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Using Conjoint Analysis to Elicit GPs' Preferences for Family Physician Contracts: A Case Study in Iran

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Abstract

Background: Family physician plans in Iran face several challenges, one of which is developing attractive and efficient contracts that motivate physicians to participate in the plan.
Objectives: This study aimed to elicit GPs' preferences for family physician contracts.
Patients and Methods: In a cross-sectional study using the conjoint analysis technique, 580 GPs selected from the family physician database in Iran in 2014. Through qualitative and quantitative methods, 18 contract scenarios were developed via orthogonal design i.e., the impact of each attribute is measured independently from changes in other attributes and a questionnaire was developed. Data were collected through this questionnaire and analyzed using the ordered logistic regression (OLR) model.
Results: The results show that "quotas for admission to specialized courses" is the strongest preference of GPs ($\beta = 1.123$). In order of importance, the other preferences are having the right to provide services outside of the specified package ($\beta = 0.962$), increased number of covered population ($\beta = 0.814$), capitation payment + 15% bonus ($\beta = 0.644$), increased catchment area to 5 km ($\beta = 0.349$), and increased length of contract to five years ($\beta = 0.345$).
Conclusions: The conjoint analysis results show that GPs concerned about various factors of family physician contracts. These results can be helpful for policy-makers as they complete the process of creating family physician plans, which can help increase the motivation of GPs to participate in the plan.

Keywords: General Practitioners, Contracts, logistic Models, Iran

1. Background

Family physician plans are one of the most effective methods to improve people's fair access to health services and are considered one of the major reforms of health system development (1).

In the first decade after the Islamic revolution in Iran, two major reforms occurred in the health system: establishment of primary health care (PHC) and integration of medical education with the former ministry of health to create the ministry of health and medical education (MOHME) (2). Both of these events were great achievements in the area of health promotion and improvement of health indicators (3). But in recent years, with the changing health needs of the community, the health system lacks the flexibility to meet the emerging needs of the population.

To overcome this weakness, Iran's government introduced reforms in 2005 (4) within the fourth social, economic and cultural development plan that included family physician plans and health insurance for rural areas and small cities (3). The plan improved the access to health services in these areas, where as absence of the plan in highly populated urban areas created some limitations in terms of accessibility (1). In recent years, concern about access to and out-of-pocket payments for health services has caused policy-makers to plan and implement the family physician plan in urban areas, which is the third milestone in the restructuring of health services and indeed the major reform in Iran's health system (2). In the fifth social, economic and cultural development plan, the family physician plan and referral system in urban areas was approved (5) and implementation of the plan was announced by the government in 2012 (6). Family physician plan implementation in Iran

faces several challenges, one of which is developing attractive and efficient contracts that motivate physicians to participate in the plan.

2. Objectives

The aim of this study was to identify the major preferences and concerns of GPs regarding family physician plan contracts. The results of this study suggest that a conjoint analysis is a suitable technique for understanding physicians' preferences regarding contract attributes.

3. Patients and Methods

This study is a cross-sectional study using the conjoint analysis technique. It was conducted in Iran during 2014.

3.1. Application of Conjoint Analysis Approach

Conjoint analysis (CA) is a comprehensive research method and group of quantitative techniques (7). CA is based on the economic theory of utility and value and originated in mathematical psychology (8). It can be used to determine respondents' preferences for the attributes that make up a product or service (7). This technique is now widely used in many fields (9) and has been applied successfully among policy-makers and health economists to measure preferences for a diverse range of health applications (10).

3.2. Conjoint Design

3.2.1. Establishing the Attributes and Their Levels

To identify the key attributes of current GP contracts, an initial literature review was conducted that comprised a review of documents, policies, and current contracts. In this review, a preliminary list of 20 attributes was identified. The attributes were discussed by a panel of eight experts including health policy-makers, health insurance experts, executive managers of the Family Physician Program, and social medicine specialists. The experts were selected using the purposive sampling technique, and the panel discussion was conducted at Tehran University of Medical Sciences in Iran in February 2014. The panel discussion resulted in a revised list of 14 contract attributes. Six to eight attributes are sufficient to conduct traditional conjoint analysis (11). To use more attributes would lead to greater complexity and increased difficulty interpreting responses (12). Therefore, we relied on the classic Delphi method to reduce and select key attributes. Consensus was reached by the experts during the first round of the Delphi technique, resulting in the selection of seven attributes as the most important for consideration and study. The levels of attributes were determined by research team members using a practical, evidence-based method. And in fact, having team members determine levels of attributes is very common in CA (13, 14). The attributes and their levels as established in this study are shown in Table 1.

Table 1. Attributes and Levels Generated in the Study

Attributes	Level 1	Level 2	Level 3
1. Contract duration	1 year	3 years	5 years
2. Payment mechanism	Capitation	Capitation + 15% bonus	Capitation + 25% fee for service
3. Contract employer	Health insurance	University of medical sciences	Medical council
4. Individuals covered	1,500 people	2,500 people	4,000 people
5. Catchment area	Limited range to 1.5 km around GP's office	Range between 1.5 to 5 km around GP's office	No geographical limitation
6. Right to provide services outside of specified package	No	Yes	NA
7. Benefits such as quota for admission to specialization courses	No benefit	After 5 years as a family physician	After 10 years as a family physician

3.2.2. Experimental Design and Construction of Scenarios

Experimental design is the process of systematically manipulating the attribute levels to create a set of scenarios that will yield as much statistical information as possible to estimate the parameters of the underlying preference model (10). In this study, there are six attributes with three levels (contract duration, payment mechanism, contract employer, number of individuals covered, catchment area, and benefits such as entrance to specialization courses) and one attribute with two levels (right to provide services outside of specified package). The total number of scenarios for the seven attributes is $36 \times 21 = 1{,}458$ in a full factorial design.

Not all possible scenarios can be included in the CA exercise for valuation by respondents (7), so an "orthogonal design" also called fractional factorial design was adopted using the SPSS software version 20 to reduce these to a manageable level while maintaining the ability to infer utilities for all possible scenarios. This resulted in an orthogonal main effects design, thus ensuring the absence

of multi collinearity between attributes (i.e., attributes included in the model are not correlated). Using this design, the 1,458 possible scenarios were reduced to 18.

3.2.3. Selecting the Sample, Administering the Questionnaire, and Data Collection

Sample-size calculations are particularly difficult for conjoint analysis applications in healthcare, and researchers commonly apply rules of thumb, based on the number of attribute levels, to estimate sample size (10). Many CA studies have used sample sizes in the range of 100 to 300 respondents (8, 15).

In accordance with previous studies, the desired precision of the results, the degree of heterogeneity in the target population, the expected response rate, and the availability of respondents, we estimated a sample size of 350 respondents. Assuming an initial response rate of 30%, a random sample of 580 respondents was required to obtain at least 350 responses.

The study sample consisted of 580 GPs from Iran. They were randomly drawn from a larger community of GPs who were registered in the MOHME Family Physician Plan database, and were from all regions of Iran. This study involved three inclusion criteria: being a general physician, willingness to work as a family physician, and registration in the Family Physician database. Participation in this study was voluntary.

The questionnaire comprised three main sections. The first section presented an introduction and described the attributes and their levels to help respondents gain a better understanding of the attributes and their levels. In Section 2, the respondents were presented with 18 scenarios comprising the CA exercise and were asked to rate them from 1 to 10, with 1 representing low desirability and 10 representing high desirability. Section 3 asked about sociodemographic details such as age, sex, and clinical experience. Validity of the questionnaire was confirmed by some of the experts and the reliability of the scenarios determined by using an orthogonal design.

Before the main study, a small pilot study (n = 30) was conducted to check that GPs understood the questions and completed the tasks as instructed. The results affirmed GPs understanding, thus no changes were made to the design of the questionnaire as a consequence of the pilot study. Data were collected from September to December 2014, with the main questionnaire and cover letter being sent to respondents via email. One reminder message was sent to non-respondents after approximately 15 days.

3.2.4. Modeling and Data Analysis

Conjoint analysis of data and the modeling of preferences can require complex statistical analysis and modeling methods (10). We used STATA software version 13 to analyze the data. The Ordered Logistic Regression Model was used to evaluate GPs' preferences of the levels and attributes of the contract scenarios. The dependent variable is the rating between 1 and 10 (least and most preferred), while the independent variables are the levels of the seven attributes and the characteristics of the GPs. We assume that any scenario that GPs rate with a higher number is preferred over any scenario that they rate with a lower number, but we do not assume that the intervals between the ratings are equal. For example, the difference in preference between ratings 1 and 2 is not the same as the difference in preference between ratings 9 and 10. The ratings therefore are characterized as discrete and ordered, but not ordered by equal interval. Again assuming that the error terms are distributed over the logistic function, ordered logistic regression fitted by maximum likelihood is an appropriate analytical approach for this analysis (7). The starting point for the ordered logistic regression model is Equation 1.

$$V_i\left(P_h\right) = b_1 Z_{1h} + b_2 Z_{2h} + \cdots + b_7 Z_{7h} + c_{1h} X_1 + \cdots + c_{Rh} X_R + \epsilon_{ih} \quad (1)$$

Where: P_h is the h-th package of scenario attributes; V_i (P_h) is an unobserved measure of the utility that a GP derives from the attributes of the h-th scenario; $Z_1h \ldots Z_7h$ is a vector of levels of the observed attributes of the scenarios; $X_1 \ldots X_R$ is a vector of the respondent's characteristics; $b_1 \ldots b_7$ and $c_{1h} \ldots c_{Rh}$ are unknown parameters; and εih is a random error term.

The indirect utility that is derived from the scenarios is a function of the attributes of the scenario and the GP's characteristics. While the indirect utility derived from a particular scenario cannot be observed, we observe the ratings (Rating) of between 1 to 10, where:

Rating = 1 if $P_h \leq \mu_1$
Rating = 2 if $\mu_1 < P_h < \mu_2$
Rating = 3 if $\mu_2 < P_h < \mu_3$
Rating = 4 if $\mu_3 < P_h < \mu_4$
Rating = 5 if $\mu_4 < P_h < \mu_5$
Rating = 6 if $\mu_5 < P_h < \mu_6$
Rating = 7 if $\mu_6 < P_h < \mu_7$
Rating = 8 if $\mu_7 < P_h < \mu_8$
Rating = 9 if $\mu_8 < P_h < \mu_9$
Rating = 10 if $P_h < \mu_9$
Where $\mu_1 \ldots \mu_9$ are estimated cutoff points.

4. Results

A total of 350 questionnaires were returned. The mean time taken to complete the questionnaire was just over 28

minutes. Close to 52% of respondents found the questionnaire "easy" or "very easy" to complete. A total of 44% found it "difficult" and 4% found it "very difficult." The descriptive characteristics of respondents are presented in Table 2.

Table 2. Descriptive Characteristics of Respondents to the Conjoint Survey[a]

Characteristics	P Value
Gender	
Male	223 (63.71)
Female	127 (36.29)
Age, y	
< 35	46 (13.14)
35 - 44	148 (42.29)
45 - 54	125 (35.71)
55 - 64	24 (6.86)
> 65	7 (2.00)
Clinical Experience, y	
< 10	84 (24.00)
10 - 19	193 (55.14)
20 - 29	63 (18.00)
30 - 39	7 (2.00)
> 40	3 (0.86)

[a]Values are expressed as frequency (%).

The results are generally consistent with expectations, with all attribute levels having statistically significant effects on preferences except for "contracting with university of medical sciences," "catchment area with no geographical limitation," and "allocating quota for admission to specialization course after 10 years working as a family physician." The estimated coefficients indicate the relevant importance of the different attributes on individual preferences. The coefficients show that "benefits such as allocating quota for admission to specialization course after 5 years working as a family physician" has the most effect on GPs' preferences (β = 1.123). "Having right to provide services outside of determined package" (β = 0.962), "increased number of covered population" (β = 0.814), "Capitation payment + 15% bonus" (β = 0.644), "increased catchment area to 5 km" (β = 0.349), and "increased length of contract to 5 years" (β = 0.345) have ordinary great effect on GPs' preferences.

The odds ratios shown in the fifth column of Table 3 show that a scenario with benefits such as "allocating quotas for admission to specialization course after 5 years working as a family physician" would be 3.07 times more likely to be preferred than a scenario without a benefit for specialization courses. A scenario that allowed GPs to provide services "outside of specified package" would be 2.62 times more likely to be preferred than a scenario that did not allow providing services outside of the specified package. A scenario that allowed GPs to enroll and cover 4,000 people would be 2.26 times more likely to be preferred, and a scenario that allowed GPs to enroll and cover 2,500 people would be 1.58 times more likely to be preferred than a scenario valid for only 1,500 people.

A scenario with capitation + 15% bonus as a payment mechanism would be 1.90 times more likely to be preferred than a scenario that only paid capitation, while a scenario with capitation + 25% fee for service as a payment mechanism would be 1.57 times more likely to be preferred than a scenario that only paid capitation. A scenario with a 5 km catchment area would be 1.42 times more likely to be preferred than a scenario with a 1.5 km catchment area. Finally, the odds ratio shows that a five-year contract would be 1.41 times more likely to be preferred than a one- year contract, while a three-year contract would be 1.13 times more likely to be preferred than a one-year contract.

5. Discussion

This conjoint analysis study was undertaken to elicit GPs' preferences for family physician contracts. The results show that benefits such as "allocating quota for admission to specialization course" is very important to GPs, and they prefer as short a contract as possible that provides them a quota for admission to specialization course. There are some likely reasons why allocating quota for admission to specialization course is so important to GPs. First, previous government policies related to developing universities increased student admissions especially in medical courses, and inappropriate distribution of physicians in different geographical regions led to unemployment of many GPs in Iran. Official statistics report that there are 12,000 unemployed GPs in Iran (16). On the other hand, specialization in the health system (17) and a huge gap between income and status of GPs and specialists in Iran led GPs to regard the general course as a temporary circumstance and to attempt to be admitted to a specialization course as soon as possible to gain competitive advantage, improved social position, and greater income (18). Study results of Bodenheimer et al. (19) in the United States of America and Barnighausen et al. in 14 OECD countries showed a considerable gap between the income of specialists and GPs, which led to increased motivation of GPs to continue education in specialized courses as well as heightened concern related to a shortage of GPs in these countries. Literature confirms a direct relationship between the advantages enjoyed by physicians and their tendency to continue their

Table 3. Result From Ordered Logistic model (OLR) on Rating of Hypothetical Scenarios[a]

Attributes Levels	Estimated Coefficients	Standard Error	Z	Odds ratio	Significance
Contract duration (baseline = 1 years)					
3 years	0.118	0.054	2.18	1.126	0.029
5 years	0.345	0.057	6.08	1.413	< 0.001
Payment Mechanism (baseline = capitation)					
Capitation + 15% bonus	0.644	0.057	11.28	1.904	< 0.001
Capitation + 25% fee for service	0.452	0.055	8.17	1.572	< 0.001
Contract Employer (baseline = health insurance)					
University of medical sciences	0.099	0.056	1.75	1.104	0.080
Medical council	0.132	0.054	2.44	0.876	0.015
Individuals Covered (baseline = 1,500 people					
2,500 people	0.461	0.058	7.90	1.585	< 0.001
4,000 people	0.814	0.055	14.88	2.257	< 0.001
Catchment Area (baseline = to 1.5 km)					
Range between 1.5 to 5 km around	0.349	0.054	6.45	1.419	< 0.001
No geographical limitation	0.102	0.061	1.69	1.108	0.091
Service Outside of Specified Package (baseline = No)					
Have right	0.962	0.054	17.51	2.616	< 0.001
Benefits such as specialization courses (baseline = No)					
After 5 years as a family physician	1.123	0.055	20.19	3.074	<.001
After 10 years as a family physician	0.132	0.070	1.87	1.141	0.061
Age	0.004	0.006	0.77.	1.004.	0.442
Gender (baseline = female)					
Male	0.042	0.048	0.88	0.958.	0.378
Clinical Experience	0.013	0.006	2.08	0.987	0.038
Cut-Point 0/1	0.300				
Cut-Point 1/2	0.361				
Cut-Point 2/3	0.980				
Cut-point 3/4	1.496				
Cut-Point 4/5	2.183				
Cut-Point 5/6	2.767				
Cut-Point 6/7	3.429				
Cut-Point 7/8	4.223				
Cut-Point 8/9	5.020				

[a] Pseudo R2 = 0.339

activity and provide better services (20). Studies also confirm that further education and admission to the specialized course play a crucial role in motivating healthcare staff (21). Study results show that GPs are increasingly willing to provide "services outside of the packages included in the Family Physician Plan." The plan proposed by the MOHME designated a certain service package for family physicians, and GPs are obligated to provide the services included in the package (6). Payment for these services is based on capitation, and if GPs offer services outside of the proposed package, they will receive "fee for service" as a payment from patients. Therefore, offering services

outside of the specified package which mainly includes cosmetic services is considered an additional source of income for a physician, and it is reasonable that GPs opt to increase their income by offering services outside of the specified package.

The results suggest that physicians are worried about "covered population" and "catchment area." They prefer to cover the maximum number of people in a larger catchment area. According to capitation payment in the Family Physician Plan, size of the covered population and geographical region determine the volume of the services offered by a physician. Because capitation exposes a service provider to a high financial risk, and a service provider's income is related to the number of covered individuals, it provides a strong motivation to control costs through increasing coverage (22, 23). In fact, increased size of the covered population leads to increase of income with current capitation (23), and it guarantees higher income for a physician. On the other hand, developing the catchment area, especially in cities with less population density, can increase the chance of registering more people, and will decrease GPs' concerns related to low population and lower income. Literature shows that based on new contracts in England, family physicians are free to enroll people in a catchment area that extends outside the area where the physician lives (24). Payment mechanism is another concern of physicians. GPs prefer the contract with "capitation + bonus" as a payment mechanism more than contracts with only a capitation method or "capitation + fee for service." Regarding the limitation of public resources and the related limitation of capitation to physicians, receiving a bonus can decrease physicians' concerns about income. Studies in England, Brazil, Denmark, Poland, and Taiwan have shown that bonuses improve the performance and retention of manpower in the health system (18). Literature also shows a direct relationship between higher income, retention, and high quality of service (25). GPs indicate that "contract duration" is also an important factor. They prefer long-term contracts over short-term contracts. As a result of permanent changes to the government's policies relating to contracts and payment, GPs feel a lack of job security (16, 18) which they believe can be alleviated with long-term contracts. Arifin et al. (7) confirmed that contract duration is a critical factor, with respondents indicating a preference for long-term contracts over short-term contracts. In total, the results indicate that in Iran and other developing countries, conjoint analysis can be effective in eliciting GPs' preferences regarding the attributes of family physician contracts.

To our knowledge, this study is the first time that CA has been applied to this subject matter. This study provides information and evidence to support negotiations between GPs, health insurance organizations, and MOHME for design and implementation of a better family physician plan. The study results suggest that health policymakers should consider revising contract attributes to attract more GPs to participate in the family physician plan in urban areas of Iran. Although it may be unrealistic to address all contract-related concerns of GPs due to structural, legal, and financial limitations in Iran, health policymakers can realize increased participation of physicians in the family physician plan by emphasizing the most important attributes. In particular, "quota of admission to specialized courses" a major concern of GPs can be addressed through bargaining and negotiating with legal and financial institutions.

Footnotes

Authors' Contribution: Study concept and design: Mohammad Ranjbar Ezatabadi, Ali Akbari Sari, and Arash Rashidian; analysis and interpretation of data: Mohammad Ranjbar Ezatabadi, Ali Akbari Sari, Arash Rashidian and Mohammad Shariati; drafting of the manuscript: Mohammad Ranjbar Ezatabadi; critical revision of the manuscript for important intellectual content: Ali Akbari Sari, Arash Rashidian, Mohammad Shariati; statistical analysis: Abbas Rahimi Foroushani and Mohammad Ranjbar Ezatabadi.

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