

# Analyzing preferences for family doctor contract services in rural China: a study using discrete choice experiment

**Peipei Fu**

Shandong University

**Yi Wang**

Shandong University

**Shimeng Liu**

Fudan University

**Jiajia Li**

Shandong University

**qiufeng Gao**

Shaanxi Normal University

**Chengchao Zhou** (✉ [zhouchengchao@sdu.edu.cn](mailto:zhouchengchao@sdu.edu.cn))

<https://orcid.org/0000-0002-9364-3579>

**Qingyue Meng**

Peking University

**Sean Sylvia**

University of North Carolina at Chapel Hill

---

## Research article

**Keywords:** primary care, family doctor contract services, rural resident preferences, China

**Posted Date:** December 31st, 2019

**DOI:** <https://doi.org/10.21203/rs.2.11846/v3>

**License:** © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

**Version of Record:** A version of this preprint was published on July 25th, 2020. See the published version at <https://doi.org/10.1186/s12875-020-01223-9>.

# Abstract

**Background:** Preliminary evaluations have found that family doctor contract service has significantly controlled medical expenses, better managed chronic diseases, and increased patient satisfaction and service compliance. In 2016, China proposed the establishment of a family doctor system to carry out contract services, but studies have found uptake and utilization of these services to be limited. This study aimed to investigate rural resident preferences for FDCS from the public perspective in China.

**Methods:** A discrete choice experiment (DCE) was performed to elicit respondent preferences towards FDCS among rural residents in China. Attributes and levels were established based on literature review and qualitative methods. Five attributes consisted of cost, medicine availability, reimbursement rate, competence of the family doctor, and attitude of the family doctor were evaluated using mixed logit model.

**Results:** A total number of 609 residents were included in the main DCE analysis. Respondents valued high competence (coefficient 2.44, [SE 0.13]) and good attitude (coefficient 1.42, [SE 0.09]) of the family doctor most. Cost was negatively valued (coefficient -0.01, [SE 0.01]) as expected. The preference heterogeneity analysis was conducted after adjusting the interaction terms, we found that rural residents with higher educational attainment prefer good attitude than those with lower educational attainment counterparts. The estimated willingness to pay (WTP) for “high” relative to “low” competence was 441.13 RMB/year and WTP for a provider with a “good” relative to a “poor” attitude was 255.77 RMB/year.

**Conclusion:** This present study suggested priorities should be given to strengthen and improve the quality of primary health care including family doctors’ competence and attitudes so as to increase the uptake of signing FDCS. The contract service package including annual cost, insurance reimbursement rate and individualized services should be redesigned and become congruent with residents with different health status and their stated preferences.

## Background

Foundational for population health, expanding access to quality primary care services are key priorities for all public health systems[1, 2]. In developed countries, family doctors are at the forefront of primary care delivery and play an indispensable role in providing comprehensive primary health services[3, 4]. While terms used to describe family doctors vary internationally—such as general practitioner (GP) and family physician—we define ‘family doctor’ in this study as a physician, a nurse or a public physician with specialist training in primary care and provide family doctor contract services.

Previous evidence in a variety of countries has emphasized the role of primary care in achieving better population health outcomes while reducing costs. Indeed, physicians and public health systems providing more coordinated services have consistently achieved better health outcomes[3, 5]. Moreover, primary health care provided by family doctors has been shown to be highly cost-effective, preventing potential health complications and the need for specialized care through early prevention and

screening[6, 7].Preliminary evaluations have found that family doctor contract service has significantly controlled medical expenses, better managed chronic diseases, and increased patient satisfaction and service compliance[8-10]. Family doctors often play the role of a “gatekeeper” in the primary health care system, ideally promoting the efficient allocation of health resources and inhibiting excessive medical costs associated with more expensive procedures[11, 12].

In order to provide comprehensive, coordinated, and preventative public health care to all citizens, the Chinese government proposed the establishment of a family doctor system to carry out contract services in 2016[13]. Family doctor contract services (FDCS) are provided by a care team which usually consists of general practitioners, nurses, and public health physicians. The family doctor contract service is at its early stage, and general practitioners play the most important role in a family doctor team. Most of the existing research indicated that general practitioners in rural areas in China have provided more than 95% of primary care and plays key role in the primary health gatekeeper[14]. The general practitioner is contracted to provide basic medical care services, public health services, and individualized health management. Under the working principles of full notification, voluntary contract signing and standardized service, general practitioners establish a long-term and stable service relationship with the serving families through contract signing. The National Medical Reform Office stipulates a full coverage rate by 2020.

In order to improve the implementation of FDCS, it is important to understand residents' willingness to sign family doctors and explore its determinants. However, few studies reflect public views and preferences on FDCS in China. In recent years, researches in China mainly focus on the significance of establishing family doctor system[15],and most of the research is in urban area[15-18].There are also some explore the effect of family doctor policy[19-21].Some researchers have noted the importance of establishing stable relationships with family doctor[22], but little is known about determinants underlining this scheme especially among rural residents with different health status. In terms of methods, logistic regression was mainly used to search for influencing factors in the study of family doctors in China. The existing international literature suggests that perceived quality of care[23-25]can be an influential determinant of demand for family doctor services alongside out-of-pocket costs and insurance coverage [26, 27]. Moreover, demand varies with socioeconomic characteristics and health status of patients[23-25]. A better understanding of the determinants of demand for FDCS contracts, particularly attributes of the care provided in addition to pricing structure, are critically important in designing and refining family doctor services as China continues to invest in its primary healthcare system. The current study seeks to address this gap by using discrete selection experiments to explore residents' preferences for FDCS, so as to provide useful information in designing and implementing family doctor service scheme for the next stage.

## Methods

Discrete choice experiments (DCEs) are a quantitative method aiming at eliciting stated preferences. This method draws on Lancaster’ consumer theory which assumes health-care interventions and policies are

the combinations of attributes, and individuals' choice on these goods is based on various levels of attributes[28]. The DCE model has been widely used to predict the probability of take-up of various contract service plans and to determine preferences for goods services in lieu of observations on real-world market interactions.

## **DCE Questionnaire Design**

To select representative attributes that could clearly depict and capture resident preferences for family doctor teams under the FDCS, we developed a DCE questionnaire through qualitative methods, which included a literature review as well as interviews with key informants. We first reviewed international and domestic literatures on primary health care providers and patients' choices of doctors to identify which attributes were highly relevant to our study. A pilot study recruited 3 rural residents who have signed FDCS, 2 village doctors and 2 township hospital managers from Zhangqiu county located at central of Shandong province, to encourage them to share views on 1) how has family doctor service mechanism been implemented; 2) influencing factors for residents considered to sign family doctors with contract services; 3) hinder factors which deter awareness and acceptance of this service scheme; 4) policy recommendations to increase family doctor signing rate. Using semi-structured interview, we collected data about what factors influence rural residents most when they sign family doctors. A DCE workshop with 2 DCE experts was also conducted in March 23-25, 2018. The DCE experts gave valuable suggestions on attributes description, determine the levels for each attribute, and experiment designs. Combined with literature review results and the common suggestions raised by FGD participants, five determinants which impact rural residents' decision making most were selected.

The five attributes of FDCS contracts described below were determined to be most relevant to uptake in our setting. A full description of the attribute selection and questionnaire implementation process is available in the Appendix.

(1) Contract Price: This attribute refers to the annual signing expenses for an individual resident. After we reviewed public policies and guidelines on FDCS enacted by central and local governments, three levels were specified for this attribute: 0CNY, 100CNY and 200 CNY per year [29, 30].

(2) Availability of medicines: Medicine availability refers to the ability to obtain affordable medicines necessary to maintain one's health[31]. We selected this attribute to indicate the accessibility of health services provided by the contracted family doctor We divide this attribute into two levels in our questionnaire: shortage and sufficient.

(3) Insurance reimbursement rate: While health insurance was recently universalized in China, insurance reimbursement rates vary by plan and scheme. Previous studies have shown that a close relationship between medical insurance and patient choice of medical treatment[32]. Referring to reimbursement guidelines from the Shandong health commission, we divide this attribute into three levels in our questionnaire: standard reimbursement, 5% more than standard, and 10% more than the standard reimbursement rate.

(4) Competence of the family doctor. The competence and skill of the physician is considered of great importance to patients[25, 33, 34]. This attribute refers to the resident's attention to physician credentials and perceived competence when selecting a family doctor. We divide this attribute into three levels in our questionnaire: low, medium and high.

(5) Attitude of the family doctor. Many studies have shown a correlation between doctors' attitudes and patients' medical behaviors[35-37]. Thus, we sought to investigate the relative importance of perceived attitude in the decision to sign a family doctor team. Three levels were divided in the research: poor, normal and good.

Consistency test was performed to ensure each respondent were making realistic trade-offs and checking validity of this research. In this study, one repeated choice set question was added in each version of the questionnaire to check preference consistency of each respondent. We excluded the information for respondent who failed the consistency test.

## **Data Collection**

This study was conducted in Shandong province, the second largest province in China. Within Shandong, 3 cities—Binzhou, Zibo, and Liaocheng—located in the northeast, central, and west regions of the province, respectively, were selected as study sites. Multi-stage random sampling was used to choose a sample of respondents representative of rural residents in each selected city. To do so, 2 counties in each city were first chosen at random. Within each county, 5 townships (the administrative level below the county) and 24 households in each township were chosen randomly. In this study, the questionnaire was administered to 720 residents aged 18 and above, which is higher than the 600 observations recommended as sufficient for preference heterogeneity analysis[38]. For the 720 questionnaires, 20 of them were incomplete, then we dropped these ineligible surveys. There were 91 surveys failed to pass the consistency test in the questionnaire and were excluded. Finally, 609 questionnaires were included in the statistical analysis.

Data was collected in this study through a DCE questionnaire administered by teams of trained enumerators at study households. Since most of the respondents were low educated, face-to-face interview method was applied to ensure each respondent clearly understand the whole survey. At the beginning of each interview, enumerators described the purpose of the study and sought participant consent. Following consent, a brief introduction of the FDCS, recent public health policies launched by the government, and attributes in each choice set were explained. Then, a one-page introduction of the task with warm-up choice question was followed to check if the respondent could fully understand the questionnaire and make tradeoff in each pair-wise choice set. Each participant was asked to imagine different hypothetical scenarios in which different family doctor contract service plans are registered to enhance their health status. They were then asked to make discrete choices between 10 pair-wise combinations of scenarios. On average, it took around 50 minutes to complete the whole questionnaire and the survey returned to interviewer immediately. A sample questionnaire choice is shown in Table 1.

**Table1** An example of a DCE question.

<b>Attributes</b>	<b>Contract plan 1</b>	<b>Contract plan 2</b>
Cost of the contract	200CNY/year	100CNY/year
Availability of medicine	Easy	Difficult
Reimbursement rate	Standard	10% more
Competence of family doctor	Medium	Low
Attitude of family doctor	Good	Normal
<b>Which contract plan would you choose?</b>	<input type="checkbox"/>	<input type="checkbox"/>

Please consider you are going to enroll in the contract service of family doctor for yourself. Of the following two contract plans, which contract plan would you choose?

## Statistical Analysis

Data were first double-entered and coded using Epidata version 3.1, and the final data was then transferred to STATA 14.2 for all statistical analyses.

Random utility theory provided the theoretical foundation for the analysis of DCEs data[39]. Mixed logit models were used to estimate the utility of registering with one contract plan[39]. We assumed that respondents were relatively homogenous on demographic measures, hence their preference would be associated with choice variables. The utility function as specified as follows:

$$\begin{aligned}
 U_i = & \alpha + \beta_1 cost + \beta_2 medicine\_sufficient + \beta_3 reimbursemen\_5\%more \\
 & + \beta_4 reimbursement\_10\%more + \beta_5 competence\_medium \\
 & + \beta_6 competence\_high + \beta_7 attitude\_normal + \beta_8 attitude\_good
 \end{aligned}$$

All attributes were dummy coded except for the costs of the contract, which was specified as a continuous variable to facilitate the calculation of willingness to pay (WTP). WTP was calculated to measure the trade-offs among various contract attributes. WTP was estimated as the ratio of the coefficient to the negative of the coefficient on the contract cost attribute. The coefficients indicated the relative importance of the worst values for the categorical variables.

## Results

### Respondents' characteristics

609 rural residents from 3 cities of Shandong province were selected in the final sample for analysis, after excluding 91 respondents who failed to pass the consistency test. The characteristics of respondents are reported in Table 2. Respondents were aged 18-88 years old (mean=51.21years old), and about half (52.38%) were female. 20.03% of respondents had completed high school or above, and 54.70% reported their annual household income to be less than 40,000 RMB (\$5960.19 based on exchange rate of 6.71). The percentage of participants whose household, in the past six months, included pregnant women or children younger than six years were 15.93% and 27.91%, respectively. 32.40% of respondents had chronic diseases.

**Table 2** Demographic characteristics of 609 respondents, in China

<b>Characteristics</b>	<b>N=609</b>	<b>%</b>
<b>Age, years Mean±SD</b>	51.21	±13.05
<b>Sex</b>		
Female	290	47.62%
Male	319	52.38%
<b>Education</b>		
Primary school degree or below	209	34.32%
Junior school degree	278	45.65%
High school degree or above	122	20.03%
<b>Marital status</b>		
Married	571	93.76%
Unmarried	38	6.24%
<b>Household income per year<sup>a</sup></b>		
<20000 CNY	161	26.44%
20000-40000 CNY	172	28.24%
40000-70000 CNY	175	28.74%
>70000 CNY	101	16.58%
<b>With chronic diseases</b>		
Yes	197	32.35%
No	412	67.65%
<b>With pregnant women</b>		
Yes	97	15.93%
No	512	84.07%
<b>With 0-6 children</b>		
Yes	170	27.91%
No	439	72.09%
<b>Region</b>		
Zibo	210	34.48%
Liaocheng	197	32.35%
Binzhou	202	33.17%

**Source** Analysis data from questionnaire of rural residents in China. **Notes** The average exchange rate between US\$ and CNY in 2018 was: US\$1= CNY6.71.

Table 3 shows the main effects of each attribute on utility for the mixed logistic models. The results indicate that on average residents prefer an FDCS with lower costs, higher reimbursement rate, a sufficient availability of essential drugs, a highly competent family doctor and a better attitude. All attributes were statistically significant at 1% level. What we want to emphasize is that the size of coefficients indicated that “competence of family doctors” and “attitude of family doctors” were the most valued attributes.

We also estimated the WTP, which measures the amount an individual would give up to improve an attribute. The WTP estimates derived from the logit model indicate that respondents would pay 441.13CNY for a family doctor with high diagnosis and treatment competence (relative to low), 255.77CNY for a family doctor with a warm and friendly attitude (relative to bad), 114.14CNY to have sufficient access to essential drugs, and 81.66CNY to obtain an insurance reimbursement rate 10.00% higher than the standard. Thus, doctors' competence and attitude had the highest impact on rural residents' demand for FDCS contracts.

**Table 3** Main effect model estimation and residents' willingness to pay for different attributes of contracted services

Attributes	Coefficient <sup>a</sup>	WTP <sup>b</sup> (CNY)
	(SE)	(95% CI)
<b>Contract costs</b>	-0.01*** (0.01)	- -
<b>Availability of medicine (easy)</b>	0.63*** (0.06)	114.14 (87.55~140.74)
<b>Reimbursement rate 5% more</b>	0.31*** (0.06)	56.02 (33.24~78.81)
<b>Reimbursement rate 10% more</b>	0.45*** (0.08)	81.66 (53.19~110.14)
<b>Medium competence of family doctor</b>	1.24*** (0.08)	224.73 (188.37~261.10)
<b>High competence of family doctor</b>	2.44*** (0.13)	441.13 (377.92~504.35)
<b>Normal attitude of family doctor</b>	1.01*** (0.08)	182.18 (148.04~216.33)
<b>Good attitude of family doctor</b>	1.42*** (0.09)	255.77 (212.22~299.34)

**Source** Analysis data from questionnaire of rural residents in China. **Notes** Estimates of WTP through calculating the ratios of coefficients between each attribute level and the contract cost attribute. <sup>a</sup>The coefficients represents the mean relative utility of each attribute conditional on other attributes in a choice set, and the bigger the coefficient means more preferred attribute. <sup>b</sup>The average exchange rate between US\$ and CNY in 2018 was:US\$1= CNY6.71. 95%CI=95% confidence interval, SE= standard error, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The result of standard deviation (SD) suggesting preference heterogeneity existed among the respondents. Preferences heterogeneity analysis was conducted with interaction terms of sex, age, educational attainment and health status (whether have chronic diseases) which shows in the Appendix. As for sex, the reference group was the female group. In terms of education, the reference group was the residents without chronic disease. The results from Table 4 indicate that individuals with higher education attainment value a better attitude compared with those lower educational residents. Younger residents value the easy availability of medicine more than older people. There were no statistically significant attributes interactions with sex and health status, indicating that no preference heterogeneity among the two demographic characteristics.

**Table 4** Interaction effects model estimation for attributes with education

Attributes and levels	Coefficient	SE
Contract costs	-0.01***	0.01
Availability of medicine (easy)	0.47***	0.11
Reimbursement rate 5% more	0.27***	0.10
Reimbursement rate 10% more	0.42***	0.12
Medium competence	1.33***	0.12
High competence	2.32***	0.18
Normal attitude	0.81***	0.13
Good attitude	1.16***	0.13
Contract cost*education_m	0.01	0.01
Contract cost*education_h	0.01	0.01
Availability of medicine (easy)* education_m	0.34***	0.14
Availability of medicine (easy)* education_h	0.10	0.17
Reimbursement rate 5% more* education_m	0.12	0.13
Reimbursement rate 5% more* education_h	-0.05	0.17
Reimbursement rate 10% more* education_m	0.08	0.17
Reimbursement rate 10% more* education_h	0.05	0.21
Medium competence* education_m	-0.11	0.14
Medium competence* education_h	-0.17	0.18
High competence* education_m	0.28	0.20
High competence* education_h	0.01	0.24
Normal attitude* education_m	0.17	0.16
Normal attitude* education_h	0.65***	0.21
Good attitude* education_m	0.21	0.16
Good attitude* education_h	0.87***	0.21

Notes: SE= standard error, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Discussion

According to proposed plans for FDCS, all Chinese residents shall be covered by family doctor teams and receive contracted services by the year 2020. This clearly implies that the first five-year stage of the implementation will rest on establishing and refining this policy. However, in order to attain this goal, it is urgent to consider and reflect public views on family doctor services, especially rural residents' preferences for contract services. This is extremely important given criticisms of the low incentives to participate in FDCS as evidenced by the current low FDCS signing rate.

The key finding of this study is that rural residents highly value health care quality, including doctors' competence and attitude and these attributes strongly influence the uptake of FDCS contracts. This finding is in line with previous studies elsewhere. Previous studies in other settings have found that patients' choices have to be significantly influenced by the quality and experience of general practitioners[40, 41]. A previous study from China also found that the ability of primary healthcare providers was the most important factor affecting residents' willingness to sign contracted services[20]. This suggests a major challenge for the FDCS program, particularly in remote rural regions lacking high-quality medical resources and facing shortages of qualified primary care providers. Several studies have highlighted the poor quality of primary care services in rural areas of China. A recent study found that most general practitioners working in primary health facilities do not have college education experience and had only received 2-3 years medical training programs in China[42]. Another study employing standardized patients found that general practitioners working at village clinics were able to correctly treat presumptive cases of angina 61.00% of the time and dysentery 45.00% of the time[43]. Thus, the feasibility of FDCS may depend critically on improving the quality of primary care.

In this study, respondents also regarded the attitude of the family doctor towards patients to be important. This result is also consistent with previous research, which has suggested that patients valued open communication with their health care providers, underscoring a desire for good attitudes from doctors [44-46]. Good attitude could enhance patients' trust in family doctors and promote health care continuity. Patients with regular primary care doctors have been found more likely to adhere to advice on treatment and prevention, which improved patient satisfaction rates and decreased hospital admissions over time[47, 48]. The preference heterogeneity analysis indicated that rural residents with higher education attainment valued doctors' attitude much more than those with lower education attainment. One possible explanation for this result is that individuals with high education attainment have more expectations for kind and patient treatment. This finding is also consistent with research suggesting that good attitude of doctors can significantly improve healthcare quality, as general practitioners can better treat and guide patients and their healthcare issues when trust is gained over time[47, 49].

Survey participants also considered medicine availability as an important determinant in their FDCS selection and registration decision. Similar to this finding, a DCE study reported that the availability of necessary medicine at health facilities significantly impacted the probability of the patient utilizing those public facilities[50]. Currently, China has a widely recognized issue of sufficient access to essential drugs at rural primary health service institutions, despite China's national essential drug policy aiming to guarantee access[8]. Because of this lack of availability, residents who have already signed general practitioners and patients with chronic diseases often have to purchase drugs at secondary or other health facilities, undermining the effectiveness of contract services.

Monetary attributes, including contract cost and reimbursement rate, were found to have the smallest effects. The model estimation results indicate that increasing contract cost would decrease signing willingness significantly. These results are supported based on our qualitative interviews and focus group discussion. Qualitative data collected from the pilot-study indicated that paying money for service

contract would lower the willingness to sign FDCS for rural residents with low household income. However, they value the outcome and benefit that FDCS could bring to them more than contract payment. If the service provided by general practitioners could improve their health status and bring much convenience of health utilization, they would like to pay and sign the contract. Hence, policy makers should adjust the service plans to make them in line with residents' health demand and make the cost of each service plan reasonable.

Our study had a number of limitations. Due to resource constraints, this DCE study was conducted in a single province, which may limit the generalizability of the study results to other areas in China. Regarding the WTP, one previous study has suggested that the levels of the cost attribute can affect the estimate[50]. In this study contract cost levels were determined based on a pilot study and chosen to correspond to existing proposed implementations of the policy. Finally, since each participant was forced to make a choice in each pair-wise choice set, respondents may hold alternative choices and explanations not captured in our questionnaire, such as not registering with any family doctor or going only to the same family doctor. Future research should include qualitative studies to capture respondents' choices and behaviors more realistically.

## **Conclusions**

This study found that rural residents valued health care quality characteristics—such as doctor competence, treatment skills, and attitude of family doctors—more than non-quality attributes, which include an increased insurance reimbursement rate, a sufficient availability of essential drugs, and contract cost. These findings clearly suggest that policy makers must prioritize improving the quality of family doctors to increase the uptake of FDCS. Specifically, policies should focus on improving family doctors' competence, incentivize doctors to engage in patient-centered services, and encourage more trustful and respectful patient-provider relationships to ensure the quality of family doctor contract services. Results also suggest that uptake may be improved by offering tailored contract service packages in line with residents' health status.

## **List Of Abbreviations**

FDCS: family doctor contract service; CNY: China Yuan

## **Declarations**

### **Ethics approval and consent to participate**

The Ethical Committee of Shandong University, School of Public Health approved the study protocol. The investigation was conducted after the informed consents of all participants were obtained.

### **Consent for publication**

Not applicable.

## Availability of data and materials

Not applicable.

## Competing interests

The authors declare that they have no competing interests.

## Funding

This study was supported by the National Science Foundation of China (71003067, 71473152 and 71774104), the China Medical Board (16-257), Cheeloo Youth Scholar Grant, and Shandong University (IFYT18032,IFYT181031,IFYT1810).The funding bodies had no role in the design, data collection, analysis, interpretation of the data, and writing of this article.

## Authors' contributions

PF and CZ and SS conceived the idea and polished the manuscript. PF and YW coded and analyzed data, PF wrote the manuscript. SL, QG, JL, CZ and QM participated in interpretation of the data. All authors read and approved the final manuscript.

## Acknowledgements

We thank the officials of local health agencies and all participants and staff at the study sites for their cooperation.

## References

1. Antezana FS, Chollat-Traquet CM, Yach D: **Health for all in the 21st century.** *World Health Statistics Quarterly Rapport Trimestriel De Statistiques Sanitaires Mondiales* 2000, **12**(1):1-2.
2. World Health Organization: **From Alma-Ata to Astana: Primary health care-reflecting on the past, transforming for the future.** 2018, **32**(11):409-430.
3. Lam CL, Yu EY, Lo YY, Wong CK, Mercer SM, Fong DY, Lee A, Lam TP, Leung GM: **Having a Family Doctor is Associated with Some Better Patient-Reported Outcomes of Primary Care Consultations.** *Front Med (Lausanne)* 2014, **1**:29.
4. Barbara S, Leiyu S, James M: **Contribution of primary care to health systems and health.** *Milbank Quarterly* 2010, **83**(3):457-502.
5. Starfield B, . **Is primary care essential?** *Lancet* 1994, **344**(8930):1129-1133.
6. Ferrer RL, Hambidge SJ, Maly RC: **The essential role of generalists in health care systems.** *Annals of Internal Medicine* 2005, **142**(8):691-699.
7. Starfield B: **Global health, equity, and primary care.** *Journal of the American Board of Family Medicine Jabfm* 2007, **20**(6):511.

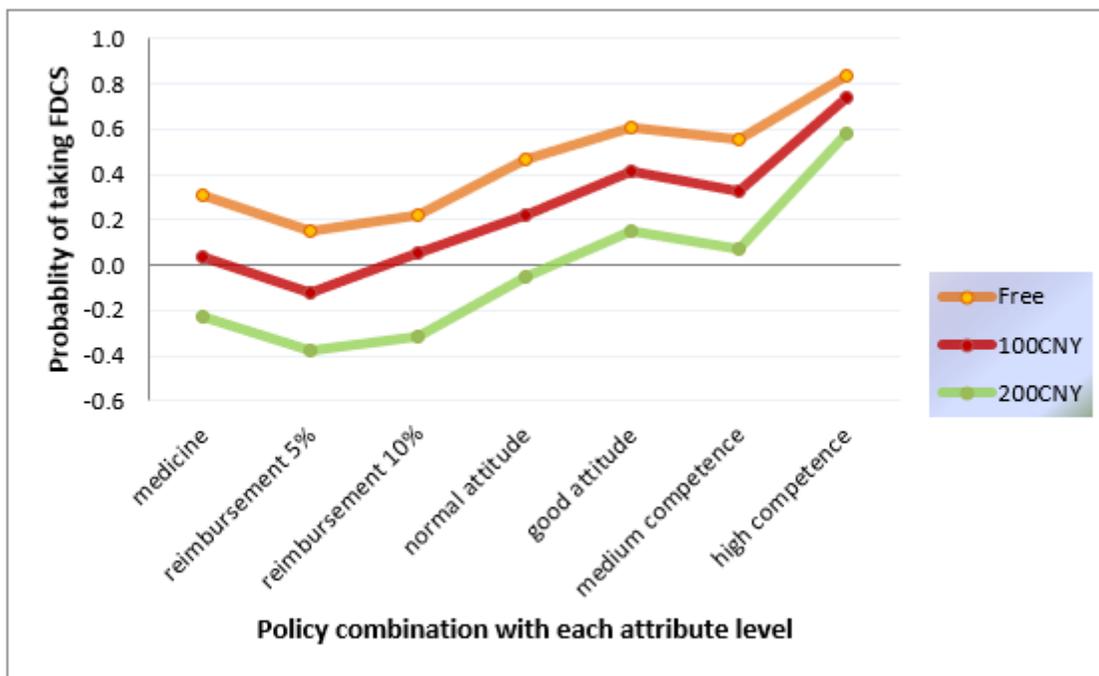
8. Wei L, Yi-min Z, Hong L, De-yu Z, Yan-ting L, Shan-shan L, Jiao-ling H: **The performance evaluation based on the demand side of the family doctor contract service: A focus on chronic diseases.** *Chinese Journal of Health Policy* 2016, **9**(8):23-30.
9. Wei W, Shang-wu Z, Ju-yang X: **Exploration of Family Doctor Contract Service Mechanism in China.** *Chinese General Practice* 2016, **19**(10):1129-1132.
10. Sun X, Tan X, Zhu Y, Chen W, Zhou Z, Liu J, Yu S, Chen W, Li Y, Chen S *et al*: **Efficacy of a type 2 diabetes self-management model with family doctor team support in southern China: a randomised controlled trial.** *The Lancet* 2017, **390**:S8.
11. Xue Z, Wenhua T: **Effect of gatekeeper and inspirations of the family physician system in China.** *Chinese Journal of Social Medicine* 2013, **30**(2):115-117(Chinese).
12. Wei L, Yimin Z, Hong L, Deyu Z, Yanting I, Shanshan L, Jiaoling H: **The performance evaluation based on the demand side of the family doctor contract service: A focus on chronic diseases.** *Chinese Journal of Health Policy* 2016, **9**(8):23-30(Chinese).
13. National Health and Family Planning Commission: **Guidline on promoting familiy doctor contract service.** 2016, **1**.
14. Qing-Yan SI: **Challenges and Solutions for Training about Contractual Services for On-site Primary Physicians before Transferring to the Position of Family Doctors.** *Chinese General Practice* 2018.
15. Liang H, Xiao-Lin HE: **The Changning model in the exploration and reform of Chinese family doctor system.** *Chinese Journal of Health Policy* 2017.
16. Huang JL, Liang H, Zhang YM, Wang XG, Zhang WS, Zhang JM, Wang C, Chen X: **Promoting the localization dilemma and strategy for the family doctor system: A case study of Hongkou District,Shanghai.** *Chinese Journal of Health Policy* 2016.
17. Pan YH, Liu D, Cao HT: **SWOT Analysis on the Implementation of Family Physician System in Shanghai.** *Chinese General Practice* 2012.
18. Jiang-Jiang HE, Yang YH, Zhang TY, Xie CY, Tang ZQ, Cao M, Liu HW, Shan-Lian HU: **Progress and bottlenecks of family doctor system in Shanghai.** *Chinese Journal of Health Policy* 2014.
19. Wei LU, Zhang YM, Liang H, Zhao DY, Yan-Ting LI, Liu SS, Huang JL: **The performance evaluation based on the demand side of the family doctor contract service: A focus on chronic diseases.** *Chinese Journal of Health Policy* 2016.
20. Liang-chen W, Min G, Ping J, Min-jie Z, Xin-ping Z, Hong L, Jiao-ling H, Shan-shan L, Yi-min Z: **[Community Residents' Awareness and Willingness towards Contractual Services from Family Doctors].** *Chinese General Practice* 2018, **21**(4):401-406.
21. Zhang BY, Huang JL, Xiao-Lin HE, Zhang YM, Xiao-Jing YE, Zhao J, Zeng JY, Shen Y: **Effectiveness comparison of different interventions of diabetes management in one Shanghai community.** *Chinese Health Resources* 2013.
22. Hou J, Jun LU, Qiao L: **Exploration of Implementing Contractual Service Relationship Between Family Doctor and Residents in Rural Communities.** *Chinese Primary Health Care* 2014.

23. Boonen LH, Schut FT, Donkers B, Koolman X: **Which preferred providers are really preferred? Effectiveness of insurers' channeling incentives on pharmacy choice.** *Int J Health Care Finance Econ* 2009, **9**(4):347-366.
24. Groenewoud S, Van Exel NJ, Bobinac A, Berg M, Huijsman R, Stolk EA: **What Influences Patients' Decisions When Choosing a Health Care Provider? Measuring Preferences of Patients with Knee Arthrosis, Chronic Depression, or Alzheimer's Disease, Using Discrete Choice Experiments.** *Health Serv Res* 2015, **50**(6):1941-1972.
25. Victoor A, Delnoij DM, Friele RD, Rademakers JJ: **Determinants of patient choice of healthcare providers: a scoping review.** *BMC Health Serv Res* 2012, **12**:272.
26. Layte R, Nolan A, McGee H, O'Hanlon A: **Do consultation charges deter general practitioner use among older people? A natural experiment.** *Soc Sci Med* 2009, **68**(8):1432-1438.
27. Zhao Y, Lin J, Qiu Y, Yang Q, Wang X, Shang X, Xu X: **Demand and Signing of General Practitioner Contract Service among the Urban Elderly: A Population-Based Analysis in Zhejiang Province, China.** *International Journal of Environmental Research and Public Health* 2017, **14**(4):356.
28. Lancaster KJ: **A New Approach to Consumer Theory.** *Journal of Political Economy* 1966, **74**(2):132-157.
29. **Guidance on Family Doctor Contract Service Fees in Qingdao city.** 2017.
30. **Notice on promoting family doctor contract service in 2017.** 2017.
31. YangJun: **The influence of the amendment of TRIPS on the accessibility of AIDS drugs in China and its countermeasures.** *Xinjiang social science* 2006(2):77-80 (Chinese).
32. Xiaoqing G, Mingxiang Y, Kai H: **Reimbursement gap, patient behavior and medical expenses- A three-stage dynamic game analyses.** *Systems Engineering-Theory & Practice* 2014, **34**(11):2974-2983 (Chinese).
33. Santos R, Gravelle H, Propper C: **Does Quality Affect Patients' Choice of Doctor? Evidence from England.** *Econ J (London)* 2017, **127**(600):445-494.
34. Das J, Holla A, Das V, Mohanan M, Tabak D, Chan B: **In urban and rural India, a standardized patient study showed low levels of provider training and huge quality gaps.** *Health Aff (Millwood)* 2012, **31**(12):2774-2784.
35. Saultz JW: **Interpersonal Continuity of Care and Patient Satisfaction: A Critical Review.** *The Annals of Family Medicine* 2004, **2**(5):445-451.
36. Cheraghi-Sohi S, Hole AR, Mead N, McDonald R, Whalley D, Bower P, Roland M: **What patients want from primary care consultations: a discrete choice experiment to identify patients' priorities.** *Ann Fam Med* 2008, **6**(2):107-115.
37. Coxon D, Frisher M, Jinks C, Jordan K, Paskins Z, Peat G: **The relative importance of perceived doctor's attitude on the decision to consult for symptomatic osteoarthritis: a choice-based conjoint analysis study.** *Bmj Open* 2015, **5**(10):e009625.

38. Wang B, Chen G, Ratcliffe J, Afzali HHA, Giles L, Marshall H: **Adolescent values for immunisation programs in Australia: A discrete choice experiment.** *PLoS One* 2017, **12**(7):e0181073.
39. Organizaiton WH: **How to Conduct a Discrete Choice Experiment for Health Workforce Recruitment and Retention in Remot and Rural Areas: A User Guide with Case Studies.** In.; 2012.
40. Schafer WLA, Boerma WGW, Schellevis FG, Groenewegen PP: **GP Practices as a One-Stop Shop: How Do Patients Perceive the Quality of Care? A Cross-Sectional Study in Thirty-Four Countries.** *Health Serv Res* 2017.
41. Cernauskas V, Angeli F, Jaiswal AK, Pavlova M: **Underlying determinants of health provider choice in urban slums: results from a discrete choice experiment in Ahmedabad, India.** *BMC Health Serv Res* 2018, **18**(1):473.
42. Song K, Scott A, Sivey P, Meng Q: **Improving Chinese primary care providers' recruitment and retention: a discrete choice experiment.** *Health Policy Plan* 2015, **30**(1):68-77.
43. Sean S, Yaojiang S, Hao X, Xin T, Huan W, Qingmei L, Alexis M, Scott R: **Survey using incognito standardized patients shows poor quality care in China's rural clinics.** *Health Policy & Planning* 2015, **30**(3):322-333.
44. Muhlbacher AC, Bethge S, Reed SD, Schulman KA: **Patient Preferences for Features of Health Care Delivery Systems: A Discrete Choice Experiment.** *Health Serv Res* 2016, **51**(2):704-727.
45. Vick S, Scott A: **Agency in health care. Examining patients' preferences for attributes of the doctor-patient relationship.** *J Health Econ* 1998, **17**(5):587-605.
46. Whitaker KL, Ghanouni A, Zhou Y, Lyratzopoulos G, Morris S: **Patients' preferences for GP consultation for perceived cancer risk in primary care: a discrete choice experiment.** *Br J Gen Pract* 2017, **67**(659):e388-e395.
47. Schers H, Webster S, van den Hoogen H, Avery A, Grol R, van den Bosch W: **Continuity of care in general practice: a survey of patients' views.** *Br J Gen Pract* 2002, **52**(479):459-462.
48. Gray DP, Evans P, Sweeney K, Lings P, Seamark D, Seamark C, Dixon M, Bradley N: **Towards a theory of continuity of care.** *J R Soc Med* 2003, **96**(4):160-166.
49. Turner D, Tarrant C, Windridge K, Bryan S, Boulton M, Freeman G, Baker R: **Do patients value continuity of care in general practice? An investigation using stated preference discrete choice experiments.** *J Health Serv Res Policy* 2007, **12**(3):132-137.
50. Honda A, Ryan M, van Niekerk R, McIntyre D: **Improving the public health sector in South Africa: eliciting public preferences using a discrete choice experiment.** *Health Policy Plan* 2015, **30**(5):600-611.

## Figures

**Figure 1** Policy simulation with different attribute level



**Figure 1**

Policy simulation with different attribute level

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Appendix1221.docx](#)