

Full Length Research Paper

Frozen food consumption in Turkey: A case study for the town of Tokat

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In this investigation, frozen food consumption by households in the town of Tokat in Turkey was studied, and factors affecting the consumption were tested using chi-square analysis. In addition, analysis of variance was also performed in order to determine whether there was a relationship between socio-economic conditions and monthly frozen food consumption by households. Data used in the study were obtained from 269 households through a questionnaire conducted in April and May, 2009. According to the results of the study, 72.12% of the households consumed frozen foods. Of frozen foods, households preferred frozen vegetables most (93.30%) and seafood least (72.16%). Frozen food consumption had statistically significant correlations with gender, marital status and income level but not with household size, monthly household income, age, working of spouse, monthly food expenditure and education level. Variance analysis showed that there were significant differences for frozen food expenditures among different income levels, food expenditure levels, education levels, working or non-working status of spouse and professions.

Key words: Consumer preference, household preference, food expenditure.

INTRODUCTION

The need for long term storage of foods has appeared with the start of human history. Storage of foods improved throughout the history along with the changes in conditions and technology. Many preservation techniques are used to delay or prevent microbial spoilage of foods (Korel et al., 2005). Drying, brining, canning and freezing are among them. Especially vitamin losses are heavy in drying, brining, and canning. On the other hand, quality losses in food preserved via freezing is minimal (Anonymous, 2001).

Consumption of frozen food, which can be prepared easily and in different ways and which stay closest to the fresh food despite being off-season, is increasing. Among the factors contributing to increased demand for frozen food are entering of women in work force and resulting changes in life styles (Keskin, 2002). Frozen foods were first introduced to the consumers in 1930s in the US and

in 1948 in the UK in Europe. In Turkey, these products were introduced about 25 years ago, and have been increasing in market share since then. Most of the industrial facilities now have the standards of western countries in terms of technological features (Keskin, 2002).

Although frozen food industry in Turkey is quite new compared to the US and European counterparts, the country has a significant potential for frozen food because of its suitable climatic and ecological conditions for fruit and vegetable growing and of its dynamic young population. Currently, only frozen fruit and vegetables are important in frozen food industry. However, considering the rich water resources of the country and investments made in this industry, it can be expected that frozen sea food will also be popular (Keskin, 2002).

Increasing awareness about frozen food, deep freezer use and spreading of hypermarkets increased the use of frozen food in the world as well as in Turkey. Frozen food use is more common in big cities and Western Turkey, especially in Istanbul, Ankara, Izmir and Bursa (Anonymous, 2003).

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The frozen fruit and vegetable sector in Turkey is a field of activity that has started to develop exclusively for export. Urbanization and increase in the demand for practical as well as healthy food have created a significant demand increase in domestic consumption recently. Although there is an important increase in the demand, Turkey is considerably behind the developed countries in terms of consumption of frozen food (Külekçi, 2009).

Changes in life styles of consumers lead to changes in consumption patterns. Frozen convenience food is among the changing consumption patterns (Shaffer, 1999). Life styles, lack of time for cooking, desire to have off-season foods cause the consumers to prefer frozen foods (Cuneo, 1998). Besides, reasons such as ease of availability, large variety and convenience for preparation of the food can increase the popularity of convenience foods. In addition, desire to have a meal at hand that can be easily and rapidly prepared in urgency can be mentioned as the reasons to consume frozen food (Yüksel, 2002).

Due to the fact that frozen foods have a certain consumption level in Tokat and that there were no investigations about frozen food consumption in the region, this study was conducted in Tokat. The aim of the study was to determine the frozen food consumption level and factors affecting it.

MATERIALS AND METHODS

A questionnaire conducted on households in April and May, 2009 in the town of Tokat provided the data used in the study. The surveys were collected from consumers using a face-to-face questionnaire. When the randomly selected consumer couldn't be reached, randomly selected other consumers were reached and total sampling volume of 269 was completed. Responses of illiterate consumers were recorded by the surveyors.

Number of household in the questionnaire was determined based on official records of the town of Tokat. Sample size in this population was calculated according to the following formula (Yamane, 2001):

$$n = \frac{N * t^2 * p * q}{d^2 * (N - 1) + t^2 * p * q}$$

Where; n = Number of household samples; N = Number of target households (23,251); p = Probability of occurrence of an event (0.50); q = Probability of non-occurrence of the event (0.50); t = Standard normal distribution value (1.65); d = Sampling error (0.05).

Sample size was determined with 5% error rate using 90% confidence interval. Calculated sample size was 269. SPSS software was used to analyze the data.

Chi-square (χ^2) analysis was performed to determine whether there was a relationship between some socio-economic conditions of people (gender, education level, occupation, household size, monthly income, age, marital status and employment of spouse). Chi-square formula is as follows (Gujarati, 1995; Mirer, 1995):

$$\chi^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i}$$

Where; χ^2 = Chi-square value; O_i = Observed frequency value; E_i = Expected frequency value.

When the relationship was significant, coefficient of contingency, that is coefficient of dependence, was calculated to determine how strong the relationship was (Spiegel, 1995):

$$C = \sqrt{\frac{X^2}{X^2 + N}}$$

Analysis of variance was also performed to find out if there were differences among different groups of people based on some socio-economic factors (gender, age, education level, household size, total monthly income, marital status, employment of spouse and monthly food expenditures) for monthly frozen food expenses

One-way ANOVA or F-test for independent samples is a way of comparing the means of two or more groups for a single independent variable based on a dependent variable. It is a statistical technique to determine whether the difference between means is significant at a confidence level (95 or 99%) (Vural and Kılıç, 2005).

n_1, n_2, \dots, n_K observations are independent random samples from K populations. If the population means are denoted $\mu_1, \mu_2, \dots, \mu_K$, the one-way analysis of variance framework is designed to test the null hypothesis $H_0: \mu_1 = \mu_2 = \dots = \mu_K$ (Newbold, 1988).

Rejection of null hypothesis in analysis of variance doesn't mean that the differences between all group means were significant. It is necessary to indicate the source of difference. For this purpose, differences between all two-group combinations were checked using LSD (Least Significant Difference) test (Sokal and Rohlf, 1969).

RESULTS

Socio-economic features of people in the questionnaire are given in Table 1. In addition, socio-economic features of people in Tokat Province and Turkey at large are also given in that table. General age average was 37.07. Most of the consumers in the questionnaire were male (51.67). Most of them (33.46%) were in 26 to 35 age group followed by 36 to 45 (26.77%), 46 and over (23.04%) and 16 to 25 groups (16.73%). A majority of the people in questionnaire (79.18) was married, and in 65.73% of the cases their spouses were not employed. Education level was high school and over in 60.97% while 1.49% of them were illiterate. In terms of occupation, 35.31% of the people in questionnaire were civil servants, 27.71 were house makers, 14.50% had their own businesses, 10.41% were students, 5.20% were retired people, 3.72% were workers, 1.86% was farmers and 1.49% was tradesmen. The average household size was 3.98 and the most common household sizes were 4 to 5 (50.18%).

Consumer attitudes towards high pressure freezing were evaluated in The Netherlands, Belgium, Spain and Finland. Generally, attitudes towards high pressure freezing were neutral, even though the term was unfamiliar for most consumers. When given some

Table 1. Socio-economic features of people in questionnaire, Tokat Province and Turkey at large.

Socio-economic features of people in questionnaire					
Variable		Frequency	%		
Age	16 – 25	45	16.73		
	26 – 35	90	33.46		
	36 – 45	72	26.77		
	46 - +	62	23.04		
Gender	Male	139	51.67		
	Female	130	48.33		
Occupation	Self-employment	39	14.50		
	Civil servant	95	35.31		
	Worker	10	3.72		
	Tradesman	4	1.49		
	Farmer	5	1.86		
	Retired	14	5.20		
	House maker	74	27.51		
	Student	28	10.41		
Marital status	Married	213	79.18		
	Single	56	20.82		
Working status of spouse	Working	73	34.27		
	Not working	140	65.73		
Education level	Illiterate	4	1.49		
	Literate without schooling	9	3.34		
	Primary school	59	21.93		
	Secondary school	33	12.27		
	High school and over	164	60.97		
Household size (person)	1 – 3	101	37.55		
	4 – 5	135	50.18		
	6 - +	33	12.27		
Total monthly household income (Turkish Lira, TL)	350 – 750	70	26.02		
	751 – 1100	48	17.84		
	1101 – 1750	52	19.34		
	1751 - +	99	36.80		
Total monthly food expenditure of the household (TL)	0 – 150	39	14.50		
	151 – 300	84	31.22		
	301 – 450	34	12.64		
	451 - +	112	41.64		
Age		Tokat		Turkey	
		Frequency	%	Frequency	%
	15–24	36 624	20.06	12 514 737	23.30
	25–34	29 279	16.04	12 419 892	23.13
	35–44	24 671	13.51	10 181 458	18.96
45+	45 891	25.14	1 858 5891	34.61	

Table 1. Contd.

Gender	Male	93167	51.03	36 462 470	50.25
	Female	89405	48.97	36 098 842	49.75
15 + age Marital status	Never married	28 151	28.84	14 789 619	27.62
	Married	62 598	64.13	34 454 747	64.34
	Divorced	1 788	1.83	1 440 440	2.69
	Widow	5 076	5.2	2 866 024	5.35
Education level	Illiterate	5 649	6.04	4 645 638	9.18
	Literate without schooling	3411	3.65	3 222 987	6.37
	Primary school	47575	50.84	27 644 570	54.65
	Secondary school	23783	25.42	10 379 231	20.52
	High school and over	13157	14.06	4 695 581	9.28

Data about Tokat Province and Turkey at large is from Turkish Statistical Institute.

information about high pressure freezing technology, consumers considered this method as appropriate, especially if it had advantageous consequences to the product. The investigators concluded that processing method itself was considered less important than price or environmental impact (Lampila and Laähteenmääki, 2007).

Average monthly income of the households was 1 659.74 TL. In terms of monthly income as TL, households were divided into four groups: the first group had monthly incomes of 350 to 750 (average 615.00), the second group 751 to 1100 (average 966.25), the third group 1101 to 1750 (average 1473.85), and the fourth group +1750 (average 2836.36). Average monthly food expenditure was 468.68 TL. With regard to monthly food expenditure as TL, consumers were divided into four groups: 0 to 150 (average 105.64), 151 to 300 (average 251.25), 301 to 450 (386.76), and +451 (average 783.04).

It was determined that 72.12% of the families consumed frozen food while 27.88% did not.

A considerable percentage of people in questionnaire (62.45%) considered frozen food unhealthy.

Freezing foods have certain advantages over other food preservation methods. First of all, they do not have additives. They can be preserved in appropriate conditions for long time periods. They are especially convenient to use in modern daily life, since they are available as washed, cleaned and ready to cook forms.

Consumption of frozen produce has also increased over the past two decades, mostly because they appeal to consumers since they are easy to cook. Besides, the frozen form of a food is available in every season. Frozen product consumption has risen rapidly, increasing by 44% for vegetables and 36% for fruit. Fruit and vegetables are pre-cut, peeled and ready for cooking, whereby reducing the time needed to prepare a meal. Frozen vegetables are a much larger market than frozen

fruit because they are used as side dishes to meals or increasingly as the main course. Frozen vegetables, packaged with seasonings and sometimes meat, offer attractive and quick meal alternatives to busy consumers. Frozen fruit items consist mostly of berries, apples, peaches, and cherries, and mostly are used for making desserts. Frozen fruit still comprise the smallest portion of fruit consumption (Pollack, 2001).

Consumer attitudes towards high pressure freezing were evaluated in The Netherlands, Belgium, Spain and Finland. Generally, attitudes towards high pressure freezing were neutral, even though the term was unfamiliar for most consumers. When given some information about high pressure freezing technology, consumers considered this method as appropriate, especially if it had advantageous consequences to the product. The investigators concluded that processing method itself was considered less important than price or environmental impact (Lampila and Laähteenmääki, 2007). The reasons for consuming frozen food were the desire to have off-season foods (55.67%), long term storability (44.33%), ease of preparation and convenience (34.54%), diversity (6.70%), lack of time for preparing the food (6.70%), and unwillingness to have food outside the home (Table 2). The reasons why investigators consumed frozen foods in a high level could be explained by the inconvenient use of these products. Among the reasons given for non-preference for frozen food were unfamiliarity to frozen food (44.00%), considering them unhealthy (44.00%), lack of taste in these food (21.33%) and high prices of such food (10.67%).

Consumers were divided into three groups for monthly frozen food expenditures on frozen food (Table 3). The first group had an average of 20.33 TL of monthly expenditure on frozen food while the second group had 49.09 and the third group 115.60. The highest share

Table 2. Ideas of consumers about frozen foods.

Parameter		Frequency	%
Frozen food consumption	Consuming	194	72.12
	Not consuming	75	27.88
Reasons for not consuming frozen food*	Unfamiliar	45	60.00
	Unhealthy	33	44.00
	Tasteless	16	21.33
	Expensive	8	10.67
Reasons for consuming frozen food*	Large variety	13	6.70
	Off-season consuming	108	55.67
	Long term storage	86	44.33
	Ready-convenient	67	34.54
	No time for cooking	13	6.70
	Not like cooking	4	2.06
Are frozen food healthy (General)	Yes	101	37.55
	No	168	62.45
Are frozen food healthy (The ones who consume frozen foods)	Yes	97	50.00
	No	97	50.00
Are frozen food healthy (The ones who do not consume frozen foods)	Yes	4	5.33
	No	71	94.67

*The total exceeds 100% due to multiple answers.

Table 3. Monthly frozen food consumption expenditures of households.

Groups	Consumption range (TL)	Frequency	%	Average monthly consumption (TL)
I	0 – 30	45	23.19	20.33
II	31 – 60	82	42.27	49.09
III	61 – +	67	34.54	115.60
General	---	194	100.00	65.39

Table 4. Methods of acquiring frozen food by households.

		Frequency	%
Frozen fruit	Purchase	40	20.62
	Homemade	87	44.85
	Both	30	15.46
	Not consuming	37	19.07
Frozen vegetables	Purchase	29	14.95
	Homemade	112	57.73
	Both	40	20.62
	Not consuming	13	6.70
Frozen pastry	Purchase	70	36.08
	Homemade	59	30.41

Table 4. Contd.

	Both	45	23.20
	Not consuming	20	10.31
Frozen meat products	Purchase	91	46.91
	Homemade	32	16.49
	Both	55	28.35
	Not consuming	16	8.25
Frozen seafood	Purchase	106	54.64
	Homemade	19	9.79
	Both	15	7.73
	Not consuming	54	27.84

Table 5. Evaluation of considerations by households in consumption of frozen foods.

Considerations	Very negligible	Negligible	Unclear	Important	Very important
Price	9.28	18.04	12.37	42.27	18.04
Health safety	0.00	1.03	3.61	20.62	74.74
Taste	0.00	3.09	11.34	45.88	39.69
Durability	1.03	7.21	8.25	31.96	51.55
Brand	8.25	11.85	8.25	36.60	35.05

belonged to the second group with 42.27%. General average monthly food expenditure was 65.39.

The ways that households obtain frozen foods are given in Table 4. More than half of frozen vegetables (57.73%), the leading frozen food, and 44.85% of frozen fruits were made at home. However, 46.91% of frozen meat food, 36.08% of pastry and 54.64% of seafood were bought from the market. The fact that a considerable part of frozen vegetables and fruits were prepared at home could be associated with the abundance of vegetables and fruits in the region. Therefore, consumers could buy these products at cheap prices and prepare them for winter in a period in which these products carry the least risks for food safety.

In terms of consumption of frozen food, the most important consideration was health safety, followed by taste, price, brand and durability (Table 5). These results show that consumers have a certain level of awareness in frozen food consumption.

Seasonal variation in frozen food is given in Table 6. The highest amount of frozen food was consumed during the winter months. This situation could be explained by the need to continue to provide food in winter months when the food is scarce as well as in summer months when food is abundant. In Anatolia, food preparation for winter using methods such as drying and brining is traditional (Baysal, 1992; Özkarslı, 2010). Technological development and use of freezers made use of frozen

food as common as other traditional food preservation methods for winter months in Turkey.

The least consumption of frozen food was in summer months. This could be explained by the fact that fruits and vegetables can easily be available as fresh during summer. In order to determine the presence of a relationship between frozen food consumption and various socio-economic features of consumers such as gender, education level, occupation, household size, monthly income, age, marital status, employment of spouse and monthly food expenditure, chi-square analysis was performed. Results showed that frozen food consumption was associated with gender, occupation, marital status and monthly food expenditures, but not with education level, household size, monthly income, age, spouse's employment.

A significant correlation ($P < 0.01$) was found between genders and frozen food consumption. This was almost a full correlation. It was concluded that women consume more frozen food than men. Contingency dependence coefficient was 0.20.

It was found that there was a significant ($P < 0.05$) association between frozen food consumption and income type of consumers, that is, no income, fixed income or variable income. Variable income or having no income increased frozen food consumption. This finding could be the result of the facts that majority of no-income group was probably constituted by students and that

Table 6. Frozen food consumption based on seasons*.

		Frequency	%
Frozen fruit	Spring	27	17.20
	Summer	15	9.55
	Fall	18	11.46
	Winter	135	85.99
Frozen vegetables	Spring	16	8.84
	Summer	22	12.15
	Fall	27	14.92
	Winter	139	76.80
Frozen pastry	Spring	41	23.56
	Summer	59	33.91
	Fall	60	34.48
	Winter	108	62.07
Frozen meat products	Spring	55	30.90
	Summer	75	42.13
	Fall	55	30.90
	Winter	118	66.29
Frozen seafood	Spring	28	20.00
	Summer	34	24.29
	Fall	32	22.86
	Winter	84	60.00

*The total exceeds 100% due to multiple answers.

consumers with variable incomes had the tendency to prepare frozen foods themselves when these foods were cheap in the harvest season.

Marital status ($P < 0.1$) affected frozen food consumption significantly. It was found that married people consumed more frozen food. This is something expected considering the preference for frozen food by women as explained before and the fact that food is generally dealt with women in Turkish households.

The relationships between frozen food consumption and socio-economic factors such as household size, monthly income, age, employment of spouse, monthly food expenditures and education level were studied using chi-square analysis. However, the results were not statistically significant. Thus, it was concluded that these factors did not affect the consumption of frozen foods. Analysis of variance was used to illuminate the relationships between purchasing preference for certain products and consumers' socio-economic features via establishing consumer groups for the reasons to use specific products. In such studies, Yüksel (2002) studied consumer preferences for frozen food consumption and Yelkur (2000) studied those for products without brand names using one-way analysis of variance (ANOVA).

In the present study, differences among different groups for various socio-economic features were also investigated using analysis of variance (Table 8).

There were significant differences for monthly frozen food expenditures of households among different groups of income, employment of spouse, education level and monthly food expenditure. Significantly different two-way comparisons were investigated and results are given in Table 9.

Monthly frozen food expenditure of fixed income households ($\bar{X} = 73.93$) was higher than others. Based on LSD test, there were no difference between consumers with variable ($\bar{X} = 73.70$) and fixed income ($\bar{X} = 73.93$) for frozen food expenditures. However, differences between consumers with variable income and no income and between fixed income and no income were significant.

Monthly frozen food expenditures of households varied significantly according to education level of the people. Pre-primary school ($\bar{X} = 50.75$) and secondary school graduates ($\bar{X} = 48.64$) did not differ statistically. However, differences between pre-primary school and

Table 7. Relationship between frozen food consumption and socio-economic features of consumers.

Variable		Frozen food consumption						χ^2	P	CC
		Consuming		Not-consuming		Total				
		Frequency	%	Frequency	%	Frequency	%			
Gender	Male	88	63.31	51	36.69	139	100.00	11.101	0.001	0.20
	Female	106	81.54	24	18.46	130	100.00			
Income type	Fixed income	46	60.53	30	39.47	76	100.00	7.633	0.022	0.17
	Variable income	89	74.79	30	25.21	119	100.00			
	No income	59	79.73	15	20.27	74	100.00			
Marital status	Married	159	74.65	54	25.35	213	100.00	3.254	0.071	0.11
	Single	35	62.50	21	37.50	56	100.00			
Household size	1 – 3	77	76.24	24	23.76	101	100.00	1.545	0.462	
	4 – 5	95	70.37	40	29.63	135	100.00			
	6 - +	22	66.67	11	33.33	33	100.00			
Monthly income (TL)	350–750	56	80.00	14	20.00	70	100.00	3.741	0.291	
	751–1100	31	64.58	17	35.42	48	100.00			
	1101–1750	36	69.23	16	30.77	52	100.00			
	1751 - +	71	71.72	28	28.28	99	100.00			
Age	16–25	33	73.33	12	26.67	45	100.00	0.367	0.947	
	26 – 35	63	70.00	27	30.00	90	100.00			
	36 – 45	52	72.22	20	27.78	72	100.00			
	46 - +	46	74.19	16	25.81	62	100.00			
Employment of spouse	Employed	58	79.45	15	20.55	73	100.00	1.355	0.244	
	Unemployed	101	72.14	39	27.86	140	100.00			
Monthly food expenditure (TL)	0–150	33	84.62	6	15.38	39	100.00	5.319	0.150	
	151–300	57	67.86	27	32.14	84	100.00			
	301–450	27	79.41	7	20.59	34	100.00			
	451 - +	77	68.75	35	31.25	112	100.00			
Education level	Primary school or less	53	73.61	19	26.39	72	100.00	0.584	0.747	
	Secondary school	22	66.67	11	33.33	33	100.00			
	High school and over	119	72.56	45	27.44	164	100.00			

high school or over, and between secondary school and high school or over were significant.

Frozen food expenditures of different income level groups were significantly different. However, frozen food expenditures of group with 751 to 1100 TL ($\bar{X} = 68.71$) were not different from the one with 1101 to 1750 TL ($\bar{X} = 64.86$) monthly income. Differences between other groups, on the other hand, were significant.

There was a significant difference among different monthly food expenditure groups. According to the LSD test, difference between the group with 0-150 TL monthly

food expenditure ($\bar{X} = 35.45$) was not different from the one with 151 to 300 TL ($\bar{X} = 49.30$), and the group with 151 to 300 TL ($\bar{X} = 49.30$) was not different from the one with 301 to 450 TL ($\bar{X} = 65.19$). On the other hand, differences between other groups were significant.

Conclusion

In the present study, frozen food consumption of

Table 8. Results of variance analysis.

	Source of variation	Degree of freedom	Sum of squares	Means of squares	F	P
Gender	Among groups	1	8 949	8 949	3.35	0.069
	Within groups	192	512 547	2 670		
	Total	193	521 496			
Age	Among groups	3	3 255	1 085	0.40	0.755
	Within groups	190	518 241	2 728		
	Total	193	521 496			
Income type	Among groups	2	31 812	15 906	6.20	0.002
	Within groups	191	489 684	2 564		
	Total	193	521 496			
Marital status	Among groups	1	2 383	2 383	0.88	0.349
	Within groups	192	519 113	2 704		
	Total	193	521 496			
Employment of spouse	Among groups	1	33 620	33 620	14.30	0.001
	Within groups	157	369 128	2 351		
	Total	158	402 748			
Education level	Among groups	2	28 517	14 259	5.52	0.005
	Within groups	191	492 979	2 581		
	Total	193	521 496			
Household size	Among groups	2	701	350	0.13	0.879
	Within groups	191	520 795	2 727		
	Total	193	521 496			
Monthly household income	Among groups	3	77 105	25 702	10.99	0.001
	Within groups	190	444 391	2 339		
	Total	193	521 496			
Monthly household food expenditure	Among groups	3	91 710	30 570	13.51	0.001
	Within groups	190	429 786	2 262		
	Total	193	521 496			

households in the town of Tokat was investigated and relationships between frozen food consumption and some features of households were studied using chi-square and analysis of variance. Studies into the frozen food consumption in Turkey at large are quite limited, and no study has been conducted for the region where the town of Tokat is located. According to the findings, frozen food consumption was common in the region and 72.12% of households consume frozen food. However, most of this amount was the frozen food prepared by the households themselves. These consumers considered the manufactured convenient frozen food unhealthy (60.00%) or were not aware of them et al (44.00%). About 50% of the households consume frozen food

because of their ease for preparation despite the fact that they considered them unhealthy. This finding shows that it would be appropriate to develop training programs and policies to educate people about frozen food in order to eliminate the wrong ideas about frozen food that they are unhealthy.

Healthy foods are very important in human consumption. Consumers have health concerns about off-season vegetable and fruit consumptions. However, frozen products can be considered the safest products for off-season consumption. Although being increased, frozen food consumption in Turkey at large is not very high. Increasing the consumer awareness about frozen foods will eliminate the concerns about their safety and

Table 9. Comparisons of the means (LSD test results).

Variable	Groups compared	Difference of means	Standard deviation	P	Significance
Income type	Variable vs. fixed	- 0.2369	9.1946	0.979	No significant
	Variable vs. no income	27.6787	9.9594	0.006	Significant
	Fixed vs. no income	27.9156	8.5006	0.001	Significant
Education level	Primary school or less vs. secondary school	2.1184	12.8848	0.870	No significant
	Primary school or less vs. - High school or more	- 24.2453	8.3898	0.004	Significant
	Secondary school vs. High school or more	- 26.3636	11.7902	0.027	Significant
Monthly household food expenditure (TL)	350–750 vs. 751–1100	- 31.6561	10.8266	0.040	Significant
	350–750 vs. 1101–1750	- 27.8075	10.3313	0.008	Significant
	350–750 vs. 1751- +	- 49.4957	8.6434	0.000	Significant
	751–1100 vs. 1101–1750	3.8486	11.8498	0.746	No significant
	751–1100 vs. 1751 - +	- 17.8396	10.4111	0.088	Significant
	1101–1750 vs. 1751 - +	- 21.6882	9.8950	0.030	Significant
Monthly household income (TL)	0–150 vs. 151–300	- 13.8437	10.4034	0.185	No significant
	0–150 vs. 301–450	- 29.7306	12.3420	0.017	Significant
	0–150 vs. 451 - +	- 54.7403	9.8956	0.000	Significant
	151–300 vs. 301–450	- 15.8869	11.1114	0.154	No significant
	151–300 vs. 451 - +	- 40.8966	8.3103	0.000	Significant
	301–450 vs. 451 - +	25.0096	10.6375	0.020	Significant

increase the use of them. Currently, frozen food is quite expensive compared to other processed food such as canning. Establishment of new frozen food manufacturing enterprises will help decrease the price of these foods. Increased awareness and decreased prices will increase the consumption and consequently consumer satisfaction.

The results of the present study could guide the food industry in the region. Consumers in the region use frozen vegetables more than other frozen foods. The fact that the region has considerable fresh vegetable and fruit production is a positive impact on this issue. Lack of enterprises for frozen foods in the region, considerable amount of fresh vegetable and fruit production and abundance of low cost labor in the region are advantages to establish enterprises to operate in frozen food manufacturing.

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