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Analysis of factors influencing the opinions of fresh fruits and vegetables consumers on food safety

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ABSTRACT

The aim of this study was to determine the factors that influence opinions of fruits and vegetables consumers' in Çanakkale province in terms of food safety. Data for the study were collected from 166 consumers, determined by means of Propositional Random Sampling. Factor Analysis and Binary Logistic Regression Analysis were used to analyze the data. According to the research, quality problems and the possibility of physical and chemical fraud in fruits and vegetables in terms of food safety proved to have a negative impact on consumer opinions towards fruits and vegetables, whereas locally produced fruits and vegetables affected the consumer opinions positively.

Keywords:

Consumer opinions
Food safety
Fresh fruits
Fresh vegetables

Yaş meyve sebze tüketicilerinin gıda güvenliği hakkındaki düşüncelerini etkileyen faktörlerin analizi

ÖZET

Bu çalışmanın amacı, Çanakkale ilindeki yaş meyve ve sebze tüketicilerinin gıda güvenliği ile ilgili görüşlerini etkileyen faktörlerin belirlenmesidir. Çalışmada kullanılan veriler Oransal Örneklemme Formülü ile seçilen 166 tüketiciden elde edilmiştir. Verilerin analizinde Faktör Analizi ve İkili Lojistik Regresyon Analizi kullanılmıştır. Araştırmaya göre, kalite sorunu ile fiziksel ve kimyasal hileler yapılması ihtimali yaş meyve ve sebze tüketicilerinin gıda güvenliği açısından düşüncelerini olumsuz etkilerken, yerel olarak üretilen yaş meyve ve sebzeler ise tüketicilerin gıda güvenliği hakkındaki görüşlerini olumlu etkilemektedir.

Anahtar kelimeler:

Tüketici düşünceleri
Gıda güvenliği
Yaş meyve
Yaş sebze

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1. Introduction

Nowadays, health is one of the world's major concerns (OECD, 2010). Because healthy nutrition is essential in the prevention of diet-related chronic diseases (Choi and Zhoa, 2014), consumers have become increasingly aware of the influence of food on health conditions (Weisong et al., 2015). The increased concern of consumers about wellness and health have made a significant contribution to the growing demand for health foods (Edward et al., 2013). As personal income has risen, consumers have become more focused on food safety (Hadi et al., 2010; Marcolini et al., 2013). Without a doubt, the safety of fresh products due to their perishability is more important for consumers (Jacxsens et al., 2015).

Fresh fruits and vegetables are highly perishable

products that can easily spoil or deteriorate during handling throughout the supply chain, from the farmer to the final retailer (UN, 2007). Nevertheless, fresh fruits and vegetables are a significant nutrition source and an integral part of a healthy, balanced diet (FAO, 2016). Newly published World Health Organization (WHO)/Food and Agriculture Organization (FAO) report recommends to consumption of a minimum of 400 g of fresh fruits and vegetables per day for the prevention of chronic illnesses, in addition to the prevention and alleviation of several micronutrient deficiencies, especially in less developed countries (WHO, 2016). However, an increase in outbreaks of illnesses associated with the consumption of fresh agricultural produce has been observed (UM, 2010). In addition, food safety problems related to the consumption of fresh fruits and vegetables contaminated

with microorganisms are increasing. Recent foodborne outbreaks related to the consumption of leafy greens, tomatoes, sprouts and green peppers prove that the consumption of contaminated agricultural produce is one of the causes of foodborne disease (WHO, 2011).

Turkey is an important fruits and vegetables exporter. Due to the residues on fruits and vegetables, occasionally some problems may arise during export. According to The Rapid Alert System for Food and Feed (RASSF) 2014, residues were found on some fruits and vegetables exported from Turkey to the EU, the most important group of importing countries (EC, 2014). Residues on fruits and vegetables and other food safety problems influence consumer opinions in domestic consumption as well. During the last decade, several studies have been done on food safety for fruits and vegetables worldwide (Oger et al., 2001; Canavari et al., 2002; Harker et al., 2003; Berdegue et al., 2005; Oraman and Unakitan, 2010; Yahaya et al., 2015).

Situated by the sea, Canakkale is an important province in terms of fruits and vegetables production on account of its suitable climate and geographic location. According to the average of 2011-2013, in Turkey the share of fresh fruits and vegetables in the marketed crop product value was 62.8 %. During the same period, the share of these products in Canakkale province's total crop product value was 50.2 % (TURKSTAT, 2015).

Although fresh fruits and vegetables are a constant element of a healthy diet, due to some wrongful practices in the production and supply chain, fresh fruits and vegetables may cause diseases; this fact gives rise to concern (WHO, 2011). For that reason, provision of food safety for fresh fruits and vegetables is difficult in Turkey as in many other countries but it is essential (WHO, 2016). For this purpose, in fresh fruits and

vegetables consumption in terms of food safety, identifying consumer attitudes and preferences is the starting point of development of the measures in this regard (Safefood, 2007; Haghiri et al., 2009). Because of these reasons, in this study the factors that influence opinions of consumers who live in Canakkale province towards fruits and vegetables in terms of food safety were examined.

2. Framework of The Research

All hazards causing food to become injurious to consumer health are included in the concept of food safety (FAO, 2003; Grunet, 2005). Protection from hazards is expected by the consumers along the entire food chain, from primary producer to consumer. Improper agricultural practices; poor hygiene at all stages of the food chain; misuse of chemicals; contaminated raw materials, ingredients and water; inadequate or improper storage, etc. are among the factors that contribute to potential hazards in foods (FAO, 2003). Likewise, risk of practices, procedures and processes which often lead to outbreaks of foodborne diseases are known. It has been put forth that that these factors are more or less the same in many countries in the world (Ehiri and Morris 2008). Price of products (Wilcock et al., 2004), quality and freshness of products (Yeung and Morris, 2001), appearance of the products and certificated products (Krystallis and Chryssohoidis, 2005), income of consumers (Baker, 2003), locality and food fraud are among other factors effective on food safety. Figure 1 indicates the factors of food safety according to the results acquired in the literature.

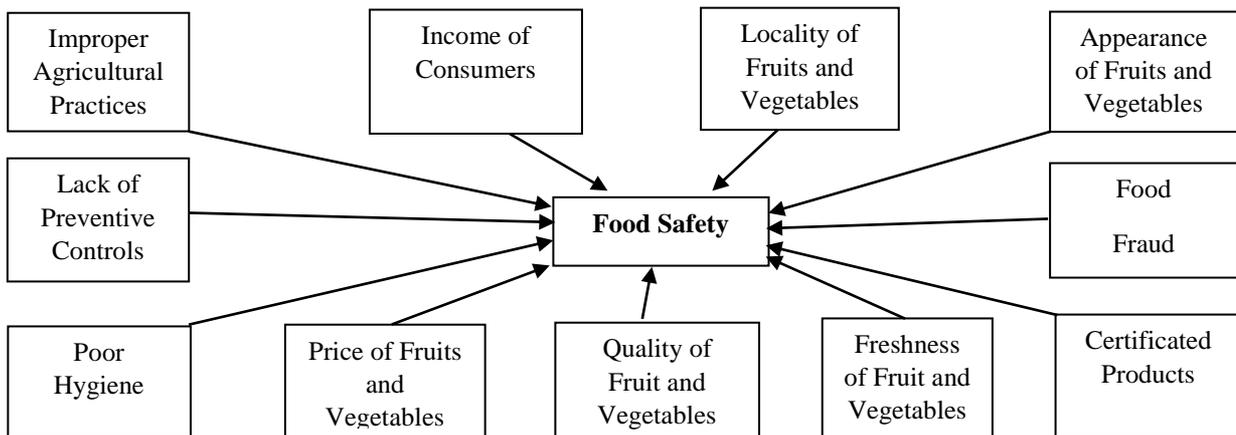


Figure 1. Factors that influence the food safety in the research

In this study, as a result of the literature review, 35 items with 5-Likert-Scale were used which are thought to be effective on consumer opinions on food safety have been prepared and asked to the consumers through the questionnaire form. The items are used in the questionnaire are given in Table 1.

Turkey is one of the world's leading countries in terms of fresh fruits and vegetables production and export (Niyaz and Demirbaş, 2011; IIB, 2014). Nevertheless, fresh fruits and vegetables exported in the past years have been returned to Turkey due to residual problems and other food safety standards. Fruits and

vegetables that can not be exported are introduced to the domestic market (GGH, 2016). In addition, there are important food safety problems with fresh fruits and vegetables that are offered domestic, independently

(EC, 2014). Food safety in fresh fruits and vegetables in Turkey is an important problem. Therefore, it is important to investigate the factors influencing opinions of consumers who are directly affected by this problem.

Table 1. Items on food safety in fresh fruits and vegetables obtained from related literature

Variables	Scales
Careful pesticide application (Safefood, 2007:p.43)	
Careful fertilizing (Yılmaz et al., 2010:p.144)	
Considering the presence of chemical fertilizer residues on fruits and vegetables (Obana et al., 2013:p.1)	
Considering food safety provision from farm-to-table production poor (FAO, 2003:p.3)	
Lack of control on farms (Safefood, 2007:p.27)	
Lack of control during sales stage (Bal et al., 2006 :p.16; Safefood, 2007:p.70)	
Provision of traceability (Liao et al., 2011:p.1)	
Compliance with hygiene regulations of the salesrooms (Sayın et al., 2011:p.1)	
Considering spraying water onto fruits and vegetables in certain time intervals wrong (USHHSFDA, 1998:p.16).	
Finding organic products safer according to conventional (D'Amato and Falzon, 2014:p.255)	
Finding Good Agricultural Practices (GAP) products safer according to conventional (Trienekens and Zuurbier, 2008:p.112)	
Preferring affordable organic products (Bal et al., 2006 :p.12; Safefood,2007:p.18)	
Preferring affordable GAP production (Bal et al., 2006:p.12)	
Not reducing the amount of purchasing for certified (organic or GAP) products (Safefood, 2007:p.18)	
Considering ISO, HACCP certified businesses reliable (Trienekens and Zuurbier, 2008:p.111)	
Considering fruits and vegetables of poor quality (Harker et al., 2003:p.337)	1= Strongly Disagree
Not setting aside quality when looking for affordable products (Cassady et al., 2007:p. 1914)	2= Disagree
Considering absence of size and color standardization (Berdegue et al., 2005:p.255)	3= Neither Agree nor Disagree
Considering packaging factor influential (Garaert et al., 2004 :p.259)	4= Agree
Paying attention to fresh consumption (Bond et al., 2009 :p.61)	5= Strongly Agree
Paying attention to seasonal consumption (Bond et al, 2009: p.61)	
Not preferring processed products to fresh products (Bond et al., 2009:p.61)	
Negative influence on purchasing decision due to worms and insects found in fruits and vegetables (Kays, 1999:p.233)	
Negative influence on purchasing decision due to fruits and vegetables damage (Kays, 1999:p.233)	
Selling non-fruit/vegetables objects with food damage as fruits and vegetables (Bucher et al., 2012:p.1553).	
Thinking that the color of market umbrellas and light fraud show fruits and vegetables brighter than they actually are	
Finding local products safe (Onazaka et al., 2010:p.2; Bond et al., 2009:p.61)	
Paying attention to local brands consumption (Bond et al., 2009:p.61)	
Sufficient income for fruit and vegetable consumption in desired quality and quantity (Cassady et al., 2007:p. 1909)	
Considering fruits and vegetables prices affordable (Cassady et al., 2007:p. 1909)	
Reduction of the consumption amount caused by increased price (Yiridoe et al, 2005:p.193)	
Preferring cheap fruits and vegetables salesrooms even if they are far away (Cassady et al., 2007:p. 1914)	
Orientation of quality products to very affordable prices (Yiridoe et al, 2005:p.193)	
Considering organic and GAP products expensive (Yiridoe et al., 2005:p.193)	
Not purchasing GAP products that are hard to buy (Safefood, 2007:p.18)	

3. Materials and Methods

The main material for the current research consisted of the data gathered through the survey conducted in

2015 among consumers in the center of Canakkale province. The sample size was determined by the proportional sampling method (USDA, 2008; FAO, 2017), based on fruits and vegetables consumers, using

the formula below:

$$n = \frac{z^2 \cdot p \cdot (1-p)}{d^2}$$

n= sample size

z²= confidence factor of the desired confidence level
(2.58 for 99 %)

p= population ratio

d= margin for error

$$\frac{2.58^2 \cdot (0.5) \cdot (0.5)}{(0.10)^2} = 166$$

n is the sample size, z is the table value of confidence level (assumed to be 99 %), p is the probability of the examined situation occurring (p=0.5 is used due to the absence of preliminary information concerning consumer food safety awareness levels about fruits and vegetables), q is the probability of the situation not occurring (q=1-p), and d is the margin for error (assumed to be 10 %). The estimated sample size was calculated to be 166 and was distributed proportionally according to the population.

There are seven districts in the center of Canakkale province. According to the income groups (1=0-1000 Turkish Liras, 5=2500 Turkish Liras or more), these districts are divided into five (1=Lowest income group, 5=Highest income group). 166 surveys were conducted in the seven districts in accordance with the income groups by means of face-to-face meetings with the fresh fruits and vegetables consumers living in these districts.

Factor Analysis and Binary Logistic Regression (BLR) Analysis were used in turn to analyze the data. Likert Scale is a commonly accepted and widely used measure (Elaine and Chirstopher, 2007). Items prepared by means of a Five-Point Likert Scale were used to determine the factors affecting consumer opinions towards fresh fruits and vegetables in terms of food safety. Reliability Analysis was used to determine the reliability of the scale used in the research. In Reliability Analysis, a value coefficient between 0 and 1 is defined as Cronbach's Alpha coefficient. The value of this coefficient should be greater than 0.60 for a reliable scale (Cronbach, 1951).

Factor Analysis is a method used to convert the data sets of interrelated variables, independent variables and a smaller number of new variables, to group these data sets or to describe the common factors of the assumed event (Özdamar, 2013). In case of a proper factorization, a) reduction of variables is required, b) separation between generated new variables or factors must be provided, and c) the obtained results, in other words the obtained factors, are required to be significant (Tabachnick and Fidell, 2001).

In this study, prepared with the Five-Point Likert Scale (Norman, 2010) and Factor Analysis, a large number of items (35) related to food safety for fresh fruits and vegetables was classified into a smaller number of groups.

BLR allows the examination of possible

relationships between qualitative dependent variables and quantitative or qualitative independent variables (Tranmer and Elliot, 2005). BLR, when two or multi-class discontinuous variables cause degradation of the assumption of normality, is an alternative to Linear Regression Analysis (Özdamar, 2013). In this study, all factors obtained from Factor Analysis were included in BLR Analysis as independent variables. Within the scope of this study, the factors influencing consumer opinions to fruits and vegetables safety were grouped as follows: 1=Yes (Safe), 2=No (Unsafe). These variables were used in BLR analysis as dependent variables. The Hosmer and Lemeshow (Hosmer and Lemeshow, 2000) test statistic was used to identify whether the BLR model, which includes influential variables, is meaningful or not from the point of fresh fruits and vegetables consumers with regard to their opinions on the safety of the products they consume.

4. Findings

4.1. General Characteristics of Fresh Fruits and Vegetables Consumers

According to the survey results, 50 % of the consumers were women. Approximately 51 % and 20.5 % of the consumers underwent fewer than 9 and more than 11 years of education, respectively. The proportion of families consisting of less than five members was founded to be 66 %. Approximately 57.2 % of the fresh fruits and vegetables consumers have monthly household incomes of 625 Euros or less. About 89.2 % of fresh fruits and vegetables consumers have monthly food expenses of 250 Euros or less, and 69 % spend 50 Euros or less on fresh fruits and vegetables. Among the consumers, (36.1 %) think that food safety is very important, (36.1 %) think that it is important, (3.6 %) think that it is not important and (10 %) are not sure about this. While 79.5 % of the consumers think that food safety is effective on the purchase decision of fresh fruits and vegetables, 10.5 % of them do not agree to this idea.

4.2. Factors Associated with Fresh Fruits and Vegetables Consumer Opinions with Regard to Food Safety

Within the scope of this study, items prepared by the Five-Point Likert Scale and related to opinions of fresh fruits and vegetables consumers and consumption in terms of food safety are presented. Primarily, Reliability Analysis was applied to determine the reliability of the scale used and to establish whether or not the responses to the 35 items were consistent. As a result of the analysis, the scale proved to be robustly reliable with the value of Cronbach's Alpha value of 0.691. This value indicates that the scale used in the study is reliable.

In the studies in the social sciences sciences, to be

able to do Factor Analysis the Kaiser-Meyer-Olkin (KMO) value is expected to be above 0.5. In the current study, the KMO value obtained from the items was calculated as 0.633 and was determined to be appropriate for Factor Analysis. In addition, taking sigma value smaller (0.000) than 0.05 in Bartlett's Test of Sphericity is another indicator of the applicability of the items.

In this study, Eigenvalues of the total variance explained method were taken into account in the determination of the number of factors. The number of variables with Eigenvalues greater than one determined the number of factors. In factor naming, a correlation coefficient showing the relationship between variable and common factors benefited from the factor scores (Field, 2006). In social sciences although factor scores

change, the smallest factor score value as 0.30 is accepted (DiStefano et al., 2009). In factor naming, the greatest factor score or common features of several factors are considered. For this study, the number of variables with Eigenvalues above one so the number of factors was determined as 11. The description rate of the 11 factor variables is 65.049 %.

After determination of the number of model factors, the number of variables in each factor and distribution of variables according to the factor were determined. Thus, the factor scores of each factor were calculated. Factor scores indicate the significance of variables in each factor. Accordingly, items related to attitudes and preferences of the fresh fruits and vegetables consumers in terms of food safety and the factor scores of these items were grouped into 11 factors (Table 2).

Table 2. Factor scores of the items from fresh fruits and vegetables consumers within the scope of this research

	1	2	3	4	5	6	7	8	9	10	11
Lack of control during sales stage	0.846	-0.061	-0.083	0.055	-0.189	-0.135	-0.031	-0.002	0.024	0.102	-0.036
Lack of control on farms	0.818	-0.061	-0.043	-0.062	-0.118	-0.004	-0.118	0.002	-0.075	0.110	-0.093
Careful fertilizing	0.658	-0.050	0.064	0.304	0.292	0.131	0.109	0.093	0.095	-0.241	-0.018
Careful pesticide application	0.621	-0.089	0.130	0.167	0.264	0.215	0.026	0.027	-0.023	-0.314	-0.043
Compliance with hygiene regulations of the salesrooms	0.554	0.006	-0.086	-0.098	-0.191	0.337	0.038	0.005	0.238	0.205	0.133
Provision of traceability	0.508	0.084	0.067	0.006	0.099	0.224	0.259	0.038	0.083	0.184	-0.172
Considering the presence of chemical fertilizer residues on fruits and vegetables	-0.481	-0.009	0.356	0.037	-0.007	-0.136	-0.004	0.302	0.054	0.343	-0.162
Preferring affordable GAP production	-0.004	0.871	0.087	0.141	0.021	0.032	-0.056	0.175	-0.016	-0.055	0.055
Preferring affordable organic products	-0.048	0.855	0.076	0.107	0.132	-0.030	0.024	0.159	0.055	-0.070	0.090
Not reducing the amount of purchasing for certified (organic or GAP) products	-0.105	0.603	0.159	0.136	-0.200	-0.039	0.188	-0.062	0.223	0.045	-0.071
Not purchasing GAP products that are hard to buy	-0.026	0.474	0.116	0.183	-0.324	0.030	0.255	-0.318	0.208	-0.083	-0.033
Not setting aside quality when looking for affordable products	-0.028	0.434	0.259	-0.145	0.186	-0.074	-0.218	-0.031	-0.293	0.419	-0.248
Paying attention to seasonal consumption	0.034	0.034	0.834	0.101	-0.095	-0.068	-0.035	0.025	0.071	0.075	0.119
Paying attention to local brands consumption	-0.039	0.223	0.768	-0.028	0.039	-0.013	-0.118	0.007	-0.034	-0.098	0.079
Paying attention to fresh consumption	-0.042	0.070	0.712	0.122	-0.109	0.134	0.076	0.169	-0.094	-0.115	-0.083
Finding organic products safer according to conventional	0.035	0.145	-0.051	0.887	-0.026	0.056	-0.024	0.001	-0.026	-0.005	-0.017
Finding GAP products safer according to conventional	0.044	0.111	0.150	0.813	-0.085	0.005	-0.143	0.021	0.037	0.048	-0.011
Considering packaging factor influential	0.117	0.167	0.285	0.500	0.147	-0.174	0.244	0.045	0.063	0.126	0.249
Considering ISO, HACCP certified businesses reliable	0.026	0.093	0.012	0.485	-0.007	0.371	0.053	0.273	-0.226	0.165	0.116
Considering organic and GAP products expensive	0.010	-0.023	0.001	-0.154	0.714	0.037	-0.082	-0.145	-0.030	0.121	0.032
Reduction of the consumption amount caused by increased price	-0.118	0.050	-0.049	0.071	0.678	-0.067	0.067	0.044	-0.005	-0.169	-0.041
Orientation of quality products to very affordable prices	0.299	-0.042	-0.060	0.147	0.566	-0.014	-0.290	0.067	0.186	0.112	0.054

Table 2 (continued). Factor scores of the items from fresh fruits and vegetables consumers within the scope of this research

	1	2	3	4	5	6	7	8	9	10	11
Considering fruits and vegetables prices affordable	0.177	-0.121	0.040	-0.003	-0.455	0.362	0.131	-0.151	-0.218	0.193	-0.389
Sufficient income for fruit and vegetable consumption in desired quality and quantity	0.160	0.159	0.261	0.289	-0.443	0.376	-0.047	-0.048	0.077	0.118	-0.078
Considering fruits and vegetables of poor quality	0.031	-0.041	-0.044	-0.002	-0.053	0.771	0.016	0.053	0.021	-0.028	-0.034
Considering food safety provision from farm-to-table production poor	0.480	-0.010	0.076	0.083	0.011	0.636	0.041	-0.164	0.103	0.063	0.017
Preferring cheap fruits and vegetables salesrooms even if they are far away	0.090	0.043	-0.029	-0.073	0.213	0.003	-0.709	-0.063	0.049	-0.121	0.138
Considering absence of size and color standardization	0.147	0.171	-0.125	-0.197	0.045	0.083	0.664	0.059	0.041	-0.057	0.165
Negative influence on purchasing decision due to worms and insects found in fruits and vegetables	0.128	0.090	0.006	0.164	-0.052	-0.048	-0.002	0.810	0.008	-0.020	-0.046
Negative influence on purchasing decision due to fruits and vegetables damage	-0.148	0.144	0.315	-0.084	0.054	0.057	0.176	0.596	-0.096	0.044	0.061
Thinking that the color of market umbrellas and light fraud show fruits and vegetables brighter than they actually are	-0.022	-0.057	0.211	-0.002	0.039	-0.091	0.171	-0.027	-0.773	-0.133	0.070
Considering spraying water onto fruits and vegetables in certain time intervals wrong	0.100	0.169	0.198	-0.042	0.135	-0.026	0.185	-0.127	0.657	-0.080	-0.063
Finding local products safe	0.085	-0.122	-0.118	0.166	-0.082	0.141	0.093	0.046	0.069	0.717	0.164
Not preferring processed products to fresh products	0.265	-0.063	-0.194	0.274	0.100	-0.230	0.310	-0.281	0.067	0.364	0.043
Selling non-fruit/vegetables objects with food damage as fruits and vegetables	-0.114	0.029	0.123	0.062	0.038	-0.007	0.002	-0.032	-0.144	0.135	0.857

The final stage of Factor Analysis is naming the factors obtained from variables. During factor naming either the highest factor score is taken as a basis or a common name is generated to represent a group. Factor naming, obtained from the items related to fresh fruits and vegetables consumers, is presented in Table 3.

4.3. Variables That Influence Fresh Fruits and Vegetables Consumer Opinions on the Safety of Products

BLR analysis, which contains two answers (yes/no, exists/doesn't exist) based on dependent variables (Hosmer and Lemeshow, 2000; Tranmer and Elliot, 2005), is a Logistic Regression Analysis. BLR Analysis was used to determine which variables are influential on fresh fruits and vegetables consumer opinions on the safety of the products they consume. The dependent variable of BLR in this study was "fresh fruits and vegetables consumer opinions on food safety and they consume was coded as follows: safe=1, unsafe=2".

In this study, factors obtained from Factor Analysis were used as independent variables in BLR analysis. Scores derived from Factor Analysis were used with highest efficiency in Regression Models to eliminate problems such as multicollinearity (Zhu, 2009). In various studies factors obtained from Factor Analysis were included into Regression Analysis as independent variables (Sakar et al., 2011). Variables that influence

fresh fruits and vegetables consumer opinions on the safety of the products they consume are presented in Table 4 by means of the BLR Model.

According to the Hosmer-Lemeshow test, owing to the Chi-square value $3.244 > 0.918$ and sigma value $0.918 > 0.05$, the model was considered meaningful and valid.

In accordance with the model results, from the point of view of fresh fruits and vegetables consumers in the studied area, independent variables such as "quality problems factor", "physical fraud factor", "chemical fraud factor" and "local products factor", were stated to be influential on product safety.

The quality problems factor is significant at the 1 % level and the coefficient sign is negative. Accordingly, when quality problems increase the possibility of fresh fruits and vegetables consumers considering products safe decreases. When the quality of fresh fruits and vegetables increases, opinions on safety also increase.

The physical fraud factor is significant at the 5 % level and the coefficient sign is negative. In accordance with this, increase of the physical fraud factor will decrease the possibility of considering products safe by fresh fruits and vegetables consumers. Generally, physical attributes with reference to the salesrooms (making fruits and vegetables colors brighter with the help of market umbrellas, etc.) are perceived by the consumers and thus reduce consumer trust in the products they consume.

Table 3. Naming of judicial factors obtained from consumers of fresh fruit and vegetables

Variable (Item) name	Factor name
Lack of control during sales stage	1-Insufficient control
Lack of control on farms	
Careful fertilizing	
Careful pesticide application	
Compliance with hygiene regulations of the salesrooms	
Provision of traceability	
Considering the presence of chemical fertilizer residues on fruits and vegetables	2-Income
Preferring affordable GAP production	
Preferring affordable organic products	
Not reducing the amount of purchasing for certified (organic or GAP) products	
Not purchasing GAP products that are hard to buy	3-Freshness
Not setting aside quality when looking for affordable products	
Paying attention to seasonal consumption	
Paying attention to local brands consumption	4-Certified products
Paying attention to fresh consumption	
Finding organic products safer according to conventional	5-Price
Finding GAP Practices products safer according to conventional	
Considering packaging factor influential	
Considering ISO, HACCP certified businesses reliable	
Considering organic and GAP products expensive	
Reduction of the consumption amount caused by increased price	6-Quality Problems
Orientation of quality products to very affordable prices	
Considering fruits and vegetables prices affordable	
Sufficient income for fruit and vegetable consumption in desired quality and quantity	7-Standardization
Considering fruits and vegetables of poor quality	
Considering food safety provision from farm-to-table production poor	8-Bad appearance
Preferring cheap fruits and vegetables salesrooms even if they are far away	
Considering absence of size and color standardization	9-Physical fraud
Negative influence on purchasing decision due to worms and insects found in fruits and vegetables	
Negative influence on purchasing decision due to fruits and vegetables damage	10-Local products
Thinking that the color of market umbrellas and light fraud show fruits and vegetables brighter than they actually are	
Considering spraying water onto fruits and vegetables in certain time intervals wrong	11-Chemical fraud
Finding local products safe	
Not preferring processed products to fresh products	
Selling non-fruit/vegetables objects with food damage as fruits and vegetables	

Table 4. Variables that influence considering production safe by fresh fruits and vegetables consumers

	B	S.E.	Wald	df	Sig.	Exp(B)
Coefficient	0.154	0.181	0.725	1	0.395	1.167
Insufficient control	-0.205	0.183	1.256	1	0.262	0.815
Income	0.098	0.179	0.297	1	0.586	1.103
Freshness	0.198	0.178	1.239	1	0.266	1.219
Certified products	0.013	0.190	0.005	1	0.946	1.013
Price	0.148	0.187	0.626	1	0.429	1.159
Quality Problems	-1.042	0.217	22.965	1	0,000*	0.353
Standardization	0.046	0.188	0.061	1	0.805	1.048
Bad appearance	-0.033	0.180	0.034	1	0.853	0.967
Physical fraud	-0.431	0.199	4.670	1	0.031**	0.650
Local products	0.484	0.195	6.150	1	0.013**	1.623
Chemical fraud	-0.336	0.185	3.315	1	0.069***	0.715

*Significant at level %1, **Significant at level % 5,*** Significant at level % 10.

The local products factor is significant at the 5 % level and the coefficient sign is positive. According to this, increasing the number of local products among the

product options improves the possibility of fresh fruits and vegetables consumers. Consumers in the studied area consider local products to be safer compared to

imported products.

The chemical fraud factor is significant at the 10 % level and the coefficient sign is negative. In reference to this, increased chemical fraud will result in a decrease in the possibility of fresh fruits and vegetables consumers considering products safe. The application of chemicals, which changes fresh fruits and vegetables characteristics such as color and smell or makes objects that are not fruits or vegetables look like them, creates a serious threat in terms of public health.

On the other studies, Baker (1999) confirms that consumers prefer reduced pesticide and safer products and they are willing to pay more for these products. Whereas similar to this study and that of Baker (1999), Harker et al. (2003) determined that the pesticide and quality are among factors affecting the opinions of consumers, it was put forth in another study carried out by Yahaya et al. (2015) that the experience of suffering from vegetable borne diseases also have positive impact on the willingness to pay of consumers. As seen in this and other related studies in the literature, there are many different variables that are effective on the food safety perception of consumers regarding fruits and vegetables. The common point of the aforementioned studies is the importance given by the consumers to food safety and quality for fruits and vegetables.

5. Conclusion

In this study, attitudes and preferences of fresh fruits and vegetables consumers in Canakkale are investigated, an important fresh fruits and vegetables production and consumption region in Turkey. It is found that consumers are negatively affected by "quality problems" and "physical and chemical fraud factors". Product quality expectations of fresh fruits and vegetables consumers are high. "Local products factor" is affecting positively considering fruits and vegetables safe.

Research results related to agricultural production and trade in agricultural products, along with food safety measures, suggest that some local improvements are required. Turkey has a large geographical area with various levels of production and consumption. Consequently, with respect to food safety, there is need for research in different regions in order to raise awareness and identify consumer expectations on this subject. This study in general is considered to inform the sectors involved in fresh fruits and vegetables production and trade, and particularly local governments, on the subject of taking necessary measures. The results of this research present educators, researchers, local governments, farmers and marketers with an opportunity to use knowledge of consumer preferences for fresh fruits and vegetables in terms of food safety to solve the current problems in meeting the needs of consumers.

It was put forth as a result of this study that food safety is a very important factor in the decision to

purchase fresh fruits and vegetables. In addition, there are also some problems in the current marketing of fruits and vegetables that have adverse effects on the food safety expectations of consumers. For this reason, some proposals have been given below for the government, farmers, consumers and researchers in order to provide food safety for the consumption of fresh fruits and vegetables.

Proposals for the government; food safety standards should be taken into account in the legal area and in the application fields in order to ensure food safety for fresh fruits and vegetables. So, the farmers, suppliers and retailers of fresh fruits and vegetables that fail to meet the standards must be punished with various sanctions. All the controls and inspections must be carried out in a serious manner from the farm to the fork.

Proposals for farmers; farmers should be made aware of the use of pesticides and chemical fertilizers. Standard values and current values for food safety must be given on the packs of products and bulk identification cards of bulk products. It should be ensured that farmers the products of whom have chemical residue above standards must be punished by disclosing them to the market.

In addition, these farmers may be prohibited from production for a certain period of time by obstructing production places. Preclusion of these farmers from agricultural support is another suggestion.

Proposals for consumers; consumers tend to the most suitable and healthy option for themselves. However, many food safety indicators are not visible to the naked eye.

Consumers should be required to have food safety certificates identity which are taken from laboratories accredited in all fresh fruits and vegetables consumed, through non-governmental organizations and the certificates should be prepared in a simple manner thereby allowing any consumer to understand.

Proposals for researchers; this research could only be carried out in the province of Canakkale due to constraints of time and budget. Carrying out this study in other provinces or countries will enable us to reach new conclusions and make comparisons among can those regions.

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