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ARAŞTIRMA MAKALESİ **RESEARCH ARTICLE**

Tomorrow's Choices: A Comprehensive Study of Consumer Perspectives on Functional Foods*

Yarının Seçimleri: Fonksiyonel Gıdalar Üzerine Tüketici Bakış Açılarını İnceleyen Kapsamlı Bir Çalışma

Fatma Pelin EREL[1*], Yasemin ORAMAN[2]

Abstract

Consumers strive for an improved quality of life and longevity on a daily basis. Owing to shifts in consumer behavior, there is a consistent rise in the proportion of well-informed and mindful consumers. Functional foods, known for their health-preserving capabilities, are gaining increased prominence within the spectrum of food products. The functional food market, both in Turkey and globally, holds promise as an unexplored sector. Within this context, food companies are keen to ascertain whether their newly developed products align with consumer expectations and how consumers engage with these offerings. The study's objective is to assess consumer attitudes towards products positioned as integral to a healthy diet, particularly those endorsed as functional foods. Moreover, the aim is to derive indicators that can enhance strategic and tactical marketing decisions based on the study's findings. The primary focus of the research centers on the purchasing behaviors of Turkish consumers. Employing an inductive research design, hypotheses were tested using data collected from 391 Turkish consumers, that reside in Istanbul, through surveys. Istanbul was chosen as it is a metropolis and a small-scale example of Turkey. Analysis methods included descriptive and inferential statistics, explanatory factor analysis (PCA), and binary regression analysis. The results revealed a heightened interest in functional foods among women, families with children, and individuals with higher incomes. Furthermore, evolving lifestyles, increased incomes, and heightened consumer awareness contribute to a surge in demand for innovative food products. The revelations derived from these findings carry profound implications that extend their influence across various domains. Primarily, state institutions actively involved in formulating and implementing public health programs stand to be significantly impacted. The newfound insights provide an invaluable resource for refining and enhancing the efficacy of existing public health initiatives. By integrating this knowledge into their strategies, these institutions can tailor interventions more precisely, addressing specific concerns and promoting the overall well-being of the populace. Moreover, the implications also reverberate within the intricate realm of the food sector, involving a diverse range of stakeholders. For businesses within this industry, understanding and adapting to these findings can prove instrumental in shaping their practices. This may encompass adjustments in production processes, sourcing of ingredients, and the development of products that align with emerging health considerations. Proactive engagement with these insights not only enhances the societal impact of these food-related enterprises but also contributes to the broader narrative of responsible and health-conscious business practices.

Keywords: Consumer attitudes, Consumer behavior, Foods with health claim, Functional foods, Strategic marketing

[1]***Sorumlu Yazar/Corresponding Author:** Fatma Pelin Erel, Tekirdag Namik Kemal University, Vocational School of Social Sciences, Tekirdag, Türkiye. E-mail: psucuoglu@nku.edu.tr OrcID: 0000-0003-2393-8096
[2]Yasemin Oraman, Tekirdag Namik Kemal University, Faculty of Agriculture, Agricultural Economics Department, Tekirdag, Türkiye. E-mail: yoraman@nku.edu.tr OrcID: 0000-0001-6776-7861
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Öz

Tüketiciler, günlük yaşamlarında daha iyi bir yaşam kalitesi ve uzun ömür arayışında bulunmaktadır. Bu arayış, tüketici davranışlarındaki sürekli değişikliklere paralel olarak, bilinçli ve bilgili tüketicilerin oranında artan bir eğilim göstermektedir. Sağlığı koruma yetenekleri ile bilinen fonksiyonel gıdalar, günümüzde gıda ürünleri yelpazesi içinde giderek artan bir öneme sahiptir. Türkiye'de ve küresel düzeyde, fonksiyonel gıda pazarı henüz tam anlamıyla keşfedilmemiş bir sektördür ve bu durum umut vadeden bir potansiyeli beraberinde getirmektedir. Bu bağlamda, gıda şirketleri, yeni geliştirilen ürünlerinin tüketicinin beklentileri ile uyumlu olup olmadığını anlamak ve tüketicilerin bu ürünleri nasıl benimsediğini belirlemek amacıyla çeşitli stratejiler geliştirmek istemektedir. Bu çalışmanın öncelikli amacı, özellikle sağlıklı bir diyetin ayrılmaz bir parçası olarak konumlandırılan fonksiyonel gıda ürünlerine yönelik tüketicinin tutumlarını değerlendirmektir. Ayrıca, çalışmanın bulgularına dayanarak, gıda şirketlerinin stratejik ve taktik pazarlama kararlarını daha etkili bir şekilde geliştirebilmeleri için öngörüler ve göstergeler elde etmektir. Araştırmanın ana odak noktası, Türk tüketicilerinin satın alma davranışlarına yöneliktir. İndüktif bir araştırma tasarımı kullanılarak, hipotezler İstanbul'da yaşayan 391 Türk tüketiciden toplanan anket verileri kullanılarak test edilmiştir. Türkiye'nin küçük ölçekli bir örneği olduğundan ve metropol olduğundan İstanbul ili seçilmiştir. Analiz yöntemleri arasında tanımlayıcı ve çıkarımsal istatistikler, açıklayıcı faktör analizi (PCA) ve ikili regresyon analizi bulunmaktadır. Sonuçlar, özellikle kadınlar, çocuklu aileler ve daha yüksek gelire sahip bireyler arasında fonksiyonel gıdalara karşı giderek artmakta olan bir ilgi olduğunu ortaya koymaktadır. Ayrıca, değişen yaşam tarzları, artan gelirler ve artan tüketici bilinci, yenilikçi gıda ürünlerine yönelik talepte yıl boyunca bir artışa katkıda bulunmaktadır. Bu bulguların, kamu sağlığı programları oluşturan devlet kurumları ve gıda sektöründeki paydaşlar için önemli olduğu düşünülmekte ve bu sonuçlar, stratejik ve taktik kararlarını geliştirmek isteyen bu kurumlar için değerli bir kaynak olmaktadır.

Anahtar Kelimeler: Fonksiyonel gıdalar, Sağlık beyanı olan gıdalar, Stratejik pazarlama, Tüketici davranışı, Tüketici tutumları

1. Introduction

At the beginning of the year 2020, with the impact of the Covid-19 pandemic that entered our lives, people are becoming increasingly sensitive to dietary approaches that will have a positive effect on their health and support their immune systems. In this regard, they are exploring different approaches to support their health and enhance their immune systems. Functional foods have become alternatives that consumers consider to support their health during this process (Decker, 2020). There is no universally agreed-upon definition and product group for functional foods worldwide. Generally, functional foods are described as foods that resemble traditional foods in appearance, are produced by adding substances or enhancers that positively affect the body and reduce the risk of disease (Aggett et al., 1999; Boudreau et al., 2000; Poulsen, 1999). While IFIC (International Food Information Council) defines functional foods as foods that provide health benefits beyond basic nutrition, the American Dietetic Association includes foods beneficial to health, such as vegetables, fruits, low-fat cheeses, and other snacks, to the definition of functional foods (Katan and De Roos, 2004). FUFOSE (The European Commission Concerted Action on Functional Food Science in Europe) defines functional foods as foods that have beneficial effects beyond their basic nutritional effects, reducing the risk of disease or improving general and physical condition (Siro et al., 2008). Ohama et al. (2006) (Siro et al., 2008) stated that most products known as FOSHU (Foods for Specific Health Use) in Japan since 2001 are in food form, but some may also be in the form of pills or capsules. While some scientists define products in the form of traditionally enriched foods with additives as functional foods, others also define naturally occurring foods with functional properties as functional foods. Some researchers believe that supplements in capsule form can also be considered functional foods. These different definitions contribute to the challenge of accurately determining the size of the functional food market. Nevertheless, this situation does not change the fact that the functional food market is growing in Türkiye and globally. In Türkiye, which is not yet among the top 10 in the global functional food market (Gok and Ulu, 2019), functional food sales amounted to 461.7 million dollars in 2017 (Sezgin, 2020). Global functional food sales were recorded at 161.99 billion dollars in 2020. In 2021, it is expected to reach 171.25 billion dollars with a 5.7% increase (The Business Research Company, 2021). According to a different source, functional food sales were $132 billion USD in 2005, $190 billion USD in 2010, and reached $299.32 billion USD by the end of 2017. It is projected to reach $441.56 billion USD in 2022 (Statista, 2018). Two different pieces of data expressed about the market also indicate the annual growth of the functional food market.

Consumer perspectives on functional foods may vary in different countries. Bech-Larsen and Grunert (2003) noted in their study that the approach to functional foods differs among American, European, and Danish consumers. Poulsen (1999) have found out in a study conducted with Danish consumers that the attitude towards functional foods is influenced by enriching substances and product variety. While in some countries these foods are welcomed, in some other countries the people approach to functional food with care and prefer conventional organic foods to stay healthy (Bech-Larsen and Grunert, 2003; Landstrom et al., 2009; Siegrist et al., 2015). Not only in separate countries do the approaches against functional foods differ but also, they differ according to the functional food product. Urala and Lahteenmaki (2004) stated that when choosing between traditional and functional foods, the reasons behind choosing functional food products vary according to different product categories. Also, different studies have different findings regarding choice about different functional food products (Siro et al., 2008; Jezewska-Zychowicz, 2009; Oraman, 2019). The researchers claim that functional food products are not one homogeneous group and different studies should be made in order to understand the consumer attitudes. So, in order to understand the Turkish functional food market, this study on 6 different functional food products was prepared. Research conducted on different product groups and in different countries regarding functional foods will contribute to a better understanding of this market. Research conducted in Türkiye with different functional food product groups is important for a better understanding of the functional food market in Türkiye. While some studies show that there is a difference regarding the gender in preferring functional foods (Saher et al., 2004; Ares and Gambaro, 2007; Siro et al., 2008) some have found out that there is no relationship between gender and consumption of functional foods (Ozdemir Ozkan et al., 2009; Annunziata and Vecchio, 2011). The gender and the type of functional foods the specific gender prefers may differ. Some research show that women have a more positive attitude against functional food products and that the main consumer of the functional foods are the women (Oraman, 2019; Poulsen, 1999; Bower et al., 2003; Siro et al., 2008; Dolekoglu et al., 2015), whereas the others have determined that there is no relationship between gender and preferring the functional foods

(Ozdemir Ozkan et al., 2009; Annunziata and Vecchio, 2011). Age, like gender, emerges as a variable investigated in functional food consumption studies (Dolekoglu et al., 2015). While some research suggests that age is a decisive factor in functional food preferences (Bower et al., 2003; Ares and Gambaro, 2007; Stewart-Knox et al., 2007), there are also studies that do not support these findings (Ozdemir Ozkan et al., 2009). In the older age group, it is observed that functional food products can be purchased, even if they are expensive, when it is believed that they are effective (Poulsen, 1999). The elder consumers demand the foods that lower blood pressure and cholesterol (Siro et al., 2008). Various variables influencing the usage of functional food have been examined in research studies. Factors such as income level (Dolekoglu et al., 2015; Siro et al., 2008), the presence of children in the family (Siro et al., 2008), and the existence of individuals practicing special nutrition or with illnesses (Verbeke, 2005; Annunziata and Vecchio, 2011; Siro et al., 2008) have been indicated as elements affecting the utilization of functional food whereas Ozdemir Ozkan et al. (2009) have indicated that no significant relation between attitudes against functional foods and gender, age, marital status and having children was detected. However, these studies have been conducted in different countries or on different functional food product categories. This study investigates the results of these variables in Türkiye and on six different functional food products (bread with added vitamins and minerals, yogurt containing probiotics, margarine that helps lower cholesterol, relaxing teas (e.g., relax, 7 herbs, form), breakfast cereals with added vitamins and minerals, and eggs with added selenium or omega-3) mentioned in this study.

Research conducted on different product groups and in different countries regarding functional foods will contribute to a better understanding of this market. This research aims to contribute to a better understanding of the Turkish functional food market and to define the target market for functional foods more effectively. The objective of this study is to assist in identifying which segment of potential functional food users could be functional food consumers and to support a better understanding of the target market. The effects of gender, education level, age, marital status, existence of children in the family, income level and having an individual applying a specific diet on the consumption of functional food was researched.

2. Materials and Methods

2.1. Research Methodology

The material for this study was collected from primary and secondary data sources. The data obtained through surveys conducted with Turkish consumers constitute the primary data source for the research. Additionally, printed research, articles, theses, books, applications and publications of government institutions in Turkey and worldwide, as well as project reports, form the secondary data sources for the study.

Surveys were applied to individuals residing in Istanbul. According to the 2016 population census, the population of Istanbul was determined to be 14.804.116 people (www.tuik.gov.tr). In determining the sample size, the formula recommended by Naing et al. (2006) for cases where the population size is known was utilized.

$$n = \frac{[N*t^2*(p*q)]}{[S^2*(N-1)+S^2*(p*q)]} \quad \text{(Eq. 1)}$$

N= The number of individuals in the population

p= The proportion of those who prefer functional foods

q= The proportion of those who do not prefer functional foods

s= The sampling error accepted by the researcher

t= The accepted level of significance

Based on the population of Istanbul in the year 2016, the number of individuals in the population (N) has been calculated. The proportions of those who prefer and do not prefer functional foods (p and q) are both considered to be 50%. The sampling error accepted by the researcher (s) is set at 5%. The accepted level of significance (t) (1-0.95 = 5%) corresponds to a value of 1.96.

$$n = \frac{14804116*1.96^2*(0.5*0.5)}{0.05^2*(14804116-1)+0,05^2*(0.5*0.5)} \quad \text{(Eq. 2)}$$

n=384

The sample size is 384 individuals, and the consumer surveys were applied to 391 individuals. The surveys were conducted through two different methods: online and printed.

For this study, a survey scale previously used in Sweden was adopted (Landstrom, 2008). Due to differences in the healthcare systems between Türkiye and Sweden, some questions from the survey targeted at healthcare professionals were omitted. This survey scale was developed based on scales by Roininen and Tuorila (1999) and Urala and Lahteenmaki (2007) as indicated by Landstrom (2008).

The hypotheses of the study are as follows:

H1: The consumption of functional foods varies between men and women, indicating a difference in their preferences and habits.

H2: Individuals with a family member adhering to a specific dietary regimen are more inclined to incorporate functional foods into their diet.

H3: Individuals with elevated levels of education are more likely to engage in the consumption of functional foods.

H4: Consumers above middle age are more inclined to consume functional foods.

H5: Marital status has an impact on the tendency to consume functional foods.

H6: The tried/preferred functional food product varies with age.

H7: Families with children are more likely to incorporate functional foods into their consumption habits.

H8: Individuals in a higher income bracket show a greater tendency to incorporate functional foods into their dietary choices.

The fundamental assumption of this research is that participants provide honest and sincere responses on the survey form, and they correctly understand all questions. The survey data obtained were analyzed using the SPSS 24.0 program.

The analysis includes frequency tables, which encompass frequency and percentage distributions specific to variables, as well as central tendency measures such as mean, standard deviation, and variance Islamoglu and Alniacik (2014). In this study, a frequency table was created for consumer groups regarding age, marital status, education level, and total monthly income data.

Factor Analysis is a multivariate analysis method that reduces a large number of variables to a smaller number of variables based on relationships between variables Islamoglu and Alniacik (2014). Exploratory factor analysis can be defined as a discovery study on collected data to represent a large number of variables with a smaller number of variables. Confirmatory factor analysis, on the other hand, is used to test hypotheses, extract latent variable structures from a specific sample data, and apply obtained results to the general population for generalization. In this research, exploratory factor analysis was used.

Two different scales were used in surveys conducted with each consumer. These two scales were named the functional food scale and health scale. The questions in these scales were designed in Likert scale which has a 5-point scale format. The Likert scale ranges from "1 - strongly agree" to "5 - strongly disagree."

The reliability of each scale was assessed using the Cronbach Alpha coefficient. The analysis results indicated that the scales have a high level of reliability.

Survey results were subjected to another analytical approach known as binary logistic regression analysis. The objective of logistic regression analysis is to construct a model that effectively captures the relationship between dependent and independent variables while minimizing the number of variables involved (Cokluk, 2010). According to Cokluk (2010) and Tabachnick and Fidell (1996) stated that logistic regression analysis does not require the independent variables to have a normal distribution. However, certain prerequisites must be met in logistic regression analysis to ensure the accurate interpretation of the data. In order to avoid misinterpretations during the analysis, it is essential to examine the presence of multicollinearity issues among independent variables (Cokluk, 2010). In this research, VIF values were assessed to detect multicollinearity among independent variables. In this research, VIF values were assessed to detect multicollinearity among independent variables. The findings revealed that all VIF values

were below 5, indicating the absence of multicollinearity.

Subsequently, binary logistic regression analysis was conducted. Binary logistic regression analysis is a method applied when the dependent variable is binary and categorical. Logistic regression analysis requires logistic transformation due to its nonlinear nature and uses the maximum likelihood method. Logistic regression relies on probabilities, odds, and the logarithm of odds as fundamental components in its methodology. The odds are determined by dividing the probability of an event occurring by the probability of the same event not occurring (Cokluk, 2010).

$$Odds = \frac{p(y)}{1-p(y)} \quad \text{(Eq. 3)}$$

p(y): Probability of an event occuring

1-p(y) : Probability of an event not occuring

The odds ratio is defined as the ratio of two seperate odds (Ozdamar, 2013).

The logit is derived by applying the natural logarithm to the asymmetric odds ratio, transforming it into a symmetric form (Ozdamar, 2013).

The prediction equation derived from logistic regression analysis is as follows;

$$L_i = \log\frac{p(y)}{1-p(y)} = b0 + b1x1 + b2x2 + b3x3 + b4x4 + \cdots \quad \text{(Eq. 4)}$$

In the equation;

p(y): Probability of the occurrence of the condition of interest in the dependent variable

b0: Constant term

X: Independent variables

B: Beta coefficients in log-odds units

Li: Logit (Y Dependent Variable)

$$Y_i = \begin{cases} 1 & \text{Consumer has consumed the product} \\ 2 & \text{Consumer has not consumed the product} \end{cases}$$

Table 1 shows the independent variables included in binary logistic regression analysis and their coding. The minimum income level was set according to the poverty threshold belonging to the year the surveys were conducted.

Table 1. Coding of Independent Variables in Consumer Surveys

Variables	Description of Variables		Parameters		
			(1)	(2)	(3)
X_1 (Gender)	1	Female	1	0	
	2	Male	0	0	
X_2 (Level of Education)	1	Primary-Secondary-High School	1	0	
	2	Higher Education	0	0	
X_3 (Marital Status)	0	Single	1	0	
	1	Married	0	0	
X_4 (Age)	1	<29	1	0	0
	2	30-39	0	1	0
	3	40-49	0	0	1
	4	>50	0	0	0

Table 1. Continued

X_5 (Income)	1	<1656 USD	1	0
	2	1657-3311 USD	0	1
	3	>3312 USD	0	0
X_6 (Presence of children in the household)	0	No	1	0
	1	Yes	0	0
X_7 (The presence of an individual implementing a special diet in the household)	0	No	1	0
	1	Yes	0	0
X_8 FF Scale Factor 1 (Personal reward of using FF)	0	I agree- I completely agree	1	0
	1	I do not agree - I completely disagree	0	0
X_9 FF Scale Factor 2 (Confidence in FF)	0	I agree- I completely agree	1	0
	1	I do not agree - I completely disagree	0	0
X_{10} FF Scale Factor 3 (Interest in FF)	0	I agree- I completely agree	1	0
	1	I do not agree - I completely disagree	0	0
X_{11} H Scale Factor 1(General Interest in Health)	0	I agree- I completely agree	1	0
	1	I do not agree - I completely disagree	0	0
X_{12} H Scale Factor 2 (Interest in Natural Products)	0	I agree- I completely agree	1	0
	1	I do not agree - I completely disagree	0	0
X_{13} H Scale Factor 3 (Interest in Diet Products)	0	I agree- I completely agree	1	0
	1	I do not agree – I completely disagree	0	0

3. Results and Discussion

The demographic data of the consumers attended to the survey is shown in *Table 2*.

Table 2. Demographic Data of Consumers

Variables	Frequencies	%
Gender		
F(Female)	217	55.9
M (Male)	171	44.1
Age		
<29	168	43
30-39	127	32.5
40-49	73	18.7
50-89	23	5.9
Marital Status		
Married	183	46.9
Single	207	53.1
Educational Level		
Compulsory Education	136	34.8
Higher Education	255	65.2
Monthly Total Income		
<1656 USD	234	60.3
1657-3311 USD	111	28.6
>3312 USD	43	11.1

In the application of factor analysis, both scales were examined separately using the factor analysis method. For the Functional Food Scale (FFS), reliability analysis was initially conducted. The Cronbach Alpha value was initially obtained as 0.901. In the reliability analysis, expressions that increased reliability when excluded were removed, and the analysis was conducted again, resulting in a Cronbach Alpha value of 0.911. When the factor analysis process was applied, a total of 4 factors were identified in the FFS scale. The factor loadings of expressions were examined, and expressions with loadings below 0.1 in different factors were removed, and the analysis was repeated. Separate reliability analyses were conducted for each factor group (Islamoglu and Alniacik, 2014). As a result of this process, 3 factors identified are specified in *Tables 4* and *5*. Finally, the Cronbach Alpha values for the remaining factors were found to be 0.894.

Table 3 shows the KMO (Kaiser-Meyer-Olkin) value for the consumer functional food scale. According to this result, the KMO value for the consumer surveys' functional food scale is 0.918. The KMO value indicates that the sample size is excellent for factor analysis (Cokluk et al., 2012).

Table 3. Consumer Functional Food Scale Factor Analysis KMO and Bartlett Test Table

KMO ve Bartlett Testi		
Kaiser-Meyer-Olkin Sample Measurement Value Adequacy		0.918
Bartlett Test	Chi-Square	3000.128
	Df	190
	Sig.	0.000

Table 4 shows the variances explained by the components obtained from the factor analysis initially and after applying the varimax rotation method. Initially, 52.803% of the total variance, explained by a total of 21 expressions, can be accounted for by 3 factors. If the explained variance value is between 0.40 and 0.60, it indicates convenience for factor analysis (Cokluk et al., 2012).

Table 4. Consumer Functional Food Scale Factors and Explained Variances Table

Factors	**Initial Eigenvalues**			**Squared Sum of Extracted Loadings**			**Squared Sum of Rotated Loadings**		
	Total	**Variance %**	**Cumulative %**	**Total**	**Variance %**	**Cumulative %**	**Total**	**Variance %**	**Cumulative %**
1	7.074	35.368	35.368	7.074	35.368	35.368	4.910	24.550	24.550
2	1.787	8.934	44.302	1.787	8.934	44.302	3.381	16.907	41.457
3	1.700	8.501	52.803	1.700	8.501	52.803	2.269	11.346	52.803

The results of the factor analysis applied to consumer surveys are shown in *Table 5*. Expressions marked with the letter 'R' in the leftmost column have been recoded as they are negative statements.

The process applied to the Health Scale (HS) was conducted similarly to the process applied to the Functional Food Scale. The Cronbach Alpha values obtained for all factors are higher than 0.6. The details of the identified factors are specified in *Tables 7* and *8*.

Regarding the factor loadings, significance of factor loading values can be determined taking into account the sample size. For a sample size of 120, a factor loading of 0.50; for a sample size of 200, a factor loading of 0.40; and for a sample size of 350, a factor loading of 0.30 can be considered significant (Hair et al., 2014; Akin and Asci, 2021)

The KMO and Bartlett test results for the factor analysis that was conducted for the Health Scale are shown in *Table 6*.

Table 5. Consumer Functional Food Scale Factor Analysis, Factor Loadings, Averages, Standard Deviations

		Factor Loading	Average	Standard Deviation
Factor 1: Personal Reward for Using Functional Foods				
	- Products with health claims facilitate the pursuit of a healthy lifestyle.	0.793	3.0684	1.0480
	- I believe that foods with health claims enhance my overall well-being.	0.763	3.2500	1.0887
	- I view it as a positive aspect that contemporary technology allows for the creation of food products featuring health-related claims.	0.747	2.8342	1.1237
	- I experience an improved well-being when I consume foods with health claims.	0.743	3.2316	1.1320
	- The idea of maintaining my health through the consumption of foods with health claims brings me joy.	0.700	3.1421	1.1421
	- Consuming foods with health claims is entirely safe.	0.601	3.3026	1.0121
	- I believe that products with health claims undergo thorough and careful safety research.	0.574	3.2737	1.0621
	- Regular consumption of products with health claims can help me prevent diseases.	0.557	3.4500	1.1113
	- The consumption of a product with a health claim enhances my performance.	0.556	3.1579	1.0999
	- I would purchase a food product with a health claim endorsed by a doctor, dietitian, or health professional.	0.516	2.4605	1.0974
R	- Healthy individuals do not gain any advantages from using food products with health claims.	0.428	3.1105	1.2722
	Factor 1 Cronbach Alpha=0.882 **Percentage of Variance Explained=24.550**			
Factor 2: Confidence in Functional Foods				
R	- Unforeseen risks are associated with the novel features of food products with health claims.	0.784	3.2316	1.0795
R	- The health effects information on the packaging of foods with health claims is frequently overstated.	0.733	3.2711	1.1635
R	- Certain situations may arise where food products with health claims could pose risks to individuals who are otherwise healthy.	0.710	3.2421	1.1552
R	- I disagree with the constant proliferation of foods with health claims on the market shelves.	0.624	2.9395	1.1932
R	- Overindulging in food products boasting health benefits may have adverse effects on one's well-being.	0.600	3.5368	1.2096
	- Infusing products typically deemed unhealthy with purported health advantages lacks significance.	0.555	3.3342	1.2692
	Factor 2 Cronbach Alpha=0.799 **Percentage of Variance Explained=16.907**			
Factor 3: Interest in Functional Foods				
	- I am willing to allocate additional funds towards purchasing functional food.	0.707	3.8737	1.1554

Table 5. Continued

- I diligently seek information about foods that come with health claims.	0.657	3.5158	1.2013
- I enjoy consuming foods that have effects similar to drugs.	0.626	3.6500	1.2182
Factor 3 Cronbach Alpha=0.603			
Percentage of Variance Explained =11.346			

Table 6. Consumer Health Scale Factor Analysis KMO and Bartlett Test Table

KMO ve Bartlett Testi		
Kaiser-Meyer-Olkin Sample Measurement Value Adequacy		0.870
Bartlett Test	Chi-Square	2637.034
	Df	91
	Sig.	0.000

Table 7 displays the variances explained by the components obtained from the factor analysis initially and after the varimax rotation process. Three factors explain 65.428% of the total variance explained by a total of 14 statements in the Consumer Health Scale.

Table 7. Consumer Health Scale Factors and Explained Variance Table

Factors	**Initial Eigenvalues**			**Squared Sum of Extracted Loadings**			**Squared Sum of Rotated Loadings**		
	Total	**Variance Percentage**	**Cumulative Percentage**	**Total**	**Variance Percentage**	**Cumulative Percentage**	**Total**	**Variance Percentage**	**Cumulative Percentage**
1	5.351	38.224	38.224	5.351	38.224	38.224	4.090	29.215	29.215
2	2.565	18.320	56.544	2.565	18.320	56.544	2.560	18.288	47.503
3	1.244	8.883	65.428	1.244	8.883	65.428	2.510	17.925	65.428

Table 8 contains details of the factors related to the health scale. A total of 14 statements have been reduced to 3 factors, named as general health interest, interest in diet products, and interest in natural products. The table includes expressions for each factor group, factor loadings for each expression, mean values, standard deviations, and at the end of each factor group, the Cronbach Alpha values and the explained variance are provided.

Consumers were asked questions about their consumption habits related to six different functional food products which are vitamin-mineral fortified bread, probiotic fortified yogurt, margarine to help lower cholesterol, teas with relaxing properties (e.g., relax, 7-herbs, form), vitamin-mineral fortified breakfast cereals, and eggs fortified with selenium or omega-3. Additionally, an overall assessment was made about the general consumption of functional foods irrespective of product differentiation.

The *Table 9* represents Exp (B), which indicates the odds ratios. For an independent variable, the Exp (B) value, when other variables are held constant, indicates the proportional change in the expected outcome (the odds) of the dependent variable (i.e., the consumption of vitamin-mineral fortified bread) with a one unit change in the independent variable. If the Exp (B) value is greater than 1, an increase in the value of the independent variable is associated with an increase in the odds of the expected outcome. If the Exp (B) value is greater than 1, an increase in the value of the independent variable is associated with an increase in the odds of the expected outcome. If the Exp (B) value is less than 1, an increase in the value of the independent variable is associated with a decrease in the odds of the expected outcome (Islamoglu and Alniacik, 2014). If the Beta coefficient is negative, the odds ratio should be corrected as AO=1/OR (Ozdamar, 2013).

When the results of logistic regression analysis are examined, it was observed that survey results for functional yogurt, breakfast cereals, and any functional food product types provided interpretable outcomes with logistic regression application.

Table 8. Consumer Health Scale Factor Analysis, Factor Loadings, Average Values and Standard Deviations

		Factor Loading	Average	Standard Deviation
Factor 1: General Interest in Health				
	-I always eat a healthy and balanced diet	0.772	2.8203	1.0047
	-When selecting food, I ensure that my choices align with health considerations.	0.732	2.4792	1.0643
	-Ensuring the healthiness of the snacks I consume is of utmost importance to me.	0.731	2.4531	1.1115
	-Having a low-fat content in the foods I consume daily is crucial for me.	0.719	2.7292	1.1850
	-I pay close attention to the health aspects of the food I consume.	0.703	2.4479	1.1136
	- I steer clear of foods that I believe could elevate my cholesterol levels.	0.687	2.8021	1.2124
R	-I consume whatever I desire, seldom giving consideration to the health aspects of my food choices.	0.634	2.5885	1.1972
	-Ensuring that the foods I consume daily are rich in vitamins and minerals is a priority for me.	0.534	2.4609	1.0760
	Factor 1 Cronbach Alpha=0.874			
	Percentage of Variance Explained =29.215			
Factor 2: Interest in Natural Products				
	- I believe that consuming foods sweetened with artificial sweeteners can be detrimental to my health.	0.852	2.1016	1.2146
	- I avoid highly processed products because I'm unfamiliar with their ingredients.	0.790	2.3177	1.1302
	- I make an effort to consume products that are free from additives.	0.774	2.2630	1.0699
	Factor 2 Cronbach Alpha=0.823			
	Percentage of Variance Explained=18.288			
Factor 3: Interest in Diet Products				
	-I hold the belief that diet products contribute to maintaining a low cholesterol level for me.	0.906	3.1016	1.1019
	- I believe that diet products contribute positively to my overall health.	0.879	3.1354	1.1299
	- I believe that I can manage my cholesterol levels by incorporating diet products into my consumption.	0.868	3.1719	1.1524
	Factor 3 Cronbach Alpha=0.871			
	Percentage of Variance Explained=17.925			

Yogurt holds significant importance in Turkish culture and is widely consumed. According to Kizilaslan and Solak (2016), a report by Danone in 2013 indicated that Türkiye ranked second in per capita yogurt consumption. Similarly, as reported by Kizilaslan and Solak (2016), the Türkiye Nutrition and Health Survey revealed that 52.7% of the Turkish population consumed yogurt daily. Şimşek et al. (2005) expressed in their study that most of the respondents participated in their research, due to dietary habits, do not have a regular habit of drinking milk. On the other hand Turkish consumers mostly prefer yoğurt, not milk. Engindeniz et al. (2021) declared in their study that 93.36% of the household members interviewed stated that they consumed yogurt.

Analyzing yogurt consumption, it was observed that the likelihood of females consuming functional yogurt is 2.78 times higher. Additionally, in an examination of probiotic consumption, as mentioned in a study by Schultz et al. (2011), it was found that 30.6% of females consume probiotics, while only 17.2% of males do. Females generally show a higher preference for probiotic consumption. Regardless of product type, the likelihood of females consuming any functional food product is 2.54 times higher. A study conducted by Dogan et al. (2011) revealed that females consume functional foods more frequently. Research conducted in different countries also showed that females have a more positive attitude towards and a higher preference for functional foods (Bower et al., 2003; Poulsen, 1999; Siro et al., 2008). However, a study by Ozdemir Ozkan et al. (2009) suggested that there is no significant relationship between attitudes toward functional foods and variables such as gender, marital status, and having children.

In families without children, the likelihood of consuming probiotic yogurt is 1.74 times lower, and the likelihood of consuming functional breakfast cereals is 1.75 times lower. The odds ratio for functional cereals is calculated as 0.571, and for yogurt, it is 0.573. Since the Beta coefficients are negative, the odds ratios are corrected as 1/OR. Thus, the odds ratios are corrected as AO=1/0.573 and AO=1/0.571. It can be speculated that families without children may prioritize food choices that contribute to the overall health and vitamin-mineral support of their children. Hacioglu and Kurt (2012) mentioned factors such as increasing healthy intestinal bacteria, aiding in weight control, and contributing to children's growth as reasons for the preference for functional foods. Siro et al. (2008) also emphasized the significant role of the presence of children in adopting functional foods.

In families where individuals implementing a personalized nutrition program are not present, it has been observed that the likelihood of consuming probiotic yogurt is low. In his research, Verbeke (2005) noted that an individual experiencing a specific health problem within the family positively influences the consumption of functional foods. Similarly, Siro et al. (2008) stated that the presence of individuals who have experienced health problems or relatives who have experienced health problems is an important factor in the adoption of functional foods.

Consumers who perceive functional foods as a personal reward have a 2.36 times higher likelihood of consuming probiotic yogurt, a 3.10 times higher likelihood of consuming vitamin-mineral fortified breakfast cereals, and a 2.76 times higher likelihood of consuming any functional food product. Consumers with positive thoughts about functional foods, believing that these products enhance their overall health and consequently make them feel better, have a higher likelihood of consuming probiotic yogurt, functional cereals, and any functional food product.

Consumers with a monthly income below 1656 USD have a 2.58 times lower likelihood of consuming probiotic yogurt and a 3.10 times lower likelihood of consuming any functional food product. Since functional foods are generally perceived as more costly than conventional foods, it is supported by findings that consumers with lower income levels have a lower likelihood of choosing such products. Siro et al. (2008) have indicated that functional food consumers have generally a high-income level.

Single consumers have a 2.08 times higher likelihood of consuming breakfast cereals. The preference for breakfast cereals, known as convenient breakfast alternatives, aligns with the results of the research.

It has been observed that consumers showing interest in functional foods have a 1.70 times lower likelihood of consuming functional breakfast cereal products and a 2.13 times lower likelihood of consuming general functional products. Factors expressing interest in functional foods include satisfaction with paying higher prices for functional foods, making a special effort to be informed about foods with health claims, and preferring to consume foods with drug-like effects. Despite positively evaluating functional foods, consumers in this group are observed to have a low likelihood of consuming them. The analysis results emphasize that a positive attitude is not the sole factor influencing purchasing decisions. Additionally, factors such as the proven health benefit perception (Poulsen, 1999), the belief that functional food products work and influences such as price and naturalness, as highlighted by (Bower et al., 2003) also play a role.

Consumers with a high level of interest in diet products have a 1.86 times lower likelihood of consuming functional cereals. Questions indicating interest in diet products include factors such as the belief that diet products

have an impact on keeping cholesterol levels low, the perception that diet products support health, and the desire to control cholesterol by consuming diet products.

Consumers below the age of 29 have a 4.65 times higher likelihood of consuming vitamin-mineral fortified breakfast cereals, while consumers in the 30-39 age range have a 3.40 times higher likelihood of consuming the same product. Consumers under the age of 39 show a higher likelihood of preferring functional cereals. Markovina et al. (2011) mentioned in their survey targeting the 14-30 age group that 75% of this age group purchases functional products.

Table 9. Odds Ratios of Consumers' Usage of Functional Products

Variable	Probiotic Added Yogurt	Vitamin-Mineral Enriched Cereals	Any Functional Food Product
Personal reward of using FF (Agree/Absolutely Agree)	2.356[a]	3.101[a]	2.765[a]
Confidence in FF (Agree/Absolutely Agree)	1.018	0.703	1.248
Interest in FF (Agree/Absolutely Agree)	0.711	0.587[b]	0.470[b]
General Interest in Health (Agree/Absolutely Agree)	1.067	0.821	1.205
Interest in Natural Products (Agree/Absolutely Agree)	1.051	0.836	1.109
Interest in Diet Products (Agree/Absolutely Agree)	1.005	0.537[b]	0.870
Gender			
Female	2.784[a]	1.315	2.544[a]
Marital Status			
Single	1.359	2.081[b]	1.616
Age			
<29	1.763	4.649[b]	1.787
30-39	1.458	3.399[b]	2.104
40-49	1.677	2.243	0.717
No children in the household	0.573 [b]	0.571[b]	0.585
Level of Education			
Compulsory Education (Primary-Secondary-High school)	0.825	0.949	1.249
Monthly Total Household Income			
<1656 USD	0.387[b]	1.092	0.322[b]
1657-3311 USD	0.675	1.235	0.804
No Individual Implementing a Special Diet in the Household	0.488[b]	1.170	0.972

a:p<0.01 b:p<0.05 c:p<0.1

4. Conclusions

Upon examining the survey results, it was observed that probiotic-fortified yogurt and general functional foods are consumed more by women among consumers. Furthermore, in families without children, the probabilities of consuming both probiotic-fortified yogurt and functional breakfast cereals were found to be lower. If it is aimed to encourage childless families to consume these products, it is recommended to provide them with more information about these product groups.

Among consumers, it was observed that the probability of consuming probiotic yogurt is lower in families where there is no individual implementing a special nutrition program at home. The presence of an individual implementing a special nutrition program at home may lead other family members to be more conscious and careful about nutrition. If there is no one implementing a special nutrition program at home, or if there is no particular interest in nutrition, individuals may be less sensitive or investigative in this regard.

Single consumers were found to have a higher likelihood of consuming breakfast cereals. For functional cereals, it is recommended to conduct studies targeting single consumers.

Consumers under the age of 39 were observed to have a higher likelihood of preferring functional cereals. As breakfast cereal products are considered a practical option, it is seen that the younger age group prefers this product more.

In comparison to traditional foods, functional foods are more costly products. In this study, consumers with a monthly income below 1656 USD were observed to have lower probabilities of consuming probiotic yogurt and any other functional food products. It can be considered a reasonable approach that consumers with lower income levels do not allocate more budget for functional foods. When the prices of functional foods become closer to the prices of traditional foods, access to functional products will be easier for this income group.

Consumers with positive thoughts about functional foods have a high probability of consuming probiotic yogurt, functional cereals, and other functional food products. In this context, to enable consumers to have more information about these products, the effects of these products on health should be conveyed more clearly and explicitly. Providing more detailed information about the effects of current and future functional foods on consumer health is expected to support consumer attitudes.

Consumers showing interest in functional foods were observed to have lower probabilities of consuming especially functional breakfast cereals and general functional products. Consumers with a higher interest in diet products were found to have lower probabilities of consuming functional cereals. The questions indicating interest in diet products involve beliefs that diet products have an impact on lowering cholesterol, the perception that diet products support health, and the desire to consume these products to keep cholesterol under control. In this context, it is considered significant that the result of functional cereal not being categorized as a diet product and not being preferred by consumers with a high interest in diet products is meaningful.

Landstrom et al. (2009) and Bech-Larsen and Grunert (2003) have stated that consumers in different countries have different approaches to functional foods. Therefore, to better understand consumers in Turkey, research on functional foods can be conducted more comprehensively by following studies conducted internationally.

Poulsen, 1999 emphasized that functional foods should be considered not as a homogeneous group but as separate products in different product categories. Ares and Gambaro (2007) also stated that different genders and age groups exhibit different approaches to products. In this regard, research on other products not examined in this study could provide more detailed insights into consumer approaches to functional food groups. This could help in better understanding the preferences of functional food consumers and diversifying activities in this market.

This research was conducted on six functional product groups. Including different product groups in future research will provide more detailed information about the functional food market. Expanding the number of respondents to the survey will enable obtaining more detailed information about the functional food market in Turkey.

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Ethical Statement

There is no need to obtain permission from the ethics committee for this study.

Conflicts of Interest

We declare that there is no conflict of interest between us as the article authors.

Authorship Contribution Statement

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