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Perception of Food Safety in Fish Consumption: The Case of Antalya Province

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Abstract

With globalization, in our country as well as in the whole world; Due to the emergence of previously unknown hazards in foods, concepts such as food safety and food safety have emerged. According to the researches, the situation in question; food trade gaining a global dimension, increase in chemical pollutants, different risks are observed with the entry of new technologies into the sector, increasing economic burden at country and global level, difficulties in food supply, inability to reach healthy food due to insufficient and unbalanced income, increased vulnerability of risk groups, sustainable food security It is caused by factors such as lack of health, unhealthy water and environmental factors.

Again, the problems experienced showed that such problems are mostly experienced in animal products, mostly meat and meat products. For this reason, in this study, it was aimed to evaluate the knowledge about food safety and food safety and perception about fish, which is one of the animal foods that consumers consider the most risky.

Food safety; It refers to the precautions to be taken during the food production and distribution process so that consumers can consume healthy foods. The process of supplying healthy and reliable products that do not harm the environment and human health, from the field (farm) to the table, and whose necessary controls are made at every stage of production, is all of the food safety stages.

Food safety is; It is a scientific system cycle that defines the processing, preparation, storage and presentation of foods to the end consumer in a way that prevents physical, chemical and biological factors that may cause food spoilage and food-borne diseases. When foods are prepared in accordance with food safety, that is, foods that have not lost their nutritional value in terms of physical, chemical and microbiological properties, and therefore will not pose a health risk to consumers, they are suitable for consumption.

While the concept of food safety is more of a supply-side economic concept, the concept of food safety refers to the safety or health of food. In this sense, the consumer also has to undertake some duties. As can be observed from the study, the consumer; should know adequate and balanced nutrition and correct food preferences, common food-borne diseases and prevention methods, safe food supply steps, and what the labels on foods mean.

For this reason, in this study, socio-economic characteristics of consumers, factors affecting food intake and their knowledge levels on food safety were investigated in order to evaluate consumers' perceptions of food safety. When the 393 consumer surveys that constitute the main material of the study are evaluated; It has been determined that a significant number of consumers are more or less familiar with the concept of food safety, but most of the consumers do not know many concepts related to food safety and food safety.

Key words
Food Safety, Fish consumption, Consumer awareness, Standards.

Introduction

Food safety is defined as complying with the necessary rules and taking precautions during the production, processing, transportation and distribution stages of food in order to ensure healthy food production, and includes the concepts of healthy, beneficial and healthy food (DPT, 2001; Tayar, 2006). The starting point of food safety is the farm and the end point is the consumer. Therefore, food safety covers all the stages that the food offered for consumption goes through until it reaches the "farm to table" (Giray and Soysal, 2007).

Mankind has been in an effort to establish and implement standards for the safety of the food they consume many years ago. As a matter of fact, with the developing technology over time, the risks in food and agricultural products have begun to increase and the emerging dangers have begun to be better understood scientifically. The development of international trade, the awareness of consumers, the demand for diversity and difference in purchasing food products, as well as the increase in health and environmental concerns have enabled producers and decision makers to approach the issue more sensitively and consciously. Accordingly, the studies of public and private sector organizations on this subject have intensified and become widespread. Parallel to the preparation of the necessary regulations and legal legislation by the public, the proof of the success of the systems implemented by private institutions led to the acceptance of the standards. Since standard applications are based on certification, they have become the warranty features sought by the consumer.

Food safety has become an increasingly important issue for all countries in recent years due to its public health and economic dimensions. Today, due to the radical changes in food production, processing, distribution and consumption processes, consumers cannot be sure about the safety of the food they consume in every region of the world, and the risks that food may be exposed to are monitored more carefully (Balta, 2005). Especially in recent years, governments have enacted many laws and regulations to ensure food safety, control and inspection (Koç et al. 2008).

Food related standards applied in Turkey and in the world; standards on the scope and methods of application of food safety measures; standards for tools and machinery used in the production, storage and distribution of food; standards for determining the microbiological makeup of food; It is possible to classify them as standards related to substances in food and which may differ for each food, and standards for substances in contact with food (Özbek and Fidan, 2010).

The ability of all these practices to yield meaningful results is closely related to both effective supervision and the level of awareness of consumers on this issue. Investigating the behaviors of consumers while purchasing food will shed a great deal of light on the measures to be taken to affect these behaviors. Therefore, there are many studies on food safety and consumer behavior in Turkey (Gülse Bal et al., 2006; Topuzoğlu et al., 2007; Koç and Ceylan, 2008; Kızılaslan and Kızılaslan, 2008; Cevger et al., 2008). ; Ceylan and Koç, 2008; Uzunöz et al., 2008; Yılmaz et al. 2009; Gözener et al. 2009; Tunalioğlu, 2010; Dolekoglu et al., 2012, Yılmaz, 2015).

In this study, the definition of food safety was used considering that the concepts of safety and reliability in many areas cause conceptual confusion.

While food safety refers to foods that will not pose a health risk to consumers, food security has a wider scope including reliability. Food security, on the other hand, is the continuous and stable continuation of people's access to food that will provide them with a healthy and balanced diet.

While consumers pay attention to their nutritional composition with the concern of balanced and healthy nutrition, they have also started to be more sensitive to the increase in risks arising from food. Parallel to these changes, the increase and availability of communication and information resources has made it easier for consumers to obtain information. While this situation affects healthy nutrition positively, it can also create a negative effect due to information pollution. The basic criterion of a balanced diet is the intake of nutrients in 4 basic food groups (milk, meat-eggs-legumes, fruit-vegetables, bread-cereals) in certain amounts according to the life period. In terms of being a good quality protein source and containing Omega-3, it is listed among the basic nutrients that should be included in the fish nutrition programs. According to FAO data, fish as an animal protein source constitutes 15.7% of the protein intake of the global population and 5.1 grams of the total protein consumed. Around 145 million tons of fishery products are produced in the world. About 80.2% of this amount is produced by developing countries. Annual consumption per capita is approximately 18.5 kg, 24 kg, 15 kg and 7.6 kg in the world, developed countries, developing countries and Turkey, respectively. These data show that the consumption of aquaculture and therefore fish is quite low in Turkey. The reasons for low fish consumption are undoubtedly quite diverse. However, among these, factors related to consumers' behavior and consumption front, and in this context, consumers' perception of food safety in fish have an important role.

While animal foods play a significant role in our nutritional intake, they are also the most risky product group in terms of food safety due to biological, chemical and physical hazards, as well as faulty practices during production, processing, preservation and cooking (Dölekoğlu et al., 2012). Increasing consumer knowledge about these high-risk products will serve as a driving force for conscious purchasing and promote the sales of reliable food within the stakeholders of the food chain. Today, quality control, which is the preservation of the superior properties of the products in the process from the producer to the consumer, has been replaced by systems such as total quality, then HACCP, GAP, GMP, GHP. Participation in applications that provide quality assurance such as HACCP, GMP, GHP, ISO 9000, EUREPGAP is also increasing in developing countries (Dölekoglu, 2003). As a matter of fact, traceability systems that ensure food safety and quality for businesses and regulators in recent years have been taken into account by the European Union in the export of fishery products (Yılmaz and Yılmaz, 2017, Yılmaz et al., 2017 , Yaralı, E., 2019).

This study was carried out to reveal the food safety perceptions of consumers in fish consumption in Antalya and to define the habits of fish consumption in Antalya as a basis.

Material and Method

The study basically includes analyzes based on survey data obtained through face-to-face interviews with randomly selected sample families residing in the city center of Antalya. The survey was carried out with the head of the family and his wife in the absence of his/her absence. Simple random sampling method based on the estimation of the sample rate (p) was used in the study. The equation used;

$n = (N z2 p q) / [(N d2)+(z2 p q)]$ (Yamane, 1967).

Here; n: number of samples, z: standard normal value found depending on the 95% confidence level chosen, p: probability of consuming fish of a selected family, q: probability of not consuming fish of a selected family, d: sensitivity (worked with 5% deviation). The value of the p ratio used in this study was 0.84, which was found in another study on fish consumption in Antalya (Özkan et al, 2006).

The study includes families living in 165 neighborhoods in Konyaaltı, Muratpaşa and Kepez districts in the center of Antalya. The sample volume, which was calculated as 380, was later increased to 393 with 13 backup questionnaires, and therefore, the study was carried out with 393 questionnaires. In the distribution of the calculated sample volume to the neighborhoods, the level of development (a. most developed, b. developed, c. medium level, d. underdeveloped, e. underdeveloped) of the neighborhoods created by TURKSTAT was taken as basis. Neighborhoods that represent each group from these neighborhoods were chosen randomly, thus it was aimed to represent the entire population.

The data obtained from the families were grouped in various ways and analyzed. Families were divided into four groups according to their monthly income (1. <1250 TL, 2. 1251-2500 TL, 3. 2501-5000 TL, 4.>5001 TL). According to the age of the surveyed subjects, they were grouped as 1. <30, 2. 31-40, 3. 41-50, 4. 51-60, 5. >61. Finally, according to the school completed by the surveyed subject, education level groups such as 1. Primary education and before (Middle school and before), 2. High School, and 3. University were determined. Whether the variables in question were statistically different by groups were analyzed using various statistical methods, and Chi-square analysis was used for the statistical analysis of discrete variables, taking into account the applicable conditions. In chi-square analysis, there may sometimes be a problem in the number of samples per cell. In such cases, for example, the data obtained using a 5-point Likert scale were converted into 3-point Likert format. Whether there is a difference between household groups in terms of the continuous variables considered was tested using analysis of variance. In order to perform analysis of variance, the analyzed variable must (1) be a random variable, (2) have a normal distribution, and (3) variances must be homogeneous. In this framework, homogeneity of variances was investigated using Levene statistics, and the assumption of normality was investigated using Kolmogrov-Smirnov and Shapiro-Wilk tests. The first condition is already met when designing the research. In cases where analysis of variance could not be used, non-parametric tests were used as an alternative. In order to test the differences of the variables measured with the Likert scale by groups, the Kruskal-Wallis test was applied because the number of groups was more than two (Lowry 1999; Arsham, 2002). Test results are shown below the relevant charts.

Results and Discussion

Before analyzing the attitudes and behaviors of the consumers participating in the survey, it is necessary to determine the main general characteristics of the consumers by examining their demographic status. As a result of the analyzes made for this purpose, in summary, the average age of the interviewed consumers is 46, 24.9% of them are in the 25-35 age group, 37.4% are in the 36-50 age group, 26.2% are in the 51-60 age group and the remaining 11.5% were in the 61-74 age group. When the monthly family incomes of the consumers participating in the survey are examined, it is seen that the average family income is 3527 TL. This level shows that the income level is at the medium level in today's conditions. When the education levels are examined, it is seen that 19.6% of the subjects are primary school graduates and before, 48.3% are high school graduates and 32.1% are university graduates (Table 1).

Table 1. General characteristics of the subjects surveyed

Age groups	Average	Frequency	Income groups (TL)	Average	Frequency	Education level	Frequency
1. 25-35	30,86	98	1. 750-1250	1042,31	32	1. Primary Education	77
2. 36-50	44,56	147	2. 1251-2500	2004,76	127	2. Secondary Education	190
3. 51-60	55,18	103	3. 2501-5000	3704,13	175	3. University	126
4. 61-74	64,55	45	4. 5001-22000	7463,16	59		
Total	46,22	393	**Total**	3526,86	393	**Total**	393

Fish consumption

When the fish consumption of the families during the survey period is examined; It has been determined that the monthly fish consumption amount is 3.8 kg and the monthly fish consumption per person is 1.08 kg. Most of the fish consumed in Antalya are sea fish. As a matter of fact, during the survey period; Among the fish consumed by families, 32.1% is mainly anchovy, and 10.8% is trout, 10.2% is sea bream culture, 8.7% is sea bass culture, 5.1% is horse mackerel, and 4.2% is coral. fish was determined. The average monthly fish consumption in the studied families was found to be approximately 2.3. While fish is not consumed in 5 families (1.3%), the amount and frequency of fish consumption increases as the income level of the families increases. While fish is consumed 1.8 times a month in the lowest income group, this value reaches 2.9 in the highest income group. As expected, the weight of fish consists of consumption at home. While 86.7% of the total consumption is at home, fish restaurants constitute 9.8%. Other consumption places are picnic and other restaurants.

Food safety

In this section, first of all, it is emphasized to what extent the concept of food safety is known by the subjects. For this purpose, Table 2 was created. In the table, the concept and phenomenon of "food safety" were asked in order to determine the general knowledge of the subjects about food safety and to lead questions about food safety perceptions in fish consumption. Perception questions were evaluated on a 5-point Likert scale. The answers are presented as a frequency table, taking into account the response given to each scale.

Table 2. Frequency distribution of consumers' opinions about food safety (%)

Thoughts		Participation level*					Tot.	Med.	Avrg.
		1	2	3	4	5			
1	I know the concept of food safety	3,3	8,9	17,0	59,1	11,7	100,0	4	3,67
2	I have sufficient knowledge about food safety	3,3	10,9	31,7	44,2	9,9	100,0	4	3,46
3	I think the food I consume is safe	4,3	27,2	36,5	27,4	4,6	100,0	3	3,01
4	I believe that food inspection is done correctly in Türkiye	17,8	43,4	29,2	8,6	1,0	100,0	2	2,32
5	Adequate information is provided about food safety.	17,3	45,2	26,6	9,4	1,5	100,0	2	2,33

*: 1. Strongly Disagree, 2. Disagree, 3. Undecided, 4. Agree, 5. Totally Agree

Most of the consumers (70.8%) who participated in the survey stated that they know the concept of food safety. On the other hand, the rate of those who say they have sufficient knowledge about food safety drops to 54.1%. This indicator shows the lack of knowledge of consumers about food safety. Responses to the statement "I think the food I consume is safe" reveals that consumers are not sure about the safety of the food they consume, in other words, they find the food safe at a moderate level. As a matter of fact, while 31.5% of the consumers who participated in the survey did not agree with this idea, 29.2% were undecided and 32.0 stated that they agreed. On the other hand, most of the consumers believe that the food inspection in Turkey is not done correctly. Similarly, most of the consumers think that adequate information about food safety is not provided.

The opinions of the consumers on the health of the main animal product groups they buy are given in Table 3. The animal product group that consumers consider the least risky is fish. The product groups that are seen as less risky after fish are milk and dairy products. Meat, chicken and turkey meat are in the group of products that are considered to be moderately risky. While fish is seen as the least risky, processed fish products are seen as risky. Meat products (Sausage, salami, sausage, etc.) are considered the most risky product group by consumers. From these results, it is possible to deduce that consumers have an opinion that the risk of food will increase with processing.

Table 3. Distribution of consumers' opinions on the risk level of animal product groups in the market

Product groups		Risk level frequencies*						Risk level percentage distribution*					
		1	2	3	4	5	Tot.	1	2	3	4	5	Tot.
1.	Meat	38	82	89	147	24	380	10,0	21,6	23,4	38,7	6,3	100,0
2.	Chicken and turkey meat	34	80	89	144	31	378	9,0	21,2	23,5	38,1	8,2	100,0
3.	Meat products (Sausage, salami, sausage, etc.)	19	25	71	172	93	380	5,0	6,6	18,7	45,3	24,5	100,0
4.	Fish	58	146	57	93	24	378	15,3	38,6	15,1	24,6	6,3	100,0
5.	Processed fish products	20	67	108	143	40	378	5,3	17,7	28,6	37,8	10,6	100,0
6.	Milk	31	139	116	89	4	379	8,2	36,7	30,6	23,5	1,1	100,0
7.	Dairy products (yogurt, cheese, ayran, etc.)	28	127	103	100	20	378	7,4	33,6	27,2	26,5	5,3	100,0

*: 1. No risk at all, 2. No risk, 3. Undecided, 4. Risky, 5. Very risky

When the reliability of the fish, which is the animal product group that consumers trust most, is questioned according to the source, consumers think that the fish obtained from fhishing is safer. While the rate of consumers who find the safety of the fish caught to be high and very high is 72.5%, this rate is 34.4% for fish obtained from aquaculture (Table 3). These results can be interpreted as consumers are suspicious of aquaculture in terms of reliability.

Table 4. Distribution of consumers' opinions on the safety of fish

Fish type	Confidence level frequencies*						Confidence level percentage distribution*					
	1	2	3	4	5	Tot.	1	2	3	4	5	Tot.
Cultured fish reliability	48	53	147	108	22	378	12,7	14,0	38,9	28,6	5,8	100,0
The reliability of the fish caught	8	11	85	168	105	377	2,1	2,9	22,5	44,6	27,9	100,0
Safety of processed fish	117	99	99	46	13	374	31,3	26,5	26,5	12,3	3,5	100,0

*: 1. Very low, 2. Low, 3. Medium, 4. High, 5. Very high

Table 4 has been prepared in order to reveal the various judgments of consumers about fish supply, consumption and safety. Judgments 1 and 2 were asked to reveal whether fish consumption is healthy or not. Consumers generally believe that fish has a positive effect on human health as expected and that fish should be eaten (at least) once a week. While there is no difference in these two judgments in terms of age groups and education level, the rate of those who respond positively to the judgment that everyone should eat fish once a week is higher in high-income groups. This difference was found to be statistically significant (α=0.01).

Most of the consumers draw parallels between the pollution of the water and the health of the health. In addition, most of the consumers know the characteristics of fresh fish. The rate of those who know these characteristics is higher in high-income groups, and this difference was found to be statistically significant (α=0.05).

Fish markets and fishermen appear as intermediaries that are approached more positively in the supply of fish to consumers. The reliability of fish sold in neighborhood markets is found to be moderate, while the reliability of fish sold by peddlers is lower. In addition, more than half of the consumers surveyed think that the sale of fish by peddlers should be banned. This idea was found to be statistically different at 1% significance level by income and education groups.

The rate of consumers who agree that there is no difference between sea fish and aquaculture in terms of nutrition is 21.5%. The rate of consumers who agree that there is no difference between sea fish and cultured fish in terms of safety is 22.9%. The difference here is in favor of marine fish, as mentioned before. However, 67.5% of consumers find the price of sea fish high. In this regard, the rate is higher especially in the group under the age of 30. This difference in age groups was also found to be statistically significant (α=0.05).

Table 5. Frequency distribution of the importance levels of consumers' opinions about fish consumption and safety

Thoughts		Points*					
		1	2	3	4	5	Tot.
1.	Fish consumption has a positive effect on human health.	1	0	37	214	128	380
2.	Everyone should eat fish once a week	1	7	66	215	91	380
3.	It is undesirable to feed fish to children before the age of 1	22	54	162	130	12	380
4.	Fish raised or caught in polluted waters are not healthy	2	6	72	216	84	380
5.	Fish with red gills, shiny eyes and skin are fresh	2	5	54	235	84	380
6.	Fish markets always have fresh fish	10	64	149	142	15	380
7.	Fish sold in neighborhood markets are less healthy	6	69	200	93	12	380
8.	Fish sold by peddlers are often unhealthy and unreliable	6	47	121	150	55	379
9.	There is no difference between marine fish and cultured fish in terms of nutrition.	20	134	143	77	4	378

10.	There is no difference between sea fish and cultured fish in terms of safety.	34	114	145	82	5	380
11.	I find the prices of sea fish high	1	42	80	207	49	379
12.	Eating frozen fish is not healthy	6	68	140	141	25	380
13.	Frozen foods should not be re-frozen after thawing.	6	8	91	194	80	379
14.	I think fried fish is harmful to my health	2	94	107	148	27	378
15.	Generally, undercooked fish is healthier than overcooked.	6	88	182	93	10	379
16.	Fish should stay in the refrigerator for a maximum of 24 hours	5	32	123	198	22	380
17.	Fish life in deep freeze is 1 year	24	98	178	77	2	379
18.	Cooked fish can be stored in the fridge for 7 days.	48	128	144	55	5	380
19.	I am lucky to live in Antalya in terms of fresh and reliable fish consumption.	12	21	131	185	29	378
20.	I want the fishing ban to be extended	11	38	127	137	63	376
21.	Fish sales by peddlers should be banned	15	47	109	169	38	378
22.	When we enter the European Union, I find it positive that more diverse products enter the market.	9	46	173	135	15	378
23.	When we enter the European Union, the price of fish will increase.	7	53	200	99	19	378
24.	When we enter the European Union, the quality of food in our country will increase.	7	33	171	137	30	378
33.	I'm worried about toxic substances from seafood	5	37	158	148	28	376

*: 1. Strongly Disagree, 2. Disagree, 3. Undecided, 4.Agree, 5. Totally Agree

Table 6. Percent distribution of the importance levels of consumers' opinions about fish consumption and safety

Thoughts		Points*					
		1	2	3	4	5	Tot.
1.	Fish consumption has a positive effect on human health.	0,3	0,0	9,7	56,3	33,7	100,0
2.	Everyone should eat fish once a week	0,3	1,8	17,4	56,6	23,9	100,0
3.	It is undesirable to feed fish to children before the age of 1	5,8	14,2	42,6	34,2	3,2	100,0
4.	Fish raised or caught in polluted waters are not healthy	0,5	1,6	18,9	56,8	22,1	100,0
5.	Fish with red gills, shiny eyes and skin are fresh	0,5	1,3	14,2	61,8	22,1	100,0
6.	Fish markets always have fresh fish	2,6	16,8	39,2	37,4	3,9	100,0
7.	Fish sold in neighborhood markets are less healthy	1,6	18,2	52,6	24,5	3,2	100,0
8.	Fish sold by peddlers are often unhealthy and unreliable	1,6	12,4	31,9	39,6	14,5	100,0
9.	There is no difference between marine fish and cultured fish in terms of nutrition.	5,3	35,4	37,8	20,4	1,1	100,0
10.	There is no difference between sea fish and cultured fish in terms of safety.	8,9	30,0	38,2	21,6	1,3	100,0
11.	I find the prices of sea fish high	0,3	11,1	21,1	54,6	12,9	100,0
12.	Eating frozen fish is not healthy	1,6	17,9	36,8	37,1	6,6	100,0
13.	Frozen foods should not be re-frozen after thawing.	1,6	2,1	24,0	51,2	21,1	100,0
14.	I think fried fish is harmful to my health	0,5	24,9	28,3	39,2	7,1	100,0
15.	Generally, undercooked fish is healthier than overcooked.	1,6	23,2	48,0	24,5	2,6	100,0
16.	Fish should stay in the refrigerator for a maximum of 24 hours	1,3	8,4	32,4	52,1	5,8	100,0
17.	Fish life in deep freeze is 1 year	6,3	25,9	47,0	20,3	0,5	100,0
18.	Cooked fish can be stored in the fridge for 7 days.	12,6	33,7	37,9	14,5	1,3	100,0
19.	I want the fishing ban to be extended	2,9	10,1	33,8	36,4	16,8	100,0
20.	Fish sales by peddlers should be banned	4,0	12,4	28,8	44,7	10,1	100,0
21.	When we enter the European Union, the price of fish will increase.	1,9	14,0	52,9	26,2	5,0	100,0
22.	When we enter the European Union, the quality of food in our country will increase.	1,9	8,7	45,2	36,2	7,9	100,0
23.	I'm worried about toxic substances from seafood	1,3	9,8	42,0	39,4	7,4	100,0

*: 1. Strongly Disagree, 2. Disagree, 3. Undecided, 4.Agree, 5. Totally Agree

Conclusion

In this study, it has been determined that a significant part of the consumers in Antalya have a lack of knowledge about food safety and are not sure of the safety of the food they consume. Most of the consumers think that there is an inadequacy in food inspections and information about safety. The animal product group that consumers consider the least risky is fish. Especially the fish obtained by fishing is considered to be safer than the fish grown. Milk and dairy products, meat, chicken and turkey meat follow fish. Meat products (Sausage, salami, sausage, etc.) are considered the most risky product group. Eliminating the doubt about the safety of fish obtained from aquaculture is considered important in terms of fisheries, as in other animal products.

Food Safety, food safety and nutrition are parts of a whole. For this reason, in order to develop the best technology and science in food safety; It should cooperate with governments and universities, agriculture sector, trade sector, health sector, consumer associations and non-governmental organizations.

Statement of Conflict of Interest

The authors declared that for this research article, they have no actual, potential or perceived conflict of interest.

Author contribution

The contribution of the authors to the present study is equal.

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