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# Public preferences and attitudes toward organic vegetables: The case of Iranian consumers

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ABSTRACT

This study investigated the connection between perceived health benefits, purchase intention, and the impact of consumers' attitudes on organic vegetable consumption. A total of 971 citizens were selected as participants by the cluster random sampling method. A questionnaire-based survey was used as a method, and it focused on data collection as a non-experimental approach to determine the comparative features that provide both a logical and long-term perspective. The findings indicated that nearly half of the communities surveyed lacked knowledge about how to identify organic products. However, after receiving the required explanations, 63.13% of them indicated a preference to purchase organic products over non-organic ones. The majority of respondents would pay a 25% price premium for organic products and prefer organic products with certified organic labels. The study's findings provided a different perspective on customers' motives, beliefs, and actions when it comes to organic foods.

## 1. Introduction

In recent times, the production and consumption of organic food have witnessed significant growth (Azlie et al., 2023; Ashaolu and Ashaolu, 2020; IFOAM, 2019; Das et al., 2020; Srisamran et al., 2022). According to Stampa et al. (2020), organic farming relies on reducing external inputs and limiting the usage of industrial fertilizers and pesticides. Organic foods can minimize exposure to nitrate and pesticide residues due to the strict restriction of the use of chemically synthesized inputs, according to the concept and principles of organic production (Gasques Meira et al., 2024; Castellini et al., 2022; Stampa et al., 2020). Therefore, people consider organic foods to be healthier than conventional food (food that is non-organic) (Lee, 2016) and healthiness was observed to be a quality indicator (Secinaro and Calandra, 2020). There is a belief in some developed countries (e.g., the US, Germany, and also the UK) that organic foods are lower in calories but healthier and even tastier to consumers than non-organic products (Lazaroiu et al., 2019). As a result of the increased demand for organic products, particularly organic vegetables, the agriculture industry should pay special attention to food stability in order to generate demand for specific items (Scholz et al., 2017).

In Iran, "organic vegetables" are defined as vegetables that are grown without the use of synthetic fertilizers or pesticides. However, farmers may use pesticides made from natural sources, such as biological pesticides, to produce organically grown vegetables (Ghazinoori et al., 2020). Organic items, such as organic vegetables, will result from plant cultivation using organic resources. The health and freshness of organic vegetables are among their main advantages. The number of organic food producers in Iran increased by over 40% in 2019 when compared to the previous 10 years (Novara et al., 2019). However, organic vegetable consumption in Iran is still considered poor and the demand is very limited due to lack of knowledge or awareness, as well as high price. The expansion of the market for organic products depends on an increase in income and education levels of consumers or on price decrease that can be achieved, for example, through tax incentives that stimulate producers to adopt organic farming, which results in higher availability of

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organic products and lower prices due to scale economies (Leonidou et al., 2022). Teixeira et al. (2021) and Wijesinghe and Senarathna (2022) emphasized that the availability of the product and its reasonable price affect the perceived control of consumers and this can increase their willingness to buy organic vegetables. Although some studies such as Melovic et al. (2020) identify high prices as the primary barrier, the limited range of products and inadequate availability in stores are also critical factors can affect customers' willingness, particularly in developing countries such as Iran. In Iran, organic vegetables can be identified by a specific organic certification logo or label that is displayed either on their packaging or at the point of sale. The organic label usually contains a green leaf or a stylized representation of nature, together with the word "organic" written in Persian or English (IFOAM, 2019).

Organic food buyers, notably those of organic veggies, frequently choose their items with greater care. There is currently little consumer awareness of organic vegetable products (Wu et al., 2019). The issue is the high cost of organic vegetables compared to non-organic foods. Improved information on organic vegetable products is still needed. According to Stanton et al. (2018), individuals prefer non-organic veggies over organic vegetables. This is because consumers are still not aware of the health advantages of organic vegetables, and thus do not consider them while making purchases of organic vegetable products.

In the meantime, Iran's agricultural sector has a significant share of GDP and wants to increase knowledge and awareness about improving the demand for healthier organic vegetables (Morshedi et al., 2017). Producers and marketing companies should be aware of the elements influencing customers' interest in purchasing organic vegetables in order to boost demand. As a result, research into customers' perceptions and understanding in connection to purchasing interest is critical in order to propose a solution for organic farmers in Iran. In fact, the vegetation, which is grown with chemical fertilizers, pesticides, and fungicides, may bring serious health and environmental issues (Ben et al., 2019). Therefore, growing public understanding of the importance of vegetables to one's well-being, social and demographic factors have led to changes in dietary preferences in people.

One of the most important factors in consumers' purchases or use of organic products is their attitude toward healthy and organic products (Rahnama, 2016). Consumers' behavior refers to the decisions taken by customers when determining whether or not to purchase a product (Bosona and Gebresenbet, 2018). Consumers' attitudes are usually related to their behavior toward accepting organic food products. Attitudes toward organic foods have been shown to be the determinants of actions and preferences for organic purchases (Lee and Choe, 2019). As indicated by Bazhan et al. (2024), the tendency for organic vegetable consumption is very high among Iranian consumers. Organic agriculture has rapidly developed in Iran and consumer interest is increasing accordingly. Some studies (e.g., Alavion and Taghdisi, 2021; Ghanbari et al., 2020) have shown that Iranians have always been interested in traditional products from the villages. Hence, Iranian consumers have always favored organic products, as they are perceived to be free from toxic chemicals, additives, artificial flavorings, colorings, and preservatives, and are considered higher quality. As a center of the evolution of agriculture, organic farming represents a promising alternative to traditional farming methods in Iran. Therefore, the future of organic agriculture in Iran is very positive. However, in Iran, few studies have been conducted on consumers' perceptions, attitudes, and behaviors. In fact, in developing countries like Iran, where agriculture has a long tradition, the production of certified organic agricultural products is small. The ecosystem in the country is varied and the biodiversity is abundant. The main system of agriculture in Iran consists of small-scale farmers who are transitioning to conventional farming and producing healthier crops with lower chemical inputs (Yazdanpanah et al., 2022). In addition, due to climatic conditions, many mountainous areas of Iran are the source of some organic plants that are different from agricultural products and their amount is very low compared to agricultural products. Lack of research on consumers' behavior toward organic products has led to very limited knowledge for researchers and business managers in the organic production systems in the Iranian markets. This study bridges the gap by exploring the essential factors impacting consumers' attitudes and preferences toward organic products. Specifically, the study aims to investigate the connection between perceived health benefits, purchase intention, and the impact of consumers' attitudes on organic vegetable consumption.

The findings of this study raise significant implications for marketers and policymakers. The findings may lead the government and the organic food industry to better understand their respective roles in supporting organic food in order to reduce resource waste. Hence, the new study's novelty is triple: i) highlighting public preferences and attitudes linked with organic vegetables in a developing country like Iran; ii) determining the impact of proper appearance, labeling,[1] and registration on the likelihood of purchasing organic vegetables; and iii) identifying the most important factors affecting the consumption of organic vegetables among groups with different demographic characteristics in Iran. To understand the various factors influencing public preferences and attitudes toward organic vegetables, the following research questions will be answered.

1) What is Iranian consumers' knowledge of organic vegetables?
2) Does the presence of organic vegetables in the market affect the willingness of customers to buy these products?
3) How do critical labeling and certification affect consumers' preferences?
4) How does increasing public awareness about the benefits of consuming organic vegetables affect consumers' preferences?

## 2. Literature review and conceptual framework

Some of the previous studies have been conducted to review the food literature and consumers' behavior. For example, a study by Makrides et al. (2021) demonstrates lack of conceptual grounding that is both coherent and consistent, contradicting empirical findings about the characteristics and behavior of cosmopolitan consumers, ongoing knowledge gaps, and methodological and contextual weaknesses. According to Inci et al. (2016), customers' preferences and behaviors for organic vegetable products differ based on demographic features, educational background, occupation, age, and income. Additionally, consumers' tastes and actions range when it comes to a product's price, health, advantages, availability, and even packaging. Health consciousness is one of the main determinants of organic food consumption.

According to Migliore et al. (2015), the quality of organic products is an indication of urban consumers' preferences and purchase behaviors. Each location has different consumer preferences and behaviors when it comes to product quality. Although customers are aware of organic products, not all of them can be loyal to them. According to Secapramana and Ang (2019), the information shown on labels, counters, and brochures can influence consumers' knowledge and trust by forming their mindset. Furthermore, the study demonstrated that providing information regarding the safety, health benefits, and overall quality of organic products may significantly impact consumers' purchase decisions, behaviors, and interests.

The sustainability of organic farming must rely in large measure on market demand (Winkler et al., 2020). Promoting sustainable

[1] To obtain critical labeling and certification services in Iran, manufacturers must ensure their products meet all the relevant EU directives and regulations requirements through a conformity assessment process. This process involves testing, documentation review, inspection, and quality control procedures by different organizations (e.g., Iran National Standards Organization and Plant Protection Organization) to ensure the product is safe for the end user. However, the producers face many challenges (e.g., lack of government support) (Razzaghi Borkhani and Mohammadi, 2019).

consumption and production are key facets of sustainable development, which are dependent on organic food brand sustainability and long-term economic growth that meets environmental and social needs (Schunko et al., 2019). Consumers' beliefs, preferences, attitudes, and responses also affect product sustainability and marketing strategies; however, this may vary according to the regions of the world (Stampa et al., 2020). The most important organic food products are known as vegetables in different countries such as Switzerland and Denmark (Kini et al., 2020). Some Iranian vegetable producers utilize a considerable amount of chemical inputs; however, these inputs are neither safe nor optimal for use. Several studies have demonstrated that the presence of chemical residues in plants has significant adverse effects on both human and environmental health within the country (Bhandari et al., 2019; Samarghandi et al., 2020). Although majority of Iranian farmers have historically been engaged in organic farming, this technique is not compliant with international standards (Ataei et al., 2019; Chabok et al., 2020).

In this study, Fig. 1 was developed on the basis of the literature review of factors affecting organic consumers' attitudes. According to the theoretical framework, a farmer's behavior is influenced by three kinds of factors: attitude toward organic farming, social component, and control factor (constraining or encouraging factors). The variables that impact a farmer's conviction and the formation of behavioral beliefs for organic farming attitudes, as well as social aspects, are organic farming knowledge, environmental influences, and personal traits. There are assumptions about the role of factors that might assist or damage the efficiency of behaviors. Accordingly, the hypotheses of this study are as follows.

**H1**. Consumers' Knowledge of organic vegetables has a significant and positive effect on their general preferences toward organic produce.

**H2**. The availability of organic vegetables in the market positively impacts consumer preferences.

**H3**. Labeling and certifying sustainable products have a significant positive effect on consumer preferences toward organic vegetables.

**H4**. Increasing consumers' awareness about the advantages of consuming organic vegetables has a positive and significant impact on their preferences toward organic vegetables.

## 3. Methodology

### 3.1. Study area

Seven provinces from north to south of Iran (Mazandaran, Ghazvin, Tehran, Isfahan, Yazd, Fars, and Hormozgan), as the study areas were chosen according to the conceptual framework of sustainability (i.e., environmental sustainability, institutional sustainability, economic sustainability, and social sustainability), were described by Ataei et al.,) 2019(. Those areas are the main centers of producing and selling organic food products in Iran. According to Rahnama et al. (2017), due to the high level of nitrate in Iranian soils, pollution of water resources, and high use of pesticides and chemical fertilizers (due to lack of producers' awareness), the presence of healthy and organic vegetables in the food basket of Iranian families is essential. If the OA is developed in these areas, it is expected that the major market will be provided with organic products in these areas. According to Khosh-khui et al. (2021), nine vegetables were selected as targets: carrot, cole crops, cucumber, leafy vegetables, lettuce, onion, peppers, potato, and tomato.

Mazandaran is the major producer of fresh fruits and vegetables, and agriculture is a significant source of revenue. Mazandaran produces over 70 types of agricultural products, meeting 40% of the domestic rice demand and 50% of the citrus fruits and vegetables demand (Taghizadeh-Alisaraei et al., 2017). Fars is one of Iran's main provinces, with a population of over 4 million people. It is situated in the southwest of the region and is one of the leading regions producing agricultural

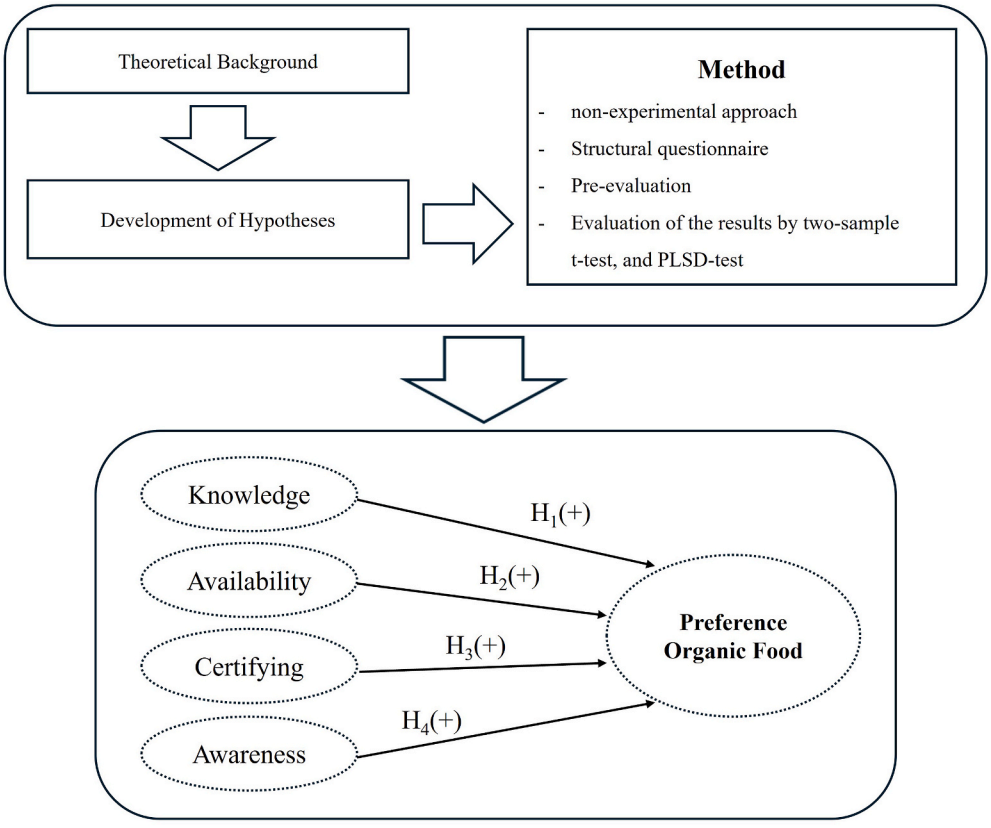


**Fig. 1.** The framework of variables influencing organic market behavior, desires, and purchasing decisions. Adapted from Leyva-Hernández et al. (2021).

products. Yazd province, which produces more than 33 different types of crops, has a substantial influence on the province's economic growth and development (Mirzaei et al., 2019). In Isfahan province, the fruits and vegetables' central market is where 10,000 tons of farmers' products are sold daily (Baghaie and Aghili, 2019). Tehran is the capital of Iran and the center of Tehran province, which produces 6% of Iran's agricultural products and has the highest consumption of agricultural products (Kiani et al., 2020). The vast and fertile plain of Qazvin with an area of 13,000 $km^2$ is one of the most important agricultural sources in the country (Etedali and Ahmadi, 2021). Hormozgan is a province in the southwest of Iran, which plays a significant role in the production of organic goods (tropical fruits). Fig. 2 depicts the sample areas' geographical locations.

### 3.2. Sampling method

The statistical population of the research comprised Iranians who had bought or consumed organic products. The cluster sampling method focuses on data collection as a non-experimental approach to determine comparative features that provide both a logical and long-term perspective. For research purposes, cluster sampling is a probability sampling method in which researchers split the population into different groups (clusters). For data collection and interpretation, this study used a basic random or systematic random sampling technique to pick random groups. In fact, this is a sampling procedure in which a population is divided into several clusters of individuals who share similar characteristics and have an equal chance of being included in the survey (Attia et al., 2018). Thus, a total of 971 citizens, aged 20–60 years, were selected by cluster random sampling method, from 7 populated provinces from north to south of Iran including Mazandaran, Ghazvin, Tehran, Isfahan, Yazd, Fars, and Hormozgan (Fig. 2). The face-to-face interviews survey was part of a class project and was performed by 17 trained students using questionnaires during two weeks of spring breaks.

### 3.3. Data and variables

The questionnaire had two parts. The first section comprised questions about the individual characteristics (gender, age, marital status, number of kids, level of education, and total income). The second section addressed awareness and attitudes toward organic vegetables versus conventionally produced vegetables, purchasing, consumption, purchase frequency, the value of organic products versus conventionally grown products, the importance of labeling, preferences for the type of vegetable, and the effectiveness of the method for providing information about organic products to the public. There were five educational-level response options: under 12-year education, a degree from high school, a degree of B.Sc., a degree of M.Sc. or Ph.D., and cleric education.

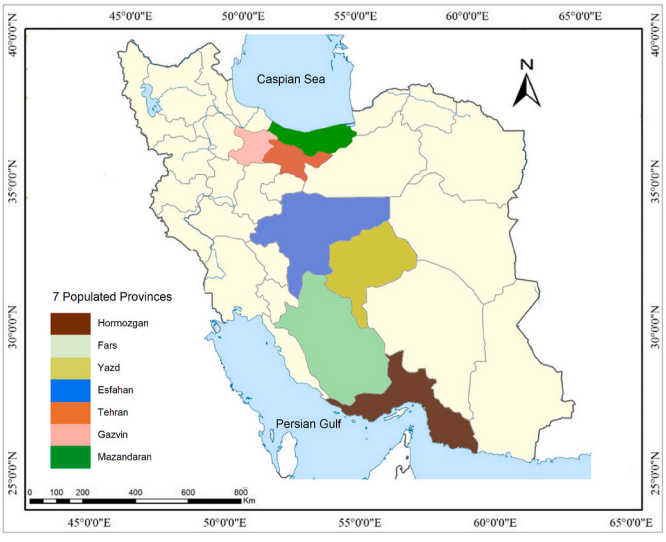


**Fig. 2.** The research areas' geographical position including 7 populated provinces from north to south of Iran

### 3.4. Two-sample t-test, and PLSD-test of Fisher

The current study's aim was to learn more about Iranian consumers' attitudes toward organic vegetables. To that end, a representative sample of consumers' behaviors, purchasing requirements, frequency of purchases, perceived supply, and beliefs regarding organic foods was investigated. Although different methods were applied to investigate public preferences and attitudes toward organic vegetables, around one-third of the articles analyzed used questionnaire surveys (e.g., case reports, interviews, and benchmark analyses) (Zhang et al., 2020). A two-tailed *t*-test (unpaired) and one-way variance analysis are used for statistical analysis (Rizzo et al., 2020). The PLSD-test of Fisher has been seen in post-hoc analyses (Jusselme et al., 2019). The unpaired two-sample *t*-test was used to compare the mean of two distinct sets.

## 4. Results

Table 1 shows the sociodemographic characteristics of the sample for 7 provinces.

### 4.1. Consumers' awareness of the organic vegetables

As the results of Table 2 show, 36.87% of the respondents stated that they knew organic vegetables. According to the measure of Chi-square ($\chi^2 = 66.967$), there is a significant difference between people's responses to awareness and lack of awareness about organic products (Table 2). Therefore, knowledge about organic vegetables significantly affects consumers' preferences and attitudes. Although some people may not have enough understanding about the characteristics, beneficial effects, and other features of organic products, only learning from any sources would affect their willingness to purchase organic products. The results support hypothesis 1 ($H_1$: Consumers' awareness of organic vegetables has a significant and positive effect on their general preferences toward organic produce).

Table 3 shows consumers' awareness of the impact of food quality on health. Based on the findings of this study (Table 3), 99.38% of people were aware of the impact of food quality on health, and only 0.62% of people were sufficiently unaware of this issue. Furthermore, the value of Chi-Square ($\chi^2 = 947.148$) indicates that consumers' awareness of the

**Table 1**
Sociodemographic characteristics of the sample for 7 provinces.

| Variables | Organic product users | Frequency |
|---|---|---|
| Age (years) | 20–60 | 971 |
| Gender | M | 593 |
| | F | 378 |
| Education | Under 12-year education | 88 |
| | High-school | 248 |
| | Bachelor | 545 |
| | Master's degree/Ph.D. | 81 |
| | Cleric education | 9 |
| Marital status | Single | 456 |
| | Married | 515 |
| Guardianship group for married (Person) | 1–2 | 171 |
| | 3 | 97 |
| | 4 | 73 |
| | 5 | 68 |
| Household income ($/month) | 300 | 436 |
| | 301–600 | 127 |
| | 601–1000 | 228 |
| | Over 1001 | 180 |

Source: Study findings

**Table 2**
Level of consumers' awareness about organic products (knowledge).

| Do you know what foods are organic? | Frequency | The proportion | $\chi^2$ | Significance |
|---|---|---|---|---|
| Yes (aware) | 358 | 36.87% | 66.967 | [a] |
| No (unaware) | 613 | 63.13% | | |

[a] Specifies a statistical value of 5%
Source: Study findings

**Table 3**
Consumers' awareness about the effect of food quality on health.

| Are you aware of the effects of food quality on human health? | Frequency | Percentage | $\chi^2$ | Significance |
|---|---|---|---|---|
| Yes (aware) | 965 | 99.38% | 947.148 | [a] |
| No (unaware) | 6 | 0.62% | | |

[a] Indicates a statistical meaning point of 5%.
Source: Study findings

effect of food quality on health has a positive and considerable impact on their attitudes and preferences toward the use of organic vegetables. Therefore, customers' willingness to purchase and consume organic veggies rises as they learn more about the health advantages of doing so. The results support hypothesis 1 ($H_1$: Consumers' knowledge of organic vegetables has a significant and positive effect on their general preferences toward organic produce).

### 4.2. Knowledge of chemical residue

Consumers' knowledge about chemical residues in vegetables and their impact on human health is shown in Table 4. The results show that 60.97% of participants were aware of the harms of chemical residues in vegetables and their effects on human health and only 38.03% of people do not have enough knowledge of the residual effects of chemicals (Table 4). Chi-Square ($\chi^2$ = 947.148) also shows that consumers' knowledge about chemical residues in vegetables could have a strong and important impact on their attitudes toward organic vegetables and their ability to eat them. In other words, when people have more knowledge about the benefits of these products, they will be more interested in buying and consuming organic vegetables. The results support hypothesis 1 ($H_1$: Consumers' knowledge of organic vegetables has a significant and positive effect on their general preferences toward organic produce) and hypothesis 4 ($H_4$: Increasing consumers' awareness about the advantages of consuming organic vegetables has a positive and significant impact on their preferences toward organic vegetables).

After providing sufficient explanations about organic products and their differences from healthy products and other products (implementing natural and eco-friendly farming practices, avoiding GMOs and synthetic chemicals, and following organic production standards), about 92.76% of people tended to consume organic vegetables and only 7.24% of them did not tend to consume organic products, which may be due to lack of sufficient knowledge in this regard (Table 5). The chi-square result shows a risk of dismissing the hypothesis of $H_0$ by 0.995 ($\alpha$ = 0.005). The results support hypothesis 1 ($H_1$: Consumers' knowledge of organic vegetables has a significant and positive effect on their general preferences toward organic produce) and hypothesis 4 ($H_4$: Increasing consumers' awareness about the advantages of consuming organic vegetables has a positive and significant impact on their preferences toward organic vegetables).

**Table 4**
Consumers' knowledge about chemical residues in vegetables and their effect on human health.

| Are you aware of the impact of chemical residues in vegetables on human health? | Frequency | Percentage | $\chi^2$ | Significance |
|---|---|---|---|---|
| Yes (aware) | 592 | 60.97% | 46.724 | [a] |
| No (unaware) | 379 | 38.03% | | |

[a] Indicates a statistical meaning point of 5%
Source: Study findings

There is a remarkable answer in this part of the survey. The findings revealed that organic plants had an exceptionally high production trend and the government and producers seemed to be capable of investing in organic production.

Table 6 shows consumers' willingness to purchase organic vegetables in the studied area. Although the willingness to purchase organic vegetables is high (59–82%), their "improper appearance" may decrease the willingness to purchase (59.22%) (Table 6) and this is an alert for producers to make the appearance of the products better, using organic and biological ways.

Consumers were asked to determine the impact of proper vegetable presentation on a propensity to purchase organic food: "Would you rather buy an organic carrot that looks less appealing (i.e., with an asymmetrical shape and nasty market) than a non-organic vegetable that looks good?" Table 7 demonstrates that $H_0$ hypothesis is rejected with a probability of 0.995 ($\alpha$ = 0.005) from the calculated Chi-square ($\chi^2$ = 260.565). There is thus a significant difference between the answers. Nevertheless, the responses are substantially different. The results show that two groups of consumers (fans of organic and fans of appearance) are independent. The results support hypothesis 3 ($H_3$: Labelling and certifying sustainable products have a significant positive effect on consumer preferences toward organic vegetables).

The willingness to purchase organic vegetables for married and single people is shown in Table 8. The results show that about 46.69% of single people and 53.04% of married people were willing to buy organic vegetables (Table 8).

The value from the estimated chi-square ($\chi^2$ = 260.565) with a likelihood of 0.995 ($\alpha$ = 0.005) indicates that ample proof exists to refute the hypothesis of H0. Furthermore, the results showed a major gap between the demographic category that answered "Yes" and the respondent community that answered "No" (Table 9). The findings are anticipated to warn policymakers and farmers to make global laws on organic vegetables more specific in Iran.

The results showed that broadcasting media is the most effective way to increase consumers' knowledge about the benefits of organic vegetable consumption in the studied area (Table 10). The roles of university professors, magazines, newspapers, and agriculture extension organizations are the next priority, respectively. The sentence "Rank the effectiveness of the methods to increase consumers' awareness about the benefits of organic vegetables consumption" was included in Table 10.

Table 11 shows the premium of organic vegetables over non-organics that consumers would pay. The results show that about 38.52% of the premium of organic vegetables is paid by consumers. The difference between the costs of organic and non-organic items is known as the organic price. Because organic produce is more expensive than conventional produce, there is no public sector aid to subsidize these commodities, as evidenced by the pricing of organic products against conventional products.

**Table 5**
Consumers' willingness to consume organic vegetables.

| Are you willing to purchase organic vegetables? | Frequency | Percentage | $\chi^2$ | Significance |
|---|---|---|---|---|
| Yes | 900 | 92.76% | 343.8 | [a] |
| No | 71 | 7.24% | | |

[a] Specifies a statistical value of 5%
Source: Study findings

**Table 6**
Willingness to purchase organic vegetables.

| What vegetables would you purchase the most if you know it is grown organically? | Lettuce | Tomato | Cucumber | Leafy | Cole crops | Carrot | Potato | Onion | Peppers |
|---|---|---|---|---|---|---|---|---|---|
| Frequency | 802 | 731 | 705 | 679 | 670 | 641 | 596 | 581 | 575 |
| Percentage | 82.60 | 75.28 | 72.61 | 69.93 | 69.00 | 66.01 | 61.38 | 59.84 | 59.22 |

Source: Study findings

**Table 7**
The appropriate look of vegetables influences the propensity to purchase organic vegetables.

| What would you prefer to purchase: organic vegetables lacking good appearance or non-organic vegetables having good appearance? | Frequency | Percentage | $\chi^2$ | Significance |
|---|---|---|---|---|
| Organic | 737 | 75.90% | 260.565 | [a] |
| Non-organic | 234 | 24.10% | | |

[a] Specifies a statistical value of 5%
Source: Study findings

**Table 8**
Willingness to purchase organic vegetables for married and single people.

| Do you purchase organic vegetables? | Frequency (Yes) | Percentage | $\chi^2$ | Significance |
|---|---|---|---|---|
| Single | 456 | 46.96% | 6.294 | [a] |
| Married | 515 | 53.04% | | |

[a] Specifies a statistical value of 5%
Source: Study findings

**Table 9**
Consumers' trend for using sustainable products' labeling and certification.

| Would you prefer organic products with labels or do not care about labeling? | Frequency | The proportion | $\chi^2$ | Significance |
|---|---|---|---|---|
| Yes, I prefer | 919 | 94.64% | 423.25 | [a] |
| No, I don't care | 52 | 3.36% | | |

[a] Specifies a statistical value of 5%
Source: Study findings

## 5. Discussion

The findings showed that consumers are quite aware of how food quality affects health, and roughly half are also aware of how toxins in veggies might affect human health. In addition, the awareness related to chemical residues in vegetables and their effect on human health is high. As a result, it should be inferred that raising consumers' knowledge of organic foods is the first stage in creating demand for organic products, which answers the study's opening question. However, being aware does not imply becoming a consumer. Organic foods are becoming more popular and this trend has caused producers to seek innovative ways to differentiate their products from one another. While individuals who are extensively involved in the processes may perceive organic products to have scientific significance, consumers may have a less scientific understanding of the procedures involved. Consumers' perceptions and knowledge levels, at least in part, influence their final choice of whether or not to purchase items made organically. The potential for this area of agriculture clearly has limitations without the sustaining demand for organically grown goods, such as a weakness in large-scale production. These results are in line with the findings of Ghosh et al. (2019), Rahnama (2016), and Mervin and Velmurugan (2013).

Attitudes toward the consumption of organic products differ among consumers. Organic foods, according to customers, do not include artificial preservatives, thus they sit on the shelf for less time, resulting in a fresher, better tasting product. Since organic foods do not have chemical tastes, the genuine flavor of the food is revealed. Furthermore, health professionals and consumers in the vegetable market said that organic products should be free from chemical use and other external contamination (Sereshti et al., 2020; Yuan et al., 2020). Many researchers like Bui and Nguyen (2020), Mahdavi et al. (2020), and Rezaei-Moghaddam and Izadi (2019) reported that the main obstacle to OA recognition in Iran is related to lack of knowledge and information among farmers.

The appearance of vegetables had little impact on their marketability or likelihood of consumers eating organic vegetables as long as they were properly labeled as organic. The results of this study are relatively consistent with those of Ghosh et al. (2019) and Rahnama (2016) but are different from the results of Stoleru et al. (2019). These research findings indicated that many customers view security as the most crucial feature of fruits and vegetables, a quality of credibility that consumers cannot assess. The primary factors influencing food choices include one's impression or attitude toward food characteristics such as flavor, attractiveness, nutritional value, and convenience. Stoleru et al. (2019) argued that consumers' behavior concerning the consumption of organic food is based on attitudes, specific behavior, perspectives, and motivations. Perceptions of the basic characteristics of an organic product can affect a consumer's preference because market demand is linked to the characteristics of economic products.

To answer the second research question, the findings indicate that

**Table 11**
The premium of organic vegetables over non-organics that consumers would pay.

| Up to how much premium (%) would you pay for organic vegetables over non-organic vegetables? | 0 | 25 | 50 | 75 | 100 |
|---|---|---|---|---|---|
| Frequency (Yes) | 151 | 374 | 237 | 129 | 80 |
| Percentage | 15.55 | 38.52 | 24.41 | 13.29 | 8.24 |

Source: Study findings

**Table 10**
The most efficient ways of increasing consumers' awareness of the benefits of organic vegetable consumption.

| Rank the effectiveness of the methods to increase consumers' awareness about the benefits of organic vegetables consumption. | Trusted people | Internet | Sellers | Producers | Agriculture extension organizations | Magazines and newspapers | University professors | Broadcasting media |
|---|---|---|---|---|---|---|---|---|
| Frequency | 145 | 182 | 189 | 209 | 243 | 257 | 357 | 656 |
| Percentage | 14.93% | 18.74% | 19.46% | 21.52% | 25.03% | 26.47% | 36.77% | 67.56% |

Source: Study findings

almost all customers choose to buy a government-certified agricultural product with a "clean product" lable. The findings should serve as a wake-up call to policymakers and farmers in Iran to prioritize global legislation on organic vegetables. Government institutional assistance is therefore needed to develop the consumer labeling and certification system (El-Abbadi et al., 2020). Because consumers are unable to determine the price of organic products, they need reassurance from reputable industries that help them understand the quality of products as well as the safety of organic foods. As a result, customers' trust in the product's consistency is crucial and is dependent on precise certification. To ensure proper certification operation, sustainability in agriculture should be used as a sign of sustainable farming and healthy living, interwoven with traditional practices and the use of safe or recycled materials. There were hints that this has been motivated by a loss of confidence in mainstream food sectors (Zhang et al., 2020). According to the log analysis results, family income and consumers' education are key factors influencing the willingness to pay for graded and packed fruits and vegetables, respectively. Market and consumer research would be used by companies in the fruit and vegetable sector to assure the success of their goods. Because customers expect market ease and the availability of high-quality items when purchasing fruits and vegetables, store design and nature, as well as product sales quality, are important tools for the retail industry, and this conclusion provides an answer to the study's third question.

The results from this study's fourth research question indicate that using organic certification logos on product labels to inform customers that a product is certified is an effective strategy. Consumers' views of organic labeling systems have shown to be subjective in character and frequently unfounded in fact. Therefore, it is advised that organic products be marked with credible, consumer-trusted symbols of organic certification. Organizations with an organic labeling program should work to develop customers' perceptions and attitudes about the program's standards and control procedures, as well as consumers' knowledge of the logo.

To answer the last research question, the findings showed that media have provided extensive coverage of the benefits of organic consumption in the study areas and it has made consumers increasingly health conscious. The roles of university professors, magazines, newspapers, farmers, manufacturers, sellers, the Internet, and confident people are at the next level. Such findings correspond to those of Muhammad et al. (2016) and Rahnama (2016). Training profoundly and essentially impacts the perception of sustainable organic food, including the increased awareness of organic food. The results also suggest that these respondents' explanatory variables play a significant role in increasing organic goods' concerns. These significant variables may be regarded by leaders, academics, and industry experts when planning their market share in organic goods.

In general, this study has consequences for legislators as well as brand managers of organic vegetables. Governments should enact relevant legislation to safeguard and support the cultivation and distribution of organic vegetables as well as to encourage the use of terminology, labels, and certifications that are more meaningful. These steps are essential for making organic food products more widely accessible as well as for clearly expressing and articulating their benefits for both human health and the environment. To encourage the growth of this industry, communication that informs customers about the advantages of selecting organic food, particularly organic vegetables, such as marketing efforts and advertising campaigns, is also advised. Clearly, the importance of product quality and health advantages should be stressed. When using organic veggies, it is important to pay attention to the psychological traits of the consumer, particularly when describing the advantages of choosing organic foods, which are connected to a healthy life, health, and environmental concerns. Individual advantages and unique decision-making procedures should undoubtedly be emphasized.

While the study has significant outcomes, it has also some limitations. It is advised that the suggested conceptual model be further evaluated in future research and diverse demographics because the study was only done with a small sample of Iranian customers. It is important to take into account other factors that can help the initial variables in protection motivation theories. The study's failure to take into account real purchasing behavior is still another drawback. This variable was beyond the purview of the study, which aimed to examine customers' perspectives irrespective of how they actually behaved in relation to this kind of product. Given the critical role that attitude and purchase intention play in explaining actual behavior, it is imperative to better understand these factors.

The prospects for organic agriculture in Iran seem bright. According to the last report by "the Research Institute of Organic Agriculture in Iran (in Agust 2021)", there is a total of 43,000 ha of certified organic agricultural land in the country (Annex 1). The fast growth rate observed over the last few years indicates significant and rapid progress in this sector. Owing to the diverse climatic conditions present throughout the country, Iran has the potential to produce a wide range of crops which could make it a regional hub and global resource for producing high-value organic produce.

## 6. Conclusion and policy implication

The organic sector is rapidly expanding. Organic product manufacturing and consumers' interest in organic products have expanded dramatically in recent years. The term "organic vegetables" is not clearly defined in the food business or in the thoughts of customers. 36% of respondents clearly installed the definition of organic vegetables. This indicates that it is necessary to consistently educate consumers about the significance of organic products and the relevance of product labeling. Manufacturers, together with healthcare organizations and other important public institutions, should accept this responsibility. Vegetables are anticipated to be the most valued category of organic goods in the next years. Consumers' perceptions revealed that organic veggies are very nutritious, palatable, and of high quality. The most significant factors in selecting organic veggies are quality, freshness, nutritional content, organic cultivation, and product safety. Therefore, raising customers' awareness of what an organic product is and how to distinguish it from other products in the marketplace will be a key responsibility for manufacturers. To increase public knowledge and awareness about the benefits of organic vegetables, creating engaging and informative content such as blog posts, social media updates, and videos is recommended. Other effective methods include displaying educational animations in stores and sharing recipe ideas with the target audience. In addition, using marketing plan formats like ClickUp can help promote the impact of consuming organic vegetables and achieve marketing goals by reaching the intended audience. This survey provides the most recent information on the purchasing habits and opinions of organic vegetables consumers. According to the research findings, providing education and information to consumers about organic agriculture and products, proper marketing operations, particularly the point of sale promotional activities, and clear labeling of organic products are crucial critical aspects for the growth of organic food.

In the coming years, the organic food production sector will face a crisis, and appropriate policy support will be prudent as a preventative measure. Therefore, policies aimed at improving lifestyle promotion could have a positive effect on organic food intake as well. However, policymakers must begin to pay attention to the role of such influences in the promotion of consumer patterns that promote healthier lifestyles and environmental sustainability. As a result, their policy design and execution are expanding beyond traditional agriculture and food policy objectives.

## Consent to participate

All authors contributed equally to the preparation of this manuscript.

## Consent to publish

All authors have read the manuscript and agree to its publication.

## Research involving human participants and/or animals

None.

## Availability of data and materials

Data are available upon request.

## Implications for gastronomy

This study suggests that consumer awareness of organic foods' health benefits directly impacts purchasing choices, which could reshape dining experiences and culinary trends. As consumers become more conscious of health and environmental sustainability, demand for organic vegetables grows, especially when these products are labeled and certified as organic. This trend encourages chefs and restaurateurs to incorporate organic ingredients, enhancing the quality and appeal of dishes by emphasizing freshness and natural flavors. Moreover, the preference for organic produce, despite higher costs, highlights a shift in gastronomy where quality, traceability, and environmental impact are prioritized.

## CRediT authorship contribution statement

**Jamal Javanmardi:** Writing – review & editing, Writing – original draft, Software, Methodology, Formal analysis, Data curation, Conceptualization. **Imaneh Goli:** Writing – review & editing, Validation, Methodology, Conceptualization. **Shahla Choobchian:** Writing – review & editing, Validation, Methodology, Conceptualization. **Rando Värnik:** Writing – review & editing, Validation, Methodology, Conceptualization. **Samane Ghazali:** Writing – review & editing, Validation, Methodology, Conceptualization. **Astrida Miceikienė:** Writing – review & editing, Validation, Methodology, Conceptualization. **Maryam Pour:** Writing – review & editing, Validation, Methodology, Conceptualization. **Kevin Maréchal:** Writing – review & editing, Validation, Methodology, Conceptualization. **Hossein Azadi:** Writing – review & editing, Validation, Methodology, Conceptualization.

## Ethical approval

None.

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## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijgfs.2024.101094.

**Table A.1**
The agricultural organic sector in Iran

Development of organic agriculture land in Iran from 2000 to 2019 (ha)

| 2000 | 2003 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 57 | 200 | 15 | 913 | 11745 | 8853 | 7256 | 43332 | 42633 | 12155 | 11601 | 14573 | 18870 | 11915 | 11915 | 11915 |

Source: FIBL survey

Organic crops production in Iran (2016-2019)

| | Organic area [ha] | | | | Organic area fully converted [ha] | | | | Organic area under conversion [ha] | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 2016 | 2017 | 2018 | 2019 | 2016 | 2017 | 2018 | 2019 | 2016 | 2017 | 2018 | 2019 |
| Almonds | 30 | 30 | 30 | 30 | | | | | 30 | 30 | 30 | 30 |
| Apples | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | | | |
| Avocados | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | | | | |
| Dates | 1042 | 3495 | 3495 | 3495 | 975 | 3364 | 3364 | 3364 | 67 | 131 | 131 | 131 |
| Grapes, no details | 567 | 540 | 540 | 540 | 567 | 540 | 540 | 540 | | | | |
| Grapes, raisins | 1287 | 1472 | 1472 | 1472 | 1287 | 1472 | 1472 | 1472 | | | | |
| Kiwis | 47 | 16 | 16 | 16 | 47 | 16 | 16 | 16 | | | | |
| Oilseeds, no details | | 650 | 650 | 650 | | 650 | 650 | 650 | | | | |
| Olives, oil | 209 | 244 | 244 | 244 | 120 | 155 | 155 | 155 | 89 | 89 | 89 | 89 |
| Oranges | 37 | 583 | 583 | 583 | 2 | 4 | 4 | 4 | 35 | 579 | 579 | 579 |
| Pistachios | 610 | 547 | 547 | 547 | 490 | 547 | 547 | 547 | 120 | | | |
| Plums | 0 | | | | 0 | | | | | | | |
| Pomegranate | 1207 | 1233 | 1233 | 1233 | 1207 | 1233 | 1233 | 1233 | | | | |
| Potatoes | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | | | | |
| Pulses | 50 | 79 | 79 | 79 | | | | | 50 | 79 | 79 | 79 |
| Rice | 105 | 21 | 21 | 21 | 95 | 9 | 9 | 9 | 10 | 11 | 11 | 11 |
| Tea | 125 | 25 | 25 | 25 | 125 | 25 | 25 | 25 | | | | |
| Vegetables, fruit | 110 | 266 | 266 | 266 | 70 | 70 | 70 | 70 | 40 | 196 | 196 | 196 |
| Vegetables, no details | 18 | 40 | 40 | 40 | 18 | 30 | 30 | 30 | | 10 | 10 | 10 |
| Walnuts, with shell | 6 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | | | | |
| Wheat | 70 | 500 | 500 | 500 | 70 | 500 | 500 | 500 | | | | |

Source: The Research Institute of Organic Agriculture (FIBL) survey

## Data availability

Data will be made available on request.

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