



Consumers' Knowledge and Perception towards Organic Foods: A Cross-Sectional Study

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Authors' contributions

This work was carried out in collaboration among all authors. Author RYK conceptualized the research idea, designed the study, wrote the protocol, supervised the entire work and wrote the final draft of the manuscript. Author WAAA managed the literature searches, collected the data and wrote the first draft of the manuscript. Author TSP performed and managed the statistical analysis of the study. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This study was conducted to investigate the consumer perception towards organic foods in the Saudi market and to scrutinize factors influencing the purchasing decision.

Study Design: A cross-sectional study.

Place and Duration of Study: Department of Clinical Nutrition, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia, between February 2020 and May 2020.

Methodology: We included 406 Saudi adults from both genders. A valid and reliable questionnaire was distributed in different regions. Data were statistically analyzed using IBM SPSS Statistics software.

Results: Results showed that 71.40% of participants consume organic foods with insignificant differences among regions, genders, education levels or health status. Participants above 50 years old reported significantly higher consumption ($p < 0.05$). Moreover, 87% of the participants who were not purchasing organic foods showed future eagerness to buy these foods and were willing to pay up to 100% price increase. The major drives to buy or consume organic foods were consumers' health perception (43.86%), nutritive primacy (22.35%), sensory attributes (12.69%)

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and environmental friendly characteristics (6.66%) of these foods. The major limiting factors, however, were the higher prices (50%) and limited availability (30%).

Conclusion: Saudi consumers are knowledgeable about organic foods and are keen to include them in their shopping lists. Organic farming should be encouraged for an adequate availability and reasonable prices of such foods in the local markets.

Keywords: Organic foods; knowledge; consumer perception; Saudi market.

1. INTRODUCTION

Organic foods are those created by processes that meet organic farming criteria. They are produced, without using most conventional pesticides, fertilizers, antibiotics or growth hormones, by farmers who emphasize the use of renewable resources and the conservation of soil and water to enhance environmental quality for future generations [1]. Trade and consumption of organic foods have significantly increased worldwide in the last decade. Organic producers recently experienced significant sales and requests for their products worldwide [2]. The increased consumption of organic foods relates to the consumer belief of their high nutritive and health attributes. Despite the inefficient scientific evidence, the observational studies showed the health benefits related to the continuous consumption of organic products such as reducing the risk of chronic diseases [3]. The major drives for buying organic foods have been investigated in some studies. Women, especially those following a vegan or vegetarian diet, were found to consume more organic products than men. In a prospective observational cohort study, the women who consumed more organic products were usually the ones who are highly educated regarding health and nutrition [4,5]. In an experimental animal study, organic food consumption was found to have many beneficial effects for overall health such as improving growth, productivity and fertility, immunity and weight gain [6]. Moreover, a self-reported questionnaire study showed that in case of increased consciousness of health and nutrition, the consumption of organic food increased too. The study further found that getting older in age leads to more consumption of organic foods which was related to the health awareness and disease prevention attention [7]. The study further showed that the economic status does not affect the regularity of organic food consumption but it does influence individual expenditure on organic foods.

Ditlevsen et al. [8] found that consumers believe that health benefits and nutritional attributes are

the most influential factors for purchasing organic foods. Older consumers were found to be more curious about their health and disease prevention and less responsive to the unhealthy food advertisement than younger consumers, which increase their tendency towards buying organic foods [9]. Singh and Verma [10] reported that sociodemographic factors such as age, economic status and education level play a role in purchasing organic products. Some consumers buy organic foods as a sort of social prestige and relevance by following the world fashion and development. However, organic foods have been scientifically proven to carry many health benefits regarding diseases including depression and cardiovascular diseases [11]. Health and nutrition knowledge affects the organic food choices in both genders. In less health educated consumers, males were more likely to limit their choices of healthy organic food. On the other hand, females were more likely to limit their choices of unhealthy foods and they tended to choose the organic foods [12].

Some studies comparing organic foods with other conventional foods showed a difference in their contents [13]. However, the results are still not well established and further research is needed in this area.

With a population of 34.8 million and a gross national income of about 21,000 US dollars per capita, Saudi Arabia is ranked as a high-income country with the Gross Domestic Product (GDP) equivalent to 166 percent of the world's average [14]. The sedentary life style has contributed to the spread of the so-called "diseases of civilization" including diabetes, obesity and ischemic heart disease. Increasing the physical activity and modulating the nutrition pattern and food choices are strongly recommended to improve health, reduce the burden of diseases and enhance the entire life quality. There is no published work on the consumer perception towards organic foods in Saudi Arabia. The only data available are of a YouGov survey commissioned by Arla Foods in 2018 which showed that 33% of Saudi

consumers have purchased organic foods in the last 12 months compared to the previous year [15]. It further showed that over half of Saudi consumers (55%) purchased organic foods more than once a month. Hence, the objective of the present study was to investigate the knowledge and perception of Saudi consumers towards organic foods and to examine the factors influencing their purchasing decision. To achieve this objective, the study hypothesized that the consumer perception to buy organic foods will be significantly affected by health, nutrition and sensory attributes, and that the perception to buy these foods will be higher among educated, affluent and higher social classes. The researchers also assumed that the price will be the major deterrent factor significantly limiting consumer perception to buy such foods.

2. METHODS

2.1 Study Design

A cross-sectional study was conducted on Saudi Adults (≥ 18 years old) from both genders living at different regions of Saudi Arabia including the Eastern Region (Dammam, Khobar, Qatif, Jubail, Hafr Al-batin, Al-Ahsa, Abqaiq), Central Region (Riyadh, Buraidah), Western Region (Mecca, Jeddah, Madinah, Taif, Tabuk, Yanbu), Northern Region (Arar, Sakakah, Hail, Jouf) and Southern Region (Aseer, Jazan, Najran, Baha). A well-designed valid and reliable questionnaire was distributed in different regions to survey the Saudi consumers' perception towards organic foods and explore the factors affecting their perception and buying decision.

2.2 Sample Size

The sample size was calculated according to Bartlett et al. [16] based on a pilot study among 244 participants. With anticipated prevalence of organic food consumption as 0.48 and with 5% absolute precision, the minimum required number of participants of the current study was 384, after fixing the type 1 error as 5%.

2.3 Exclusion Criteria

Except for subjects less than 18 years old and/or non-Saudis, there was no exclusion from participation in the study.

2.4 Statistical Analysis

The collected data were presented as frequency tables and descriptive statistics. The association

analysis was performed using chi-square test and logistic regression analysis and the bar plots were presented for graphical representation. The data analysis was done by using R Studio and IBM SPSS Statistics software (Version 26).

3. RESULTS

The full study questionnaire was distributed to the participants in different regions and 406 responses were collected and analyzed.

3.1 Description of Demographic Characteristics of Study Participants

Out of the 406 responders, 275 (67.73%) were males and 131 (32.27%) were females, and 76% of participants were married. The respondents were distributed among different age groups as 74 (18.20%), 204 (50.30%), 108 (26.60%) and 20 (4.90%) from the 18-24, 25-35, 36-50 and 51-64 years, respectively with the second group contributing more than half of participants. The participants included subjects from different education levels ranging from primary education (0.50%) and secondary education (6.40%) to the post-secondary (university or similar) (75.90%) and postgraduate education (Master's or PhD) (17.20%). The data showed that 93.10% of participants (378 out of 406) had either a university or postgraduate degrees. The consumers responded from different regions of the country with the majority of participants being from the Eastern Region (30.30%), Central Region (29.31%) and Western Region (28.10%) as compared to 4.42% and 7.87% from the Northern and Southern Regions, respectively. Out of the 406 participants responding to this study, 360 (88.67%) were healthy adults where only 46 subjects (11.32%) reported various health problems including obesity (9.31%), thyroid disease (5.62%), diabetes (9.67%), hypertension and heart disease (7.86%), respiratory problems (11.26%), colon abnormalities (5.62%), hereditary blood diseases (5.62%), obesity and eczema (11.26%), diabetes, hypertension and heart disease (11.26%), obesity, hypertension and heart disease (11.26%), and obesity and dyslipidemia (11.26%). The majority of participants reported high monthly income where 43.10% had more than 10,000 and less than 20,000 SR and 34.20% had monthly income of more than 20,000 SR. 19.50% of subjects had monthly income of 5,000 to 10,000 SR and only 3.20% reported monthly income less than 5,000 SR.

3.2 Prevalence and Description of Organic Food Consumption Pattern of Saudi Consumers

The organic food consumption pattern was investigated among Saudi consumers. 71.4% of subjects (290 out of 406) already buy/consume organic foods either occasionally (53.8%) or in a regular base (weekly: 12.1%; daily: 3-4 times a week: 19.3%; daily: 6.6%). The consumption is distributed among different food commodities where fruits and vegetables contributed to almost half of this consumption (47.6%) followed by cereals and grains (14.8%), beverage, milk and dairy products (12.4%), sweets (7.2%), meat and meat products (6.2%), pasta and sauces (4.1%) and poultry (3.1%). Other foods include fish and seafood products, oils, nuts butters, salt, chips, seeds and vinegar.

The participants were asked about the major drives that motivate them to buy or consume organic foods. The responses (Fig. 1) showed that the health consciousness of the consumers and their conviction that these foods are healthier was the major motive (78%). The other motivators were nutrition (42%), sensory attributes (24%), environmental friendly characteristics (13%), authentic labelling and packaging (11%), availability (6%), social status (5%), sales & promotions (2%) and advertising (1%).

3.3 How Can the Consumer Recognize Organic Foods?

Asking the participants about how they recognize organic foods, the majority of subjects (79%) reported that they depend mainly on the product labelling to identify if the product is organic (Fig. 2). This might be attributed to the fact that both organic and conventional foods may look the same or difficult to differentiate visually. Surprisingly, 31% of the participants stated that they can recognize the appearance of organic foods and screen them out from their conventional counterparts. Other group of respondents (16%) concluded that they are able to differentiate organic foods from conventional ones by tasting suggesting that these foods have better taste. The other factors reported by the consumers to recognize organic foods included smell, customer experience, asking the cashier, the presence of organic foods in special stores and on specific shelves in the other stores, brand reputation and by reading about these foods.

3.4 Consumer Knowledge and Perception about Organic Foods

The consumer knowledge and perception about organic foods have been investigated through a set of questions (Table 1). The results showed that 94.6% of subjects are knowledgeable about organic foods and are familiar with their definition and concepts. The responses showed that 20% of consumers instantly check the food items while shopping to make sure if it is organic or conventional. Other consumers do check frequently (20%) or sometimes (30%). This indicates that the consumers in the Saudi markets are knowledgeable about organic foods and are keen to include them in their shopping lists. The consumers were also familiar about where they can purchase such foods as they reported supermarkets (57%) and organic food stores (32%) as the most common venues to procure these foods.

The major reasons that may prevent the consumers from buying organic foods were further explored. Half of the subjects reported that the relatively higher prices of organic foods compared to the conventional alternatives was the major limiting factor. About 30% of the respondents were not able to purchase organic foods because of their limited availability in the stores. Other limiting factors included the inadequate knowledge about of these foods (6%) or the lack of confidence that these foods are really different from the conventional alternatives (5%). The untrusted labelling and nutritional characterization of organic foods is another factor reported by 7% of the consumers that negatively affect their purchase decision of these foods. Some subjects (3%) further stated that they do not purchase organic foods because they are not willing to try new foods that might carry different sensory attributes. It was found that raising the consumers' awareness about organic foods and their nutritional and health benefit might greatly affect their purchase decision and increase their consumption of such foods. Going through the questionnaire, more than 87% of the participants who were not purchasing/consuming organic foods showed their willingness to buy these foods in the future and most of the participants (84%) responded as there were willing to pay up to 25% more than the usual payment for organic foods.

Table 2 illustrates the general consumers' conception about organic foods. The data revealed the high awareness of the consumers

Table 1. Consumer knowledge about organic foods

	Customer response	Percentage response (%)
Do you know what organic food is?	Yes	94.60
	No	5.40
How often do you check if a food product is organic when shopping?	Always	20.40
	Often	20.20
	Sometimes	29.60
	Rarely	19.20
	Never	10.60
As far as you know, organic food products can be bought from	Pharmacy	1.50
	Organic food store	31.50
	Conventional store	3.00
	Supermarket	57.10
	Other places	6.90
If the answer above (other places), please list them.	Online order in specific websites	75.00
	Grocery store	16.70
	All of the previous choices	8.30
If not buying organic foods, what are the major reasons preventing you from buying organic foods?	High price	49.80
	Limited availability in stores	28.60
	Less knowledge (I do not know a lot about organic foods and their benefits)	6.40
	I do not think it's any different between organic and conventional foods	5.40
	I do not trust the labelling and nutritional characterization	6.90
	I do not like trying different sensory attributes	3.00
If not buying organic foods, would you consider buying them in the future?	Yes	87.20
	No	12.80
How much are you willing to pay for organic foods more than your usual payment for the conventional counterparts?	10%	56.20
	25%	27.90
	50%	9.00
	75%	2.80
	100%	4.10

Table 2. Consumers' perception of organic foods

Domains	Percentage Response (%)
Organic foods are environment friendly	82.8
They are healthier	86.2
They are superior in quality	82.3
Most of organic foods don't justify their name	51.5
Organic foods are equal to other available food	23.2
Organic foods are lower than other available food	13.5
They have no harmful effect	51.2
Some "Organic products are just named to attract the customer"	75.1
They are very costly	84.2
They don't have enough variety/taste	66.3

towards organic foods and their benefits and superiority. Over 80.0% of the participants reported that these foods are healthier, environment friendly and higher in quality than their conventional counterparts. More than half of the subjects believed that these foods have no harmful effects. When asked if the organic foods don't justify their names or are of equal or lower quality than traditional foods 51.5%, 23.2% and 13.5% agreed on these assumptions, respectively. On the other hand, 84.2% of participants stated that organic foods are very expensive compared to the conventional choices. These foods have been also questioned by 66.3% of the responders as not having enough varieties which limits the customer selection scope and thus contributes to the reduced consumption of such foods.

3.5 Consumer Nutritional Culture, Purchasing Behavior and Tendency towards Healthier Choices

The study could explore the Saudi consumers' food purchasing behaviors and affinity to nutritious, healthier and more environment-friendly food choices. Data (Table 3) showed that 70.2% of the study participants confirmed that they always consume fresh foods and 55.9% of participants avoid food products containing preservative chemical additives. Almost 65% of participants were very aware about the health attributes of food products and they build their purchase decisions accordingly. Half of the responders were mindful about the standards and regulations of food safety of their products of choice, and they were keen to obtain complete information about food product before they take the purchase decision. About 70% of participants reported that they trust the good brand names as a criterion for high quality food products.

The results showed that 64% of participants trust the food labelling and believe in the logos of different brands. About 90% showed interest in using foods that have assured labelling. The influence of product promotion and peers on the food selection and purchase decision was prominent as 70% of participants stated that they consider peer reference for healthy product and 48% usually look up the internet for customer feedback about specific foods before taking the purchase decision. The food price was another significant determinant in formulating the purchase decision as reported by 83% of participants. Moreover, 58% of subjects were willing to pay higher prices for healthier food

product. The product availability may further contribute to the consumption pattern. The current study showed that over 70% of participants will just buy those products that are readily available in the stores, and less consumers will give extra effort to search for the products that are eco-friendly, more nutrition or healthier.

3.6 Association between Demographic Variables and Organic Food Consumption

The association between demographic variables and organic food consumption is illustrated in Table 4. There was no significant difference in organic food consumption between male and female participants ($p=0.712$). The organic food consumption is more among married than unmarried participants (73% Vs 67%), however, this is not statistically significant ($p=0.303$). Compared to 18-24 years old participants, the higher age groups were showing a higher tendency to purchase organic food. All the participants above 50 years old were consuming organic food. However, despite the significant variation in the number of participants from different regions, the reported consumption of organic food did not significantly differ among different regions ranging from 65.10% to 81.30%. As compared to Eastern region, all other region participants are purchasing or consuming more, however this was also not statistically significant. However, the consumption of organic foods among healthy and unhealthy participants was 71.10% and 73.90%, respectively with no significant difference due to the health status. In addition, there were no significant differences in the consumption of organic foods as affected by the family size where the consumption rates were 61.10%, 72.10%, 70.90% and 72.20% in the households consisting of 1, 2, 3 and ≥ 4 persons, respectively. The data analysis showed that the difference in the consumption as affected by the education level also were insignificant. Rather than the education level, the health culture and nutritional knowledge might have contributed to that shift towards organic foods as healthier alternatives.

Despite the higher consumption rate of organic foods among participants with higher income, the data analysis showed that this correlation is still insignificant. This suggests that Saudi consumers are nutritionally educated and aware of the nutritional and health benefits of organic foods and are gradually shifting to increase their

consumption of such foods regardless of their income or formal education levels and despite of the higher price of these foods as compared to their conventional counterparts.

3.7 Association between Consumers' Knowledge and Perception, Attitude towards Organic Food and Their Food Consumption

The association between the knowledge and attitude about organic foods and the

consumption of such foods is presented in Table 5. Among the participants who responded as they know about organic food, the majority believed that organic foods are environmental friendly, healthier and superior in quality ($p = 0.015, <0.001, 0.003$ respectively). Also, they responded that some organic are just named to attract the customer ($p < 0.001$). Most of the participants who were knowledgeable about the organic foods responded as they are costly and do not offer enough variety or taste ($p < 0.001, 0.010$ respectively). These participants further

Table 3. Consumers nutritional and food consumption attitude

Domains	Percentage Response (%)
Product	
I always consume fresh food	70.2
I avoid food containing preservatives	55.9
If I don't know about a food I never try it	51.0
I am very conscious about my health & buy product as per that	64.5
I am aware about food safety standards & regulations of products that I consume	50.0
I gain complete information about food product before I buy	53.9
Branded food gives me quality assurance	68.0
<i>Labelling and packaging</i>	
I like to use those foods which have assured labelling	88.9
I trust food logo, labelling	64.0
Promotion	
I consider peer reference for health product	69.7
I usually see internet & search for customer feedback if any	48.3
Price	
I am willing to pay high for healthy product	57.7
Price plays a key role in buying items	82.8
Availability	
I buy product which are easily available in stores	70.2
I give extra effort to search for the products which are really eco-friendly or healthier	55.0

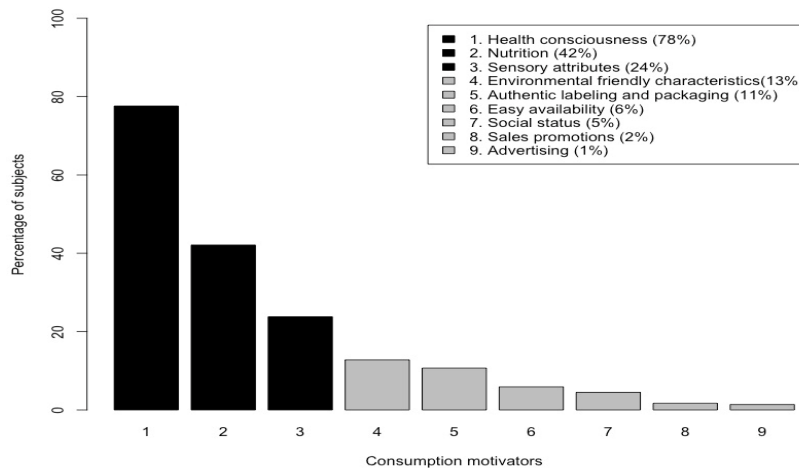


Fig. 1. Factors motivating consumers to buy/consume organic foods

Table 4. Association between demographic variables and organic food consumption

	Consuming organic food regularly (N=290)		Not consuming organic food (N=116)		Univariate analysis		
	n	%	n	%	OR	95% CI	p value
Gender							
Male	198	72	77	28	REF		
Female	92	70.2	39	29.8	0.92	0.58, 1.45	0.712
Marital status							
Single	65	67	32	33	REF		
Married	225	72.8	84	27.2	1.3	0.79, 2.12	0.303
Age group							
18-24 years	50	67.6	24	32.4	REF		
25-35 years	147	72.1	57	27.9	1.24	0.70, 2.20	0.467
36-50 years	73	67.6	35	32.4	1.01	0.53, 1.88	0.997
51-64 years	20	100	0	0			0.998
Region							
Eastern region	80	65.1	43	34.9	REF		
Central region	91	76.5	28	23.6	1.75	0.99, 3.07	0.052
Western region	79	69.3	35	30.7	1.21	0.70, 2.09	0.486
Northern region	14	77.8	4	22.2	1.88	0.58, 6.07	0.29
Southern region	26	81.3	6	18.8	2.33	0.89, 6.09	0.085
Health status							
Healthy	256	71.1	104	28.9	REF		
Unhealthy	34	73.9	12	26.1	1.51	0.57, 2.31	0.692
Number of family members							
One	11	61.1	7	38.9	REF		
Two	31	72.1	12	27.9	1.64	0.52, 5.24	0.4
Three	56	70.9	23	29.1	1.55	0.53, 4.49	0.42
Four or more	192	72.2	74	27.8	1.65	0.62, 4.42	0.318
Education level							
Up to secondary	21	75	7	25	REF		
Post-secondary	214	69.5	94	30.5	0.76	0.31, 1.85	0.543
Postgraduate	55	78.6	15	21.4	1.22	0.44, 3.42	0.702
Monthly income							
Up to 10,000 SR	63	68.5	29	31.5	REF		
>10,000 and < 20,000 SR	130	74.3	45	25.7	1.33	0.76, 2.32	0.314
>20,000 SR	97	69.8	42	30.2	1.06	0.60, 1.88	0.833

responded that they gain complete information about food products before they buy them and also, they like to use those foods which have assured labeling (p=0.032, <0.001 respectively). Also, they responded that the price plays a key role in buying items (p<0.001) and they prefer to buy products which are easily available in stores (p=0.002).

4. DISCUSSION

The findings of this cross-sectional study showed no significant differences in organic food consumption between males and females. Consumers aged 50 years or more were more nutrition and health concerned and showed significantly higher tendency to consume organic

foods than other age groups. This conforms to Hwang [9] who found that older consumers were more conscientious about their health and more willing to buy organic foods. Bosona and Gebresenbet [17] reported that female shoppers have more willingness than men towards consuming organic food and age category takes a role in organic food consumption. The present finding indicated that family size, household income and education level had no effect on organic food buying decision. The results (Fig. 1) showed that the majority of respondents consuming organic foods took their purchase and consumption decision based on their belief about the nutrition and health benefits of such foods. This comes in line with Kumar and Chandrashekar [18] who reported that 58% of the consumers preferred organic foods because of their beneficial properties related to health and well-being. Cheng [19] found no significant different or effect of family size, income and education level on the frequency of consuming organic foods. Singh and Verma [10], however, reported that sociodemographic factors such as age, economic status and education level may play a role in the decision of purchasing organic products. In a bibliometric review for an emerging literature, Li et al. [20] found that consumers' health consciousness, individual norms, consumer knowledge, food safety, environmental concerns, animal welfare, and purchasing power were major influencing factors for willingness to pay for organic foods in China.

The majority of subjects in the current study (56.52%) reported that they depend mainly on the product labelling to identify if the product is organic. On the other hand, buying from specific farmers who practice organic farming, practicing own organic farming and purchasing specific brands known to be organic were the popular determinants that the consumers trust to identify the organic products as reported by Ndungu [21]. Most of the respondents depend on the supermarkets as the primary place to purchase organic products. This contradicts with the finding of Kumar and Chandrashekar [18] who reported that most of respondents preferred to purchase organic products from organic store rather than supermarkets or other markets including farms. The major limiting factor that may prevent the consumers from buying organic foods was the high price, which comes in agreement with other studies. Mukul et al. [22] found that price plays a significant role on consumer perception to purchase organic foods. A positive correlation was reported in the literature between the consumers' purchasing power and their willingness to pay for organic foods. Gan et al. [23] found that organic foods are expensive compared to conventional foods that are readily available. They stated that people with a high social standing were more likely to purchase organic foods as social markers. Xu et al. [24] further found that price was a major determinant of consumer willingness to pay for organic foods.

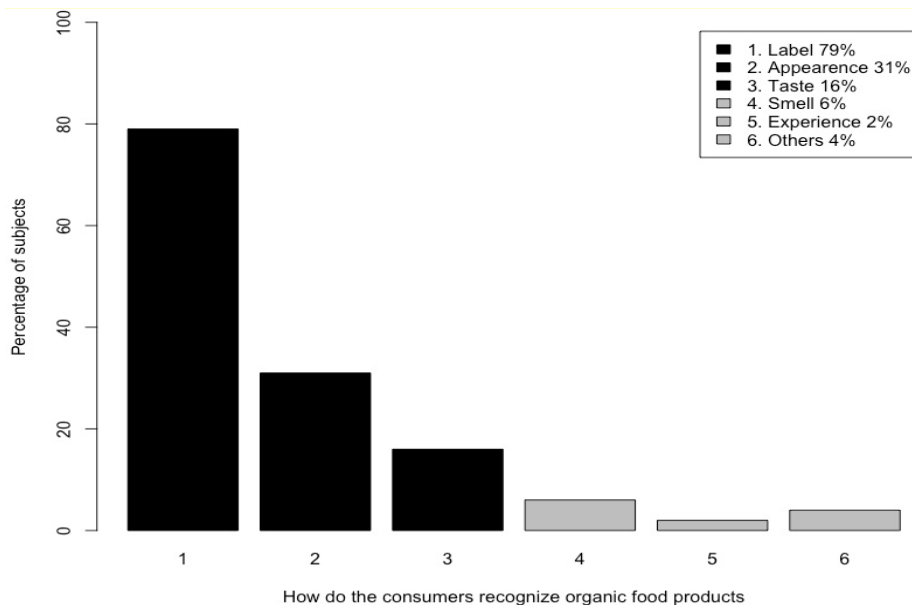


Fig. 2. Ways used by the consumers to recognize organic foods in the markets

Table 5. Association between consumers' knowledge and perception/attitude towards organic food and their food consumption

Perception /attitude about organic food	Do you know what organic food is?				p value
	Yes (N=384)		No (N=22)		
	n	%	n	%	
Organic foods are environment friendly.	322	83.9	14	63.6	0.015
They are healthier.	337	87.8	13	59.1	<0.001
They are superior in quality.	321	83.6	13	59.1	0.003
Most of organic foods don't justify their name.	201	52.3	8	36.4	0.145
Organic foods are equal to other available food.	87	22.7	7	31.8	0.322
Organic foods are lower than other available food.	50	13.0	5	22.7	0.196
They have no harmful effect.	199	51.8	9	40.9	0.319
Some Organic products are just named to attract the customer.	296	77.1	9	40.9	<0.001
They are very costly.	333	86.7	9	40.9	<0.001
They don't have enough variety/taste.	260	67.7	9	40.9	0.010
Attitude towards food consumption	n	%	n	%	P value
I always consume fresh food.	270	70.3	15	68.2	0.832
I avoid food containing preservatives.	219	57.0	8	36.4	0.058
If I don't know about a food I never try it.	197	51.3	10	45.5	0.594
I am very conscious about my health & buy product as per that.	252	65.6	10	45.5	0.054
I am aware about food safety standards & regulations of products what I consume.	194	50.5	9	40.9	0.381
I gain complete information about food product before I buy.	212	55.2	7	31.8	0.032
Branded food gives me quality assurance.	263	68.5	13	59.1	0.358
I like to use those foods which have assured labeling.	347	90.4	14	63.6	<0.001
I trust food logo, labeling.	247	64.3	13	59.1	0.619
I consider peer reference for health product.	269	70.1	14	63.6	0.524
I usually see internet & search for customer feedback if any.	185	48.2	11	50.0	0.868
I am willing to pay high for healthy product.	221	57.6	13	59.1	0.887
Price plays a key role in buying items.	325	84.6	11	50.0	<0.001
I buy product which are easily available in stores.	276	71.9	9	40.9	0.002
I give extra effort to search for the products which are really eco-friendly or healthier.	215	56.0	8	36.4	0.072

The most purchased organic foods as reported by the present study were vegetable and fruits. Similar findings were reported by Chandrashekar [25] who reported that most of respondents were willing to buy or consume organic vegetables than other food items. The current study showed that about 30% of participants were not able to purchase organic foods because of their limited availability at the stores. This agrees with Meixner et al. [26] who found that the main reason behind the limited purchase of organic foods was the inadequate availability in the supermarkets. Petrescu et al. [27] also found that consumers were strongly oriented toward organic food (certified or uncertified) and driven by health concerns and taste, but were primarily deterred by price and lack of availability.

The present study showed that Saudi consumers have a good level of knowledge regarding organic foods. In facts, over 80% of subjects responded that they were used to consume organic foods because of their beneficial health effects. They further tended to consume organic foods because of their higher quality and environment friendly attributes as compared to the conventional counterparts. These findings are supported by several studies [28–33].

This study showed that 64% of participants trust the food labelling and believe in the logos of different brands and 90% of them were interested in using foods that have assured labelling. In a study investigating the consumer

perception towards organic food, Patnaik [34] found that 37% of participants believe that organic food production can make an effect on products' quality and 54% of the participants were keen to use those foods that have assured labelling. Consumers need to shift their consumption pattern towards more organic foods for better health and wellbeing. Protecting the environment through organic farming is another asset for such approach. In general, consumers value organic foods more despite their higher prices and limited availability. Studies comparing the nutrient content of organic and conventional foods are either lacking or limited. Despite the slight differences reported by Popa et al. [13], other studies found non-significant differences in nutrient properties and carbon food prints between organic and conventional foods [35]. Further research is needed to confirm or deter such assumptions.

5. CONCLUSION

Organic foods are foods produced by methods that comply with the standards of organic farming, which avoids the use of man-made fertilizers, pesticides; growth regulators and livestock feed additives. Irradiation and the use of genetically modified organisms or products are generally prohibited by organic legislation. The consumption of organic foods has been globally augmented in the last decade due to their deemed nutritional, health and environmental friendly attributes. The current study explored the knowledge and perception of Saudi consumers towards organic foods and the factors influencing their purchasing and consumption decision. The results showed that Saudi consumers are knowledgeable about the nutritional and health benefits of organic foods and are increasingly shifting their consumption of such foods regardless of the income or education levels and despite the higher price of these foods as compared to the conventional counterparts. The obtained results supported the research hypothesis that the price will be the major restrictive factor limiting consumer perception to buy organic foods. The limited availability was the next constricting factor. The consumer perception to buy organic foods was greatly affected by health, nutrition, sensory attributes and the environmentally friendly characteristics of such foods. However, the results did not accord to the hypothesis that the perception to buy organic foods will be higher among educated, affluent and higher social classes as

there were no significant differences in the consumption among participants from different education backgrounds or income levels. This study recommends that organic farming should be encouraged nationally to ensure an adequate availability and reasonable prices of such foods in the local markets. Governmental subsidizing programs should be in place to support and encourage organic farmers. Governmental bylaws and facilitation procedures should be further adopted to encourage local importers to bring these foods to the Saudi market and increase their availability and ensure balanced prices.

TRANSPARENCY DECLARATION

The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported. The reporting of this work is compliant with STROBE2 guidelines. The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned have been explained.

ETHICAL APPROVAL AND CONSENT

Participants were given all the information about the objectives and procedures of the study. Discriminating, degrading, and hard language were assured to be avoided in the questionnaire and during any contact with participants. Participants were asked to go through an informed consent form clarifying the study and providing a clear description of any benefits and risks associated with participation and confirm their agreement to participate. The experimental protocol, questionnaire and informed consent were approved by the Institutional Review Board of Imam Abdulrahman Bin Faisal University (Approval No. IRB-2020-03-011) on the 27th of January 2020.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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