Analysis of Factors Influencing the Willingness of Signing Family Doctors—Based on the Survey Data of Unsigned Residents in Jinan

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Keywords: Family Doctors, New and Old Kinetic Energy Conversion, Association Rule Analysis, Stepwise Regression Analysis.

Abstract. Family doctors are new types of doctors who provide comprehensive, continuous, effective, timely and personalized health care services and management for clients. In order to make the family doctor policy more smoothly, the article uses the collected survey data as a sample, using descriptive analysis, association rule analysis and stepwise regression analysis to explore the understanding and demand of the unsigned residents of Jinan on family doctors, and the factors affecting their signing contracts. Studies have shown that: (1) Residents have insufficient understanding of family doctors, and the results of association rules show that migrant workers, low-income seniors, and female student groups have low levels of understanding of family doctors and relatively low willingness to sign; (2) The construction of medical system informatization needs to be accelerated; (3) For family doctors, residents are more worried about their low medical level, poor equipment and less service content; (4) Whether their family members are sick, their knowledge of family doctors, age and contract fees have a positive impact on signing intention. The government should continue to increase the promotion of family doctors and optimize service content.

Introduction

Research Background

With the rapid development of China's economy, the national living standard has been greatly improved, and people's expectations for improving the medical service system are increasingly strengthened. Documents issued by the Central Government, such as "Guiding Opinions on Promoting Family Doctors' Contracting Services" and "Opinions on Promoting the Development of "Internet + Medical Health"" are all promoting the development of family doctor service models and improving the service experience of the masses.

In combination with the big background of the old and the new kinetic energy conversion in shandong province, the Jinan Municipal Government issued the Notice on Printing and Distributing the Work Plan for the Construction of the First-Generation Joint of the Province of Jinan in 2018, which has made progress in the health care industry in the next four years. The plan includes the promotion of family doctors' contract coverage, development and improvement of a diversified health care system.

In recent years, the Jinan Municipal Health Planning Commission has carried out 12 major projects in the city, including 49 basic public health services. As of August 2017, 1,348 family doctor service teams have been established in the city. The number of registered residents is 2,142,100, and the 2.0 version has signed 250,000, of which 22,700 are poor.

Literature Review

Regarding the status quo of family doctor's contract service, Hu Xia and Huang Wenlong (2013)
believe that the current family doctor contract service needs to set up core service content, strict examination and approval mechanism for general practitioners, establish a complete training mechanism and an efficient internal incentive mechanism, and optimize the referral system for the first diagnosis [1]. Song Zhijie, Shang Beibei et al. (2018) believe that the family doctor system in China is facing the problems of imperfect medical information platform, insufficient number of family doctors, uneven quality of service, lack of community medical resources and low confidence of residents [2]. Sun Huajun and Chen Ping Ren (2018) believe that the government needs to improve the family doctor service system in grass-roots medical services and basic public health services after field research [3]. Fan Zhuanzhuan, Liu Yuanyuan et al. (2018) through systematic review of literature found that improving the family doctor contract service needs to give priority to solving social environmental problems and resource supply problems [4].

Many scholars have conducted many studies on the analysis of influencing factors of family doctors' willingness to sign contracts. In their research, Zhang Yuehong, Zhang Tuohong et al. (2013) found that the factors affecting the signing of contracts included marital status, whether the medical staff contracted for chronic diseases, and whether they suffered from chronic diseases [5]. Yuan Li, Zhou Changming et al. (2013) used logistic model to find that age is the most important factor for residents to sign a contract [6]. Zhao Jiangong, Zhang Xiangdong et al. (2015) used multiple stepwise logistic regression to find out whether they considered the content of family doctor's service, whether they thought family doctor's service was important, whether they had received health education, and whether they had urgent/critical/critical referral needs were the factors influencing residents' willingness to renew the contract [7].

**Innovation Points**

Under the background of accelerating the conversion of new and old kinetic energy in the health care industry, this paper launched an investigation on the unsigned residents of Jinan City, collected survey data, conducted empirical analysis, and provided data support for the promotion of family doctor policies, so that the promotion of family doctor policies can be "The right medicine" and ensure the smooth promotion of signing services. This paper uses association rule analysis and Python software for data mining, and conducts in-depth analysis, which is the first application in the field of family doctors.

**Survey Brief and Data Overview**

In the early stage of the investigation we designed the questionnaire. The questionnaire included basic information of residents, understanding of family doctors, willingness to sign for family doctors, signing fees and acceptable way of appointment. After fully consulting the experts' opinions and suggestions and many discussions, the questionnaires were revised. After the revision, the investigators were uniformly trained to fully understand the current family doctor policy, the development of family doctors abroad, and the questionnaire. related information. After the revision, the investigators were given unified training to fully understand the current family doctor policy, the development of family doctors abroad, and the relevant contents of this questionnaire. After all the preparatory preparations, in the period from February to April 2018, in Lixia District, Licheng District, Shizhong District, Huaiyin District, Tianqiao District, Changqing District, Zhangqiu District, Jiayang District, Shanghe District, Jiayang District and Pingen County, 20 streets were selected by stratified random cluster sampling method, and 30 households were selected from each street to conduct a questionnaire survey on residents of unsigned family doctors. In the process of questionnaire recovery, the quality of the questionnaire was strictly controlled, and eliminate the missing questionnaires and the questionnaires that do not match the logic before and after, and enter the data. A total of 600 questionnaires were distributed in this survey, and 560 were collected. After removing the invalid questionnaires, there were 537 valid questionnaires.

Of the 537 residents collected, 227 were men and 310 were women. There are 56 people under
the age of 20, 239 at the age of 20-40, 165 at the age of 40-60, and 77 over the age of 60. There are 159 people whose monthly income per capita is below 3,000 yuan, 191 people with 3,000 and 5,000 yuan, 145 people with 5,000 and 10,000 yuan, and 42 people with 10,000 yuan or more.

Empirical Analysis

Descriptive Analysis

| Option                                      | Proportion |
|---------------------------------------------|------------|
| I never heard of it; I don’t understand it at all | 24%        |
| I have heard of it, but I don’t know much about it | 61%        |
| Generally understanding, know the general service content | 13%        |
| Very understanding, know the specific service content | 2%         |

Table 1. Awareness of family doctors.

| Option                      | Number |
|----------------------------|--------|
| High medical express       | 318    |
| Low medical level          | 342    |
| Poor service attitude      | 214    |
| Not timely                 | 250    |
| Poor equipment             | 283    |
| Less service content       | 238    |
| Family information disclosure | 252   |

Table 2. Worried questions.

As you can see in Table 1, most of the respondents have heard of it but they don't know much about family doctors. Followed by those who have not heard of them, do not understand them at all, and generally understand and know most of their services. Only a small number of people have a good understanding of family doctors and each service. As can be seen in Table 2, respondents are worried that the more common problems are the low medical level of family doctors, high medical expenses and poor equipment.

There are still many problems that need to be improved in the family doctor service, and these problems are also important factors that affect the unsigned residents not signing the contract.

Variable Selection

Dependent Variable. In this article, the willingness of unsigned residents to sign up for family doctors was measured according to the four dimensions of "the services that contracted family doctors can bring to residents", "the convenience of visiting doctors through family doctors", "the frequency of regular family doctors' hopes", and "worries for family doctors". These four dimensions are reflected in the questionnaire as a direct problem by calculating the option scores for each question and determining the weight of each dimension based on the entropy method. Finally, the sum is based on the weights.

Independent Variables. In this paper, the independent variables are the age of the resident, the monthly income of the family, the degree of understanding of the family doctor, and the signing fee that they are willing to pay.

Control Variables. In this paper, the control variables are gender, occupation, whether a family member has a disease, the type of family doctor who wants to sign a contract, and the way to make an appointment with a family doctor.
Analysis of Association Rules

Table 3. Analysis of association rules 1.

| Age   | Monthly per capita income [RMB] | Gender   | Career | Learn degree | Confidence | Lifting degree |
|-------|---------------------------------|----------|--------|--------------|------------|----------------|
| 20-40 | 5000-10000                      | Female   | Student| I have heard of it, but I don't know much about it. | 0.9        | 1.63           |
| 60+   | 5000-10000                      | Female   | Farmer | Never heard of it, I don't understand it at all.   | 0.9        | 4.1            |
| 60+   | 3000-5000                       | Female   | Farmer | Never heard of it, I don't understand it at all.   | 0.9        | 4.1            |

According to the results of Table 1, the association rules are used for in-depth analysis of the two parts of “I heard, but not very well understood” and “I have never heard of it, I don’t understand at all”, according to gender, age, occupation and monthly income per capita. A basic information indicator to infer the extent to which respondents understand family doctors.

The results of the analysis are shown in Table 3: Female students aged 20-40 years old with a monthly income of 5,000 to 10,000 yuan per family have a 90% chance of hearing about it, but they are not very familiar with family doctors, and their degree of promotion is 1.6, indicating that The rules have higher credibility and better effectiveness; farmers over 60 years old and households with monthly income of 3,000 to 10,000 yuan have a 90% chance of not hearing about the family doctor, and their promotion rate is 4.1. It shows that the rule is very reliable and very effective. The reason is that the female student group is not very concerned about the policies related to current politics, and the female students of this age group have low demand for family doctors; the elderly have less access to information in the rural areas, and the government has insufficient publicity.

Table 4. Analysis of association rules2.

| Signing fee [RMB] | Monthly per capita income [RMB] | Career   | Worried problem            | Confidence | Lifting degree |
|-------------------|---------------------------------|----------|---------------------------|------------|----------------|
| 100-500           | 3000-5000                       | Farmer   | High medical expenses     | 0.9        | 1.69           |
| 500-1000          | 5000-10000                      | Administrator | Low medical level      | 0.9        | 1.57           |

Further excavating and analyzing the problems of family doctors' concerns, according to the contracting fees, monthly income per capita and occupational inference concerns, the following association rules with higher credibility and better validity are obtained. The results are shown in Table 4:

Farmers who are willing to pay a contraction of 200 to 500 yuan and a per capita monthly income of 3,000 to 5,000 yuan have a 90% chance of worrying most. The problem is that medical expenses are high, indicating that they are willing to pay less due to restrictions on family living standards. Further concerns about high medical costs. 90% of the employees who are willing to pay the contracted 500 to 1,000 yuan and the per capita monthly income of 5,000 to 10,000 yuan have a 90% probability. The most worrying problem is the low level of medical care. In other words, for families with better living standards, they are more worried. The problem of insufficient medical level of family doctors.
Stepwise Regression Analysis

Relevance Test. For the four numerical independent variables, the R software was used to test the correlation, and the correlation coefficient between each variable was less than 0.3, indicating that the correlation coefficient between these four factors is relatively small or even non-correlated. A regression analysis can be performed.

Stepwise Regression Analysis. Firstly, we establish a multivariate regression model of all variables on the willingness to sign and use the backward stepwise regression to retain the variables that have significant effects on the signing willingness, such as age, contracting fees, understanding, and whether the family member is sick. In order to further reduce the effects of heteroscedasticity and multicollinearity, the logarithm of the dependent variable is processed, and finally

| Variable      | Coefficient | Std.Error | t     | Sig.   |
|---------------|-------------|-----------|-------|--------|
| Age           | 0.022640    | 0.010026  | 2.258 | 0.024344 |
| Signing fee   | 0.017241    | 0.006393  | 2.697 | 0.007226 |
| Awareness     | 0.047143    | 0.013558  | 3.477 | 0.000548 |
| Is the family sick? | 2.516297    | 0.040998  | 61.376 <2e-16 |

the results of the model shown in Table 5 are obtained after five steps of regression.

After testing, the model F statistic is 2.001e+04, the P value is less than 0.001, the adjustment R2 is 0.9947, and the P value of each variable is less than 0.05, which is significant. Therefore, the model fits well, statistically meaningful.

According to the above equation, the following conclusions can be drawn:
(1) A family with a patient is more willing to sign a family doctor, which is a big gap compared to a healthy family, and more powerfully illustrates the importance of the family doctor system to a family with a patient.
(2) The higher the residents' understanding of the family doctor, the stronger the willingness to sign.
(3) As the age increases, the residents' willingness to sign a family doctor is stronger.
(4) If the family doctor policy can provide higher quality service content based on higher contract fees, the residents' willingness to sign will increase.

Conclusions and Recommendations

This paper draws conclusions from descriptive analysis, association rule analysis and stepwise regression analysis, and proposes the following suggestions:
(1) At present, the publicity of family doctor policy is insufficient, and most unsigned residents are not aware of the convenience brought by the signed family doctor service. It is necessary to increase the propaganda of the family doctor policy through multiple channels, in order to increase the willingness of contracting residents to sign a family doctor.
(2) First of all, in this study, it is found that the progress of the informatization construction of the medical system is slow, and it is necessary to speed up the improvement of the "Internet + health care" service system. Secondly, it is also very important for the unsigned residents to worry about the problems of family doctors, enrich the number of general practitioners, and increase the investment in medical infrastructure. Finally, improving the relevant medical security system is very important for low-income families. Improving the quality of family doctors' services and meeting the diverse needs of residents is critical for high-income families.
(3) The study found that the older the residents, the higher the possibility of illness, and they need more detailed service content. Therefore, for key caregivers, the quality of service of family doctors should be improved and relevant service contents should be improved.
Acknowledgement
This paper is one of the periodic achievements of the key project of Shandong province social science planning fund project 2017 "research on the upgrading and transformation path of China's producer service industry structure under the background of" One Belt, One Road "initiative (17BJJJ03).

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