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# Estimating the Recreational Value of Chitgar Forest Park Using Contingent Valuation Method

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**Abstract**

The objective of this study was to estimate the recreational value of Chitgar forest park and the willingness to pay (WTP) of visitors to this park using the contingent valuation method (CVM). The questionnaire was used for data collection. The Cochran formula was applied to determine the required sample size for the survey. The random sampling method was used to survey. The double-bounded dichotomous choice approach was used to design the questionnaire. A logit regression model was used to estimate the relationship between WTP and explanatory variables. The results of the logit model showed that WTP had a significant negative relationship with the explanatory variables such as the respondent's age, household size, education level, and membership in non-governmental organizations (NGOs). In addition, results indicated that WTP had a positive relation with respondents' gender, marital status, and monthly household revenue as the explanatory variables. Results showed that the maximum expected WTP of visitors was 79630 IRRials. Furthermore, results showed that the total annual economic value of the recreation in Chitgar forest park was 38.9 billion IRRials. The results of this study can help decision-makers to enhance the quality of Chitgar forest park, develop tourism, increase the number of visitors, and generate revenue for the park.

***Keywords:***
***Welfare effect; Logit model; double-bounded dichotomous choice; economic value; willingness to pay***

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## INTRODUCTION

Expressing the value of natural resources inevitably leads us to questions about how and to what extent environmental resources are valued. The required efforts to estimate the monetary value of ecosystem services play an additional role in the integrated management of humans and natural systems. At micro levels, valuation studies provide data on the structure and function of ecosystems and their diverse and complex role in supporting human welfare. At macro levels, ecosystem valuation can contribute to the creation and improvement of human welfare indicators and sustainable development. Valuation of environmental resources can be helpful in enhancing environmental policies. The main objective of the economic valuation of ecosystem services is to provide data that help decision- makers plan the optimal and efficient utilization of available resources to maximize the well-being of society (Shahbazi & Samdeliri, 2017; Resende et al., 2017).

Some of the ecosystem services are well known, such as supply of food, fiber, and fuel, and the provision cultural services that provide benefits to people through recreation and appreciation of nature. In contrast, other services provided by ecosystem are not so well known, such as climate regulation, air, and water purification, flood protection, soil formation and nutrient cycles. These services are not generally considered in policy evaluation (Defra, 2007).

Forest parks are sources of non-wood products such as fruits, oxygen production, carbon sequestration, regulation of surface water flow and increasing groundwater levels. The history of economic evaluation of recreational sites (like forest parks) goes back to the last few decades (Amiri & Mohammadi-Limaei, 2021).

CVM estimates the economic values for all kinds of ecosystems and environmental services. The CVM involves directly asking people, in a survey, how much they would be willing to pay for specific environmental services (Ecosystem Valuation, 2015). CVM surveys were first proposed in theory by Ciriacy-Wantrup (1947) as a method for the eliciting market valuation of a non-market good. The CVM is the most common approach for estimating the monetary value of environmental assets (Wang et al., 2006; Whittington, 2002).

There are many studies about the valuation of recreational sites using CVM and the aim is not to review all of these studies, below we mentioned some of them: Bertram et al. (2017) studied the differences in the recreational value of urban parks between weekdays, and weekends. Results showed that preferences significantly differ between weekday and weekend recreation for some park characteristics. For weekdays, respondents prefer urban parks in closer to their homes, while the size of the parks is not important. For the weekend, larger parks with picnic facilities are preferred, while distance matters less. Cleanliness and maintenance are important, regardless of whether a park is visited on weekdays or the weekend. Resende et al. (2017) investigated the WTP of visitors to preserve a protected ecosystem in the Serra do Cipó National Park in southeastern Brazil. Their results showed that the average WTP was R$ 7.16, and the total annual average WTP was R$ 716,000.

Chen and Qi (2018) investigated the recreational use and amenities of Fuzhou National Forest Park (FNFP) in China and calculated the monetary value of provided services using the CVM. Results indicated that park visitors would be willing to pay an average of 11.6 RMB (equivalent to 1.69 USD) per person. Chu et al. (2020) investigated households' willingness to accept for advanced services of the ecosystem and the factors that affecting it in China using CVM. Their results showed that the studied households were willing to pay the equivalent of 477.91 Yuan per year for forestry projects. Their results also showed that high household revenue was a critical factor in their WTP to participate in forestry projects. Belay et al. (2020) studied the factors affecting the WTP of households for the conservation of public

land in northeastern Ethiopia. Results showed that the number of livestock, credit, social relationships and farm size had a significant and positive effect on the WTP of households. Kang et al. (2021) valued the recreational services of the China national forest parks. Results indicated that each recreational attribute considered enables the generation of a significant amount of tourism welfare for tourists. In contrast, tourist congestion was found to be a negative contributor to tourists' satisfaction. Reducing congestion from the current level is the most valued recreational attribute for tourists, and the WTP for it is 623.18 CNY per visitor per trip.

There have been several studies using CVM to determine the recreational values of Iran's forests parks and we mention some of them in below:

Amirnejad and Khalilian (2006) investigated the recreational value of Sisangan forest park in the north Iran. Their results showed that the WTP for the annual recreational value of the park is 2477 IRRials per visit. The total annual recreational value was 2535835 IRRials/ha (291 US$/ha). Mohammadi Limaei et al. (2016) investigated the recreational values of Saravan forest park in the north Iran. Their results showed that 91.19 percent of visitors were willing to pay for the recreational value of the forest park, and the total annual recreational value of the forest park was 22,761.6 million Rials. Abedi and Riahi Dorcheh (2018) estimated the WTP for recreational and conservation values at Chamran Park in Karaj, Iran. Their results showed that the maximum WTP per person for recreational and conservation values was 19778.5 and 4834.9 Rials, respectively. Satari Yuzbashkandi, and Mehrjo (2019) studied the recreational value of Kabudval forest park in the north Iran. Their results indicated that the WTP to protect the park was 34,850 IRRials, and the annual recreational value was 12,787,400 Rials/ha. Amiri and Mohammadi-Limaei (2021) investigated the recreational value of Kahman forest park in the west Iran. Their results showed that the WTP for recreational value was 19,983 IR Rials per visit, and the annual recreational value was 1,989,407 IRRials/ha.

The review of previous studies showed that CVM and the double-bounded dichotomous choice approach were the most prevalent methods for estimating the recreational value of a tourism site. In most studies, demographics were used in the valuation model, and expected WTP was estimated based on significant variables in the valuation model. Chitgar forest park is one of the most highly used and popular visitor destinations in the capital city of Tehran. Therefore, the study of the recreational value of this park can be essential to predict the recreational demand and resolve the shortcomings for developing tourism in the region.

## METHODOLOGY

### *Study Area*

The study area is Chitgar forest park, located in district #22 in western Tehran (Figure 1). The general slope of the region is southwest, but within the park, the predominant directions of the slope are southwest and northeast. The park has many features, heights, and hills. Its slope fluctuation is high, starting from zero and reaching up to 80 percent. The main extension of the park is the west-east direction. The altitude ranges from 1225 m to 1313 m, and the mean altitude is 1269 m (Tehran Municipality, 2014). Tehran is a city with four seasons, and even in different seasons, there is a significant temperature difference. The climate of Tehran divided into four sections (northern, foothill, semi-arid, and arid climates). Chitgar forest park is highly valued by locals and travelers due to its mountainous climate.

### *Facilities*

Chitgar forest park has facilities such as a cultural, and sports complex, playground, meeting hall and warehouse, cycling station and track, fire station, restaurant and buffet, office building, parking, pavilions and tents

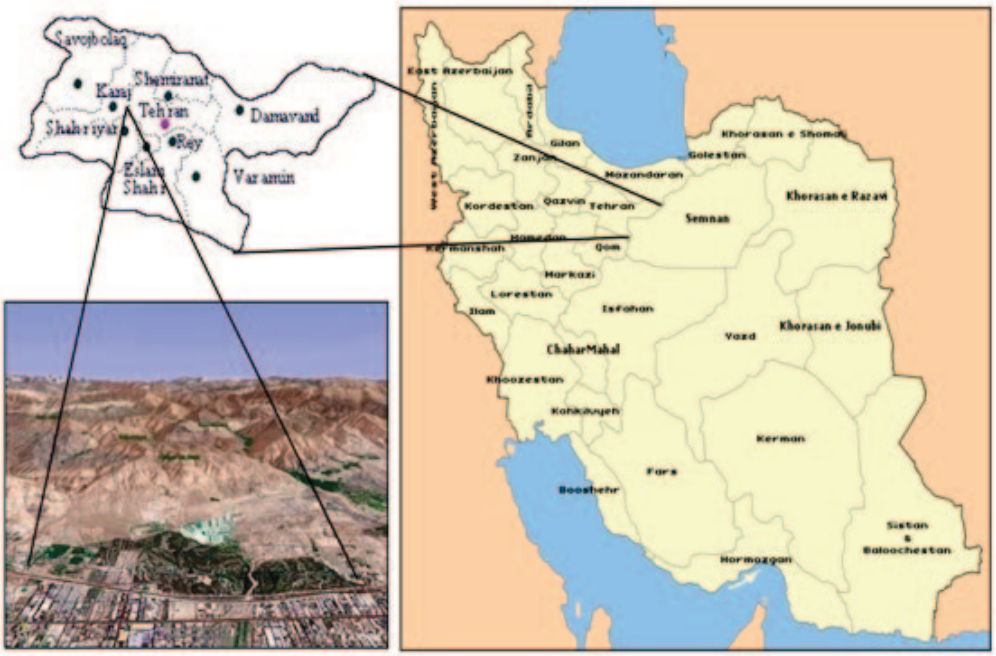


*Figure 1.* Geographical Location of Chitgar Forest Park

and other similar spaces. Most of these facilities located in the eastern part of the park and the western part has fewer service facilities, and remains pristine and forested (Tehran Municipality, 2014).

*Vegetation*

A total area of about 734 ha covered by trees, and about 53 percent of the trees are coniferous species such as *Pinus eldarica, Cupressus Arizonica, Thuja Orientalis.* Broad-leaved trees also account for about 47 percent of the planted trees and including *Fraxinus rotudifolia, Robinia psueoloacacia, Acer negundo, Acer velutinum, Ulmus densa, Cercia silsqastrum, Quercus sp. Celtis australis*, and *Ailanthus altissima* (Tehran Municipality, 2014).

*Sample size and sampling method*

The main objective of this study was to estimate the WTP of visitors for the recreational use of Chitgar forest park. For this purpose, the CVM was used. To this end, a questionnaire was designed. The sample size was determined using the Cochran formula based on pre-questionnaire data. The sample size was 383. A random sampling used, to collect the required data through in-person interviews with 383 visitors of Chitgar forest park in the spring, summer, and autumn of 2019.

*The welfare effect of recreation in Chitgar Forest Park*

CVM is applied as a flexible and standard instrument for calculating non-use and non-market use values of environmental services and natural resources (TahamiPour, & Kavoosi-Kalashami, 2012). WTP for non-use and non-market use values were determined through CVM under hypothetical scenarios (Shahbazi & Samdeliri, 2017). In the CVM, we ask people how much they would be willing to pay for specific environmental services such, as recreation using a questionnaire. This method is called "contingent" valuation as people were asked to state their WTP, contingent on a specific hypothetical scenario and description of the environmental service (Ecosystem Valuation, 2015). To provide a model for measuring the WTP, it was assumed that a person accepts the proposed bids for the current value, and the preservation of the recreational site according to the maximum acceptability or rejects it in an-

other way (Hanemann, 1984). Assume that decision of an individual to pay or refuse to pay the proposed bid depends on some explanatory variables such as age, gender, education and other socio-economic variables. WTP is defined as the amount that must be taken away from the person's income while keeping the individual utility constant (FAO, 2000):

$$V(y - WTP, p, q_0; Z) = V(y, p, q_1; Z) \quad (1)$$

where, V indicates the indirect utility function, $y$ is income, p is a vector of prices (two price for each visitor) faced by the respondent, $q_0$ and $q_1$ are the alternative levels of the good or quality indexes, if $q_1 > q_0$, shows that $q_1$ refers to improved environmental quality. Willingness to pay (WTP) for good is defined as the amount of money that must be given to an individual experiencing a worsening in environmental quality to keep the individual utility constant (TahamiPour & Kavoosi-Kalashami, 2012):

$$V(y + WTA, p, q_0; Z) = V(y, p, q_1; Z) \quad (2)$$

The probability that a person accepts or rejects one of the proposed bids for the recreational use when the dependent variable is a dichotomous choice (yes or no), can be estimated by the logit or probit models. Due to the simplicity of interpretation, we used the logit model in our analysis. We did not present the details of the logit model here (see Gujarati, 2014). The double-bounded dichotomous choice approach was used to design the questionnaire and ask proposed bids.

After estimating the logit model, various diagnostic tests used to investigate the multicollinearity and heteroscedasticity of residuals in the model.

## RESULTS

In order to investigate the statistical characteristics of the explanatory variables used for modeling, the mean and scatter indicators of standard deviation and its interval for quantitative variables were investigated. In addition, frequency and frequency percentage were reported for qualitative variables (Table 1)

Bids were determined based on prior-test results. Visitors' answers to valuation scenarios of recreation in Chitgar forest park were summarized in Table 2.

In order to estimate the closed-ended recreational valuation model, the logit functional form and the maximum likelihood estimator were used. The results of this model were shown in Table 3.

Considering the significance level of the LR statistic (0.00), the estimated logit regression is significant at the significance level of 1 percent. The percentage of correct prediction of the model equals 84.99 percent, which indicates the high predictive power of the specified model.

The regression coefficient of the explanatory variable of the bid indicated its negative or inverse effect on the WTP for recreational use of the study area. The value of the t-statistic of this coefficient (-6.11) indicated that it is statistically significant at the significance level of 1 percent. The cumulative elasticity of this variable also showed that by increasing the proposed bid by 1 percent, and holding all other variables constant, the probability of WTP decreases by 0.27 percent. In addition, the value of the marginal effect calculated for this explanatory variable showed that if the other conditions were constant, by increasing the proposed bid by 10 thousand IR Rials, the probability of WTP for the recreational use of the study area would reduce by $0.25 \times 10^{-4}$ units.

The regression coefficient of the explanatory variable of the respondent's age indicated its negative effect on the WTP for recreational use of Chitgar forest park. The value of the t-statistic of this coefficient was -2.56, indicating that it is statistically significant at the significance level of 5 percent. The value of cumulative elasticity of this variable showed that with a percent increase in the re-

Table 1
*Summary of Descriptive Statistics of Explanatory Variables Used in the Closed-Ended Valuation Model*

| Variable | | Frequency | % | Mean | S.D. | Range |
|---|---|---|---|---|---|---|
| Proposed bid (10 IRRials)* | - | - | 5013.05 | 255.49 | 5000 | |
| Age (years) | - | - | 38.34 | 10.57 | 53 | |
| Gender | Male | 270 | 70 | - | - | - |
| | Female | 113 | 30 | | | |
| Marital status | Married | 318 | 83 | - | - | - |
| | Single | 65 | 17 | | | |
| Household size | - | - | 2.88 | 1.59 | 7 | |
| Being native | Traveler | 314 | 82 | - | - | - |
| | Native | 69 | 18 | | | |
| Education level | M.A and higher | 72 | 19 | - | - | - |
| | B.A | 173 | 45 | - | - | - |
| | Associate degree | 73 | 19 | - | - | - |
| | High school | 51 | 13 | - | - | - |
| | Elementary school | 4 | 1 | - | - | - |
| | Illiterate | 10 | 3 | - | - | - |
| Visit experience | Once | 96 | 25 | - | - | - |
| | Twice | 162 | 42 | - | - | - |
| | Three times | 41 | 11 | - | - | - |
| | Four times | 56 | 15 | - | - | - |
| | Five times | 23 | 6 | - | - | - |
| | Six times | 5 | 1 | - | - | - |
| Number of visits per year | - | - | 2.24 | 2.83 | 19 | |
| Environment importance for visitor | Very low | 20 | 5 | - | - | - |
| | Low | 27 | 7 | - | - | - |
| | Average | 57 | 15 | - | - | - |
| | High | 156 | 41 | - | - | - |
| | Very high | 123 | 32 | - | - | - |
| Environment attitudes | Very low | 20 | 5 | - | - | - |
| | Low | 27 | 7 | - | - | - |
| | Average | 58 | 15 | - | - | - |
| | High | 155 | 41 | - | - | - |
| | Very high | 123 | 32 | - | - | - |
| Membership in environmental NGOs | Yes | 367 | 96 | - | - | - |
| | No | 17 | 4 | | | |
| Household monthly revenue (million IRRials) | - | - | 50.67 | 1.73 | 12.5 | |

Average exchange rate in 2019: 1$ = 42156 IRR

spondent's age, holding all other variables constant, the probability of WTP reduced by 0.15 percent. The calculated value of the marginal effect for the respondent's age showed that, on average, with an increase of one year in the respondent's age, the probability of WTP for the recreational use of the study area reduced by $0.26 \times 10^{-2}$ units.

The regression coefficient of the variable of the respondent's gender was equal to 0.52 percent, indicating its positive or direct effect on the WTP for the recreational use. This coefficient was statistically significant at the significance level of 5 percent. The marginal

Table 2
*The Respondent's WTP Under Three Scenarios*

| Bid sacceptance/ rejection | Frequency and percentage | Initial bid 50000 IR-Rials extra for the entrance fee per visit | Lower bid 25000 IR-Rials extra for the entrance fee per visit | Upper bid 100000 IR-Rials extra for the entrance fee per visit |
|---|---|---|---|---|
| Acceptance of bids | Frequency | 328 | 8 | 261 |
| | % | 86 | 15 | 80 |
| Rejection of bids | Frequency | 55 | 47 | 67 |
| | % | 14 | 85 | 20 |
| Total | Frequency | 383 | 55 | 328 |
| | % | 100 | 100 | 100 |

Table 3
*Results of Estimating the Closed-Ended Recreational Valuation Model in Chitgar Forest Park*

| Variable | Coefficient | S.D. | t-statistic | Elasticity | Marginal effect |
|---|---|---|---|---|---|
| Bid | $-0.27 \times 10^{-3}$ | $0.44 \times 10^{-4}$ | -6.11*** | -0.27 | $-0.25 \times 10^{-4}$ |
| Age | $-0.28 \times 10^{-1}$ | $-0.11 \times 10^{-1}$ | -2.56** | -0.15 | $-0.26 \times 10^{-2}$ |
| Gender | 0.52 | 0.26 | 2.01** | - | 0.04 |
| Marital status | 0.74 | 0.41 | 1.81* | - | 0.07 |
| Household's size | -0.17 | $0.96 \times 10^{-1}$ | -1.82* | -0.09 | $-0.17 \times 10^{-1}$ |
| Native | 0.41 | 0.39 | 1.05 | - | $0.39 \times 10^{-1}$ |
| Education level | -0.31 | 0.14 | -2.28** | -0.12 | -0.03 |
| Visit experience | 0.06 | 0.09 | 0.67 | 0.02 | $0.57 \times 10^{-2}$ |
| Number of visits per year | 0.08 | 0.06 | 1.33 | 0.02 | $0.76 \times 10^{-2}$ |
| Importance of the environment | 25.53 | $0.48 \times 10^{6}$ | $0.53 \times 10^{-4}$ | 12.06 | 2.43 |
| Environmental friendly | -25.29 | $0.48 \times 10^{6}$ | $-0.52 \times 10^{-4}$ | -11.95 | -2.41 |
| Membership in NGOs | -1.06 | 0.51 | -2.08** | - | -0.11 |
| Household monthly revenue | 0.04 | $0.97 \times 10^{-2}$ | 3.67*** | 0.21 | $0.34 \times 10^{-2}$ |
| Constant | 2.08 | 0.98 | 2.11** | - | - |

***$p$<0.01, **$p$<0.05 and * $p$<0.1
LR statistic = 121.87 (0.00), Percentage of right predictions = 84.99%, Durbin-Watson = 2.01

effect showed that being a male respondent increased the probability of WTP for the recreational use of Chitgar forest park by 0.04 units.

The regression coefficient of the respondent's marital status was 0.74, indicating its positive effect on the WTP for recreational use on the site. This coefficient was statistically significant at the significance level of 10 percent. The value of the marginal effect showed that being a married respondent increased, the probability of WTP for the recreational use of the forest park by 0.07 units.

The regression coefficient of the explanatory variable the respondent's household size indicated its negative effect on the WTP for recreational site use. The value of the t-statistic in this coefficient was -1.82. It shows that it is statistically significant at the level of 10 percent. The calculated elasticity showed that, on average, by increasing the value of this variable by 1 percent, holding all other

variables constant, the probability of the WTP for recreational use of Chitgar forest park reduced by 0.09 percent. The value of the marginal effect of this variable showed that on average, with the increase of one person in the respondent's household, the probability of the WTP for recreational use reduced by $0.17 \times 10^{-1}$ units.

The regression coefficient of the explanatory variable of the respondent's education level indicated its negative effect on the WTP for recreational use of the Chitgar forest park. The value of the t-statistic of this coefficient (-2.28) indicated it is statistically significant at significance level of 5 percent. The value of the marginal effect of this variable showed that when the respondent's education increased, the possibility of the WTP for recreational use of the site reduced by 0.03 units. For visitors with a higher level of education, the park environment and available recreational facilities have not been able to increase their level of well-being and lead to their WTP.

The regression coefficient of the variable membership in NGOs indicated its negative effect on the WTP for the recreational use of the forest park. The value of the t-statistic (2-8.0) indicated its statistical significance at the level of 5 percent. The value of the marginal effect of this variable showed that the respondent's membership in NGOs reduced the possibility of the WTP for recreational use of the site by 0.11 units. For visitors who are members of environmental NGOs, the park environment and its environmental indicators have not been able to increase their level of well-being and lead to their WTP.

The regression coefficient of monthly revenue of the respondent household indicated its positive effect on the WTP for recreational use of the site. The value of the t-statistic of this coefficient (3.67) indicated its statistical significance at 1 percent. The calculated elasticity value showed that, on average, by increasing the respondent's household monthly revenue by 1 percent, holding all other variables constant, the probability of the WTP for recreational use of the park increased by 0.21 percent. The marginal effect calculated also indicated an increase of 0.0034 in the probability of WTP for recreational use of Chitgar forest park with an increase of one million IR Rials in the respondent's monthly household revenue, as the other conditions are being constant.

The effect of five explanatory variables such as native, visit experience, number of visits per year, the importance of environment, and environmentally friendly on the possibility of WTP for recreational use of the Chitgar forest park was not significant at the significance level of 5, and 1 percent.

In order to investigate the possibility of simultaneous excluding of insignificance variables as mentioned above, Wald nonlinear test was used. The value of t-statistics was equal to 6.37 and its probability level was equal to 0.27. Hence, it is possible to exclude simultaneously five insignificant explanatory aforementioned variables.

In the final model, the negative effect of the explanatory variables such as proposed bid, age, household size, education level, and membership in NGOs were significant on the probability of WTP for recreational use of the Chitgar forest park at the significant levels of 1, 1, 5, 1, and 10 percent, respectively. In addition, the positive effect of the explanatory variables such as respondent's gender, marital status and monthly revenue of the household on the WTP was statistically significant at the significance levels of 1, 5, and 1 percent, respectively (Table 4).

The variance proportion was used to investigate the collinearity in the final valuation model. The results indicated that no multicollinearity between the explanatory variables or there is no exact linear relationship among the explanatory variables in this model.

In addition, the LM2 test was used to evaluate the heteroscedasticity between the error terms of the logit model. The value of the t-statistics of this test was equal to 5.02, and its probability level was 0.75. Hence, the null hy-

Table 4
*Results of Estimating the Final Closed-Ended Recreational Valuation Model in Chitgar Forest Park*

| Variable | Coefficient | S.D. | t-statistics | Elasticity | Marginal effect |
|---|---|---|---|---|---|
| Proposed bid | $-0.26 \times 10^{-3}$ | $0.43\times 10^{-4}$ | -5.96*** | -0.26 | $-0.2^{\wedge} \times 10^{-4}$ |
| Age | $-0.28 \times 10^{-1}$ | $-0.11 \times 10^{-1}$ | -2.62** | -0.15 | $-0.29 \times 10^{-2}$ |
| Gender | 0.64 | 0.25 | 2.6** | - | 0.06 |
| Marital status | 0.87 | 0.39 | 2.2* | - | 0.09 |
| Household's size | -0.2 | $0.94 \times 10^{-1}$ | -2.18* | -0.11 | $-0.21 \times 10^{-1}$ |
| Education level | -0.4 | 0.11 | -3.5** | -0.15 | -0.04 |
| Membership in non-governmental organizations (NGOs) | -0.98 | 0.51 | -1.94* | - | -0.11 |
| Household monthly revenue | 0.04 | $0.94 \times 10^{-2}$ | 4.17*** | 0.23 | $0.4 \times 10^{-2}$ |
| Constant | 3.52 | 0.79 | 4.43** | - | - |

***$p$<0.01, **$p$<0.05 and * $p$<0.1
LR statistic = 115.02 (0.00), Percentage of right predictions = 85.38%, Durbin-Watson = 1.98

pothesis could not be rejected as it shows no heteroscedasticity between the error terms.

*Maximum expected WTP*

According to the final recreational valuation function of the recreational site, and the mean value of explanatory variables in Table 4, the maximum expected WTP of the sample was calculated as below:

$$Y= 3.52 - 0.26 \times 10\text{-}3 \text{ Bid} - 0.28 \times 10\text{-}1 \text{ Age} + 0.64 \text{ Gender} + 0.87 \text{ Marital} - 0.2 \text{ Household} - 0.4 \text{ Education} - 0.98 \text{ NGOs} + 0.04 \text{ Revenue} \quad (3)$$

The maximum expected WTP of the sample was calculated and it was 79634.6 IR Rials per visit. In addition, the total annual recreational value, considering 300 thousand visitors and the entrance fee of Chitgar forest park, was equal to 38.9 billion IR Rials.

## DISCUSSION

Results indicated that there is a significant negative relation between the probability of WTP, and the explanatory variables such as the respondent's age, household size, education level, and membership in NGOs. In addition, the positive or direct effect of the explanatory variables of the respondent's gender, marital status and monthly revenue of the household was statistically significant on the WTP. TahamiPour and Kavoosi-Kalashami (2012) showed that income and education had a significant effect on the WTP for services. Kiami et al. (2016) investigated the recreation value of Masouleh village in north of Iran using CVM. Results revealed that education level had negative and significant effect on WTP but income had a statistically direct and significant effect on the mentioned variable. Ronoud and Moayeri (2016) studied the recreational value of Naharkhoran's natural forest park in the north Iran using the CVM. Their results showed that the WTP had a positive relationship with income and education level, but it had a negative relationship with age, residency status, crossed distance and proposed bids. Also, the results showed that variables such as family size, length of stay in the park and the number of visitors had no significant effect on WTP, which is somehow similar to the results of this study as education and age have an adverse effect on WTP. Shahbazi, and Samdeliri (2017) showed that income, education and age of visitors had a direct and significant effects on

WTP for the recreational use of an aquatic ecosystem area like ShirinSou Wetland. Satari Yuzbashkandi and Mehrjo (2019) indicated that income, education, age, and household variables had a significant effect on the WTP for the recreational use of Kabudval forest park in the north Iran. There are some contradictions between the results of their study, and our study as we found that age, household size, and education level have an adverse effect on the WTP in Chitar forest park.

The results showed that 87.73 percent of the visitors are willing to pay more for the recreational use of Chitgar forest park. Mohammadi Limaei et al. (2016) showed that 91.19 percent of the visitors were willing to pay for the recreational value of the Saravan forest park in the north Iran, which is close to the results of our study. Attarroshan et al. (2021) indicated that 74.9 percent of the visitors were willing to pay for recreational use of the Jahan Nama forest park in the Alborz Province in Iran, which was lower than the results of this study. Amirnejad and Khalilian (2006) showed that 78.8 percent of visitors are willing to pay for recreational values at the Sisangan forest park in the north Iran, which was also lower than the results of this study.

Results of this study indicated that the maximum expected WTP was 79630 IR Rials, and the total annual economic value of the Chitgar forest park was about 38.9 billion IR Rials. Amiri and Mohammadi Limaei (2021) investigated the recreational value of the Kahman forest area in the west of Iran using the CVM. Their results indicated that the WTP for recreational value was 19,983 IR Rials per visit, which was lower than the estimated value in this research. Their study area was far from the one in this research, and this could be the primary reason for the differences in the two estimated WTP. Satari Yuzbashkandi and Mehrjo (2019) indicated that the WTP of the individuals to protect the Kabudval forest park in the north Iran was 34,850 IR Rials. Abedi and Riahi Dorcheh (2018) showed that the maximum WTP per person for recreational and conservation values of Chamran park in Karaj (Iran) was 19778.5 and 4834.9 IR Rials per person, respectively. The estimated amounts for WTP in the studies mentioned above were lower than the results of our study, and the reason could be due to the geographical differences of study areas and the inflation rate in Iran in different periods of data collection.

## CONCLUSION AND POLICY IMPLICATIONS

This study aimed to estimate the recreational value of Chitgar forest park in the west of Tehran. The CVM was used for this proposal. The results showed that the majority of visitors (87.73%) willing to pay more than the entrance fee for recreational use of Chitgar forest park. The policymakers may decide to increase the park revenue by increasing the entrance fee in order to improve the quality of park by investing more on its infrastructure. The maximum expected WTP was 79630 IR Rials per visit, and the total annual economic value of the Chitgar forest park was about 38.9 billion IR Rials. The underlying case for evaluating the ecosystem services such as recreation in Chitgar forest park is that it will contribute towards better decisions by ensuring that policy evaluation fully takes into account the costs and benefits to the natural environment by highlighting much more the consequences for human well-being and at the same time providing policy development with new insights (Defra, 2007). The results of this study can help decision-makers to enhance the quality of the recreational sites, develop tourism, increase the number of visitors, and generate revenue for the park by considering the statistically significant explanatory variables on the WTP.

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