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ECONOMIC FACTORS AFFECTING THE CONSUMER'S CHOICE OF DENTAL SERVICES

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ABSTRACT

Considering the importance of health in the development of communities, in this study, the economic factors affecting the consumer's choice of different dental services are investigated. In this regard, 450 patients referred to dental clinics in Tehran were selected as a sample, and the economic factors affecting consumer's choice of different dental services were analyzed using the Heckman two-step model. The results indicate that income and level of education are among the most important factors influencing the choice of dental services, especially luxury dental services (from the consumer's perspective) such as dentures, scaling, and dental and surgeries. The cost of each of the essential dental services (from the consumer's perspective) such as tooth extraction, tooth restoration, and endodontic therapy does not affect the demand for these services because the coefficient was high in these cases. This means that the consumer often does not pay attention to the cost of essential dental services because he/she has to undergo treatment.

1. INTRODUCTION

One of the most important concerns of economics is to increase economic development. However, what has received more attention in today's world is sustainable economic development, one of the basic elements of which is the level of health. In other words, one of the prerequisites for achieving sustainable development is to have an initial level of health, which can be considered as one of the most important parameters determining the economic development of any country. Studies suggest that tooth decay and poor oral hygiene are on the rise in the community. Accordingly, it can be argued that detailed planning of health education in this field is of great importance. The results of a study conducted by the Ministry of Health and Medical Education of Iran show that about 62% of 12-year-old Iranian children have tooth decay and 18% of them have gum disease.[1] There are many studies on the prevalence of tooth decay and gum disease. According to these studies, treatment alone is not enough, and measures such as prevention, promotion, and observance of oral health issues must be taken to succeed in this area. Achieving this goal requires consumer awareness of oral health and the use of services such as consultation with dentists. Dental check-ups should be performed every 6 months to prevent oral diseases. However, this time is reduced to three months in high-risk individuals. One of the components of community health is oral health. In this regard, various services in the field of dental services are provided.

As with goods, the dental services provided are essential or luxurious. Proper health patterns in this field can be provided by increasing public awareness through education and culture building. It is worth noting that all people may need dental treatment, but different factors cause them to go to the dentist or not. In this study, the economic factors affecting the consumer's choice of dental services are examined. This study is conducted to determine the economic factors affecting the number of visits to dentists because consumer behavior in this field can be managed and directed to ensure the health of the community concerning oral health at the lowest cost by recognizing these factors. The main questions of the study are whether economic factors such as income, the cost of smoking per month, or demographic factors such as education level and distance to the dental office or clinic affect the cost and participation in dental services. Consumer behavior in the field of dental services is modeled based on microeconomic analysis to answer the study questions.[2] Factors affecting medical services are then analyzed.

[1] *Portal of the Ministry of Health and Medical Education of Iran, 2013.*
[2] *Dental services include a wide range of medical procedures such as check-ups, pulling, opening abscesses, tumor surgery, scaling, brushing, pulp treatment, restoration of cavities, root canal treatment, dressing, filling, and many other services.*

2. THEORETICAL FOUNDATIONS

According to the consumer theory, the first and most important point is the rational action of the consumer. From the point of view of economics, a rational consumer is someone who chooses from among all possible combinations and available goods the one that brings him/her the maximum utility. According to Grossen's theory, oral health is a depreciable asset. In other words, the rational consumer seeks to maximize the following objective function relative to the budget constraint:

$$\begin{cases} max. & \cup (x_1 \text{و} \dots \dots \dots . \mathrm{x_n}) \\ s.t & \sum_{i=1}^{n} X_i P_i \qquad i = 1 \dots \dots \dots . n \end{cases} \quad (1)$$

(2)

Where m is the consumer income (consumer budget), x_i is the consumption of goods i, and p_i is the price of that goods. So, the above utility function can be solved using the Lagrange multiplier method, and the maximum utility (U^*) is obtained with the optimal consumption values of each product, i.e. x_i^*.

$$x_i^* = x_i^*(p_1 \dots \dots \dots p_{n.m}) \quad i = 1 \dots \dots . n \quad (3)$$

In economics, the above equations are known as ordinary or Marshallian demand functions. People need to maximize their oral health capital over time to maximize their convenience by making replacing investments, requesting a variety of dental services, purchasing oral care products, spending on health care, and visiting a dentist.[3] Many factors affect oral health, and their role can be considered at the level of this capital. Some of these factors include age, family structure, occupation, education level, and so on. In general, the demand function can be estimated in two ways:

1. Using the Lagrange function
2. Without the use of a specified utility function.

Like all economic goods, health demand is analyzed through the utility function. Each consumer is faced with a budget constraint, maximizes its utility according to the budget constraint, and chooses the optimal combination of health goods (H) and other goods (X). Assuming that the other conditions are constant and that only the price of the health goods changes, the budget line changes, and the optimal combination in the consumption of goods H and X is obtained. Thus, in the space p and q, the relationship between p and q of the health goods is obtained, which is the same as the demand function. On the other hand, there is a production relationship between health goods and medical care.

$$H = g(m) \quad (4)$$

$$\cup = f(X.H) = f(X.g(m)) \quad (5)$$

Thus, by achieving the relationship between p and health, the relationship between p and medical care is indirectly obtained, which is the demand function for medical care.

$$\begin{cases} m = h(p) \quad \text{و} \quad h < 0 \\ m: \quad \text{Medical Care} \\ p: \quad \text{The price of health goods} \end{cases} \quad (6)$$

According to Equation 6, which is the opposite of the demand function, the demand for medical care decreases with increasing price (Phelps, 2014). A negative slope indicates an inverse relationship between price and demand. In this equation, it is assumed that other factors affecting the demand for medical care are constant.

3. LITERATURE REVIEW

In this section, related studies inside and outside Iran are presented.

Conrad (1983) examined the drivers of demand for dental services among people over the age of 65 in the United States using cross-sectional data from 1975. In this study, the demand for different types of medical services was investigated separately. In this study, the linear model and the ordinary least squares (OLS) estimator are used. The results show a high price elasticity of demand for medical services and less use of check-up services than other people (other age groups) in society. The effect of health insurance on variables of oral care and treatment was investigated in a study by Conrad, Grembowski, and Milgram (1987). The results indicate that the variable of health insurance significantly reduced the price elasticity of demand for dental services in the sample. Gille and Houy (2014) studied the factors affecting medical care services in developed countries. They divided consumers into categories according to their need for medical care, using cross-sectional data for 2010 and 2012 and a multivariate regression model. The results show that the requirements and facilities for using these services in the workplace significantly affect the demand for medical services and care. In a study by Monski and Meyerhoefer (2017), the demand for dental services and check-ups in Australian citizens from 2020 to 2025 was examined. The data are in time series and are related to 1975 to 2015. The results indicate that the age structure significantly affects the demand for dental services.

In a study titled Assessment of Demand for and Utilization of Dental Services by Insurance Coverage in a Developing Oral Health Care System, Bayat et al. (2007) investigated the relationship between insurance and demand for dental services in Iran. The results of linear regression showed that 76% of households had public insurance and that 28% had commercial insurance in addition to general insurance. Moreover, the second group used 1.5 times more restoration and checkup services

[3] *Costs such as time spent visiting a dentist, although cannot be calculated on their own, are indirectly affected by demographic variables such as distance to the doctor's office. In this way, their effect can be calculated.*

and 1.4 times more expensive services compared to other people studied. Besides, tooth extraction services had a price elasticity close to zero. In a study titled Investigation of the Consumer Choice in the Use of Dental Services Care Applying Heckman Two-Step Procedure, Kouhbar et al. (2018) found that family income, insurance, and education are among the most important factors affecting the choice of essential and luxury dental services. The income elasticity of root canal treatment services and the income elasticity of check-up was 0.4, but the income elasticity of tooth extraction was negative.

Badiei et al. (2012) conducted a study entitled The Relationship between Dental Caries and Some Socio-economic Factors in 35- 44 Years Old Adults in Some Urban Areas of Sistan & Baluchestan. They determined the DMFT index and found a significant relationship between the DMFT index and ethnicity. In a study titled Estimation of Dental Services-Demand Function of Family in Sabzevar, Iran, in the Urban Area: 2007, Ghaderi et al. (2009) concluded that there is a direct relationship between household income level and demand for dental services. Azizi et al. (2012) conducted a study titled Assessing and Segmentation of Dental Patients According to Their Expectations. In this study, the main factors of needs and expectations were divided into 6 main dimensions as follows: access, personnel dimensions, services, finance, speed, and environment. The results showed that dentists 'awareness of patients' expectations improves the relationship between dentist and patient and the quality of health care, which is the ultimate goal of the health system.

4. METHODOLOGY, MODEL PRESENTATION, AND ANALYSIS OF VARIABLES

The regression model for answering the questions is as follows:

$$Dental\ services = ax + U$$

$*\ D.S$: The dependent variables of the model

$*$ a: The regression coefficient

$*$ x: Vector of explanatory variables

$*\ U$: Error Term

According to the statistical surveys conducted in the study, not all dental services (dependent variable), including luxury dental services such as orthodontics, are used by many Iranian individuals and households, and their cost is zero. Therefore, using the OLS method, in this case, will not be reliable because it gives biased estimates. Tobin (1958) showed how to use linear estimators when there are repeated zeros for any reason, inspired by the probit model. He argued that E (u) would not be zero if only non-zero data are used. In other words, the estimate is made for only one set of observations while we seek to examine the entire statistical population.

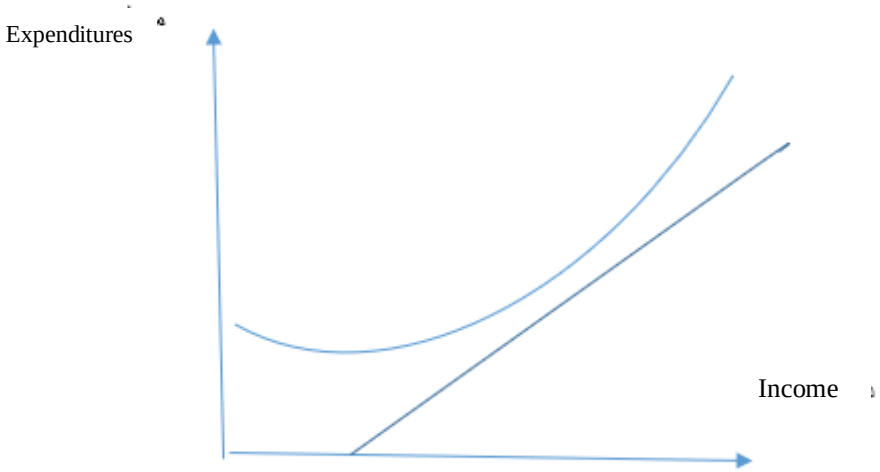

Figure 1. Distribution of points in the case of repeated zeros (Tobin, 1958)

Suppose $y = \beta x + u$, $u \sim IN(O.\ \sigma^2$ and observations are censored. Assuming this theorem is censored and zeroed, for y * less than zero, the data likelihood function will be as follows:

$$L = \Pi_{y_i} > 0 \frac{1}{\sigma} \varphi\left(\frac{y - x_\beta}{\sigma}\right) * \Pi_{y_i} = 0 \phi\left(\frac{-x_\beta}{\sigma}\right) \quad (8)$$

By estimating the above regression model for positive observations, we have:

$$\mathrm{E}(u|y > 0) = \sigma\varphi\left(\frac{-x_\beta}{\sigma}\right) / \left(1 - \varphi\left(\frac{-x_\beta}{\sigma}\right)\right) \quad (9)$$

The above equation does not have to be zero. So, least squares estimators are biased in addition to being insufficient. Heckman uses the bias shown as an explanatory variable called the inverse Mills ratio in the model.[4] Following an explicit estimate of the demand for durable goods, Amimia (1984) has proposed several cases of suitable forms of dependent and discrete variables. Accordingly, a truncated distribution is mentioned when all the data of the dependent and explanatory variables for outliers are missing. However, in censored data, only dependent variable data in this range will be lost. Assuming that y^* indicates the consumption of durable goods resulting from the process of marginal utility and that prices contain information such as quality, the factors affecting the consumption of these goods can be extracted to examine consumer behavior.

$$y^* = \beta_1 + \beta_2 x + u \tag{10}$$

Where x is the vector of explanatory variables affecting the consumption of the desired goods, and u represents other variables affecting utility that are outside the model. However, in reality, y^* is not visible and represents consumer y:

$$\begin{cases} y = y^* & if \quad y^* > 0 \\ y = 0 & if \quad y^* \leq 0 \end{cases} \tag{11}$$

The likelihood function of the consumption observations is as follows:

$$L = \Pi_0 F_i(y_{0i}) \Pi_i F_i(y_{1i}) \tag{12}$$

However, in this study, it is assumed that the observations have an independent normal distribution.

So, we have:

$$L = \Pi_0 \left[1 - \phi\left(\frac{x_\beta}{\sigma}\right)\right] \Pi_1 \frac{1}{\sigma}\left[1 - \phi\left(\frac{y_i - x_\beta}{\sigma}\right)\right] \tag{13}$$

The above function is the main equation of the censored Tobit model because an explanatory variable is also visible for zero observations. The Tobit equation with the truncated likelihood function is as follows:

$$L_1 = \Pi_1 \frac{\frac{1}{\sigma}\phi\left(\frac{y_i - x_\beta}{\sigma}\right)}{\phi(x_\beta)} \tag{14}$$

In data with such a distribution, the best method of estimation is to use the Heckman (1979) sample selection model or the Hackett model because the existence of zero for the dependent variable is due to the phenomenon of non-observation. So, in this type of data, zeros do not play a role in estimating the original model y^*, and the sample selection function is as follows.

$$y_i \begin{cases} y_i * & if \; y_i * > 0 \\ unobserved & 0.W \end{cases} \tag{15}$$

The estimation steps in this model are as follows:

A) Estimating the probit model in the first step using the whole sample;
B) Calculating the inverse Mills ratio from the Tobit equation obtained in the previous step;
C) Putting the inverse Mills ratio as an explanatory variable in the equation of economic factors affecting consumer's choice and estimating it by the ordinary least square (OLS) method (Green, 2000).

Since some subjects may use bandages in each dental service, the Heckman two-step model is used to examine the economic factors affecting the consumer's choice of dental services. In this model, the factors affecting the likelihood of participation in the consumption of each dental service are first examined. Factors affecting spending on each of these services by each individual, provided they participate in consumption, are then investigated. Given that only the participants are used in the second step and that statistical inference is made for the whole sample in the hypothesis test, the inverse Mills ratio is used as a bias correction.

4.1 Investigating variables and data

According to Table 1, various explanatory variables affect the consumer's choice of dental services, which are described below. Important variables used in the study are income (x_i), education (x_2), costs of smoking per month (x_3), distance to the dental clinic (km) (x_4), costs of scaling (x_{51}), costs of tooth restorations (x_{62}), costs of dental prostheses (x_{73}), costs of tooth extraction (x_{84}), and costs of dental surgeries (x_{95}). The coefficients obtained can be seen in Table 1. These variables were used as independent variables of the model due to their correlation with medical and health information, which according to the theoretical foundations of the study, can play a significant role in the demand for some preventive services and, consequently, increase oral health. In this study, the dependent variable is the demand for different types of dental services, including:

y_1 (Demand for dental scaling)
y_2 (Demand for tooth restoration and endodontic therapy)
y_3 (Demand for dental prostheses)
y_4 (Demand for tooth extraction)
y_5 (Demand for dental surgeries)

[4] *Taken from Heckman (1979) and also from the following address:*
http: www.wanchuanlin.org/policy%to evaluation% 200f% 20 social% 20policies / Lecture3typed.pdf

Figure 1 shows the frequency of using different dental services in the whole sample.

The frequency of using different dental services in each of the subjects can be seen in Figure 2.

As can be seen in the figures, the maximum frequency belongs to tooth restoration and endodontic therapy and the minimum belongs to dental surgery. After a descriptive review of the model data using the Heckman two-step model, each of the economic factors affecting the demand for different dental services is examined separately.

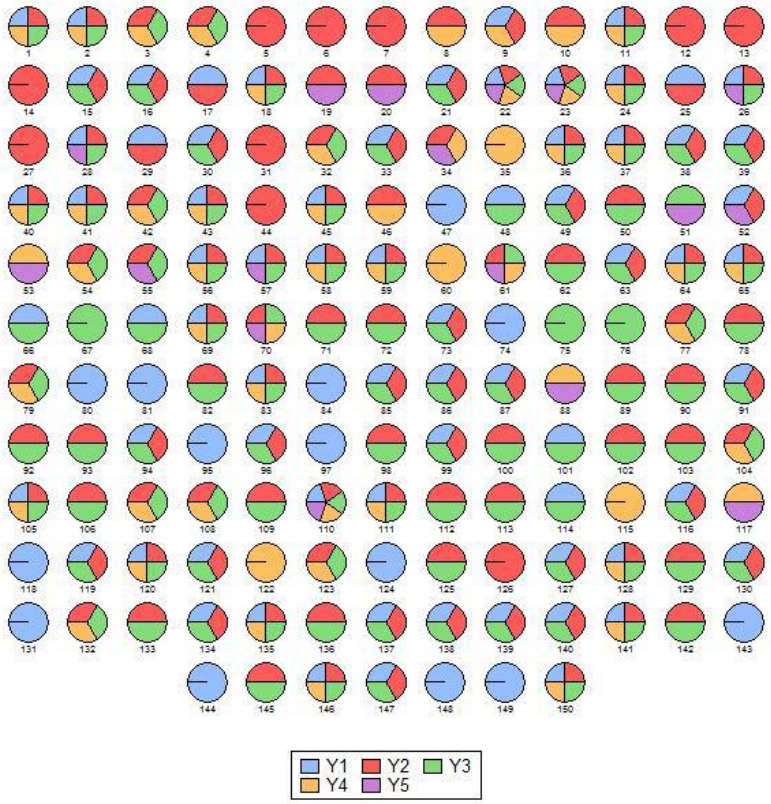

Figure 1. Frequency of using different dental services in the whole sample

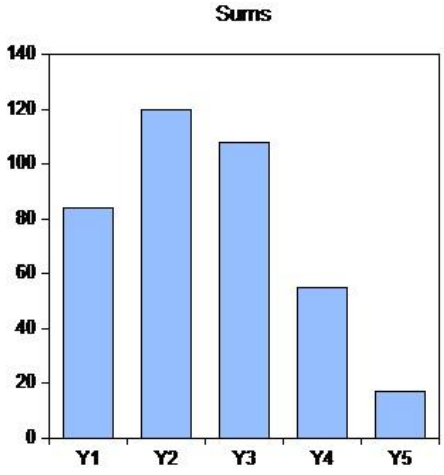

Figure 2. Frequency of using different dental services in each of the subjects

4.2 Estimation of factors affecting participation and cost

Table 1 shows the estimation of economic factors affecting dental check-up services based on the Heckman two-step method. The dependent variable of the first step of this model is participation in referring to the dentist for a check-up. In the next step, the economic factors affecting the cost of the check-up are estimated. The explanatory variables used in the first step are used again in the second step.

Table 1. Estimation of Heckman two-stage model for examining the economic factors affecting the demand for dental check-up services

Variable	Participation factor	Probability	Cost factor	Probability	Elasticity
Distance to the clinic	-0.001	0.01	-0.63.79	0.020	-0.7685
The cost of smoking	-0.001	0.02	-0.73903	0.020	-0.86532
Income	0.0010	0.025	0.24567	0.01	0.11129
The number of literates	0.0713	0.03	79632	0.04	0.21371
The number of under diploma	-0.1391	0.000	-17839	0.03	0.31571
Intercept	-2.742	0.000	3500000	0.00	-
Coefficient ρ	1				
Inverse Mills ratio	e 710 * 1.3				
Coefficient ε	1195945				

In Table 1, statistics ρ shows the correlation between the two generalizations, meaning that the consumer also thinks about the cost of the check-up as an effective factor in generalizing whether or not to visit the dentist for a check-up. From the point of view of consumer theory in microeconomics, this correlation points to the fact that the services in question are unnecessary normal products. According to the results, all the estimated coefficients are statistically above 96% confidence level, and education level, costs of smoking per month, age, costs of each dental service are factors that affect the likelihood of referral to the dentist for a check-up.

4.3 Estimation of economic factors affecting the participation and cost of dental scaling services

Table 2 shows the factors affecting the participation and cost of dental scaling services in the sample. According to statistics ρ, the two generalizations are correlated.

Table 2. Estimation of Heckman model to examine the economic factors affecting the demand for dental scaling

Variable	Participation factor	Probability	Cost factor	Probability	Elasticity
Distance to the clinic	-0.010	0.000	0.01695	0.012	0.02415
The cost of smoking	0.0488	0.000	0.02695	0.013	0.02413
Income	-0.0004	0.056	0.00959	0.024	-0.0045
The number of literates	0.04856	0.032	-5530.82	0.00	-5138.8
The number of under diploma	-0.01310	0.005	-13266	0.004	-16724.4
Intercept	+2.3606	0.000	14786	0.000	-
The cost of scaling	-0.25203	0.004	1478	0.00	0.0425
Coefficient ρ			-0.46729		
Inverse Mills ratio			-449801.5		
Coefficient ε			962566.66		

$$\begin{cases} y*_1 = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_5 x_5 \\ y*_1 \text{ :Consumer's demand for dental scaling} \end{cases} \quad (16)$$

According to Table 2, the coefficients are significant at the 95% confidence level, and, therefore, the proposed statistical inference can be justified. The results indicate that the cost of smoking per month affects the consumer's demand for dental scaling, which is probably due to the lack of attention to oral health in this group of people. Moreover, the direct effect of income and education level on consumer's demand for dental scaling can be mentioned. It is also found that there is an inverse relationship between the costs of scaling and consumer's demand for scaling, which can be seen in the following equation.

$$y*_1 = 0.220457 + .0152002x_1 + .0871101x_2 + .0572017x_3 + .01186000x_4 = .0251204x_{51} \quad (17)$$

4.4 Estimation of economic factors affecting the participation and costs of tooth restoration and endodontic therapy

One of the differences between this type of dental service and other types is coefficient ρ, which is 57%. According to this coefficient, it cannot be argued that the two generalizations of referral for tooth restoration and endodontic therapy and the cost of these services are correlated. In other words, when the patient is required to have endodontic therapy on his/her tooth, he/she no longer thinks about the costs and looks at it as a necessary commodity.

Table 3. Estimation of Heckman model to examine the economic factors affecting the demand for tooth restoration and endodontic therapy

Variable	Participation factor	Significance	Cost factor	Significance	Elasticity
Distance to the clinic	0.321700	0.006	1.115	0.028	0.15645
The cost of smoking	0.421700	0.007	1.215	0.038	0.16458
Income	0.0010	0.008	2.22110	0.029	2.3349
The number of literates	0.0002	0.002	1.16446	0.036	1.0726
The number of under diploma	0.111538	0.003	377976	0.000	0.04277
Intercept	+0.57324	0.000	-76572.15	0.037	0.56312
The cost of dental restoration	0.142004	0.002	27798	0.037	0.76312
Coefficient ρ			1.000		
Inverse Mills ratio			7+e10*-3.80		
Coefficient ε			3796467		

According to Table 3, the coefficients are significant at the 95% confidence level, and the results are statistically justified. The results show that from a consumer perspective, there is a direct relationship between income, education level, costs of smoking per month, and costs of tooth restoration and endodontic therapy with the demand for tooth restoration and endodontic therapy, and there is a negative relationship between distance to the dental clinic and demand for tooth restoration and endodontic therapy.

$$\begin{cases} y*_2 = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_6 x_{62} \\ y*_2 = \text{Consumer's demand for tooth restoration and endodontic therapy} \end{cases} \quad (18)$$

$$y*_2 = 0.573555 + 0.1997001 x_1 + 0.2994015 x_2 + 0.421700 x_3 - 0.150510 x_4 + 0.142004 x_{62} \quad (19)$$

4.5 Estimation of economic factors affecting the participation and costs of dental prostheses

It is usually thought that dental prosthesis services such as veneers, implants, composites, etc., although they are part of the essential dental services, but are not given much attention due to insufficient information about the effects of related diseases. So, the degree of necessity of these services from the consumer's perspective is reduced, and the cost of services is very effective in generalizing their use. The coefficient ρ confirms this. Its high value indicates that households do not think about the costs of dental prostheses when applying for this service.

Table 4. Estimation of Heckman model to examine the economic factors affecting the demand for dental prostheses

Variable	Participation factor	Significance	Cost factor	Significance	Elasticity
Distance to the clinic	0.0327	-0.056	-0.0215	0.012	0.02571
The cost of smoking	0.0488	0.046	0.0265	0.013	0.02413
Income	0.0042	0.032	0.0095	0.024	-0.00456
The number of literates	0.04852	0.005	-5530.8	0.00	-51308.8
The number of under diploma	-0.01308	0.000	-13266	0.004	-16727.46
Intercept	0.294483	0.004	9e107.6	0.00	9e2.84
The cost of dental prosthesis	0.142004	0.004	7e107.2	0.00	7e*5.8
Coefficient ρ			0.971		
Inverse Mills ratio			09e2.14		
Coefficient ε			151.09e2		

According to the estimation results, the education level has the greatest effect on the demand for dental prostheses.

$$\begin{cases} y*_3 = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_{73} \\ y*_3 = \text{Consumer's demand for dental prostheses} \end{cases} \quad (20)$$

$$y*_3 = 0.294483 + \alpha_1 0.406300 x_1 + 0.580620 x_2 + 0.218150 x_3 + 0.182201 x_4 - 0.45650 x_{73} \quad (21)$$

4.6 Estimation of economic factors affecting the participation and costs of tooth extraction

One of the differences between this type of dental service and other types is coefficient ρ, which is 47%. According to this coefficient, it cannot be argued that the two generalizations of referral for tooth extraction and its costs are correlated. In other words, when a patient is required to have a tooth extracted, he/she does not pay attention to its costs because he/she considers tooth extraction a necessary commodity that he/she needs to get rid of the pain.

Table 5. Estimation of Heckman model to examine the economic factors affecting the demand for tooth extraction

Variable	Participation factor	Significance	Cost factor	Significance	Elasticity
Distance to the clinic	0.1856	0.008	0.04	8e10	8e
The cost of smoking	0.2853	0.007	0.03	966.4	1023.9
Income	0.23960	0.071	0.09	-40.304	-44.37
The number of literates	0.4210105	0.007	0.00	6e10	6e
The number of under diploma	0.15417	0.07	0.00	7e107.2	7e
Intercept	0.266604	0.004	0.00	9e107.6	9e
The cost of tooth extraction	0.73796	0.6	0.09	8e105	9e
Coefficient ρ			0.471		
Inverse Mills ratio			09e2.14		
Coefficient ε			151.09e2		

According to Table 5, the coefficients are significant at the 95% confidence level, and the results are statistically justified. The results indicate that there is a direct relationship between the coefficients of all independent variables and the dependent variable (y^*4).

$$\begin{cases} y*_4 = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_5 x_{84} \\ y*_4 = \text{Consumer's demand for tooth extraction} \end{cases} \quad (22)$$

$$y*_4 = 0.26604 + \alpha_1 0.397000 x_1 + 0.239600 x_2 + .0420105 x_3 + 0.154170 x_4 + 0.737966 x_{84} \quad (23)$$

4.7 Estimation of economic factors affecting the participation and costs of dental surgeries

As with dental prostheses, it is thought that dental surgeries, although they are part of the essential dental services, are not considered enough due to the lack of adequate medical information in the community about the effects of diseases caused by lack of surgery. So, the degree of necessity of these services from the consumer's perspective is reduced, and the cost of services is very effective in generalizing their use. The coefficient ρ confirms this. Its high value indicates that households view the cost of dental surgery as an important factor if they are required to use these services.

Table 6. Estimation of Heckman model to examine the economic factors affecting the demand for dental surgeries

Variable	Participation factor	Significance	Cost factor	Significance	Elasticity
Distance to the clinic	0.2853	0.008	8e10	0.04	8e
The cost of smoking	0.0001	0.07	966.4	0.03	1023
Income	0.008	0.07	-40.304	0.09	-43.37
The number of literates	+0.0718	0.07	6e10	0.00	6e
The number of under diploma	-0.1395	0.004	7e107	0.00	7e
Intercept	-0.7125	0.007	9e107	0.08	9e2.84
The cost of dental surgeries	0.73796	0.000	9e108	0.00	8e2.85
Coefficient ρ			0.971		
Inverse Mills ratio			09e2.14		
Coefficient ε			521.09e2		

$$\begin{cases} y*_5 = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_5 x_{95} \\ y*_5 = \text{Consumer's demand for dental surgeries} \end{cases} \quad (24)$$

$$y*_5 = 0.100049 + 0.366910 x_1 + 0.798700 x_2 + 0.318250 x_3 + 0.2974000 x_4 - 0.712501 x_{95} \quad (25)$$

5. CONCLUSION

One of the goals of demand analysis in the health sector is to determine the factors affecting the consumption of health services. This is an interdisciplinary applied study that examines the demand for different dental services with statistical methods and econometrics and EViews software using theories of microeconomics and, in particular, consumer behavior. A summary of the results is as follows:

- During the period under review, the cost of dental check-ups increases as income levels increase. In other words, people with higher incomes are more likely to go to the dentist for a health check-up and pay more for it.
- People with a higher level of education are more likely to go to dentists for dental prostheses, dental surgeries, and scaling. This shows the importance of quality services for people with higher education.
- People's income and education are directly correlated to their dental health and information.
- There is a direct relationship between the level of smoking in individuals and their referral to the dentist, but there is an inverse relationship between the level of smoking in individuals and their demand for dental services.
- There is a direct relationship between the cost of each dental service (x_{51}, x_{62}, x_{73}, x_{84}, x_{95}) and the demand for these services, if necessary, such as tooth restoration and endodontic therapy (y_2) or tooth extraction (y_4).
- If the consumer considers dental services such as dental prostheses, scaling, or dental surgeries to be luxury, the distance to the dental clinic has little effect on the demand for these services, but there is an inverse relationship

between distance and services that the consumer deems necessary, such as tooth restorations, endodontic therapy, and tooth extraction.

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