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RESEARCH PAPER

Does the Level of Education Affect the Preferences for Prioritizing Health Resources?

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Abstract

If people feel that the decisions made by health authorities are the result of the public's points of view, they will accept them without any question. This is a descriptive-analytic cross-sectional study in which we used the DCE (Discrete choice experiment) technique to elicit the public's preferences for individuals with different education levels in Tehran in 2017. The study findings indicated that for individuals with a bachelor's degree, treatment of patients suffering from communicable diseases is the top priority (odds ratio = 2.79), while for those with a master's and doctoral degree, the most important criteria for prioritizing resources were severity of disease (odds ratio = 2.66) and benefit from treatment (odds ratio = 2.38), respectively. The study results will help healthcare policy and decision-makers to better understand and analyze the causes of differences in society members' behaviors.

Keywords: Discrete Choice Experiment, Public's Preferences, Health Resources, Education.
JEL Classification: D12, D63, D61, D81.

Introduction

Although some people may argue that prioritization of health resources is immoral, since it does not put some groups of patients in the priority for receiving health services, the fact is that in a case where health needs exceed health resources, not prioritizing resources would be considered immoral (Norheim, 2016; Kieslich et al., 2016). Determination of the criteria for prioritizing health resources must pass through legal processes, while it has been emphasized that citizens should participate in decisions to increase legitimacy (Yamin et al., 2015). In Norway, for example, *the Committee for Prioritizing Resources* reviewed the citizens' point of view, using online questionnaires and holding panels, and then considered the results in the final decision-making process (Ottersen et al., 2016). Since policymakers' decisions on allocating resources will have positive and negative effects on different patient groups, they must prove that social values have been considered and resources have been allocated to the patients who definitely deserve them (Rumbold, 2017; Norheim et al., 2014). If individuals feel that the made decisions are the result of the public's points of view, they will accept it openly and willingly (MacLeod et al., 2016; MacLeod et al., 2014). In a society, different people will have different perspectives depending on their age, gender, social status, and

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education level. Therefore, regarding these differences, involving and sharing the views of the community are one of the issues that should be considered in the development process of resource allocation programs (Torani et al., 2010).

Democratic governments refer to social values, when raising demands for medicines and high-cost healthcare services, and they allocate resources to certain services using the public's preferences as a basic criterion. In Iran, government maintain that involving the public in the priority setting process will lead to increase health authorities' responsibility, accountability, transparency, improvement of health outcomes, and strengthen the solidarity of the community with government. In fact, this is essential that people must feel that their points of view have been considered in allocating resources, and there should be a justified reason why they have not been regarded (MacLeod et al., 2016; Falk et al., 2018; Whitty et al., 2015). Recently, in Iran, economic evaluation has been widely used for allocating health resources in different groups and programs. However, one of the problems of economic evaluation is that in this method, only those results are taken into account that focus on improving individual health and there is no emphasis on the results of other health improvement aspects. Therefore, there is a need for different studies assessing the public's points of view based on different individuals' characteristics, such as level of education, and age group; thus, individuals can see which views are considered in setting health priorities and why other views are not, due to differences of opinion with other community groups (Alayli-Goebbels et al., 2013; Morrell et al., 2017).

This is potentially an obvious fact to use the public's participation in prioritizing resources in Iran, but an important issue is how to implement this partnership in policymaking and select the right algorithm to elicit preferences. Different surveys have introduced several approaches to make this partnership work in practice (Whitty et al., 2014; Boaz et al., 2014). Ryan (2001) conducted a systematic survey to investigate different techniques of eliciting the public's preferences for healthcare. He found that two methods, including *discrete choice experiment* and *citizens' juries* were appropriate to elicit the public's preferences. Ryan et al. (2011), between which the former, compared to the latter, was less costly. It determines not only directions of preferences, but also the relative weight of citizens' preferences through quantitative techniques (Whitty et al., 2014). If healthcare policymakers intend to be responsive to the outcomes of prioritizing health resources, they need more information about the community's preferences (Van Exel et al., 2015). Furthermore, they should know what the general preferences of the community and the preferences of individuals with a different education level are, and what differences between the preferences of individuals with a different education level exist, as well as why they are different.

Method

This is a descriptive-analytic cross-sectional study in which we used the DCE (Discrete choice experiment) technique to elicit the public's preferences for people with a different education level in Tehran in 2017. In DCE techniques, both qualitative and quantitative methods are used. In the first step, using the qualitative method, related attributes are extracted, and in the next step, preferences of the community in relation to these attributes are obtained (Vass et al., 2017). In the following, different steps of the study are explained in detail:

Determination of Attributes and Their Levels

Semi-structured interviews in two phases, with health experts – individuals with more than ten years of working experience in Iran's Ministry of Health - were conducted to determine attributes and their levels. In the first phase, 25 health experts were interviewed to identify important and effective attributes in prioritizing health resources. In the second phase, the experts were asked to prioritize attributes identified in the first phase. Out of all the attributes identified and prioritized, 5 of the highest rank attributes were chosen to be included in the study. Table 1 presents the chosen attributes and their levels. In these phases of the study, the interviewers were chosen using purposeful and snowball sampling methods in which the researcher, based on, chooses individuals, who are able to answer the interview questions. The inclusion criteria were as follows: having MS degree or higher in health sciences and fields, having more than five years of working experience in the Ministry of Health or medical sciences universities, and being willing to participate in the study. The data collected in this phase were analyzed through the content analysis method using the MAXQDA10 sofware. Then, types of codes were identified, and the contents of each interview were reviewed by the research team. To determine the levels of each attributes we took the research team and the experts opinion into consideration and set them in a way that could be understandable to the respondents. In the end, with the discretion of the research team, attributes and their levels were evaluated and finalized by a pilot study.

Experimental Design and Data Collection

After defining the attributes and their level, we developed choice options and defined which choices should be given to whom so that we could maximize the effectiveness of our study design. Given that we included four attributes with three levels and one attribute with two levels in the study, the combination of these attributes and levels with complete factorial design, created 162 scenarios ($2^1 * 3^4$) – 81 set of binary choices; it was not possible to consider them all in the study. In this step, SAS software, regarding the number of attributes and their level, determines the number of scenarios in a way orthogonal is fulfilled and D efficiency is obtained. Therefore, the software reduced the number of selection sets from 81 to 18 by means of a factorial method, and since it would be complicated and confusing to put 18 set of options in a questionnaire, we divided them into three groups of six. As we divided the first questionnaire into three parts, we had three different questionnaires in which the first part, containing demographic questions, was the same, but the second part, containing six sets of choices (and a dominant question) was different. Each choice option had two scenarios, which each scenario represented a hypothetical patient with a different level of attributes. The respondents were supposed to choose only one scenario between the two given scenarios.

To ensure internal consistency or reasonableness of the respondents' answers, which show that they had taken the choices seriously and answered them with care, we used the dominant option technique. In this method, one of the scenarios is dominant over the other one, and respondents are expected to prefer and choose the dominant option. It should be noted that the results of dominant options are not included in the final analysis. Of all 600 respondents who participated in the study, 21 respondents chose the wrong scenarios in the dominant options and were excluded from the study.

Although there are numerous theories about determining the sample size of the DCE studies in health economics, they cannot provide an exact number of the sample sizes used to estimate the parameters of a particular study. De Bekker-Grob et al. (2015), based on their own practical experience, pointed out that to obtain a valid model, a sample size of 20 people would be sufficient for each version of the questionnaire. However, to have a meaningful analysis and estimate the effects of the variables, a larger sample size is needed. In this study, to increase the accuracy of the study, we included 600 people in the study, and considering that we had three versions of the questionnaire, 200 people were assigned for each version of the questionnaire. The inclusion criteria were having a diploma degree and being resident in

Tehran. Therefore, we refer to different colleges of the different districts of Tehran. The sampling of the subjects was consecutive, meaning that the questionnaires were distributed consecutively until reaching the intended sample size.

Data Analysis Method

We estimated our model using Conditional Logit (CL), since most models used in the DCE estimation are different types of this method. To estimate this model, we categorized the participants' education level based on the dummy variable and estimated it based on the utility formula, then we interpreted the model according to the fact that odds ratio of different groups varies. Conditional logit was first introduced by McFadden for compatibility with the random utility theory. McFadden, considering that the selective behaviors that were consistent with economic theories, developed a regression model evaluating different options for decision-makers according to the respondents' choices. With the use of CL, it is possible to estimate the effect of each level of attributes on the respondents' choices. The coefficients obtained in CL model are preferential weights and indicate how much that level of attribute contributes to the utility of that choice (scenario) (Hauber et al., 2016).

In the random utility theory, it is assumed that the utility of each choice depends on the levels of observed attributes, as well as the invisible attributes. It is also assumed that every individual intending to choose between a group of options, they choose the option that, all else equal, provides the maximum utility. Therefore, the utility function consists of two components: the first component shows the level of attributes provided in selection options, and the second component shows the random error criterion, revealing the invisible attributes that the researcher cannot measure:

Formula (I): $Ui= V (BiXi) + €_i$

where V is utility of the attribute level for option i, $€_i$ is the random error criterion, X_i is the value of the attribute level for option i, and B_i represents the quantity of estimated coefficients, which in fact, shows the relative contribution of each attribute level to the utility of each option. In the CL model, it is assumed that $€_i$ is independent. The logit model assumes that the random error criterion follows the type-1 extreme-value. Therefore, its probability distribution function will be:

$F(€i)= \exp \{ - €I – \exp(-€i)\}$

Considering the above assumption, the probability of choosing option i is:

Formula (II): Probability of choosing option i = $e^{v(BiXi)} / \Sigma_j e^{v(BiXi)}$

In formula 2, v(BiXi) is the function visible component for option i, and i is one choice among j choices. To express it more simply, the probability of choosing i depends on two factors: the first is the attribute levels of choice i, and the second is the attribute levels of other choices presented in the model Hauber et al. (2016). Our study was a discrete choice experiment with two choices. In these types of studies, respondents chose between 2 options, so J = 2. In these studies, the probability of choosing each option is 1 minus the probability of choosing the other option. Therefore, the choice probability is between zero and one. In the conditional logic, the choices depend on the elements defined in the options chosen by the respondents.

Sociodemographic characteristics of respondents:

The data of the questionnaires were completed by 579 participants, from whom 302 (52%) had a bachelor's degree, 210 (36%) had a master's degree, and 67 (12%) had a doctoral degree. Table 2 presents the respondents’ sociodemographic characteristics.

Results of the Model Analysis

In general, the models were significant in terms of input variables (Prob > $\text{chi}^2 \leq 0.001$). The maximum likelihood estimate, which follows the chi-square distribution, was used to test the model significance. The model’s general significance test shows that according to the LR test, the model is significant. The interpretation of the LR test and its formula is:

$$LR = -2\,[L_{\text{unbounded}} - L_{\text{bounded}}]$$

Its interpretation is that the difference between the model with only the width of the source (the bounded model) and the model with the input variables (unbounded model) is significant at the level of 0.001, which means that these variables can be considered in the model. The larger the log-likelihood (the less negative value), the better the model fit. This criterion is used to compare two or more models to identical variables and observations. An odds ratio more than one indicates that changing values of variables from the base value to other values increases the chance of resource allocation, while an odds ratio less than one indicates that changing values of variables from the base value to other values decreases the chance of resource allocation.

The results presented in Table 3 show that for individuals with a bachelor’s degree treating patients suffering from communicable diseases is the highest priority (Odds ratio = 2.79); however, as the level of education increases, the importance of treating communicable diseases decreases. The treatment of communicable diseases is the second priority for people with a master’s degree, and is much less important for those with a doctoral degree (odds ratio = 1.10, which shows that it is not also significant). In Table 4, we prioritize the level of attributes for the three groups. As the table reveals, for people with a bachelor’s degree, communicability of a disease has the greatest importance; individuals with a master’s degree believe that the treatment of diseases with high level of severity is the first priority; and those with a doctoral degree argue that the effectiveness of the treatment should be the most important criterion used in resource allocation. Of the obtained results, only the attribute “*benefit from treatment (moderate)*” for the respondents with a master’s degree, and attributes “*communicable (yes)*” and “*age (15-65)*” for those with a doctoral degree were not significant.

Discussion

In this study, we aimed to examine the impact of education level on individual preferences in how to allocate health resources. The study results clearly showed that with an increase in education level, the individuals’ preferences about how to allocate health resources change. Owing to our use of the DCE method and the specific limitation of this method, we were not able to examine the preferences of individuals with an education level lower than diploma. Since answering the study questions requires individuals to understand, interpret and analyze the scenarios, we assumed that individuals with an education level lower than diploma and under the age of 18 would not be able to respond to the questions; therefore, only people with university education were entered the study. Another limitation we faced in DCE studies was that in these studies, firstly, the important criteria for entering the quantitative phase were determined through a qualitative study. In other words, those participating in the quantitative phase of the study have to make their choices among pre-provided criteria, while other criteria may be their priority. Therefore, the quality of conducting the qualitative phase study is extremely important in achieving comprehensive results.

This study is the first study in Iran attempting to elicit the effects of individuals' education on their preferences in prioritizing health resources using the DCE method. To the best knowledge of the research team, there is not even a similar study worldwide using this method to examine individuals' preferences. Only Van Der Aa et al. (2018) used the DCE method to survey the community's preferences about health resources allocation, analyzed the study results for different educational subgroups of the community. Although the criteria used in Van Der Aa's study are not similar to those in our study, its results showed that as the level of education increases, individuals' preferences for prioritizing resources allocation on the study criteria (patients' financial capability, lifestyle, and insurance coverage) significantly changed. For example, respondents with a higher education level compared to those who had a lower education level paid more attention to insurance, and maintained that patients with lower insurance coverage should have had a lower priority in health resources (Van der Aa et al., 2018).

Our study results will help policy and decision makers to better understand and analyze the causes of differences in the society members' attitudes and behaviors. In other words, they would know the difference and similarities of individuals' preferences and apply them to the decision-making processes associated with the health system. Despite the differences in the prioritization of the criteria for a different education level, the results presented in Table4 show that direction of changes is the same at all defined levels of education. Thus, in all three different education groups, preferences are reduced only when the age of an individual increases from under 15 to over 65, and in other cases, preferences increase. The results also indicated that there was a low odds ratio for all the three education groups when there is an increase in age from under 15 to 15 - 65 years. Therefore, it can be concluded that the general consensus in the community is that when the patients' age changes from under 15 to working ages (15-65), there would be no change in the individual's right to receive health resources, but they will have less privilege for resources allocation when they reach the age of 65.

As individuals' education level increases, priority given to the treatment of communicable diseases decreases, perhaps the reason is that individuals with a higher education level are more aware of the high prevalence of non-communicable diseases in the community and have noticed that non-communicable diseases such as psychological and cardiovascular disease are considered high risk diseases in the society. The importance of attributes benefits from treatment and severity of disease increases when the level of education increases, while the importance of the emergency admission for diseases decreases as the level of education increases. A reason for this result may be that individuals with a doctoral degree have a greater ability to analyze the cost-benefit of the treating process of diseases. In this regard, Green in his study on elicitation of social values for health interventions concluded that the increase in the *severity of illness* and *effectiveness of treatment* would increase the right of individuals to have access to health services (Green and Gerard, 2009). Blumenschein et al. (2016)'s studies in Canada and the study of Skedgel and Regier (2015), confirm the general results of our study; however, they did not differentiated between the participants by educational level.

Conclusion

Health policymakers may face contradictions in individuals' views and behavior when using the community's preferences to prioritize health resources, making the process more difficult for them. In our study, it was found that different levels of education were one of the factors making individuals' opinions different. Therefore, these differences and similarities were identified, and it is recommended that those preferences that there is consensus on them in the community, such as the lower priority for patients over the age of 65, should receive the top priority for implementation. Then, the reasons for the difference in other preferences were determined and it is suggested that health policymakers, while explaining these differences to the people, convince them to be in line with their policies. It is also recommended that other studies should be reviewed for the effects of other demographic variables such as age, gender, or economic status on prioritizing health resources, to obtain a clear picture of the community's preferences.

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