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Analysis of the difference in consumer willingness to pay for organic vegetables in urban and rural areas in Hamedan-Iran

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The purpose of this study is to investigate the differences in willingness to pay for organic vegetables in urban and rural areas and their affecting factors in the city of Hamadan and surrounding rural areas. The data of this study were collected through a questionnaire and interviews with rural-urban consumers in the Hamadan County-Iran in 2019. To estimate the amount of WTP, contingent valuation method, Double-Bounded Dichotomous and One-and-One-Half-Bounded Dichotomous Choice approaches were used. The results of this study indicated that both in the urban area and in the surrounding rural areas, there is a potential market for organic vegetables, but urban residents showed higher willingness to pay than the people rural areas. Consumer awareness of the benefits of organic vegetables and the harms of inorganic products and also household monthly income had a positive and significant effect on the willingness to pay for organic vegetables in both urban and rural areas, and trust in labelling did not affect WTP. According to the results of this study, due to differences in the preferences of rural-urban consumers, these areas should not be considered as a homogeneous group in the development of organic food policies.
Keywords: Food safety, Organic vegetables, Consumer preferences, WTP, Potential market.

INTRODUCTION

With the increase in the world's population and the development of technology, the global consumption of pesticides, antibiotics, veterinary drugs and hormones in food production has grown significantly. The increase in the use of chemical inputs has led to an increase in various types of environmental pollution and also endangers human health (Tudi *et al*., 2021; Alori and Babalola, 2018). While the use of chemical inputs in developed countries is declining due to health and environmental concerns, the use of chemical fertilizers and pesticides is increasing in developing countries (Liu *et al*., 2015). The researchers' findings show that the use of chemical fertilizers and pesticides leads to diseases such as cancers, heart attack, stroke, asthma and respiratory disorders, nervous system disorders, reproductive disorders, liver damage and skin diseases (Alengebawy *et al*., 2021; Sharma and Singhvi, 2017; Ying *et al*., 2016; Thippeswamy, 2013).
The goal of the Green Revolution and the development of technology -which led to an increase in the consumption of chemical inputs- was to provide the food needed for the increasing demand of the growing population and to increase agricultural production and productivity growth (Pingali, 2012). In fact, more than improving the quality of food, increasing its quantity was the basis of production. In contrast, consumer preferences are changing all over the world today, including in developing countries, and the pattern of food consumption is gradually changing from cereal-based foods to nutritious foods such as meat, fish and vegetables (Ha *et al*., 2019). This can be attributed to globalization, urbanization and rising living standards (Mottaleb *et al*., 2018). At the same time, in these countries, the importance of food safety and quality standards for consumers is increasing (Unnevehr, 2015) and concerns about food safety and health are growing in all countries (Ha *et al*., 2019). Consumers pay more attention to the quality, safety and health of food and organic products for various reasons. Consumers' attention to issues such as the environment (Kantamaturapoj and Marshall, 2020), animal welfare and biodiversity (Lindström *et al*., 2020) and human health (Nelson *et al*., 2019) has led to the growth of the organic food market. In addition, extensive media coverage of the dangers and pathogens of inorganic food consumption, as well as the consequences of environmental pollution and global warming, has led to this rapid expansion (Van Doorn and Verhoef, 2011).

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As in other countries in the world, in Iran, food consumers pay more attention to food safety and health, and over time, consumer preferences are shifting to healthier foods. This is confirmed by studies on willingness to consume and consumers' willingness to pay for organic products in Iran (Haghjou *et al*., 2013; Hayati *et al*., 2017; Kavoosi Kalashami *et al*., 2017a; Kavoosi *et al*., 2017b). Concerns about food safety and health, especially in cases where agricultural pesticides are used in their production, including organic vegetables, have led to increased motivation to buy organic products. Also, the improvement of living standards and the existence and expansion of the middle-income class can potentially promise the formation of a large market for organic food in Iran.

In production and supply side, Iran's agricultural sector has many capacities and capabilities for the establishment and expansion of organic agriculture. About 75% of Iran's arable land is owned by smallholders with a cultivation area of less than two hectares. The small size of land leads to better management in pest and disease control, and provides a good platform for biological pest control as well as organic crop production (Ministry of Agriculture, 2019). The abundant labor force, different climates, and a high diversity of agricultural and livestock products are among the characteristics of Iran's agricultural sector that have helped create a comparative advantage for the production of organic products (Ministry of Agriculture, 2019).

According to the statistics provided in the World Report on Organic Products, in 2009, Iran allocated 913 hectares (Mahmoudi, 2009) and in 2012, 7256 hectares of its agricultural lands to cultivate organic products (Kledal et al., 2012). According to the latest report, in 2020, the area under cultivation of organic products in Iran has reached 11,916 hectares (Mahdipour et al., 2020), which is about 0.03% of the total area under cultivation of agricultural products in Iran, and compared to 2012, the area under cultivation of organic products is showing a 64.2% growth. As it is clear from the statistics, the level of organic products cultivation in Iran is low. This shows despite the increasing demand for organic products and also the existence of high production potentials in Iran's agricultural sector, there are obstacles and restrictions for the development of organic crops that have deprived both consumers and producers of the potential benefits of organic agricultural markets.

One of the important obstacles to growing organic products in Iran is the low awareness of farmers about the different stages of production an organic product. According to studies by the Ministry of Agriculture of Iran, among the various stages of the value chain of organic products, farmers have the least information about how to sell and the rules governing the production of healthy and organic products (Ministry of Agriculture, 2019). According to farmers' point of view, uncertain economic income, limited government support and restrictions on the market for the sale of healthy and organic products are the most important obstacles to the formation and development of organic and healthy agriculture in the country. Also, in Iran, in terms of certification and labelling for organic products, appropriate measures have not been taken and until this gap is not filled, foreign companies will apply for certification of organic products of Iranian farmers and a significant part of the profits from the sale of these products will be earned by them and Iranian farmers will benefit little (Ministry of Agriculture, 2019).

Despite the growing desire of consumers for organic food, high prices, lack of market information and consumer distrust of the quality of these products are important barriers to demand (Hai *et al*., 2013). Therefore, the formation of the organic food market in Iran depends on consumer demand for organic food. Thus, understanding consumer preferences for organic food helps both producers and policymakers to design better plans for the future. The purpose of this study is to estimate the consumers' willingness to pay for organic vegetables in urban and rural communities. Analyzing the differences and comparing the two communities in terms of factors affecting the amount of WTP is another goal of this study. To achieve the objectives of this study, the following three hypotheses were considered, the validity of which will be examined:

1. The amount of WTP of urban consumers for organic vegetables is higher than the WTP of rural consumers.
2. Awareness and information of rural-urban consumers about the benefits of consuming organic vegetables and understanding the risks and harms of consuming inorganic (customary) vegetables have a positive effect on the amount of WTP.
3. Labelling organic product approval has a positive effect on WTP of rural-urban consumers.

MATERIALS AND METHODS

Study area: Iran, with an area of about 1.6 million square kilometers, is located in the southern half of the northern temperate zone between 25˚ 4′ and 39˚ 46′ and has 31 provinces. Hamedan province with an area of 19491 square kilometers is located in the west of Iran between 33˚59′ to 35˚ 44′ north latitude and between 47˚ 47′ to 49˚ 30′ east longitude from the Greenwich meridian. Figure 1 shows the geographical location of Hamadan County (Red circle).

Hamedan province has 10 counties, and the center of this province is Hamadan County. Hamadan county has a total of 9 villages. The statistical population investigated in this study is Hamedan County and its surrounding villages.

Sample selection and data collection: Data of this study were collected through a questionnaire and interviews with rural-urban consumers in the Hamadan County, Iran in 2019. For this purpose, convenience sampling was applied (Kolstoe *et al*., 2022). For urban consumer preferences data, people living in the city of Hamedan and for rural consumers, people living

in villages close to Hamedan were selected as the sample. The sample size was first determined by performing a pre-test using the following equation (Mitchell and Carson, 1989; Soroushi *et al*., 2016):

$$n = \left[\frac{t \times \hat{\delta}}{d \times RWTP}\right]^2 = \left[\frac{t \times \hat{V}}{d}\right]^2 \qquad (1)$$

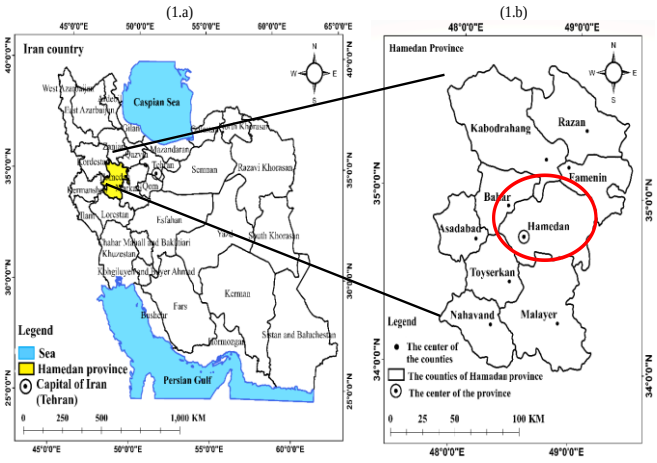

Figure 1. The geographical location of Hamedan province and study area. The yellow part in figure (1.a) is Hamadan province in Iran. Hamadan county is marked with a red circle in figure (1.b). This map is drawn using ArcGIS software.

In equation (1), sample size *n*, *t* is the value of t-student statistics, *RWTP* is the estimated value of WTP, $\hat{V}$ is the coefficient of variation (CV) of estimated WTP, and *d* is the difference percentage of estimated WTP and real WTP. The value of *d* is determined by the researcher and indicates what percentage of deviation from the actual value of WTP is acceptable to the researcher; the acceptable value of d in contingent valuation studies is between 0.05 and 0.3 (Mitchell and Carson, 1989). In total, the study sample includes 300 observations, of which 138 observations are related to rural consumers and 162 observations to urban consumers. This division of the sample is due to the difference in the population share. First, the 30 questionnaires have been pretested through a preliminary study and after reviewing, modifying and determining the sample size, the main questionnaire was compiled to collect data, and interviews were conducted based on the sample determined for the rural and urban areas.

Questionnaire design: The questionnaire related to the contingent valuation method includes three main parts (OECD, 2018): 1) Socio-economic characteristics of the respondent, 2) set of attitudinal and behavioral questions about the good to be valued, and 3) expressing the characteristics of the good, constructing scenario to create a hypothetical market, and asking about the willingness to pay for the good.

First, questions about the socio-economic and demographic characteristics of the respondent (such as age, income, family size, education, etc) are asked. This part of questionnaire to examine how willingness-to-pay varies due to respondents' characteristics. Second, a set of attitudinal and behavioral questions are asked about the good to be valued. This part is to prepare the respondent to answer the questions of valuation and also to examine the effect of background factors and individual attitudes on the subjective value of a person towards the goods. The main part of the questionnaire that leads to valuation is the third part and it has three stages: i) identifying the good to be valued; ii) creating the hypothetical scenario; and iii) Estimating the monetary values. The hypothetical scenario is presented in this part and respondents are asked for their monetary valuations. The scenario includes a description of the good and of the conditions under which it is to be hypothetically supplied. Finally, the respondents are asked what value they place on that good under the stated conditions.

Valuation method: One of the most common and practical methods used to estimate cosumers' willingness to pay is the contingent valuation method. In this method, using a questionnaire, people are directly asked about the amount they are willing to pay for a product or service. In contingent valuation, there are several approaches to extracting the bid amounts. Initially, the Single-Bounded Dichotomous Choice (SBDC) approach was used in many studies. Hanemann (1985) modified the Single-Bounded Dichotomous Choice (SBDC) approach and proposed the Double-Bounded Dichotomous Choice approach (DBDC) to extract the willingness to pay amounts. The DBDC approach was very popular among researchers due to its statistical efficiency and was preferred to the Single-Bounded approach. Of course, there have been criticisms of this approach, arguing that in some cases the answers to the first and second bid are inconsistent. For this reason, another form of Double-Bounded choice approach by Cooper *et al*. (2002) was proposed as the One-and-One-Half Bounded Dichotomous Choice Approach (OOHB). In the present study, both methods were used to calculate the willingness to pay of rural-urban consumers for organic vegetables, and among them, the best model will be selected according to good fitness tests.

Double-Bounded Dichotomous Choice Method: In Double-Bounded Dichotomous method, to determine the actual willingness to pay of the respondent, three consecutive and related questions are asked to finally determine the actual willingness to pay of the respondent. First, the middle bid amount is proposed, and in case of a positive response to the middle bid, a higher bid is asked. If the person responds negatively to the middle bid, the lower bid is asked.

In a DBDC survey, the first and second responses to price bids can be different for each respondent. Therefore, these responses have different or identical covariances, but with different response vectors and random components. Thus,

assuming that the mean WTP is the same for all individuals, the real or maximum observation is described as the general econometric model (Haab and McConnell, 2002; Amirnejad and Jahanifar, 2018):

$$WTP_{ij} = X_{ij}\beta + \varepsilon_{ij} \quad (2)$$

In the above equation, WTP_{ij} is the amount of willingness to pay of the respondent *j* and *i* (i=1,2) the first and second answers, *X* a vector of socio-economic characteristics and attitudes, β the vector of estimated coefficients and ε_{ij} a random error term. Taking B^1 and B^2 into account, respectively, as the first and subsequent bids, the specified range for the willingness to pay will be in the form of equations (3) to (6):

$$B^1 < WTP < B^2 \ \forall \ WTP_{1j} = YES \ and \ WTP_{2j} = NO \ \{YN\} \quad (3)$$

$$B^1 > WTP \geq B^2 \ \forall \ WTP_{1j} = NO \ and \ WTP_{2j} = YES \ \{NY\} \quad (4)$$

$$WTP \geq B^2 \ \forall \ WTP_{1j} = YES \ and \ WTP_{2j} = YES \ \{YY\} \quad (5)$$

$$WTP < B^2 \ \forall \ WTP_{1j} = NO \ and \ WTP_{2j} = NO \ \{NN\} \quad (6)$$

By extracting the probability of observing possible alternating responses (equations 3 to 6), the j-th distribution of the likelihood function is determined as equation (7) (Haab and McConnell, 2002):

$$L_j = Pr\left(\mu_1 + \varepsilon_{1j} \geq B^1, \mu_2 + \varepsilon_{2j} < B^2\right)^{YN} \times Pr\left(\mu_1 + \varepsilon_{1j} > B^1, \mu_2 + \varepsilon_{2j} \geq B^2\right)^{YY} \times Pr\left(\mu_1 + \varepsilon_{1j} < B^1, \mu_2 + \varepsilon_{2j} < B^2\right)^{NN} \times Pr\left(\mu_1 + \varepsilon_{1j} < B^1, \mu_2 + \varepsilon_{2j} > B^2\right)^{NY} \quad (7)$$

In which, μ_1 and μ_2, are the average of the answers to the first and second questions. YY for {YES, YES} is equal to 1 and otherwise to 0, NY for {NO, YES} answer is equal to 1 and otherwise to 0, and so for YN and NN. If the error term is assumed to have a normal distribution in the form of $\varepsilon_i \sim (N, \delta_i^2)$, a logit model can be used to estimate the model. By defining $\varphi(\Omega)_{\delta_1\delta_2}$ as the standardized dichotomous normal cumulative distribution function with mean (μ), variance (δ) and correlation coefficient (ρ), the j-th distribution of the dichotomous logit likelihood function is as relation (8) (Haab and McConnell, 2002; Amirnejad and Jahanifar, 2018):

$$L_j\left((\mu|B)\right) = \varphi_{\delta_1\delta_2}\left(d_{1j}\left(\frac{B^1-\mu_1}{\sigma_1}\right), d_{2j}\left(\frac{B^2-\mu_2}{\sigma_2}\right), d_{1j}, d_{1j}, \rho\right) \quad (8)$$

In the above equation, $d_{1j} = 2Y_{1j} - 1$ and $d_{2j} = 2Y_{2j} - 1$, if the answer to the first question is [YES], $Y_{1j} = 1$ and otherwise $Y_{1j} = 0$, and also if the answer to the second question is [YES], $Y_{2j} = 1$ and otherwise $Y_{2j} = 0$.

One- and- One- Half- Bounded Dichotomous Method: Assume that C_i is the maximum actual willingness to pay of the person for the problem in question, which is a function of socio-economic characteristics (vector X). Based on the characteristic of random utility, an individual's WTP from an econometric point of view is a random variable that expresses the individual's preferences and unobserved variables or the amount of error in the observed variables. So, while one knows the amount of their WTP (C_i), this value is a random variable with a definite cumulative distribution function (cdf) for the observer. This function is defined as $G(C_i, \theta)$, in which θ represents the distribution parameter, and can be estimated and calculated based on the answers of the CV method. These parameters are a function of X_i vector variables (Cooper *et al*., 2002).

In the OOHB method, the respondent is faced with price spectrum of $[B_i^D, B_i^U]$ from the beginning; As the B_i^D price is lower and the B_i^U price is higher $[B_i^D < B_i^U]$. First, one of these two prices is randomly selected and the person is asked to express their willingness to pay in comparison with the bid amount. The second bid amount will be proposed only if it is consistent with the answer to the first question. If the lower price (B_i^D) is randomly selected as the first bid, three results will follow {NO(N)}, {YES(Y), NO(N)} and {YES(Y), YES(Y)}. If the higher price (B_i^U) is randomly selected as the initial bid, the results are {YES(Y)}, {NO(N), YES(Y)} and {NO(N), NO(N)}. In this case, the probability functions corresponding to the above answers will be in the form of equations (9) to (11) (Cooper *et al*., 2002):

$$\pi_i^N = \pi_i^{NN} \equiv Pr\{C_i \leq B_i^D\} = G(B_i^D; \theta) \quad (9)$$

$$\pi_i^{YN} = \pi_i^{NY} \equiv Pr\{B_i^D \leq C_i \leq B_i^U\} = G(B_i^U; \theta) - G(B_i^D; \theta) \quad (10)$$

$$\pi_i^{YY} = \pi_i^Y \equiv Pr\{B_i^U \leq C_i\} = 1 - G(B_i^U; \theta) \quad (11)$$

Therefore, the likelihood logarithm based on the above answers in the OOHB approach will be as follows:

$$Ln\, L^{OOHB}(\theta) = \sum_{i=1}^{N}\{d_i^Y Ln[1 - G(B_i^U; \theta)] + d_i^{NY} Ln[G(B_i^U; \theta) - G(B_i^D; \theta)] + d_i^{NN} Ln[G(B_i^D; \theta)]\} \quad (12)$$

In the above equation:

$d_i^Y = 1$, If it starts with B_i^D and the answer is {YES, YES}, or starts with B_i^U and the answer is {YES}, otherwise it is zero.

$d_i^{NY} = 1$, If it starts with B_i^D and the answer is {YES, No}, or starts with B_i^U and the answer is {NO, YES}, Otherwise it is zero.

$d_i^{NN} = 1$, If it starts with B_i^D and the answer is {NO}, or starts with B_i^U and the answer is {NO, NO}, Otherwise it is zero.

Expected WTP calculation method: In the present study, the following equation was used to calculate the expected value of WTP (Fattahi Ardakani, 2016):

$$E(WTP) = \int_0^{\max A} F_n(\Delta U)dA = \int_0^{\max A}\left(\frac{1}{1+\exp\{-(\alpha^*+\beta A)\}}\right)dA \quad (13)$$

In the above equation, *E(WTP)* is the expected value of WTP, α^* is the adjusted vertical intercept source and β is the estimated coefficient of the bid amounts variable. This

integral is calculated in the range of zero to the maximum bid (A).

Urban and rural WTP difference test: To evaluate the significance of the mean difference in the two samples, the t-statistic is used as follows (Kim, 2015):

$$t = \frac{\bar{x}_1 - \bar{x}_2}{S_p\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}} \qquad (14)$$

In the above equation, $\bar{x}_1$ and $\bar{x}_2$, respectively, are the mean of a variable in the first and second samples. In the present study, the comparison of expected WTP for two samples of urban and rural consumers was investigated. Therefore, $\bar{x}_1$ and $\bar{x}_2$, respectively, are WTP_u of urban and WTP_r of rural. The n_1 and n_2 of the size of first and second samples and the pooled variance of the two samples (S_p) are also calculated as follows (Kim, 2015):

$$S_p = \sqrt{\frac{(n_1-1)S_1^2+(n_2-1)S_2^2}{n_1+n_2-2}} \qquad (15)$$

If the computational t is greater than the critical value of t-student with a n_1+n_2-2 degree of freedom at the α% level, the null hypothesis that there is no difference between the means of the two samples is rejected and the difference between the means of the two samples is confirmed.

RESULTS

Data description statistics: Given that there is no official market for organic vegetables in Iran, consumers were asked whether they are willing to pay more per kilogram to buy and consume organic vegetables (for enjoy its benefits) than paying for inorganic vegetables? About 96% of urban consumers and about 87% of rural consumers answered this question in the affirmative. One of the influential factors in the desire to buy organic vegetables is the level of consumer awareness of the dangers of inorganic products and knowledge of the safety and health of organic products. Consumer awareness was assessed using the questions in Table 1.

The table above shows that the awareness and information of urban consumers about the benefits of organic vegetables and the harms of inorganic vegetables is almost twice that of rural consumers. Of course, this is natural due to the higher access of urban communities to information resources. Therefore, it is expected that a higher percentage of urban consumers than rural consumers will be willing to buy organic vegetables at a higher price. In the above table, in addition to questions related to knowledge and information, questions about consumers' trust in the organic product approval label on vegetables were also asked. The answer of the majority of people in both groups of urban and rural consumers was number one, which indicates the least trust in the labelling system from the consumer's point of view. Uncertainty about labelling is expected to have a negative impact on WTP.

The existing literature on willingness to pay for organic products shows that in addition to factors such as awareness and knowledge of the benefits of organic products and trust, socio-economic factors (such as income, cost, household size, etc.) also affect WTP for organic vegetables. Descriptive statistics for other variables used in the model are presented in Table 2.

Among the above variables, income and education have been used as influential variables in many studies of estimating willingness to pay (Xu and Wu, 2010; McFadden and Huffman, 2017; Ha *et al*., 2019). Both variables of education

Table 1. Descriptive variables measuring the awareness of the benefits of consuming organic vegetables, awareness of the harms of consuming non-organic vegetables and the level of consumer trust in organic labels, which were measured using 10-scale gauges.

Question	Variable use in model	Scale	Mean (SD)		Mode	
			Urban	Rural	Urban	Rural
How much did you know about the dangers of unsafety and unhealthy consumption of customary (inorganic) vegetables?	Awareness (Awareness to the benefit of consumption of organic vegetables and unsafe and unhealthy risk from customary vegetables)	[1–10]	6.7 (2.7)	3.4 (2.0)	10	2
How much did you know about the health of organic vegetables?		[1–10]	7.0 (2.8)	3.6 (2.2)	10	3
How much did you know about the safety of organic vegetables?		[1–10]	7.0 (2.6)	3.6 (2.3)	10	2
How much did you know about the nutritional value of organic vegetables?		[1–10]	7.2 (2.9)	3.3 (2.0)	10	2
How much did you know about the taste and flavor of organic vegetables?		[1–10]	6.9 (2.9)	3.3 (2.1)	10	2
How much do you trust the organic label that the producers put on the organic vegetable packages?	Trust (Trust in organic label)	[1–10]	3.4 (2.8)	1.7 (1.1)	1	1

Table 2. Descriptive statistics for socio-economic variables according to separation of urban and rural statistical samples.

Variable	Mean		Standard deviation		Min		Max		Mode	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Age (year)	35.6	44.3	11.6	11.3	20	23	63	80	40	45
Gender (M=1, F=0)	0.4	0.6	0.5	0.5	0	0	1	1	0	1
Education (Year)	13.8	10.2	4.8	4.3	0	0	22	18	16	11
Marital status (married=1, unmarried=0)	0.6	0.8	0.4	0.3	0	0	1	1	1	1
Family size (person)	3.5	3.7	1.3	1.3	2	0	8	7	4	4
Household monthly income (10 million Rials)	3.4	2.1	1.8	1.7	1	0.7	10	10	2	1
home-grown vegetables consumption (Percentage of total consumption)	29.9	42.3	34.9	26.9	0	0	100	100	0	50

Rial (R) is the currency of Iran. Each US dollar (USD) in 2019 was 137446 Rials on average (Sources: Central Bank of I.R. Iran)

Table 3. Goodness of fit of the DBDC and OOHB models (in addition to conventional criteria, the criterion of compatibility of the sign of the estimated coefficient with theoretical expectations has been used).

Criteria	Urban		Rural	
	DBDC	OOHB	DBDC	OOHB
Log-Likelihood function	-78.91	-48.29	-39.54	-15.58
Maddala R^2	0.31	0.53	0.55	0.68
Number of significant coefficient	3	3	8	6
Conformance with theory	Variables signs corresponding to theoretical expectation	Some coefficients signs contrary to theoretical expectation	Variables signs corresponding to theoretical expectation	Some coefficients signs contrary to theoretical expectation

level (years of education) and household monthly income are higher in urban households than in rural ones. Due to the conditions and environment of the village, it is more possible to grow home-grown vegetables there (as an alternative to organic vegetables), so a higher percentage of vegetable consumption in the village is home-grown vegetables. This variable is expected to have a negative effect on the amount of WTP for organic vegetables.

Model estimation results: In this study, as described in the research method section, DBDC and OOHB methods were used to estimate the amount of WTP and the factors affecting it. In order to finally use the best method for the final analysis, the results of estimating the two models for urban and rural consumers were compared in Table 3.

Considering the results of the model, good fitness criteria, number of significant variables and compatibility of the coefficient sign with the theory, to estimate WTP and the factors affecting it for both urban and rural consumers, the DBDC model provides better results. Therefore, this model was estimated and used as the basis for WTP estimation. The results of estimating the DBDC model for urban and rural consumers are presented in Table 4.

Table 4. Result of estimation of DBDC model (providing estimated coefficients and t-statistics for models related to rural and urban samples).

Variables	Urban		Rural	
	Coefficient	t-value	Coefficient	t-value
Gender	0.697	1.50	-2.669***	-3.18
Marital status	-0.260	-0.57	4.139***	3.11
Education	-0.059	-0.40	0.995***	3.02
Household monthly income	0.507***	3.43	0.641***	2.99
Perception	0.080***	3.34	0.102**	2.14
Home-grown vegetables consumption	-0.291	-0.35	-3.199**	-2.23
Trust	-0.089	-1.06	-0.126	-0.32
Bid1	-0.001***	-5.65	-0.0026***	-5.97
Constant	1.386	1.30	3.404*	1.93
Likelihood ratio test	60.40 (P-value: 0.0000)		110.35 (P-value: 0.0000)	
Maddala R^2	0.31		0.55	

The significance level: *= 0.1, **= 0.05, ***= 0.01

According to the results of Table 4, 3 variables in the model of urban consumer and 8 variables in the model of rural consumer have got significant. The three variables that have

become significant in both samples are monthly household income, consumer awareness and information about organic vegetables, as well as the bid amounts. Due to the fact that organic vegetables are more expensive and are considered a normal good (luxury good), it is expected that with increasing income, demand and willingness to pay for this product will increase. Awareness level of the benefits of consuming vegetables as well as awareness of the dangers of using customary inorganic vegetables has had a positive and significant effect on the willingness to pay in urban and rural communities. This result implies the importance of consumer perception of organic products and its effect on changing their preferences. The variable of the years of education in rural areas has a positive and significant effect on WTP amount, but this variable is not significant in urban areas. It seems that awareness about organic products in rural areas is much less than urban areas and therefore an increase in the level of education in rural areas causes their awareness of organic products to increase. Hence, as their level of education increases, their WTP for organic products increases. However, in urban areas, due to the higher level of awareness and willingness to pay more, the level of education does not have significant effect on increasing the willingness to pay. Among rural consumers, the variable of home-grown vegetables consumption has had a negative and significant effect on their WTP, but this variable has not had a significant effect on urban consumers. In rural Communities, one of the ways to deal with the dangers of consuming customary and inorganic vegetables is to grow and produce home-grown vegetables. Because chemical fertilizers and pesticides are less commonly used in the production of home-grown vegetables, these products are healthier than inorganic vegetables and are considered a substitute good for organic vegetables. Therefore, in the rural model, this variable had a negative effect on rural WTP but was not significant in the urban model. Due to living conditions in urban areas, it is not possible to cultivate home-grown vegetables or it is less common in urban communities. In some rural examples, up to 100% of the vegetables needed by the household are produced as home-grown vegetables and consumed.

One of the influential variables on WTP, which has been proven in many studies, is the trust in the labelling of organic products (Katt and Meixner, 2020; Ha *et al*., 2019). But in the present study, this variable has not been significant in any of the models. According to the statistics of Table 1, which show the very low level of trust in the labelling system in the region, this variable seems obvious to be insignificant. This shows that people in this area do not have sufficient trust in the institutions in charge of health and standards, which in a way indicates the low level of social capital in this county and the surrounding villages. Therefore, monitoring these institutions and more precisely monitoring the hygiene and health of the products can, in the long run, strengthen social capital and restore public trust in the labelling system of organic products.

The bid variable coefficient (Bid1) has become significant with a negative sign. The negative sign of this coefficient is based on the law of demand and matches the expectations, so that the increase in the bid amounts will result in reducing the demand and the amount of WTP.

Calculation of WTP and test for mean difference of urban-rural WTP: The average value of WTP for urban and rural consumers as well as the results of calculating the t-student statistic to test the statistical difference between urban and rural WTP are presented in Table 5.

Table 5. t-test to investigate the difference between the average willingness to pay for organic vegetables between urban and rural samples.

	Urban	**Rural**	**$WTP_u - WTP_r$ (mean difference)**
Expected WTP	69839.25 R (0.51 USD)	34264.63 R (0.25 USD)	35574.62 (0.26 USD)
t-test	t = 173.49,	$t^{critical}_{df=298,\propto=0.01} = 2.58$	

Table 5 shows that the urban consumers' expected WTP for organic vegetables is more than twice the rural consumers. The difference in WTP values was tested using t-statistic for the difference between the mean of the two samples, which due to the critical value of this statistic at a significance level of 5%, the WTP of urban consumers was significantly higher than the WTP of rural consumers. Therefore, the hypothesis of this study that the WTP of urban consumers is higher for organic vegetables is confirmed.

Due to the fact that customary vegetables are currently bought and sold in the market for 80,000 Rials (0.58 USD) per kilogram, urban consumers are willing to pay 149839 Rials (1.09 USD) for organic vegetables and rural consumers are willing to pay 114264.6 Rials (0.83 USD) per kilogram of this product.

DISCUSSION

In the present study, three hypotheses were examined. The first hypothesis which says the WTP of urban consumers is higher than that of rural consumers for organic vegetables was confirmed. According to the results of the study, various factors have led to the formation of higher WTP in urban areas than rural areas for organic vegetables. One of the most important factors of this difference is the variable of perception of urban-rural consumers towards the risk of conventional vegetables and the benefits of organic vegetables, which is explained in the examination of the second hypothesis. Understanding the risks of consuming conventional vegetables leads to a change in consumer behavior (Yeung and Morris, 2006). Higher WTP for organic food is one such strategy to deal with the risks of consuming

non-organic food. Although the risk perception of conventional vegetables was higher in the urban area than in the rural area (on average 3.3 score higher), this factor was not the only explanation for the higher WTP compared to the rural respondents. Other factors also play a role in their higher WTP. The urban consumer's awareness and understanding of the health of organic vegetables (average score 7 vs. 3.6), safety (average score 7 vs. 3.6), nutritional value (average score 7.2 vs. 3.3) and taste (average score 6.9 vs. 3.3) of organic vegetables was higher than rural consumers. The set of these variables shows that the urban consumer's understanding of the benefits of organic vegetables is greater than the rural consumer's and has shown itself as a higher WTP. Other studies such as Mergenthaler et al. (2009) and Ha et al. (2019) confirm this result. Since home-grown vegetables are considered very safe (Ha et al., 2019), it was expected that consumers would have a higher stake in home-grown vegetables, will have less demand and WTP than marketed organic vegetables. As expected, this variable has a negative effect on WTP in both areas, although it is not significant in the urban area. The reason is clear; This is because in the urban homes, the possibility of producing vegetables at home is much less than this possibility in rural homes. The studied sample shows that 86.9% of rural respondents grow vegetables in their homes, while this figure is 53% in urban communities. Therefore, it is expected that this variable will cause to lower WTP in rural areas than urban areas.

The second hypothesis of the study about the positive effect of awareness and information on WTP was confirmed. The variable related to consumer awareness and information, in both urban and rural models, had a positive and significant effect on the amount of WTP. This variable was a compound variable in the form of 5 questions from the consumer that measured the level of consumer awareness about the benefits of consuming organic vegetables and the dangers of consuming customary vegetables. The value of this variable for the urban sample was almost twice that of the rural sample. On the other hand, the willingness to pay for urban samples was twice the rural samples. These results show that one of the main drivers in increasing WTP is the level of consumer awareness. Also, one of the most important factors that has led to the difference in the willingness to pay for rural-urban is the higher level of awareness of urban consumers relative to rural consumers. Therefore, educating consumers and making them aware, especially in rural areas, to increase WTP for organic vegetables and paying more premium for the production of this product is an effective policy. In some other studies, the effect of consumer awareness of the benefits of organic products, as well as understanding the harms and dangers of customary vegetables, on the willingness to pay has been confirmed (Ha *et al*., 2019; Hsu *et al*., 2016). If the consumer seriously understands the pathogenic risk of consuming inorganic products, he will change his consumption behavior and consumer preferences will be directed to reduce the risk.

Contrary to the first and second hypotheses of this study, the third hypothesis was not confirmed. It was expected that labelling, as confirmation for organic product, would have a positive effect on the consumer's willingness to pay. But this variable was not significant in either urban or rural models. One of the reasons for this could be the low level of public trust in the labelling system or standard and health monitoring systems in the area. As shown in Table 1, the majority of consumers in rural-urban samples had the least level of trust in labelling. This is why this variable does not have a significant effect on the value of WTP. Contrary to the results of this study, in other studies, the labelling of organic products has had a positive and significant effect on consumer willingness to pay (Ha *et al*., 2019). Therefore, to stimulate demand for organic food, it is important to precisely monitor safety and health standards to build trust about the labelling system.

Overall, it can be concluded that consumers in both urban and rural communities have a positive attitude towards organic vegetables and are willing to pay more to buy this product than customary vegetables, so that urban consumers are willing to pay 149839 Rials (1.09 USD) per kilogram of organic vegetables and rural consumers 114264.6 Rials, which shows 87.3% and 42.8%, respectively, rise in price compared to the current price of customary vegetables (80,000 Rials equals 0.58 USD). According to the results, there is a potential market for organic vegetables in the urban area and the surrounding villages.

Conclusion: This study, firstly, assesses the existence of demand and potential market for organic products, and secondly, show producers, marketers, and policymakers the factors affecting the demand for these products, and identify barriers to the development of the organic products market. The information obtained from such studies also determines the policy direction in this field for the policymaker. In general, useful information about the willingness to pay of rural-urban consumers, their similarities and differences was extracted from this study. Given the behavioral differences and different preferences of urban and rural areas, as well as their different willingness to pay for organic vegetables, the uniform policies and strategies should not be considered for both urban and rural communities to create and develop an organic vegetable market.

Of course, there are obstacles to the formation of such a market that policymakers must try to remove them. One of the major barriers is consumer distrust of the health and safety of labeled products. Because there is not enough trust in the labelling system. Therefore, a strict monitoring mechanism should be established to solve this problem and build trust. Another problem is that the producer should not use chemical fertilizers and pesticides to produce organic products. This

leads to a decrease in product yield per unit area, which leads to an increase in production costs per kilogram of product. Therefore, the producers are only willing to produce and supply the product at a higher price than the price of the inorganic product. On the other hand, with the unusual increase in the price of the product, the consumer loses his desire to buy an organic product. In this case, the policy maker can help to shape this market by applying incentive policies to each side of the market (supply and demand).

It is also suggested for examining the results of the present study in different societies, the topic of this research be replicated in other parts of the country as well as in other similar economies/developing countries, so that the generalization of the results can be done with more confidence and a more realistic picture of the results can be obtained.

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