



A Research on Food Safety in Turkey after the Covid-19 Pandemic

Günel MİKAILSOY

Sakarya University, Institute of Business Administration, Department of Production Management and Marketing, Sakarya, Türkiye

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ABSTRACT

The aim of the study is to investigate the food safety perception of consumers during and after the covid 19 pandemic. Surveys were administered to a total of 1000 people from all regions of Turkey via the internet. The survey data were defined as frequency and percentage, and analyzed by nonparametric test methods for dependent and independent groups. As a result of the analysis, it has been determined that the knowledge and awareness levels of consumers about food safety are generally high, and that there are significant differences according to education, age and region. It was observed that the participants did not differ much between their food preferences before and during COVID-19, but they were more careful about health and packaging safety. In other words, the anxiety level of the participants increased during COVID-19. In addition, it was found that with the increasing of education level and age, the awareness and knowledge of the food preferences of the participants also increased. As another factor affecting consumer behavior, the result of the anxiety level measurement that can be evaluated within the scope of perceived risk, it was determined that 76.4% of the participants would prefer more packaged food products during and during the pandemic period. The results of the study support that consumers' preferences in situations of uncertainty are shaped according to their risk perceptions and there is an increase in their anxiety levels.

1. Introduction

According to the research conducted by Euromonitor, a worldwide strategic market research organization, in the post-coronavirus pandemic period, there has been a faster than expected change in consumer trends. Among the trends that have been transformed to suit multiple purposes, the virus is in the focus of consumers, and this is the source of their fears (BBC, 2020a). So, what are the effects of this process when consumers are shopping for food of animal origin? At this point, what kind of role does the consumer awareness level play in the choice of food products of animal origin? For example, although there are various viruses transmitted from food products of animal origin, no such findings about coronavirus have yet been encountered. However, in one state in the USA, most of the meat factories and slaughterhouses have been closed due to an pandemic. Because some of the workers working here have tested positive for COVID-19 (BBC, 2020b).

In recent years, due to the increased sensitivity of consumers to food production and consumption, food safety, which is one of the determining factors in the

food products demand is always on the agenda and has become more important in the period during the COVID-19 pandemic. Consumers' food shopping preferences have always been affected by crises, necessarily or arbitrarily. Consumer behavior affected by the external environment has a great place in perceptions from meeting basic needs to shopping preferences. The effect of environmental factors may vary depending on the purpose of purchasing, the internal state of the consumer and other situational factors (Odabaşı and Barış, 2002; Güzel et al, 2018). Due to all these factors, depending on the level of education and culture, and with their rise the consumer wants to know what is in the food products they eat, and it is seen that the consumer cares about food safety (Özmetin, 2006). The concept of conscious consumer is increasing in importance day by day within the scope of consumer behavior. With the emergence of the conscious consumer concept over time, there have been changes in the purchasing behavior of the consumer and as a result, there have been differences in product preferences (Gülse et al, 2019). The level of awareness of consumers is directly proportional to their level of protection against the dangers they may encoun-

* Corresponding author email: gunel.mikailsoy@ogr.sakarya.edu.tr

ter. The conscious consumer takes precautions beforehand in his shopping preferences and is deemed to have protected himself from a number of adverse situations that pose a risk. Consumer behavior is affected by the reactions of the consumer to environmental factors in the context of the events that the consumer experiences while purchasing the product or service (İslamoğlu and Altunışık, 2017). Today, the behavior of the consumer of food products is on a line of balance and rationality. This situation is based on inherited or acquired traditions and food habits, which have effects on meeting the nutritional needs of the individual's body, but without neglecting modernity and innovation specific to the nutritional field (Petroman et al, 2015). As the perspectives and perceptions of different social classes vary in consumer behavior, it is normal for their preferences to also differ. Consumer behavior resulting from the relative effect of sociological factors on psychological factors (Güzel et al, 2018; Karabulut, 1981) health concerns of individuals and increased health awareness shape their lifestyles and food preferences (Dutta-Bergman, 2004; Bakke et al, 2016; Pakmak and Koçoğlu, 2019).

In this study, it was aimed to investigate the effect of the COVID-19 pandemic on the food consumption of consumers, which can be evaluated in the context of a situation factor affecting the whole world.

2. Materials and Methods

Material

Participants are grouped based on their native provinces data by the seven geographical regions of Turkey. The survey questions are designed based on the literature and consist of two parts. These are dimensioned in accordance with demographic data and the purpose of the research as awareness and knowledge and anxiety levels.

Method

The simple random sampling formula Eq.(1) was used in the study to estimate the sample size (Yamane, 1967). In general, according to this formula, when the population size exceeds 100 000, with $\alpha = 0.05$ significance level, $p = 0.5$ probability and $d = \pm 5\%$ margin of error, the sample number does not exceed 400. The fact that the number of surveys made is 2.5 times this number increases the power of the sampling.

$$n = \frac{Nz^2 pq}{(N - 1)d^2 + z^2 pq} \quad (1)$$

In addition to the descriptive statistics of the data, the nonparametric Wilcoxon sign test for the analysis of the difference between the two dependent variables, the Mann Whitney U test to determine the difference between two independent groups, and the Kruskal Wallis H-test to compare more than two independent groups were used in the study. Spearman Rank - Order correlation was used to determine the relationship between some features (Cebeci, 2019).

3. Results and Discussion

The demographic information of the participants in the study is included in Table 1.

Table 1

Frequency table of some demographic information of the participants

Demographic Characteristics		n	%
Gender	Female	553	55.3
	Male	447	44.7
Education	Primary school	26	2.6
	Middle school	36	3.6
	High school	179	17.9
	University	759	75.9
Age	Under 20	70	7.0
	21-30	364	36.4
	31-40	381	38.1
	41-50	141	14.1
	51-60	32	3.2
	Over 61	12	1.2
Hometown (as Regions)	Mediterranean	123	12.3
	Eastern Anatolia	80	8.0
	Aegean	58	5.8
	Southeastern Anatolia	452	45.2
	Central Anatolia	141	14.1
	Black Sea	78	7.8
Marital status	Marmara	123	12.3
	Married	584	58.4
Average monthly income	Single	416	41.6
	Less than 2500 TL	266	26.6
	Between 2500-5000 TL	395	39.5
Average monthly food expenditure	More than 5000 TL	339	33.9
	Less than 600 TL	152	15.2
	Between 600-1000 TL	269	26.9
Average monthly food expenditure	Between 1000-1500 TL	241	24.1
	More than 1500TL	338	33.8

As seen in Table 1, 55.3% of the participants are women and 44.7% are men. 58.4% of them are married and 41.6% are single. 2.6% of the participants' education level is primary school, 3.6% secondary school, 17.9% high school and 75.9% university graduates. Considering the age of the participants, 7% are under 20 years old, 36.4% are 21-30, 38.1% are 31-40, 14.1% are 41-50, 3.2% are 51-60 years old and 1.2% is over 61 years old. The distribution of the respondents according to regions is as follows: Mediterranean Region 12.3%, Eastern Anatolia Region 8%, Aegean Region 5.8%, Southeastern Anatolia Region 45.2%, Central Anatolia Region 14.1%, Black Sea Region 7.8% and Marmara Region 12.3%. It has been determined that 26.6% of the participants' monthly income is less than 2500 TL, 39.5% is between 2500-5000 TL and 33.9% is more than 5000 TL. It is seen that 15.2% of participants' average monthly food expenditure is less than 600 TL, 26.9% is between 600-1000 TL, 24.1% is between 1000-1500 TL and 33.8% is more than 1500 TL.

Knowledge level

Consumer awareness is based on information and when evaluated from a marketing point of view, it can be said that consumers who have a high level of knowledge and awareness of their legal rights regarding products and producers will positively affect the dynamics of the market as conscious consumers (Pakmak and

Koçoğlu, 2019). In this context, the answers to the questions asked about the knowledge levels of the participants are included in Table 2.

Table 2
Frequency and percentages about the knowledge and awareness level of the participants

N Questions	Yes		No	
	n	%	n	%
<i>Knowledge level</i>				
1. When you encounter a spoiled or faulty food product, do you report your complaint to the place where you bought it?	833	83.3	167	16.7
2. Do you pay attention that the food products you buy are approved by the Ministry of Agriculture?	653	65.3	347	34.7
<i>Level of Consciousness</i>				
3. Have you heard of the concept of food safety before?	766	76.6	234	23.4
4. I have information about Alo 174 Food Line	547	54.7	453	45.3
5. I have information about Alo 175 Consumer Line	644	64.4	356	35.6
6. When buying a food product, I always look at the expiration date.	922	92.2	78	7.8

Food safety for the purpose of ensuring full consumer safety should pass through the stage of protecting the products from biological, chemical and physical hazards in the process until they reach the end user, the consumer. According to this, it is seen that 76.6% of the participants have heard about the concept of food safety before, 54.7% have information about the Alo 174 Food Line and 64.4% have information about the Alo 175 Consumer Line. It has been determined that 65.3% of the participants pay attention to the fact that the purchased food products are approved by the Ministry of Agriculture, and 83.3% of the participants complain to the place where the product was purchased when a defective or faulty food product was encountered (Table 2). When the table above is examined, it is seen that the rate of reading the expiry date is the highest (92.2%), and the level of knowledge and awareness about food safety and consumer rights is followed by high rates. In another study, it was determined that 68.6% of consumers in Tokat province heard the concept of food safety and defined it correctly (Onurlubaş and Gürler, 2016). Taşdan et al. (2014) found the rate of knowledge of food safety to be 80% in their study. In the study conducted by Yalçın and Kızılaslan (2013) in Samsun city center, this rate was found to be 84%. According to the report published by the Ministry of Commerce in 2018 (Güzel et al, 2018), it was determined that the rates of consumers with high level of knowledge (36%) and medium level of knowledge (35.5%) are close to each other. The rate of consumers with low level of knowledge is 28.5%. In the study conducted by Yuzbaşıoğlu et al. (2018), it was stated that the food safety inspection of 69.7% of the participants in Sivas province should be done by the Ministry of Agriculture and Forestry. Similarly, in the study conducted by Mutlu (2007) in Adana, consumers stated the Ministry of Health (35.5%) and the Ministry of Agriculture and Forestry (22.7%) as the institution or organization conducting food safety inspection in the

context of food safety knowledge level. In a study conducted in Denizli, it was determined that the participants did not have sufficient information about consumer rights (Pakmak and Koçoğlu, 2019). In the study conducted by Tüyben (2018), it was determined that 79.0% of individuals with the habit of reading food labels pay attention to the information of ingredients ($p < 0.05$), and the rate of those who do not have information within the scope of the consumer line was found to be 23.5%.

It is observed that the rate of the participants who sometimes read the information on the packaging in the food they buy with labels is 38.5%, and the rate of those who do not read at all is 1.2% (Figure 1).

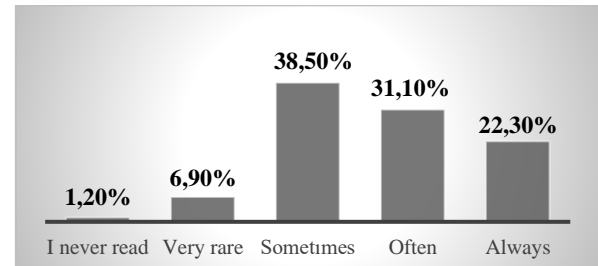


Figure 1
The percent of the participants who read the information on the packaging for the food they buy with labels

When evaluating in general, it can be said that the rate of reading the information on the packaging is high. When looking at the field information, it is seen that consumers generally read the information on the food products they buy packaged. Similarly, in Ogur's (2020) study with consumers in Bitlis, this rate is 64%. Güzel et al. (2018) stated in a research report that most of the participants generally read the label information when purchasing food products, but 8.7% of the participants never read it. Another study was conducted by Topuzoğlu et al. (2007) to examine the knowledge and attitudes of people who applied to a health center about purchasing food products and the rate of reading the label information was observed as 52.1%. In general, the rate of reading tags in our study coincides with the rates of other studies. In the study of Babaoğlu et al. (2016), the rate of tag reading was always 20.5% and never 30.5%. In the research conducted by Çınar and Sağlık (2006), it was determined that 75% of the consumers partially read the label information and 25% never read it. These examples differ with our study in terms of not reading labels.

According to Duesenberry's theory of relative income, families influence each other in terms of consumption. The consumption of the individual within the family or family as whole depends on the relative income of the families with which this family has a relationship. In addition, consumption habits that vary according to income and consumption activities depending on the cultural and social characteristics of the families also affect the country's economy (Özsungur and Güven, 2017). In this respect, the consciousness level scale was used together with the questions (1, 2, 3) measuring the knowledge level of the participants in our study. According to this scale:

Consciousness level score: Up to 8 "Weak",

Consciousness level score: Those between 9-10 are "Medium",

Consciousness level score: Those who are 11 and above are classified as "High" information.

The conscious consumer aims to get the maximum benefit from it while purchasing a good or service. While purchasing, it is consciously organized, taking into account its real needs, shopping with plan and documentation, while taking into account the quality, standard, healthy, safe, environmentalist features of the product/service, it is a socio-economic element that attaches importance to saving by choosing the most suitable product for its budget and has the feature of directing the economy to efficiency over time (Topuzoğlu et al, 2007). The inability of consumers to know the organizations that control food production is an obstacle for them to play the conscious consumer role in this sector and to control it. Eryılmaz and Kılıç (2020) in their study had found that consumers with a high level of education and income level are more conscious about the food safety matter. In European Union countries, where the standard of living and social awareness is higher, there is no linear relationship between the education and income levels of consumers and their food safety awareness. In our study, statistically significant results were found as a result of the Spearman Sequential correlation analysis performed between the educational status, average monthly income and level of consciousness of the participants (Table 3).

According to the analysis results, a positive correlation was found between the level of consciousness and age, education level and average monthly income ($p < 0.01$). In other words, as the age, education level and average monthly income increase, the awareness level of the consumers also increases. In the study of Erdoğan and Çiçek (2015), it was determined that household income contributes positively to the consumption level of some foods of animal origin. In the statistical analysis, positive correlations were found between the increase in income and consumption of drinking milk, yoghurt, beef-veal, fish meat, eggs and honey. Education level and income were observed to be effective in food preferences of animal origin. Demanding white meat more than red meat, keeping criteria such as production and expiration date, brand, packaging, and fat ratio in purchased products can be shown as evidence for this effect.

Table 3

Correlation coefficients between the education level, average monthly income and level of awareness of the participants

	Age	Education level	Average monthly income
Education level	0.041	-	-
Average monthly income	0.397**	0.302**	-
Consciousness level	0.141**	0.156**	0.148**

**: $p < 0.01$

Significant results were found as a result of the statistical testing of the difference between knowledge and awareness levels according to socio-demographic characteristics (Table 4-5).

Table 4

Mann-Whitney U test results to determine the difference between the knowledge and awareness levels of the participants according to sex and marital status

N Questions	Sex	Marital status	
	Z value		
<i>Knowledge level</i>			
1.	Do you pay attention that the food products you buy are approved by the Ministry of Agriculture?	-4.793**	-2.377*
2.	When you encounter a spoiled or faulty food product, do you report your complaint to the place where you bought it?	-2.105*	-1.982*
<i>Consciousness level</i>			
3.	Have you heard of the concept of food safety before?	-0.39	-1.765
4.	I have information about Alo 174 Food Line	-3.639**	-2.261*
5.	I have information about Alo 175 Consumer Line	-1.576	-0.281
6.	Do you read the information on the packaging of the food you buy with labels?	-3.278**	-2.591*
7.	When buying a food product, I always look at the expiration date.	-4.299**	-1.328

*: $p < 0.05$; **: $p < 0.01$

Table 5

Kruskal Wallis test results for determining the difference between the consciousness levels of the participants according to the regions, age and education level

N Questions	Regions	Age	Education level	
	χ^2 value			
<i>Knowledge level</i>				
1.	Do you pay attention that the food products you buy are approved by the Ministry of Agriculture?	4.454	12.226*	7.947
2.	When you encounter a spoiled or faulty food product, do you report your complaint to the place where you bought it?	2.967	9.814	23.222**
<i>Level of Consciousness</i>				
3.	Have you heard of the concept of food safety before?	13.481*	29.919**	56.436**
4.	I have information about Alo 174 Food Line	28.882**	29.281**	4.908
5.	I have information about Alo 175 Consumer Line	3.354	11.383*	18.955**
6.	Do you read the information on the packaging of the food you buy with labels?	7.601	16.440**	29.920**
7.	When buying a food product, I always look at the expiration date.	6.087	51.965**	24.367**

*: $p < 0.05$; **: $p < 0.01$

That is to say, the level of consciousness about the food line differs significantly by gender ($p < 0.05$) and

marital status ($p < 0.05$). We see that there is a statistically significant ($p < 0.01$) difference between men and women in paying attention to the expiration date (Table 4). In different studies (Losasso et al., 2012; Eryılmaz & Kılıç, 2020), it has been determined that women are more concerned and more conscious about food safety than men. We see that there are important differences related to the knowledge-awareness level, according to the regions, age and education level (Table 5). That is to say, while there is a statistically significant difference in terms of only the concept of food safety and having knowledge about the food line, there are statistical differences in many concepts according to age and education level.

Anxiety level

Perceived risk, which is one of the factors affecting the purchasing behavior of consumers, causes an increase in the level of anxiety in an environment of uncertainty. Perceived risk is defined as the degree of uncertainty that consumers feel before and after purchasing a product or service. In other words, consumers' evaluations about products, selection decisions and purchasing behaviors will be affected by the uncertainty (Campbell and Goodstein, 2001; Deniz and Erciş, 2008).

Table 7

Kruskal Wallis and Mann-Whitney U test results to determine the difference between the anxiety levels of the participants by demographic characteristics

N	Question	Regions	Age	Educational level	Gender	Marital status
		χ^2 value			Z value	
1.	Has there been any change in your life in terms of food consumption in general during the COVID-19 pandemic?	6.688	12.955*	4.904	-1.465	-1.804
2.	When consuming food products, I prefer packaged products now	9.747	15.301**	4.014	-0.375	-1.688
3.	I started to consume more organic agricultural products	12.476	7.993	10.938*	-3.878**	-1.727
4.	I'm more worried now while consuming	8.354	22.799**	13.179*	-1.583	-2.948**

*: $p < 0.05$; **: $p < 0.01$

3. Results and Discussion

In this study, before and during COVID-19 pandemic food consuming habits of people living in 7 regions of Turkey were examined and it was investigated how this findings change depending on such demographic characteristics as people's gender, age, education, marital status and average monthly income, as well as knowledge and anxiety level. In our study, the knowledge level of the participants showed statistically significant differences according to gender and marital status. The level of knowledge also varied by region, age and education level. Since information is the basis of consumer awareness, those who are conscious consumers affect the dynamics of the market positively, and in the study, it was found that the majority are those who look at the expiration date while purchasing a food product. When faced with a spoiled and faulty food product,

Numerical data determining the anxiety level of the participants about food consumption in the COVID-19 process are given in Table 6.

Table 6

Descriptive statistics on anxiety level

Questions	Yes		No	
	n	%	n	%
When consuming food products, I now prefer packaged products more	764	76.4	236	23.6
I started to consume more organic agricultural products	698	69.8	302	30.2

76.4% of the participants stated that they preferred packaged products more in this period, 69.8% started to consume more organic products.

Richardson et al. (1994) conducted a survey by sending random letters to people in England to determine the red meat consumption habits, in their study. As a result of the findings obtained from the analyzes, 28.3% of the consumers reported that they reduced their meat consumption, the main reason for this was health concerns.

Significant differences were found between the anxiety levels of the participants by region, age, gender, education level and marital status (Table 7). We see that age and education level are very effective in these differences.

it was determined that the majority of consumers complained to where they bought them. There was a difference between the anxiety levels of the participants and regions, age, education level, gender and marital status. It has been observed that the percentage of the responses of the participants that they will prefer more packaged and organic products during the COVID-19 period. Finally, it is recommended people to be conscious consumers and that necessary studies should be carried out to reduce their anxiety in any pandemic.

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