	312 (28.3)	90 (8.2)	56 (5.1)	1104 (100.0)
Marital status	Single	86 (33.5)	58 (22.5)	35 (13.6)	78 (30.4)	257 (100.0)	192 (64.6)	59 (19.9)	31 (10.4)	15 (5.1)	297 (100.0)
	Married	230 (28.6)	246 (30.5)	92 (11.4)	238 (29.5)	806 (100.0)	454 (56.3)	253 (31.3)	59 (7.3)	41 (5.1)	807 (100.0)
	Total	316 (29.7)	304 (28.7)	127 (11.9)	316 (29.7)	1063 (100.0)	646 (58.4)	312 (28.3)	90 (8.2)	56 (5.1)	1104 (100.0)
Registered permanent residence	Yes	138 (34.7)	140 (35.2)	34 (8.5)	86 (21.6)	398 (100.0)	254 (65.3)	100 (25.7)	21 (5.4)	14 (3.6)	398 (100.0)
	No	178 (26.8)	164 (24.7)	93 (14.1)	230 (34.6)	665 (100.0)	392 (54.8)	212 (29.6)	69 (9.7)	42 (5.9)	665 (100.0)
	Total	316 (29.7)	304 (28.7)	127 (11.9)	316 (29.7)	1063 (100.0)	646 (58.4)	312 (28.3)	90 (8.2)	56 (5.1)	1104 (100.0)

or expected medical institutions (χ^2=5.569, p=0.018). Those with high monthly income were more inclined to choose high level first visit medical institutions. In terms of the expected medical institution, more than 50% of the participants in all monthly income groups chose a municipal hospital as their first medical institution, of which the largest proportion was observed in the groups with incomes of ¥10 000–¥14 999 and more than ¥15 000, at 72.7% and 73.3%, respectively.

Medical insurance

Significant differences were observed in the levels of (χ^2=69.656, p<0.001) and expected medical institutions (χ^2=39.734, p<0.001) among participants with differing medical insurance levels. Linear trends were observed between medical insurance levels and actual (χ^2=26.885, p<0.001) or expected medical institutions (χ^2=10.450, p=0.001). Participants with lower levels of medical insurance were more inclined to choose community health service centres. In terms of the expected medical institution, the proportion choosing municipal hospitals was highest, ranging from 45.2% to 65.2%.

Housing conditions

Participants with different housing conditions had different preferences for actual (χ^2=84.040, p<0.001) and expected medical institutions (χ^2=38.790, p=0.001). In terms of the actual medical institutions, the proportion of participants who had self-purchased houses and or were renting commercial houses who chose municipal hospitals as their first medical institution was the highest, at 39.6% and 39.2%, respectively. The proportion of participants renting policy housing who chose district-level hospitals was highest, at 48.0%. The proportion of participants living in dormitories who chose community health service centres was highest, at 44.6%. In terms of the expected medical institution, the proportion of participants choosing municipal hospitals was highest in all groups with different housing conditions. The overall proportion of participants choosing community health service centres was only 5.1%, ranging from 3.5% to 9.2% in all groups.

Marital status

No statistically significant difference was observed in the actual medical institution selection according to marital status (χ^2=6.738, p=0.081). The proportions of participants choosing municipal hospitals and community health service centres were the highest for single participants, at 33.5% and 30.4%, respectively. However, a significant difference in expected medical institutions was observed according to marital status (χ^2=15.348, p=0.002). The proportion of participants expecting to choose municipal hospitals was highest among both single and married participants, at 64.6% and 56.3%, respectively. Only 5.1% of the participants indicated that they would choose community health service centres.

Registered permanent residence

Significant differences were observed in the level of actual (χ^2=35.141, p<0.001) and expected medical institutions (χ^2=14.263, p=0.003) among participants with different registered permanent residence. In terms of actual medical institutions, participants with a Shenzhen registered permanent residence were more inclined to choose municipal and district-level hospitals, at 34.7% and 35.2%, respectively. Participants without a Shenzhen registered permanent residence were more inclined to choose community health service centres, at 34.6%. Participants with and without Shenzhen registered permanent residence both expected to choose municipal hospitals and district-level hospitals as their second choice.

Factors influencing the choice of medical institution

Major factors in the selection of medical institution are shown in table 3. More than 70% of the participants considered medical technology and convenience the main factors in choosing a medical institution. A total of 14.0% and 12.7% of participants considered service attitude and medical price, respectively, in choosing a medical institution. Only 2.8% considered specific circumstances.

Understanding of the community first diagnosis system

Participants did not have a high level of understanding of the community first diagnosis system, as shown in table 4. Only 3.7% of the participants were very familiar with the community first diagnosis system, whereas 59.5%

Table 3 Factors influencing the choice of medical institution (n, %)

Factors	Municipal hospital	District-level hospital	Street-level hospital	Community health service centre	Total
Medical technology	350 (73.5)	96 (20.2)	15 (3.2)	15 (3.2)	476 (100.0)
Convenience	127 (42.1)	126 (41.7)	30 (9.9)	19 (6.3)	302 (100.0)
Attitude of service and medical ethnics	93 (60.0)	29 (18.7)	24 (15.5)	9 (5.8)	155 (100.0)
Price	57 (40.7)	55 (39.3)	20 (11.8)	8 (5.7)	140 (100.0)
Others	19 (61.3)	6 (19.4)	1 (3.2)	5 (16.1)	31 (100.0)
Total	646 (58.5)	312 (28.3)	90 (8.2)	56 (5.1)	1104 (100.0)

Table 4 Analysis of the understanding and agreement on the community first diagnosis system (n, %)

Whether understanding community first diagnosis system	Agree	Disagree	Unconcerned	Total
Very familiar	32 (58.2)	10 (18.2)	13 (23.6)	55 (3.7)
Quite familiar	99 (61.9)	16 (10.0)	45 (28.1)	160 (10.7)
Moderately familiar	221 (56.4)	32 (8.2)	139 (35.5)	392 (26.1)
Less familiar	210 (42.3)	64 (12.9)	223 (44.9)	497 (33.1)
Unfamiliar	74 (18.7)	38 (9.6)	284 (71.7)	396 (26.4)

were less familiar or unfamiliar. In participants who were unfamiliar with the community first diagnosis system, only 18.7% agreed with this system and 71.7% were indifferent. Participants with better understanding of the community first diagnosis system were more in favour of the community first diagnosis system (χ^2=177.805, p<0.0001). A linear trend was observed between understanding and agreement with community first diagnosis (χ^2=145.327, p<0.0001).

Main factors affecting participants' medical institution preferences

We established two logistic regression models to explore the factors in the selection of medical institution. The dependent variables were the actual and expected first medical institution in models 1 and 2, respectively. The dependent variable was further divided into two categories, with street-level hospital, community health service centre and private hospital as '0' and municipal and district-level hospitals as '1'. Independent variables and their definitions were the same, including age, education, occupation, registered permanent residence, marital status, monthly income, housing conditions and medical insurance, which were selected on the basis of statistical significance in single factor analysis of the preferred first medical institution. The main factors in choosing a medical institution and agreement on the community first diagnosis system were also considered as the independent variables. Occupation, housing conditions, the main factors in choosing a medical institution and agreement on the community first diagnosis system were dummified, with other occupation, other housing condition, medical price and unconcerned attitude towards the community first diagnosis system, as a reference, respectively. Other independent variables included age ≤20 years, Shenzhen registered permanent residence and unmarried status as a reference. Monthly income, education, medical insurance and understanding of the community first diagnosis system served as ordered variables.

In model 1, education, monthly income and the main factors in choosing a medical institution affected participants' actual medical institution. A statistically significant difference was observed in the regression equation (χ^2=212.63, p<0.001), with −2log=1231.393 and correction coefficient of determination r^2=0.244. The prediction accuracy rate was 70.9%. Participants with higher education and higher monthly income, were more inclined to choose municipal or district-level hospitals. As compared with medical price, the main factors considered when choosing large hospitals were medical technology, convenience, providers' service attitude and medical ethics. Among these factors, medical technology was more important. In addition, the better the participants understood the community first diagnosis system, the more difficult the choice of large hospitals, as shown in table 5.

In model 2, occupation, registered permanent residence and the main factors in choosing a medical institution affected participants' expected medical institution. A statistically significant difference was observed in the logistic regression, with −2log=784.420 (χ2=78.101, p<0.001) and correction coefficient of determination r^2=0.126. The prediction accuracy rate is 86.6%. Participants working in public institutions or enterprises, and those with individual industrial and commercial households were more inclined to choose city-level or district-level hospitals. Compared with participants with Shenzhen registered permanent residence, those without Shenzhen registered permanent residence were more inclined to choose street hospitals and community health service centres. As compared with medical price, medical technology was the main factor considered in choosing a large hospital, as shown in table 5.

DISCUSSION

This study demonstrated the preferences and associated factors in the choice of medical institution for the first visit among Shenzhen residents. Generally, more than 50% of the participants were willing to select municipal and district-level medical institutions for the first visit. Those with high education or income levels, or a Shenzhen registered permanent residence, were more inclined to choose high-level medical institutions. More than 70% of the participants considered medical technology and convenience as the main factors in choosing a medical institution.

Factors influencing medical service preference

In theory, an individual's healthcare needs do not necessarily translate to effective demand. The behaviour of consuming medical service involves a series of decision-making processes governed by many factors. In addition to whether residents themselves perceive a need for health services, the choice is also associated with their income level, socioeconomic status, health security, transportation convenience, risk habits, health awareness,

Table 5 Logistics regression analysis of the factors affecting subjects' actual and expected first medical institution

	Model 1: actual selection model						Model 2: expected selection model					
Variable	**ß**	**SE**	**Wald X^2**	**P**	**OR**	**OR 95% CI**	**ß**	**SE**	**Wald X^2**	**P**	**OR**	**OR 95% CI**
Constant	−0.292	0.682	0.184	0.668	0.747	–	0.802	0.904	0.788	0.375	2.230	–
Age group	−0.117	0.087	1.836	0.175	0.889	0.751 to 1.054	−0.017	0.115	0.021	0.885	0.984	0.785 to 1.232
Education	0.178	0.090	3.904	0.048	1.195	1.001 to 1.425	0.026	0.117	0.047	0.828	1.026	0.815 to 1.291
Occupation (others as the reference)	–	–	7.775	0.255	–	–	–	–	12.919	0.044	–	–
Public institutions	−0.164	0.314	0.273	0.602	0.849	0.458 to 1.571	1.131	0.458	6.094	0.014	3.098	1.262 to 7.604
Professional and technical personnel	−0.224	0.289	0.598	0.439	0.800	0.454 to 1.409	0.195	0.336	0.335	0.563	1.215	0.629 to 2.348
Enterprise managers	0.344	0.311	1.225	0.268	1.411	0.767 to 2.595	0.732	0.403	3.297	0.069	2.080	0.944 to 4.583
Enterprise staff	−0.340	0.284	1.439	0.230	0.712	0.408 to 1.241	0.773	0.359	4.619	0.032	2.165	1.070 to 4.380
Individual industrial and commercial households	0.048	0.279	0.030	0.863	1.049	0.607 to 1.813	0.924	0.387	5.717	0.017	2.520	1.181 to 5.377
Worker	−0.235	0.258	0.834	0.361	0.790	0.477 to 1.310	0.551	0.308	3.196	0.074	1.735	0.948 to 3.175
Registered permanent residence (registered as the reference)	−0.324	0.176	3.374	0.066	0.723	0.512 to 1.022	−0.500	0.250	3.990	0.046	0.607	0.371 to 0.991
Marital status	0.068	0.186	0.134	0.715	1.070	0.743 to 1.542	0.161	0.245	0.431	0.512	1.175	0.726 to 1.900
Monthly income	0.237	0.092	6.588	0.010	1.267	1.058 to 1.518	0.136	0.126	1.159	0.282	1.145	0.895 to 1.467
Housing conditions (others as the reference)	–	–	6.862	0.231	–	–	–	–	4.134	0.530	–	–
Self-purchased housing	0.359	0.296	1.469	0.225	1.432	0.801 to 2.561	−0.470	0.414	1.290	0.256	0.625	0.278 to 1.407
Renting policy housing	0.490	0.363	1.816	0.178	1.632	0.801 to 3.327	−0.580	0.472	1.511	0.219	0.560	0.222 to 1.411
Renting housing in urban villages	−0.107	0.266	0.162	0.687	0.898	0.533 to 1.513	−0.279	0.367	0.575	0.448	0.757	0.368 to 1.555
Renting commercial housing	0.070	0.309	0.051	0.822	1.072	0.585 to 1.963	0.022	0.459	0.002	0.962	1.022	0.416 to 2.513
Dormitory	0.088	0.389	0.051	0.822	1.092	0.509 to 2.340	0.123	0.499	0.060	0.806	1.131	0.425 to 3.007
Medical insurance	−0.083	0.072	1.327	0.249	0.920	0.798 to 1.060	−0.153	0.094	2.648	0.104	0.858	0.713 to 1.032
Major factors (medical price as the reference)	–	–	71.254	<0.001	–	–	–	–	29.217	<0.001	–	–
Medical technology	1.862	0.233	64.062	<0.001	6.435	4.079 to 10.151	1.226	0.297	16.982	<0.001	3.407	1.902 to 6.104
Convenience	1.142	0.237	23.222	<0.001	3.134	1.969 to 4.988	0.182	0.274	0.442	0.506	1.200	0.701 to 2.055
Attitude of service and medical ethnics	0.947	0.279	11.565	<0.001	2.578	1.494 to 4.451	−0.105	0.313	0.112	0.738	0.901	0.488 to 1.662

Continued

Table 5 Continued

Variable	Model 1: actual selection model						Model 2: expected selection model					
	ß	SE	Wald X^2	P	OR	OR 95% CI	ß	SE	Wald X^2	P	OR	OR 95% CI
Understanding community first diagnosis system	−0.284	0.071	16.130	<0.001	0.753	0.655 to 0.865	0.075	0.090	0.692	0.405	1.078	0.904 to 1.285
Agreement community first (doesn't matter as the reference)	–	–	3.336	0.189	–	–	–	–	3.100	0.212	–	–
Agree	−0.153	0.155	0.973	0.324	0.858	0.633 to 1.163	0.316	0.210	2.257	0.133	1.372	0.908 to 2.071
Disagree	0.290	0.262	1.221	0.269	1.336	0.799 to 2.233	−0.095	0.313	0.092	0.761	0.909	0.493 to 1.678

and the type and quality of services provided by health facilities.[24] Health-seeking behaviour,[20–22] defined as the actions taken by individuals who perceive that they have an illness to obtain a suitable remedy,[23] occurs only if an individual indeed uses medical resources. Therefore, the expected medical institution for an individual's first consultation may differ from the actual selection. In this study, we found that if participants were feeling unwell, the main factors influencing their preferred medical institution and their actual first visit differed. When conditions permit, occupation and registered permanent residence were the main factors affecting participants' expected medical service selection. In comparison, education, and monthly income affected participants' actual first medical service selection. The exploration of factors affecting expected and actual first medical institution may aid in determining the differences between individual preferences/attitudes towards the medical institution and their actual healthcare-seeking behaviours, a crucial aspect for strengthening the hierarchical diagnosis and treatment system, because it also concerns the effective allocation and rational use of medical resources.

Many factors may be associated with healthcare choices, including patient and family factors, provider factors and environmental factors. In the current study, the finding that medical technology and convenience were the main factors in choosing a medical institution is consistent with the results from previous studies in which participants prioritised organisational factors.[25] Healthcare providers' attitudes towards service and medical ethics also affect patients' preferences regarding medical service. A study in England indicated that the perception of provider responsiveness, considering factors such as convenience, waiting time and confidence, is a strong motivating factor in choosing primary care.[26] In addition, perceived professionally relevant factors[27 28] and the number of physicians affect patients' choices.[29] Geographical factors should also be considered, because residents of disadvantaged areas were more aware of the contribution of their location to health disparities than residents of affluent areas, according to a study conducted in Australia.[30]

Dilemma of first diagnosis at the community health service centre

Some of our findings may reflect the initial effects of reform implementation. Under the current hierarchical diagnosis and treatment system, the participants in the current study were not very familiar with the first diagnosis system of community health service centres, and most did not know whether a community health service centre could provide a first diagnosis and questioned the service capacity. These phenomena will undoubtedly hinder the implementation of the hierarchical diagnosis and treatment system and are also unconducive to residents' effective cooperation with the implementation of the system. Beyond the low level of awareness of the first diagnosis system, notably, participants' willingness to visit community health service centres was low. Only 21.1%

of the participants indicated that they would choose community health centres for their initial visit, a finding inconsistent with the results of a previous study in Shenzhen, in which the willingness to use community health centres was high among patients who had health insurance, who were female and who were familiar with the gatekeeper policy.[31]

The concepts most relevant to hierarchical diagnosis and treatment worldwide are the three-level healthcare service model and the gatekeeper system, which essentially include the gatekeeper system and a two-way referral system centred on initial diagnosis at the grassroots level. It is not only a matter of seeing a doctor but also of institutional arrangement, which consists of division of labour among medical institutions, rational allocation of medical resources, maximisation of use efficiency and refinement of patient management services.

However, the first diagnosis in a primary healthcare facility faces a dilemma. Patients tend to trust large hospitals that are well-equipped with advanced instruments and have highly skilled physicians. From the health provider's perspective, weaknesses such as the insufficient service capacity of primary health institutions, the ambiguous positioning of medical institutions and the inability to share information are quite clear.[27 29 32] For instance, according to the statistics of the 2016 Health and Family Planning Statistical Bulletin, 94.2% of the total primary medical and health institutions provided only 55.1% of the total diagnoses and treatments, whereas first-level, second-level and third-level hospitals, which accounted for 3.0% of all medical institutions, provided 41.2% of the diagnoses and treatments.[33] No incentive mechanisms exist in the hierarchical diagnosis and treatment system, which is generally led by health administrative departments and uses semi-mandatory measures to encourage patients to seek medical treatment in an orderly manner. This administrative hierarchical diagnosis and treatment system is passive and has not included an effective incentive mechanism.

The UK, which has one of the first established and strictest hierarchical diagnosis and treatment system among Western countries, has become a typical representative of the British welfare system. Although prominent problems, such as rapid growth of medical expenses and low efficiency, have become the challenges faced by the NHS,[34 35] its successful experiences, particularly its gatekeeper system, may have served as a reference for China's medical reform.

To solve the dilemma of first diagnosis by community health services, several approaches may be proposed on the basis of other countries' successful experiences. First, to improve the ability of primary medical and health services, the management of the general practitioner system and personnel training should be strengthened. Successful experiences have been described, such as the Quality of Health Framework in UK,[36] Royal College of General Practitioners in Australia,[37] and Germany's implementation of accessing management and strict practice qualification review for physicians.[38] Second, referring to the USA, the implementation of strict cost control and incentive measures can be used to clarify the diagnostic criteria for disease and to specify the length of hospitalisation through diagnosis-related classifications.[39] Third, payment methods can be more diversified. For example, the option of paying per capita, as in Canada, could be added to encourage general practitioners to actively control medical expenses and attract more community residents to sign up for first consultations.[40]

Disease severity may affect patients' preferences

Although we reported that the main factors influencing participants' expected and actual first visits differed, we did not further explore the influences of disease severity and comorbidities. When individuals are ill, decisions as to whether to seek medical treatment and which healthcare provider to choose are made by patients and their family members, mainly according to personal preferences, disease severity and economic capacity.[20] A previous study has indicated that the distance to the provider becomes less important as the illness becomes more severe.[41] Self-assessment of disease severity may also play an important role in the selection of the first medical service. In addition, in cases of perceived minor or severe illness, factors influencing the choice of medical service differed between urban and rural respondents. In the case of perceived minor illness, both rural or urban residents stated many factors causing them not to access the system at the lower, primary level. The respondents indicated that higher quality of care outweighed the higher costs of transportation, services and medication, as well as the inconvenience of the complex physical environment.[42]

Influences of income and medical investment on participants' choices

Participants with high education, high monthly income or favourable housing conditions, such as self-purchased or rented commercial houses, were more inclined to choose high-level medical institutions for their first visit. These findings were consistent with those from a previous systematic review, which has also revealed that higher income, higher education and urbanisation are associated with access at high levels.[22]

Income is usually considered a measure of socioeconomic status. To some extent, the definition of the position of income in its hierarchy relative to the prevailing social norm may matter, rather than income itself. The influence of income on medical preferences may involve various factors including socioeconomic status, income and environment. Generally, a positive correlation exists between income and healthcare use.[24] Wealthy individuals are less likely to underuse healthcare resources; instead, they spend more money and time on healthcare, whereas individuals with lower income face greater barriers to accessing adequate healthcare.[43] A study from Finland has also indicated that retirees over the age of 60 or individuals without formal employment have relatively

greater difficulty in accessing medical help or even may not seek treatment because of their lower incomes.[32 44] A study conducted in 14 tertiary hospitals in China has reported that patients' preferences are influenced mainly by illness severity and sociodemographic characteristics, and patients with higher monthly incomes express a preference for first-class providers.[20] In contrast, Geitona *et al* have suggested that the utilisation of primary and secondary healthcare in Greece is determined primarily by health status rather than socioeconomic factors.[45]

The relationship between income and health is also demonstrated through investment in medical services. Total health expenditure, an internationally accepted indicator, is widely considered an effective way to understand the health status of a country. Taking the government capital investment in health services into account, further increasing investment in medical and health services, and paying greater attention to population health are crucial. Some countries in South East Asia spend very little on health; for example, India spends US$215 in terms of purchasing power parity per person, which is lower than that in comparable middle-income countries, such as China, Brazil and South Africa. A great need exists for countries to extend health funding by taking a broader view of investing in human capital. Thus, on the basis of the observations of the current study, we strongly recommend that cities with rapid economic growth accelerate their investment in medical resources to solve the problems related to the imbalances between the economy and health.

Limitations

Several limitations of this study must be addressed. First, although the study sample was representative, as a result of random sampling according to the proportions of the population from all districts of Shenzhen, because of the large floating population in Shenzhen, the interpretation and extrapolation of the observed preferences for first medical service to the entire city population should be performed with great caution. Second, we did not further explore the effects of disease severity nonparticipants' preferences regarding their initial visit. Self-assessment of disease severity may play an important role in the selection of first medical service. Convenience, such as distance, becomes less important as an illness becomes more severe.[41] Third, because the study focused on participants 18 years of age or older, we were unable to collect information on the preferences regarding first medical service from children or their parents. Shenzhen is a city with a young population age structure, and, because of the two-child policy recently imposed by the Chinese government, paediatrician shortage has become an increasingly important issue. Parents' choices regarding high-level medical institutions may be affected by the shortage of specialists.[46] Selection bias might have existed. Because the study participants were outpatient, we could not demonstrate and compare the preferences and attitudes towards first medical service between inpatients and non-patients.

Finally, although the participants were randomly selected from ten districts, we did not consider the effects of geographical characteristics on the residents' preferences regarding first medical service. Shenzhen is long and narrow from east to west and shorter from north to south. The allocation and accessibility of medical resources may somewhat affect people's willingness to use and preferences regarding medical service.

CONCLUSION

In general, more than 50% of the participants were willing to select municipal and district-level medicals institutions for the first visit. Those with higher education or income levels, or Shenzhen registered permanent residence, were more inclined to choose high-level medical institutions for the first visit. Medical technology and convenience were considered the main factors in the choice of medical institution.

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