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Stated preferences for family doctor contract services: a survey of the rural elderly in Anhui Province, China

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ABSTRACT

Objective A number of factors contribute to the utilisation of family doctor contract services (FDCS) in China. This study aims to measure the preferences of the elderly for the FDCS and identify the key factors (and their relative importance) that may guide policymakers in more accurately providing the FDCS.

Participants and methods A discrete choice experiment was performed to elicit the preferences for FDCS among the rural elderly in China. Attributes and levels were established based on qualitative methods. Four attributes were included: service type, service package, physician's reputation and annual contract costs. A D-efficient design was used to create a set of profiles that represented FDCS. The survey was conducted face to face using a sample of participants aged 60 and above in rural areas of Anhui Province. The data were analysed using a latent class logit (LCL) model.

Results A total of 545 valid questionnaires were included in the analysis. The average age of the participants was 69.44 (SD 5.80). Two latent classes were identified with the LCL model. All four attributes proved statistically significant at the level of both the population mean and the two classes. The rural elderly showed a preference for FDCS with a relatively good reputation, lower annual contract costs, the basic service with the add-on of chronic disease service and home visit. Age, gender, education, self-reported health status and the number of chronic diseases were found to be associated with latent class membership.

Conclusion In this study, the physician's reputation had the largest impact on the rural elderly's choice of FDCS. Policy recommendations included the need to strengthen family doctor team training, devote greater attention to improving the family doctor's medical skills and service approaches, and increased FDCS efficiency for the care of the rural elderly.

Strengths and limitations of this study

► The first study to examine patient preferences for the contents of services within the family doctor contract services scheme.
► A carefully designed and implemented discrete choice experiment to generate reliable preference data from a vulnerable group in China.
► Possible hypothetical bias and data quality issues caused by fatigue and cognitive constraints.
► Results only representative of the rural region of Anhui province.

INTRODUCTION

To achieve efficient and quality care, a multi-tiered healthcare system is widely adopted around the world with primary care as the first point of contact for people in need of healthcare.[1] In China, the general population is free to choose healthcare facilities without being restricted by a gatekeeping mechanism. However, residents prefer to seek care in secondary or tertiary hospitals rather than in primary care facilities. This is despite primary care facilities providing care that is usually more accessible and less costly.[2 3] In the health system in China, primary care facilities consist of township hospitals and village clinics in rural areas.

To strengthen primary care facilities and direct patients to the primary medical institutions for treatment, the Chinese government proposed to establish a hierarchical diagnosis and treatment system in a new round of medical reform in 2009.[4] And the family doctor contract services (FDCS) scheme was established in June 2016 to strengthen the gatekeeping mechanism. The target groups of FDCS included the general and priority population which includes the elderly, women, children and patients with chronic diseases. Residents voluntarily sign a contract with a chosen family doctor team, and in turn receive treatment and primary healthcare services in a community setting. This family doctor team consists of general practitioners, nurses and public health workers. The contract is of 1 year duration with its fee charged annually according to the chosen services. Part of the contract is covered by the government, thus the annual contract fee varied from region to region depending on the financial revenue of the regional government. Following the

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implementation of this national policy, 200 model cities were initially selected to implement a pilot programme of FDCS in 2016, and then the programme was expanded to more cities. The government increased financial investment in primary care facilities to facilitate the implementation of the FDCS.

By 2017, the contract sign-up rates for the general and priority groups had reached 35% and 65%, respectively.[5] While these numbers are not low, evidence suggested that patients had not been successfully redirected from high-level hospitals to primary care as intended by the policy.[5 6] A study found that 70% of the respondents preferred tertiary hospitals over family doctor for first-contact care.[6] Reluctance of patients to visit family doctor has been a significant obstacle to the success of FDCS and the promotion of primary care.[3]

In order to effectively implement FDCS, it is important to understand how Chinese patients feel about FDCS from a consumer perspective. There has been a growing number of studies on consumer preferences for the attributes of primary care services in China.[2 7–9] The general finding is that, when choosing primary care facilities, Chinese patients value the quality and attitude of doctors, out-of-pocket costs, travel time, total visit time, etc. These results cannot be directly transferred to the case of FDCS as it is a primary care service in the form of contract with specific types of services agreed on signing. The research on FDCS has been focused on its implementation[10–14] and policy impact.[15–18] There is also a small number of studies on the association between patient characteristics and usage of FDCS.[19 20] Only one study elicited consumer preference for the attributes of FDCS by undertaking a discrete choice experiment (DCE) with 609 rural residents in Shandong Province, China.[21] However, it did not include any attribute related to the contents of the services such as type of services and the service packages.

The DCE method has been used extensively to evaluate patient choice within healthcare systems.[22 23] It is a technique for eliciting stated preferences, using hypothetical scenarios with products (or services) described by various attributes and levels, and asks respondents to choose their most preferred. The method is particularly useful when evaluating policy within markets with restricted choice, and where the characteristics driving real choices are not observed or attributes of interest are not measured or lack variation (eg, the price in the real market often does not vary much within a period of time). Moreover, estimates are not affected by confounding factors given they are extracted from a controlled experiment. These advantages of DCEs well suited the objectives of this research.

In this study, we undertook a DCE to elicit patient preferences for the attributes associated with FDCS among the rural elderly in Anhui province, China. While the FPCS programme aims for full population coverage, at the current stage, the focus is the priority groups primarily including the elderly and those with chronic conditions. These two groups also largely overlap each other. In Anhui province, where our study was carried out, over

Attributes	Plan1	Plan 2
Service type	Home visit	Home visit
Service package	Basic service + Chronic disease service	Basic service + Personalized service
Physician's reputation	Relatively good	Average
Annual contract costs	CNY 40 (US$ 6)	CNY 80 (US$ 12)
Which would you choose?	( )	( )
Now suppose you can also choose not to sign up with a family doctor, noting that your diseases would not get better, what would you prefer?		
1. I would still prefer the plan I choose above ( )		
2. I would choose neither ( )		

Figure 1 An example of one choice set used in the discrete choice experiment.

90% of the people who signed up the programme fell into these two groups. Other priority groups are pregnant women and women in childbed, and children with likely different care needs. To design a DCE with attributes that are general enough to accommodate the care needs from all the groups is both challenging and also less useful in helping design targeted policies. We therefore focused on elderly people in this study.

We aimed to answer three questions: (1) what factors affect patient choice to use FDCS?; (2) what is the relative importance between these factors? and (3) how much are they willing to pay for a desirable feature of the FDCS? The findings have important implications for policymakers aiming to improve the utilisation of FDCS and the delivery of precision healthcare services for the elderly in China.

METHODS
Discrete choice experiment design
The DCE approach has been widely adopted in eliciting patient preference in healthcare.[24 25] We selected the attributes and their corresponding levels through a systematic review of journal articles and policy documents about FDCS as well as expert consultations (experts in the field of health economics and primary healthcare research).[26 27] Four attributes were included in the final DCE (figure 1): the first is 'service type', representing the type of medical services provided by the family doctor to the elderly, including clinic visit and home visit. The second is 'service package', representing the content of the services, including four levels: basic service, basic service and chronic disease service, basic service and traditional Chinese medicine (TCM) service, and basic service and personalised service. The third is 'physician's reputation' which refers to the residents' evaluation of the skill level, service attitude and quality of the family doctor team. The levels of this attribute include relatively good, average and relatively poor. The fourth is annual contract costs, representing the out-of-pocket cost for signing up to the contract. It is a relatively small component of the total costs which are mainly covered by the government.

The levels include CNY 20 (US$ 3), CNY 40 (US$ 6), CNY 60 (US$ 9) and CNY 80 (US$ 12); the average annual exchange rate between US$ and CNY in 2019 was US$ 1=CNY 6.908.[28] The levels chosen in our study reflect the actual contract costs in those rural regions where we sampled. A detailed explanation of attributes and levels (online supplemental eTable 1) and service packages (online supplemental eTable 2) as well as the final questionnaire are in the online supplemental document.

The number of attributes and levels ($4^2 \times 3^1 \times 2^1$) was deemed impractical for a full-factorial design due to a large number of choice tasks.[29] Therefore, we used the Ngene software (V. 1.1.2, ChoiceMetrics) to create an efficient design that maximised the D-efficiency.[27] An opt-out option was included for each choice set. Compared with those that do not present an opt-out option, DCE that have opt-out options have resulted in a lower risk of overestimating attribute influence.[30] Respondents were asked to choose plan 1, plan 2, or the opt-out option.

To test the respondents' comprehension of the task and assess the validity of the questionnaire, one rationality test choice set was added. In the test choice set, plan 2 is dominated by plan 1 across all attributes. The respondent was considered to have failed the test if they did not choose the plan 1.[31] Multiple versions of the questionnaire were generated, each with a computer-generated random sequence of the choice sets. To test the quality and feasibility of the questionnaire, we conducted a pilot test of 50 volunteers in a community to test the understanding, and the validity of the questionnaire content as well as the time it takes to complete the questionnaire. In the pilot, we considered one additional attribute called 'diagnosis and treatment time' and there were eight choice sets. While the participants could understand the choice tasks well, it turned out to be difficult for them to trade-off across five attributes and some also found it cognitively demanding to complete eight choice sets (plus the testing one). We therefore decided to drop the 'diagnosis and treatment time' attribute which was considered the least important attribute by most participants in the pilot and to reduce the number of choice sets from eight to six. We made some other minor adjustments on wording based on the feedback from the pilot testing. Face-to-face interviews with participants were used for both pilot tests and formal data collection.

Data collection

This study was conducted in Anhui Province, located in the southeast of China. The province has a population of over 63 million and the majority of the residents are middle-or-lower income earners. Multistage random sampling was used to choose a representative sample of the rural elderly population in Anhui which is traditionally divided into three geographical areas: the northern, central and southern region (figure 2). We first randomly selected three cities, Fuyang, Lu'an and Xuancheng, from each region, and then randomly selected a county from each city: Yingzhou, Jin'an and Jingxian. According
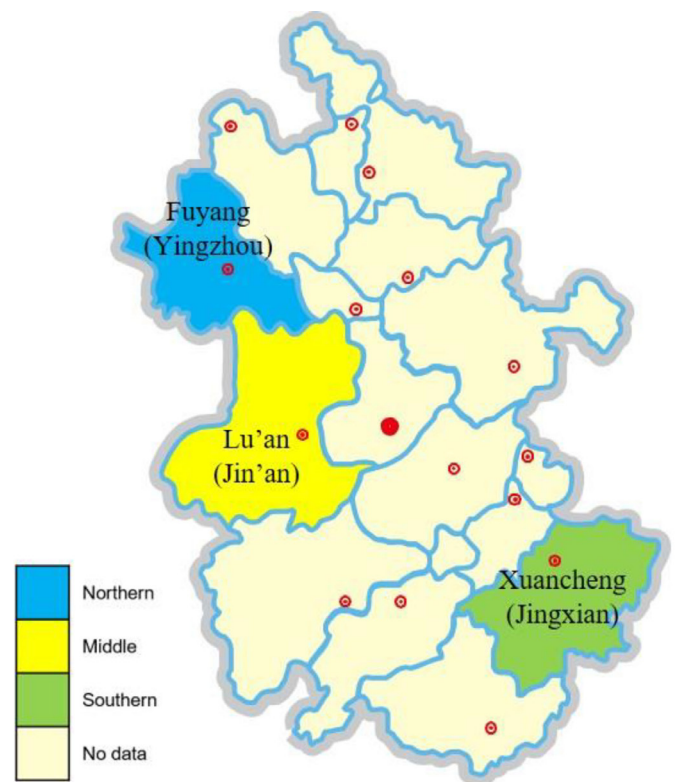
Figure 2 Locations of sampling.

to the sample size requirement of DCE studies, we aimed for around 200 respondents in each county. We did so by randomly choosing two villages in Yingzhou (a relatively populous county), four villages in Jin'an, and four villages in Jingxian. Respondents were eligible for our study if they: (1) were over 60 years old; (2) had spent more than 6 months in the current year at the registered place of residence and (3) could complete the questionnaire independently. From July to August in 2019, a team of trained postgraduate students from Anhui Medical University visited the chosen ten villages. With the help of the village committee, eligible respondents were identified and face-to-face interviews were conducted either at the village committee office or at the respondent's home. At the start of an interview, respondents were told that their participation were completely voluntary, and they were allowed to leave the interview at any time.

When selecting the interviewers, we chose the students from the local counties where data would be collected since they can communicate with the elderly residents using the local dialect. A standard interview manual was used in the training workshop where the selected students were paired to simulate the interview process (one student played the role of the interviewer while the other the interviewee). These students had another chance to practice at the pilot stage when the interview manual was also updated.

The interview manual mainly included: (1) the introduction about the FDCS programme, (2) the explanation on the types of services to be provided after signing the contract, (3) the structure of the questionnaire and the

detailed definition of each attribute of the DCE and (4) instructions on how to help participants understand the choice task through the warm-up exercise. The manual also explained the interview steps and the order of the choice sets to be presented. There were instructions on terminating the interview if it was clear that the participant could not understand the choice tasks or found it difficult to complete the choice tasks.

The participants were instructed to answer the survey questions carefully as each of their choices would contribute to the development of relevant FDCS policies (this is a 'cheap talk' approach to engage the participants).[32] Sociodemographic information was also collected including: age, gender, education, marital status, household composition, self-reported health status and the number of chronic diseases.

Statistical analysis

DCE data were analysed based on random utility theory, where the utility that respondent i derives from choosing alternative j in choice set t is given by

$$U_{ijt} = X_{ijt}\beta_i + \varepsilon_{ijt}; \ i = 1, \ldots, 545; \ j = 1, 2, 3; \ t = 1, \ldots, 6$$

where β_i is a vector of coefficients, and X_{ijt} is a vector of variables representing attributes of alternative j. If the random term ε_{ijt} is assumed to be independently and identically distributed according to the type I extreme value distribution, then the model becomes the conditional logit (CLOGIT). The latent class logit (LCL) model was also used to explore the preference heterogeneity among the respondents.[33] It provided a framework for understanding the latent segmentation of respondent preferences. The number of classes was determined based on the Bayesian Information Criterion (BIC).[34] Both models were estimated using the Stata software (V. 16, StataCorp).[35] Statistical significance was set at α=0.05.

The attribute 'cost' was analysed as a continuous variable and other attributes were included as dummy variables due to their categorical nature. Under the LCL model, we estimated preference coefficients for each class and then produced their weighted average over classes as the overall population mean. A positive regression coefficient suggested that respondents preferred an increased value for an attribute, whereas a negative coefficient suggested that respondents preferred a decreased value for an attribute.

We calculated the relative importance (RI) of each attribute as the proportion of the sum of its utility ranges to obtain an understanding of the difference each attribute could represent in the total utility of the programme design.[36] The formula is as follows:

$$RI_k = \left(\frac{A_k}{\sum_{k=1}^{4} A_k} \right) \times 100\%$$

where A_k is the difference between the highest and lowest score among attributes for the kth attribute. We then estimated the mean RI for each class and the population mean.

We also derived the relative value attached to each attribute, which is potentially useful for pricing policymaking because it measures respondents' willingness to pay (WTP) for a desirable feature of the service.[37] We derived WTP as the negative ratio of the non-cost attribute coefficient to the contract costs coefficient.

A posterior analysis was undertaken to know who the respondents are in a specific class.[35] We estimated the posterior probability of respondent i for each class by using the Bayes rule. A multinomial logit (MNL) model was estimated to describe each class using individual characteristics. The covariates used in the classes' characterisation are documented in the supplement file (online supplemental eTable 3). After the MNL regression, the average marginal effect for each variable was estimated for each class. Finally, we produced a profile of membership in each class by estimating the expected values of the statistically significant predictors in the membership function.[38]

Patient and public involvement

Patients were the participants in this study, and not involved in creating the survey instrument in this study.

RESULTS

Sample characteristics

The questionnaire was administered to 612 elderly residents, among which 12 were urban dwellers living in the village at the time of data collection, 44 were incomplete and 11 failed the rationality test. A total of 545 questionnaires were included in the analysis (table 1). The average age of the participants was 69.44±5.80 years. A slight majority (53.03%) of them were male. A little more than half of the respondents had an education level of primary school or above (58.53%). The vast majority of the respondents (77.06%) were married and 55.96% of all the participants lived with spouses. A little more than one-third (32.48%) and only 4.04% of respondents indicated that they were healthy or very healthy respectively on the day of the survey. A total of 70.83% of the respondents reported to have at least one chronic disease.

Preferences

LCL dominated CLOGIT estimates (online supplemental eTable 4) based on BIC, so only the former results are reported. A two-class LCL model was chosen based on BIC and its estimates were reported in table 2. Class 1 accounted for 83.1% and class 2 for 16.9% of the population. Apart from the service package attribute in class 2, all four attributes were statistically significant in each class. Those in class 1 prioritised service package and annual contract costs more than class 2. By contrast, those in class 2 gave greater priority to service type and physician's reputation.

The total sample and both classes preferred home visit as opposed to clinic visit, a 'relatively good' physician's reputation and lower contract costs. The population mean

Table 1 Sample demographic characteristics (n=545)

	N (%)/mean (SD)
Age (in years)	69.44 (5.80)
Gender	
Male	289 (53.03)
Female	256 (46.97)
Education	
No school education	226 (41.47)
Primary school	217 (39.82)
Junior high school or above	102 (18.71)
Marital status	
Married	420 (77.06)
Other*	125 (22.94)
Household	
Single	86 (15.78)
Spouse only	305 (55.96)
Other†	154 (28.26)
Self-reported health status	
Very unhealthy	20 (3.67)
Unhealthy	187 (34.31)
Moderately healthy	139 (25.5)
Healthy	177 (32.48)
Very healthy	22 (4.04)
Number of chronic diseases	
0	159 (29.17)
1	196 (35.96)
2	107 (19.63)
≥3	83 (15.23)
Region	
Yingzhou, Fuyang (north)	197 (36.15)
Jin'an, Lu'an (central)	176 (32.29)
Jingxian, Xuancheng (south)	172 (31.56)

*Other marital status includes unmarried, widowed and divorced.
†Other household members include children only or spouse and children.

and class 1 preferred the service package that included an add-on of the chronic disease service to the basic service.

Relative importance

We derived the RI for each attribute for the population and the two classes (figure 3). For the population, physician's reputation was the most influential attribute. The second was annual contract costs. Service type was the least important. Class 1 was the same as the mean population. Class 2 regarded physician's reputation as the most important and service package proved the least important.

Willingness to pay

We also estimated WTP for each attribute level (table 2). On average, respondents were willing to pay CNY 29 (US$ 4) more for a 'home visit' than a 'clinic visit'. They also were willing to pay CNY 45 (US$ 7) more for a 'basic service with chronic disease service', CNY 20 (US$ 3) more for a 'basic service with TCM service' and CNY 27 (US$ 4) more for a 'basic service with personalised service' than the 'basic service'. Moreover, they were willing to pay an additional CNY 55 (US$ 8) for a physician with 'average' reputation and CNY 108 (US$ 16) for one with 'relatively good' reputation than a physician with a 'relatively poor' reputation.

Class membership profile

We reported the results in the form of average marginal effects for ease of interpretation (online supplemental eTable 5). The results suggested that age, gender, education, self-reported health status and the number of chronic diseases were statistically significant predictors of class membership. Respondents who were older than 65, male, with a lower education level, self-reported to be 'healthy', and with less than one chronic disease were more likely to be assigned to class 1. The expected values for the five significant predictors are in figure 4.

DISCUSSION

The underuse of primary care services has become one of the major challenges the Chinese healthcare system is facing today. While the FDCS proposed in 2016 seems promising, patients still preferred visiting high-level hospitals even for mild diseases. Understanding patient preference for the attributes associated with FDCS is therefore important as this allows us to make more informed policy design to provide more effective basic health services and guide residents to the primary health service institutions. To this aim, this study carried out a DCE survey to examine elderly residents' preferences for FDCS.

Our results suggested that all four attributes (service type, service package, physician's reputation and annual contract costs) had a significant impact on patient choice. The rural elderly most valued the physician's reputation, defined as the competence and attitude of family doctors. This finding is consistent with previous non-DCE studies which reported that patients preferred doctors from secondary or tertiary hospitals because they believed that they possess greater skills than those from primary care clinics.[39] It is also in line with another DCE study of FDCS conducted in rural area of Shandong Province which included two attributes measuring competence and attitudes of doctors separately.[21]

The annual contract cost was the second most important attribute. As reported in a study that the importance of out-of-pocket was ranked next to the travel time in the severe health state scenario.[9] The Shandong DCE study also suggested that increasing the contract cost would significantly decrease the willingness to sign a contract with the family doctor team.[21]

Our study is the first to examine the patient preferences for the service contents of the FDCS. The rural

Table 2 The two-class latent class logit model estimates and willingness to pay

|		Class 1		Class 2		Mean preference‡	
		Est	**SE**	**Est**	**SE**	**Est**	**SE**
Share		0.831***	0.019	0.169***	0.019		
Asc1		2.799***	0.478	−0.309***	0.479	1.937***	0.400
Asc2		2.649***	0.477	−2.248***	0.415	1.823***	0.397
Service type	Clinic visit†						
	Home visit	0.629***	0.136	0.769***	0.211	0.653***	0.114
Service package	Basic service†						
	Basic service+chronic disease service	1.183***	0.151	0.575	0.408	1.081***	0.145
	Basic service+traditional Chinese medicine service	0.442*	0.257	0.522	0.328	0.455**	0.216
	Basic service+personalised service	0.669***	0.2	0.456	0.318	0.633***	0.176
Physician's reputation	Relatively poor†						
	Average	1.148***	0.441	1.580***	0.343	1.221***	0.364
	Relatively good	2.404***	0.405	2.696***	0.301	2.454***	0.332
Annual contract costs		−0.025***	0.006	−0.016**	0.006	−0.023***	0.005
Willingness to pay (CNY)§							
Service type	Clinic visit†						
	Home visit	25.192**	11.463	47.935**	24.389	29.029**	9.914
Service package	Basic service†						
	Basic service+chronic disease service	47.378**	17.1	35.827	24.959	45.429**	14.857
	Basic service+traditional Chinese medicine service	17.678**	6.612	32.541	23.211	20.186**	6.643
	Basic service+personalised service	26.769*	13.808	28.440	21.792	27.051**	12.079
Physician's reputation	Relatively poor†						
	Average	45.969*	24.567	98.501**	46.602	54.831**	21.103
	Relatively good	96.258**	31.002	168.066**	66.766	108.373***	27.03

***p<0.01; **p<0.05; *p<0.1.
†Reference.
‡Weighted average of coefficients over two classes.
§According to the Organization for Economic Co-operation and Development (OECD) data (https://data.oecd.org/conversion/exchange-rates.htm), the average annual exchange rate between US$ and CNY in 2019 was: US$ 1 = CNY 6.908, Accessed 30 March 2021.

elderly preferred services for chronic diseases over personalised services. Many studies have indicated that the family doctor system has been effective in the management of chronic diseases as it provides continuous, personalised and comprehensive services in addition to integrated prevention and treatment.[40–42] Over 70% of the participants in our study suffered from at least one chronic disease. Furthermore, the rural elderly have had a low education level, which often complicates the understanding and acceptance of an appropriate combination of personalised services.[43] The majority of the participants in this study did not choose TCM service over other services package, despite its proven effectiveness for the cure and treatment of chronic disease in other studies.[44 45] Therefore, an argument could be made for the need to offer an additional chronic disease service to the basic service.
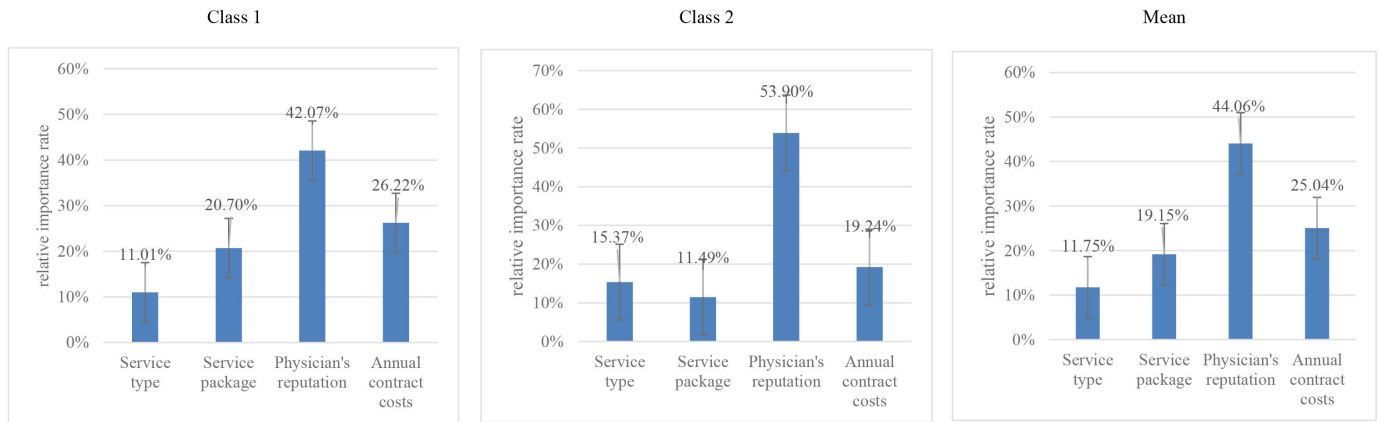
Figure 3 Relative importance of the attributes within each latent class and at the mean.

Although the rural elderly preferred home visit compared with clinic visit, this attribute was the least important which is consistent with those from previous studies.[43] Some expressed concerns about home visit, including the lack of appropriate medicine provided as well as the lack of relationship with the physicians. They also worried that home visit would reveal their poor physical health to others. Therefore, policymakers could focus on improving the quality of services provided rather than a wider range of service types.

The heterogeneous nature of preferences is an important consideration for policymakers who strive to improve the delivery of personalised primary healthcare services. In this study, gender, age, education, self-reported health status and the number of chronic diseases were identified as important indicators of that heterogeneity. Results from previous studies were consistent with our findings.[46–49] Healthy older men with lower education levels who did not have chronic diseases were more likely to focus on the quality of the services they chose. However, younger women with chronic diseases and who had higher levels of education prioritised service types and their costs. Thus, efforts should be made to improve the quality of FDCS, make the costs of service reasonable and provide personalised service types to the elderly patients with different characteristics.

CONCLUSION

Our study suggests that the reputation of the physician could be one of the most important factors for elderly patients in their choice of FDCS. The findings suggest a need to strengthen the training of the family doctor team to meet the potential demand for their services. Particular attention should be paid to developing the doctors' medical skills and doctor–patient communication skills as ways to improve service quality. Annual contract costs and the service package options could also be important factors in deciding to utilise FDCS.
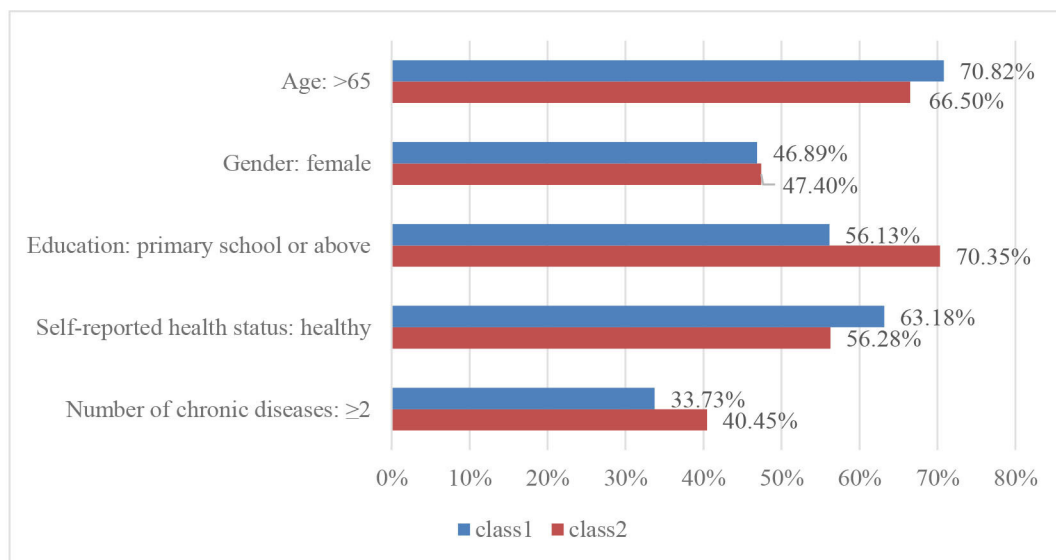
Figure 4 Profile of latent class membership for each class. Note: reference: age≤65; gender=male; education=no school education; self-reported health status=unhealthy; number of chronic diseases≤1. %: the posterior probability of being assigned to a class.

LIMITATIONS

The research team have made extensive efforts to ensure the quality of data. Only 11 of the participants failed the rationality test suggesting the methods implemented were effective and participants were overall engaged with the choice tasks. Nevertheless, this study still has several limitations. First, we were unable to include more attributes because of the limitations inherent to a DCE; the total number of attributes and levels that could be reasonably included while maintaining respondent comprehension and data quality was limited.[50] Second, the reliance on self-reported data created the risk of hypothetical bias. Third, the quality of the data may be affected by fatigue and cognitive constraints since the participants are the elderly with chronic conditions and a low education level. Fourth, this study only estimated the preference of rural elderly for the FDCS in a single province of China. Expanding the research to other provinces and undertaking comparison between rural and urban areas are warranted.

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