

# **University Students' Perception and Attitudes towards Functional Foods in Istanbul**

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## **Abstract**

The current market share of functional food is still very smaller when compared with the total food and drink market, but even in smaller quantities it is getting larger every year around the world. However, functional food products are newly developing in the market; there is lack of knowledge about consumer attitudes toward the functional food products. At this point, this study will fill the research gap in order to identify young consumers' attitudes and perceptions, as well as their buying and consumption tendencies to functional foods. In this study, it's aimed to determine perception and attitudes towards functional foods of university students in Istanbul via a consumer survey conducted on the internet. According to results of analysis, women were more awarded group than men through the functional food concept. In addition, ANOVA results showed that there are significant differences between gender groups for energy drinks, probiotic yoghurt and baked goods with whole grain flour; where these foods were independent from income levels. Half of the participants scored that they will probably buy functional food in the future if they were informed, whereas nearly half of the rest scored as "perhaps" for their future buying probability.

## **Keywords**

Functional foods, consumer awareness and attitudes, survey, university students, Istanbul

## **1. Introduction**

Consumer demands on food consumption have numerously changed in the last decades. Consumers are of the opinion that foods are closely related with their health (Mollet and Rowland 2002; Young 2000). Foods products are aimed to provide nutrition-related diseases (metabolic diseases, obesity, cancer, etc) and also improve physical and mental well-being of the consumers in recent years as well as their satisfaction of hunger and necessary nutrients for humans (Menrad 2003; Siro et al. 2008). Because of this context, functional foods play an important role. Functional foods make a huge contribution to increasing cost of healthcare, the steady increase in life expectancy and the desire of older people for improved quality of their later years (Kotilainen et al. 2006; Roberfroid 2000a).

Functional foods are demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either improved state of health and well-being and/or reduction of risk of disease (Hailu et al. 2008). Functional foods may improve the general conditions of the body (e.g. pre- and probiotics), decrease the risk of some diseases (e.g. cholesterol-lowering products), and could even be used for curing some illnesses. Different demographical studies indicated that because of the high expensive of the medical service of the aging population, there is strong demand for these products (Menrad 2003; Siro et al. 2008). The market for such products in industrialized countries has expanded rapidly, especially where manufacturers are allowed to make claims about the health benefits of functional ingredients (Verbeke 2005; Hailu et al. 2008).

## **2. Literature**

### **2.1 History of Functional Food**

The term "functional food" itself was first used in Japan, in the 1980s, for food products fortified with special constituents that possess advantageous physiological effects (Hardy 2000; Kwak and Jukes 2001a; Stanton et al. 2005). The concept of functional food was first promoted in 1984 by Japanese scientists who studied the relationships between nutrition, sensory satisfaction, fortification and modulation of physiological systems. In 1991, the Ministry of Health introduced rules for approval of a specific health-related food category called FOSHU (Food for Specified Health Uses) which included the establishment of specific health claims for this type of food (Burdock et al. 2006; Kwak and Jukes 2001a; Menrad 2003; Roberfroid 2000b). The European Commission's Concerted Action on Functional Food Science in Europe (FuFoSE), coordinated by International Life Science Institute (ILSI) Europe defined that functional food is "a food product can only be considered

functional if together with the basic nutritional impact it has beneficial effects on one or more functions of the human organism thus either improving the general and physical conditions or/and decreasing the risk of the evolution of diseases. The amount of intake and form of the functional food should be as it is normally expected for dietary purposes. Therefore, it could not be in the form of pill or capsule just as normal food form” (Diplock et al. 1999). On the contrary to this latter statement, since 2001 FOSHU products in Japan can also take the form of capsules and tablets, although a great majority of products are still in more conventional forms (Ohama et al. 2006). However, European legislation does not consider functional foods as specific food categories, but rather a concept (Coppens et al. 2006; Stanton et al. 2005; Siro et al. 2008).

## **2.2 Legislation of Functional Foods**

There is some legislation of food ingredients which indicate the usage levels of food ingredients in the countries. Generally, they also include strict limitations on the health claims related with the functional food ingredients. Three different types of claims – a nutrition content claim, a structure/function claim or a health claim was allowed for the label of a dietary supplement or food product by The FDA (Food and Drug Administration)’s Center for Food Safety and Applied Nutrition. Nutrient content claims simply describe the relative amount of a certain substance in a serving of the product. A structure/function claims describe how the product or product ingredient may affect certain body systems, but it is not permitted to mention any specific disease states. Health claims describe a relationship between a certain food or food/supplement component and a reduction in the risk of a disease or negative health outcome (Thompson and Moughan 2008). Today, functional food sector has the limited number of approved claims but important research which will explain the benefits or other effects of functional foods will be finish in the upcoming years.

The FDA has tried to determine the regulatory definition for functional foods is needed or not, and if so, what it should be- among consumer groups and manufacturers of functional foods. Those have negative opinion on definition needs assert that current regulatory and statutory provisions which are used for ingredients in foods are sufficient functional ingredients. They also stated that further regulations are not needed unless any functional ingredients have GRAS (Generally Recognized As Safe) status. Other groups consider that manufacturers will easily describe their products as functional foods and their intended benefits as functional foods category defines clearly (Thompson and Moughan 2008).

When the functional food legislations of Turkey were viewed there was a big problem for manufacturers of functional foods related with functional foods labeling and advertisement because of the 5. Annex of “2002/58 Gıda Maddelerinin Genel Etiketleme ve Beslenme Yönünden Etiketleme Kuralları Tebliği (Regulation on General Labelling and Labelling for Nutrition Rules of Foods)”. According to this annex, manufactures did not present differences between functional foods and similar products. However, ten different food ingredients had a right to state health claims within limits that are determined in the regulations through new regularization was made in the same regulation, in 07.07.2006. It is possible to use these claims on label of functional food and their advertisement so that dishonest trading was removed in functional food sector (Özdemir et al. 2009).

## **2.3 The Market of Functional Foods**

Functional foods is not clearly defined which foods are considered as functional. Because of that market of functional foods could not be estimated easily (Kotilainen et al. 2006). The global market of functional food is estimated to at least 33 billion1 US\$ according to definition of functional food by which ingredients with an additional health value have been added to foods (and this is announced to the consumers) (Siro et al. 2008). Sloan (2000) has considered the global functional food market to be 47.6 billion US\$, being the United States the largest market segment, followed by Europe and Japan. In total, functional food have a market share of around 2–3% in the US food market (Menrad 2003; Siro et al. 2008). It is not surprising that in Japan, regarded as the birthplace of functional food, the market of these products is significant (Hilliam 2000b). In total, more than 1700 functional food products have been launched in Japan between 1988 and 1998 with an estimated turnover of around 14 billion US\$ in 1999 (Menrad 2003). The market was estimated to be 5 billion US\$ in 2003 (Side 2006) and 5.73 billion US\$ in 2006, while more than 500 products were labeled as FOSHU in 2005 (Side 2006). The European market for functional foods was estimated to be between 4 and 8 billion US\$ in 2003 depending which foods are regarded as functional (Menrad 2003). This value has increased to around 15 billion US\$ by 2006 (Kotilainen et al. 2006). The current market share of functional food is still below 1% of the total food and drink market. Germany, France, the United Kingdom and the Netherlands represent the most important countries within the functional food market in Europe (Siro et al. 2008). Even though functional food market in Turkey is in the primary phase, it has a big potential of development which is increasing day by day. It is stated that functional food market reached 420 million TL in 2007 with increasing 18.3% according to previous year. It is considered that deficiencies of Turkish Food Codex are a big drag in the functional food sector which has potential of up and coming functional food market.

## **2.4 Some Examples of Functional Food Products**

Functional foods were developed by fortifying with vitamins and/or minerals such as vitamin C, vitamin E, folic acid, zinc, iron, and calcium in the beginning of production of functional foods (Sloan 2000). Subsequently, the focus shifted to foods fortified with various micronutrients such as omega-3 fatty acid, phytosterol, and soluble fiber to promote good health or to prevent diseases such as cancers (Siro et al. 2008). More recently, food companies have developed food products that offer multiple health benefits in a single food (Siro et al. 2008). Functional food products have been mainly launched in the dairy, confectionery, soft-drinks, bakery and baby-food market even though these products are not homogeneously scattered over all segments of the food and drink market (Kotilainen et al. 2006; Menrad 2003).

- **Probiotics**

Functional food of Japan and Europe market is dominated by gut health products, in particular probiotics with 379 product launches worldwide in 2005 (Alzamora et al. 2005; Siro et al. 2008). Probiotics can be defined as “live microorganisms, as they are consumed in adequate numbers confer a health benefit on the host”, with ongoing controversy as to whether cultures must be viable for efficacy in all cases (Stanton et al. 2005; Siro et al. 2008). Most studied and widely employed bacteria within the probiotic field are lactic acid bacteria (LAB) and bifidobacteria which are normal components of the intestinal microbiota and have a long tradition of safe application within the food industry (Kociubinski and Salminen 2006). Probiotics dairy products are the key product sector accounted for sales of around 1.35 billion US\$ in 1999 and about 56% of functional foods’ total 31.1 billion US\$ global sales in 2004. Scandinavia, the Netherlands, Switzerland, Croatia, Estonia, while Greece, France and Spain are the main developing markets of dairy probiotics (Siro et al. 2008).

- **Prebiotics**

“Prebiotics are non-digestible food ingredients that beneficially affect the host by stimulating the growth and/or activity of one or a limited number of bacteria in the colon, thus improving host health” (Charalampopoulos et al. 2003; Stanton et al. 2005). Demand of prebiotics is estimated to be around 167,000 tons and 390 million Euro in the worldwide. Fructo-oligosaccharide (FOS), inulin, isomalto-oligosaccharides (IMO), polydextrose, lactulose and resistant starch are considered as the main prebiotic components. Foods containing a combination of these ingredients are often referred to as symbiotic due to the potential synergy between probiotics and prebiotics (Siro et al. 2008).

- **Functional Drinks**

Another important product category within the functional food segment is non-alcoholic beverages fortified with vitamins A, C and E or other functional ingredients. The market is still small and fragmented in most European countries even though there is a relatively high number of a product available in this segment. Germany is the only country in Europe with a sizeable functional drink market. The European functional drink market was estimated to be around 7% of the total soft drink market in 2004, with a further increase to 8% in 2005. According to the predictions the consumption will reach 5.1 billion l by the year of 2009, which corresponds to 23% increase compared to that of 2005 (Siro et al. 2008).

- **Functional Cereals**

Cereals are the alternative options, especially oat and barley, for the production of functional foods. Cereals can be used as fermentable substrates for the growth of probiotic microorganisms. In addition, cereals can be applied as sources of non-digestible carbohydrates that besides promoting several beneficial physiological effects can also selectively stimulate the growth of lactobacilli and bifidobacteria present in the colon and act as prebiotics. Cereals contain water soluble fiber, such as beta-glucan and oligosaccharides, such as galacto- and fructo-oligosaccharides and resistant starch, which have been suggested to fulfill the prebiotic concept.

- **Bakery Products**

Even though dairy products or confectionery sectors of functional foods are rapidly increasing in popularity, bakery is still relatively underdeveloped. In Germany about 20–21% of the new functional food products launched in 2001 were dairy and confectionary product and only about 13% were from the bakery industry (Menrad 2003). This difference was found to be even higher in Spain in 2006, where about 45% of the launched functional food products were dairy food compared to about 13% of the functional bakery product (Siro et al. 2008).

## **2.5 Consumer Acceptance of Functional Foods**

Developing of functional food market, consumer based product development and making profit with market opportunities are provided with consumer acceptance of the concept of functional foods, and a better understanding of its determinants (Ares and Gambaro 2007; Grunert et al. 2007; Verbeke 2005). Acceptance

failure rates from recent food cases have shown that consumer acceptance is often neglected or at least far from being understood (Verbeke 2005; Siro et al. 2008). Most of the studies investigated consumer reactions towards functional foods second half of the 1990s in the US and Europe (Siro et al. 2008).

Belgian consumer willingness to compromise on taste for health in the case of functional foods was studied by Verbeke (2006) according to the socio-demographic and attitudinal determinants of consumers. Results showed that during the data collection interval, the perceived importance of food for health increased significantly. In addition, opinions of consumer on unconditional acceptance of functional foods, especially on taste, and a lower conviction that functional foods can constitute a part of a healthy and tasteful diet have decreased during data collection interval.

A comparative research on functional food perception of consumers from United States, Canada and French Canada was conducted by Labrecque et al. (2006). A consumer survey was conducted on 611 college/university students with ages between 18-25 years old studied business at three different countries. Questions of the survey aimed to reveal items like functional food awareness, eating habits, health consciousness and acceptance of novel foods of consumers. Likert scale and two different scales designed by other researchers were used to assess the participants' responds. Buying tendency to functional food product of participants was evaluated omega-3 eggs, calcium fortified milk and orange juice. Results of research showed presence of low tendency through functional foods and weak link between health benefits and functional foods among the business students. Also, participants had uncertain thoughts if the information about functional foods is true, or not. Besides, they were less tend to buy functional foods. These parameters had meaningful differences when compared across the cultures. In addition, food neophobia was only the factor affects students' behavior towards the functional foods.

Moreover, Devcich et al. (2007) have concluded that functional foods with disease-preventing properties than either risk-reducing or appearance-enhancing properties were tend to be chosen by people with high "modern health worries" (e.g. concerns about cell phones, high-tension power lines, vaccination programs, pesticide residue, genetic modification, as well as hormones and additives in food).

Functional foods were also studied from two different research groups to reveal the consumers' perception of functional foods in Turkey. In the first study, İşleten et al. (2007) had an aim to reveal how socio-demographic properties, prices and labels of food products affected consumer choice of functional food. Consumer survey containing 9 questions was chosen as research method. University staff, students and supermarket customers willing to participate in the study constituted the sampling part of the study. Total participants were 249 people aged from 20 to 60 years old. The responds of the consumers were examined via Multiple Correspondence Analysis. According to the analysis results of the survey, labels of food products were important for women consumers while young participants had less interest on labels except nutrition and energy tables. In addition, an increase in the participant age and education level resulted with an increase of expectation limit for health enhancing characteristics of functional foods.

Barrios et al. (2008) conducted a study on Spanish consumers in order to determine their behavior pattern and thoughts about functional foods, and the reasons especially for buying yogurt. 59 consumers took place in this research were further classified into six different groups according to their demographic properties like age, gender and educational level. Research method was based on interview consisting of three different parts with 90 minutes duration for each one. Each session was conducted by a moderator and two assistants. Tape records and session notes taken by assistants during each interview session were used to analyze the data. According to the results, functional food awareness was low with a score of 25%. Although the functional food type had an influence on consumer behaviors, in youngest consumer group had a negative tendency to foods recognized as functional. Besides, health benefits of functional foods were uncertain for 4 groups (intermediate age groups) over six groups. Price and sensory properties of yogurt were found as the factors affecting purchasing attitude of participants.

IFIC Functional Foods/Foods for Health Consumer Trending Survey was conducted in 2009 and tried to determine perceptions of consumers on functional foods. The survey showed that 89% of consumers considered that some foods provide in excess of basic nutrition and also may reduce the risk of disease and other health concerns. Foods provide functional benefits were regarded as "strongly agree" by 53% of consumers. Americans remain highly interested in learning more about functional foods; 43% are "very interested" and another 41% are "somewhat interested." Furthermore, 1005 participants of survey were asked that "What is the (first/second/third) food or food component that comes to mind that is thought to have health benefits beyond basic nutrition top functional foods". Fruits and vegetables, fish/fish oil/seafood, dairy (including milk and yogurt), meat and poultry, herbs/spices, fiber, tea and green tea, nuts, whole grains and other grains, water,

cereal, oats/oat bran/oatmeal, and vitamins/supplements were considered as top ten functional foods. As a result of the survey, functional foods providing health and wellness benefits were regarded positively by consumers (IFIC, 2009).

In the other study from Turkey, Özdemir et al. (2009) conduct a consumer survey on academic personal of Faculty of Economics and Administrative Sciences of Dokuz Eylül University. The question form of the survey was constructed according to the different research papers taking place in the literature. After the preparation of questions, survey was conducted on 15 academicians as nonrandom sampling in order to obtain last form of the survey containing five-point Likert scale. The questionnaires were delivered by e-mail to 164 academicians of the faculty, and only 96 question forms were evaluated in this study. Statistical software program, SPSS, was used for the analysis of survey results. Factor analysis was applied to reveal the factors affecting consumer perception. T-test, analysis of variance and LSD tests were used to determine if the factors vary among the demographic properties of respondents. According to the results, 46.9% of respondents used a functional food product before and probiotic dairy products were the most consumed ones. Besides, printed media and selling point activities has important role for participants' awareness of functional foods. Also, it was seen that there was no significance difference between consumer age/gender and functional food consumption frequency.

In a research, Markovina et al. (2011) aimed to identify the young consumers' perception of functional food living in Croatia. A total of 1035 high school and university students with an age between 14 and 30 years from four biggest cities of Croatia were participated in the self-administered consumer survey. The survey consisted of dichotomous, open-ended and multiple-choice questions and Likert scale to assess respondents' knowledge, consume/purchase attitudes about functional food and their socio-demographic properties as well. Responds to the answers were evaluated by using different statistical methods. According to the results of data analysis, functional food awareness among the respondents was approximately 40%. Besides, according to young consumers', taste and price-quality performances were the most important properties of functional food. Also, health promoting effects of functional foods had more impact than its appearance and shelf life for the young consumers' satisfaction.

### **3. Methodology**

#### **3.1 Scope and Significance of Study**

Nowadays, nutritional habits of individuals are changing due to the fact that nutritional awareness is improving and their demands are rising gradually. Because of this, new kind of market opportunities could develop. It is required that tendencies of consumers are followed and data obtained are shared among researchers and implementers in order to utilize the developed opportunities. Functional foods can be generally referred as foods which have positive impacts on health and are developed with food science and medicine science which are improving day by day.

To determine the consumer manner through functional foods category of which product range and market share are improving every passing day in our country as in parallel with the world, different kind of studies were performed especially in developed countries. However, in our country functional foods are a subject of food engineers are interested within the scope of production. Non-academic researches were performed by the producers in order to market these foods. These kinds of studies revealed the market status of functional food instead of understanding consumer awareness and manners (Özdemir et al. 2009). In addition to this, as studies are related with functional foods in the literature were examined, it is concluded that they are focused on the consumer are over 35, high educated and have high income (Chids 1997; Hilliam 1996; Siro et al. 2008; Teratavanat and Hooker 2006). There is no data for young are in university period and have low income. In this study, it's aimed to determine perception and attitudes towards functional foods of university students in Istanbul via conducting a consumer survey.

#### **3.2 Procedure**

Convenience sampling was used in the study and the respondents of the survey were chosen among the university students with ages between 18 and 30 years old in accordance with the purpose. The data used in the study were collected via internet survey that was conducted on December 12-21 of 2011. About 210 students were participated in the survey, but the partial surveys were eliminated. So, a total of 149 completed surveys were used in the data analysis.

The survey included questions about the knowledge of functional food concept, awareness of some functional food products, and also consumption frequencies of these products. Besides, factors affecting respondents' buying decision through functional foods (e.g. price, packaging, labels, etc.) and reasons for non-consumption of functional foods were also asked in the questionnaire. Furthermore, probability of buying functional food in the

future and preferences of informing channels like medical doctors' advice, expert opinions, advertisements, promotions, etc. Socio-demographic characteristics such as age, sex, and income and education level were also asked to the respondents. Several studies on functional food awareness/knowledge/acceptance from literature (Labrecque et al. 2006; Thompson and Moughan, 2008; Özdemir et al. 2009) and an official web source (TUİK 2010) were utilized for the construction of questions and functional food products.

Dichotomous, open-ended and multiple-choice questions, as well as five-point Likert scale (1 indicates strong agreement and 5 indicates strong disagreement, vice versa) and a seven-point Likert scale were used to assess consumer knowledge and attitudes toward functional foods. The survey was conducted on eight people who study different disciplinary as a pre-test in order to adjust the questionnaire before giving its last shape.

### 3.3 Limitations

Data were collected via internet in ten days. The most important hurdle is the limited study program which was resulted in lower number of respondents. Limited new market share and lower awareness level of functional foods are another cause of the lower attendance for this survey. It is important for the accuracy of studies that sample is as large as possible in the studies which are aimed to determine consumer awareness. Owing to these hurdles, it was avoided from generalization reweaving findings of the study.

## 4. Results

Percentage and frequency of socio-demographic results were obtained from an online survey website. SPSS 18.0 PASW Statics program was used to evaluate survey results. t-test and variance analyze (ANOVA) was performed to analyze the relationship between consumer manners through functional foods and demographic variables. The t-test is used to test for a difference between two independent groups (like males and females) on the means of a continuous variable. It is also help to decide the difference between groups is whether significant statistically or randomly. However, using of ANOVA is provided owing to inability of t test as it is needed to compare more than two groups (Baş 2001). Awareness, manners, consuming frequency and preference of consumers through functional foods were compared with gender, age and income using t-test and ANOVA.

### 4.1 Socio-demographic Characteristics of Respondents

According to data retrieved from the survey, it was revealed that the respondents are not distributed proportionally to the gender categories: 101 female and 48 male answered the questionnaire where 75.2% of total respondents are aged between 18-25 years and 24.8% of total respondents are aged between 26-30 years. Almost all respondents are single (141) and only 8 participants are married. Most of the respondents are from Istanbul Technical University (73), where rest is mostly from Istanbul University (18) and Marmara University (10). Besides undergraduate students have the highest portion of education levels; 55% of the participants are enrolled undergraduate, 28.9% and 16.8% are enrolled in masters and doctorate programs, respectively. Half of the respondents are living with their family and the rest of them are mostly living with their home mate. Furthermore, 44.3% of the university students are employed and the rest of them are unemployed. In addition, income levels of the students and the household were not distributed normally; monthly income of 58.4% of the respondent is more than 700 TL, and 49.7% of the participants categorized their monthly income of household as upper income level (more than 2500 TL).

### 4.2 Test Statistics

According to answers of the question aimed to determine the awareness of the functional food concept, 59.7% of respondents have not heard about functional food before whereas only 2% of them are closely following them which mean more than half of the participants are not familiar with functional food concept. Besides, the knowledge of the concept is differing across the gender groups: women are most aware gender of the study. According to t-test, there is a significant difference in the awareness of functional food concepts between male and female groups since  $p(0,00) < 0,05$ , as shown in Table 1.

Table 1. Independent-samples t-test results for comparison of gender and awareness through functional food concept.

Groups	n	$\bar{X}$	SD	SE	t-test Results		
					df	t	p
Female	101	3,3366	0,83997	0,08358	147	4,962	0,000
Male	48	2,5833	0,91868	0,13260			

**Abbreviations:** SD, standard deviation; SE, standard error; df, degree of freedom; t, t value; p, significance.

Besides, awareness of functional food concept is independent from the income levels of the respondents according to ANOVA as shown in Table 2.

Table 2. One-way ANOVA results, and n,  $\bar{X}$  and Std. Dev. values for comparison of monthly income levels and awareness through functional food concept.

n, $\bar{X}$ and Std. Dev. Values				ANOVA Results					
Groups	n	$\bar{X}$	SD	VS	SS	df	MS	F	p
0-100	5	4,0000	1,22474	<b>Btwn G.</b>	5,334	4	1,333	1,557	0,189
100-300	8	2,7500	0,70711						
300-500	34	3,1471	0,78363						
500-700	15	3,0000	0,84515						
700den fazla	87	3,0690	0,98587						
<b>Total</b>	149	3,0940	0,93246	<b>Within G.</b>	123,351	144	0,857		
				<b>Total</b>	128,685	148			

**Abbreviations:** SD, standard deviation; VS, variance source; SS, sum of squares; df, degree of freedom; MS, mean of squares; F, F value; p, significance.

This study revealed that energy drinks, probiotic yoghurt and baked goods with whole grain flour are mostly consumed products and gender groups show significant differences through these products. Moreover, according to ANOVA results as shown in Table 3, there are significant differences between gender groups for energy drinks, probiotic yoghurt and baked goods with whole wheat flour since  $p < 0,005$  at  $\alpha: 0,05$  significance level, and also there is no significance differences between income levels in the consumption of these products.

Table 3. ANOVA results for top 5 functional food products for gender groups.

		Sum of Squares	df	Mean Square	F	Sig.
Energy drink	Between Groups	17,239	1	17,239	20,354	0,000
	Within Groups	52,511	62	0,847		
	Total	69,750	63			
Probiotic yogurt	Between Groups	30,562	1	30,562	27,345	0,000
	Within Groups	97,236	87	1,118		
	Total	127,798	88			
Light milk	Between Groups	5,625	1	5,625	2,974	0,087
	Within Groups	223,166	118	1,891		
	Total	228,792	119			
Whole grain flour	Between Groups	5,790	1	5,790	4,350	0,039
	Within Groups	166,399	125	1,331		
	Total	172,189	126			
Fruit juice	Between Groups	0,051	1	0,051	0,035	0,853
	Within Groups	176,197	119	1,481		
	Total	176,248	120			
Mineral water	Between Groups	0,067	1	0,067	0,050	0,823
	Within Groups	168,926	127	1,330		
	Total	168,992	128			

Respondents were also asked to determine how they heard about functional food products given in the survey form. Television advertisements are the most effective source to be heard about functional food products for the

respondents of the survey. Table 4 shows the frequency and percent % values of responds for the source to be heard about functional food products.

Table 4. Frequency and percent % values of responds for the question “How did you hear about the given functional food products? You could choose more than one options.”

Groups	f	%
TV advertisement	92	65.7
Internet	54	38.6
Shopping mall	91	65
Expert’s advice	21	15
Newspapers, journals etc	48	34.3
Friends’, parents’, neighbours’ advice	59	42.1

The survey form also included the question about the consumption frequency of participants through the given functional food products. As the results were analyzed, it was concluded that baked products with whole grain flour (16.9 %) is the most daily consumed functional food product. Furthermore, cholesterol lowering drink (90.7 %), yoghurt (89.9 %) and margarines (82.3 %) are the most rated products for their non-consumption from the respondents.

According to results, gender groups make a significant difference for the descriptions “I feel happy” and “It helps me to be protected from diseases”. Furthermore, 14.4% of respondents are certainly and 41% of respondents agree that functional foods are healthier than conventional foods. 51.1% of respondents agree that functional foods could be balanced unhealthy nutrition. 33.1% of respondents do not agree with the packages of functional foods are good and also % 22.3 of them do not agree with functional foods are tasteful. When the factors that have an impact on buying decision of functional food were asked to the university students, it is concluded that 42.6% of respondents choose doctor/expert advice, 32.4% choose positive effects on health and 27% choose flavor as “certainly significant”.

Reasons of respondents for not consuming functional foods were also investigated in the survey. According to results, 114 respondents indicated that they have not enough knowledge of functional foods. The other reasons are ordered like “not reach easily” (104), “not consider they are safe” (96) and “not consider healthful people need to consume” (96). Responses of consumers for the reasons of non-consumption of functional foods were tested with ANOVA in order to determine difference between gender groups. As shown in Table 5, there is no significant difference between gender groups and reasons of non-consumption of functional foods because of the p values of each categories >0.05.

Table 5. ANOVA results for comparison of gender groups and some reasons for non-consumption of functional foods

		Sum of Squares	df	Mean Square	F	Sig.
I don’t have enough knowledge	Between Groups	2,564	1	2,564	2,156	0,145
	Within Groups	133,190	112	1,189		
	Total	135,754	113			
Not beneficial	Between Groups	1,190	1	1,190	0,618	0,434
	Within Groups	156,039	81	1,926		
	Total	157,229	82			
Expensive	Between Groups	0,633	1	,633	0,425	0,517
	Within Groups	114,886	77	1,492		
	Total	115,519	78			
Harmful	Between Groups	0,015	1	,015	0,014	0,907
	Within Groups	93,738	87	1,077		
	Total	93,753	88			
Not natural	Between Groups	0,041	1	,041	0,023	0,880
	Within Groups	167,584	94	1,783		
	Total	167,625	95			

Table 5. (cont'd.) ANOVA results for comparison of gender groups and some reasons for non-consumption of functional foods

Not easily reach	Between Groups	0,471	1	0,471	0,385	0,536
	Within Groups	124,750	102	1,223		
	Total	125,221	103			
Delicious	Between Groups	0,045	1	0,045	0,030	0,862
	Within Groups	130,444	88	1,482		
	Total	130,489	89			
New trend	Between Groups	,872	1	0,872	0,486	0,487
	Within Groups	159,546	89	1,793		
	Total	160,418	90			
No need consumed by healthy people	Between Groups	2,297	1	2,297	1,477	0,227
	Within Groups	146,203	94	1,555		
	Total	148,500	95			
Already have a healthy diet	Between Groups	1,240	1	1,240	0,738	0,392
	Within Groups	149,485	89	1,680		
	Total	150,725	90			
Inconsistent informations	Between Groups	0,073	1	0,073	0,043	0,835
	Within Groups	152,207	91	1,673		
	Total	157,229	82			

In addition, respondents were also asked if they consume these types of foods when they are efficiently informed. The answers show us, respondents choose “yes” (41.9%) and respondents choose “perhaps” (44.9%) are almost equal. Results of this question are shown in Table 6.

Table 6. Frequency and percent % values of responds for the question “Do you consume these type foods when they are efficiently informed?”

Groups	f	%
Yes	57	41.9%
Perhaps	61	44.9%
Indecisive	10	7.4%
No	9	6.6%

Finally, as the factors that will affect the participants’ future buying tendencies through functional foods were asked, expert and doctor opinion are the most rated influential factors for future buying probability of participants’.

## 5. Conclusion

According to our results, consumer demands and expectations about these foods should determine accurately and also developments related with raising consumer awareness should increase in order to develop functional food market. Legal hole in the functional food sector is the main hurdle for the improving this market. Laws about health claims should be reformed because they are not sufficient to explain the health benefits of functional foods.

Asserted health effects of functional foods should explain to consumers demonstratively owing to the fact that it is the most important subjects for the producers of functional foods as for the several kinds of studies. Survey results concluded that consumers do not have enough knowledge about functional foods. From this point of view, companies should perform informative and demand stimulating marketing strategies. Consumer doubts related with asserted health effects of functional foods could be also removed by taking support from scientific experts in this field. Another interesting research topic would be the motivations of food manufacturers to develop functional foods, the incentives they give to consumers to try functional foods, and the marketing tactics they use to stimulate demand for functional foods, and educate consumers about their benefits. It would also be interesting to examine collaboration between functional food manufacturers and health professionals, as their interrelationships might influence the development and sales of functional foods.

The most important goal of functional food manufacturers should be to teach and educate consumers about their products, the ingredients used in their products, and the corresponding health benefit. As a result of this, manufacturers can increase sales while also helping consumers take better care of them. Working with expert/doctors could also affect the preference of consumptions of functional foods by giving accurate and

efficient information related with specific health issues – for example, in relation to digestion – can alleviate their symptoms with the use of functional foods. Furthermore, as well as their health effects of functional foods, packages and taste are important change the consumption rate of functional foods. Food engineers play a part of the improving taste and texture of functional foods. As a result of these functional manufacturers invest into research and development studies and also follow technical and scientific developments.

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