

The Factors Affecting Willingness to Consume Functional Foods in Mersin Province

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ABSTRACT

To have a healthy life and live long; to reduce health cost, risk of illness and to obtain health protection, sustainability and increasing consumer awareness have increased consumer demand for functional food in developing and developed countries. The objective of this study was to determine socio-economic factors and food consumption affecting consumers' willingness to consume functional foods in Mersin Province. For this purpose, a survey was conducted with 384 consumers in 2017 and obtained data was analyzed by using Binomial Probit model. Results show that there was a positive relationship between consumers' willingness to consume functional food and education, income, working in the health sector and paying attention to nutrition information on package. In fact, increasing the level of education and income of the consumers and having knowledge about functional foods increase the willing of consuming these products.

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Mersin İlinde Fonksiyonel Gıda Satın Alma İstekliliğini Etkileyen Faktörler

ÖZET

Gelişmiş ve gelişmekte olan ülkelerde uzun ve sağlıklı yaşam sürme, sağlık masraflarını azaltma, hastalanma riskini azaltma, sağlığı koruma ve sürdürülebilirliğini sağlama gibi etkenler tüketicilerin fonksiyonel gıdalara olan talebini artırmıştır. Bu çalışmanın amacı tüketicilerin fonksiyonel gıdaları tüketim istekliliğinde etkili olan sosyo-ekonomik ve gıda tüketimi ile ilgili faktörlerin belirlenmesidir. Bu amaçla 2017 yılında Mersin ilinde 384 tüketici ile anket yapılmış ve elde edilen verilerle çalışmanın amacına yönelik olarak Binomial Probit analizi yapılmıştır. Analiz sonucunda tüketicilerin fonksiyonel gıda tüketim isteği ile eğitim, gelir, sağlık sektöründe çalışma, fonksiyonel gıda tüketme ve ambalaj üzerindeki besin öğelerine dikkat etme durumu arasında pozitif yönlü, ailedeki birey sayısı arasında negatif yönlü ilişki tespit edilmiştir. Çalışmanın sonuçları tüketicilerin eğitim ve gelir seviyesinin artması ile birlikte fonksiyonel gıda hakkında bilgi sahibi olmasının bu ürünlere karşı tüketim istekliliğini arttırdığını göstermektedir.

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INTRODUCTION

The desire to live longer and to improve human life quality by protecting the mind and body health is effective in the development of healthy nutrition knowledge (İşleroglu et al., 2005; Annunziata et al., 2015; Kraus, 2015a). Food-based health risks and reducing healthcare costs in recent years have led consumers not only to consume safe food but also to maintain health care and sustainability (Özçiçek Dölekoğlu et al., 2015; Büyükkaragöz et al., 2014; Krystallis, et al., 2008). Increasing awareness of the

consumers over time has led to increase research on healthy nutrition and with the development of technology; the food industry has begun to search for beneficial products for human health. One of these products is functional food (FF).

Even though the definition is not accepted universally, (Hasler, 2002), FF is defined as a food or food components which contains biologically active components and benefits the individual's metabolic, physiological and mental functions reducing the risk of individuals becoming ill, and prolongs their

lifespan (Frewer et al., 2003; Niva, 2007; Krystallis et al., 2008; Messina et al., 2008).

This food contains minerals, fatty acids and antioxidants (natural foods) such as: kefir, wheat cheddar, and cocoa. Moreover, probiotic and prebiotic enriched yogurt, beverages, vitamins D, and C vitamins supplemented with calcium added products (active supplement) and lactose-free milk, low-calorie foods are also examples of FFs (Siro et al., 2008).

FF has entered the food market for the first time in Japan in the 1980s and has taken its place in the US and European markets with the increasing interest of consumers. Increasing consumers' interest in low-calorie foods and willingness to live healthy life has increased (Granato et al., 2010) the demand for such products. Although FFs are found in almost all food categories, they cannot be reached to all segments of the growing world food market (Siro et al., 2008).

FF global market is estimated at 299.32 billion US \$ in 2017 and it is expected to be 440 billion US \$ by 2022 (Anonymus 2018). The largest growth in the functional food market in Japan was in 2016. The market value of Functional Foods was 238.2 billion YEN in 2019 in this country.

Functional food revenues for the main market in Asia and the Pacific Islands account for 34% of World. The world's second largest market is North America, consisting of the United States and Canada, which account for 25% of total revenue. Functional food consumption in Europe varies depending the countries and the culture, yet, it is more popular in Central and Northern European countries. The functional food market in these countries accounts for 16% of total world revenue. In Turkey, Functional Food Market Size has lagged behind European and Asian countries and has not reached the desired level. The functional food market in Turkey grew by 52% from 2012 to 2017 reaching to \$ 461.7 million in 2017 (Gok and Ulu, 2018)

In the 2000s, many studies on FF consumption was conducted such as the factors affecting consumers' FF awareness (Krystallis, et al., 2008; Bornkessel et al., 2014; Büyükkaragöz et al., 2014; Annunziata et al., 2015), the socio-demographic factors affecting FF preference (Gaston and Gambaro, 2007), consumer's FF consumption decision (Brecic et al., 2014; Özçiçek Dölekoğlu et al., 2015; Kraus, 2015a; Boluda and Capilla, 2017), consumer perception of FFs (Hacıoğlu and Kurt, 2012; Dolgopolova et al., 2015), the role of socio-demographic, cognitive and attitudinal variables in accepting FFs (Verbeke, 2005), relationship between purchasing these goods and lifestyle and healthy eating habits (Chen, 2011), and the factors affect the willingness to consume functional foods (Ares and Gambaro, 2007; Goetzke, et al., 2014; Siegrist et al., 2015; Pappalardo and Lusk, 2016;

Zielinska and Zychowicz, 2017). In addition, review studies also were conducted by providing an overview of the development of these foods (Kaur and Singh, 2017) and their technical aspects (Granato et al., 2010).

Factors influencing the purchasing of FFs by consumers differ depending on a country, region, culture and socio-economic characteristics. Therefore, studies to increase knowledge, awareness, consciousness and consumption of FF have a great importance in developed and developing countries. Thus, the purpose of this study was to determine socio-economic factors and food consumption affecting consumers' willingness to consume functional foods in Mersin Province.

MATERIAL and METHODS

The main data of the study was obtained from survey data with 384 consumers in Mersin province of Turkey in October of 2017. Questionnaires were filled in by researchers to minimize the errors of some questions answered by consumers during the survey.

$$n = \frac{N * p * (1 - p)}{(N - 1) * \sigma_p^2 + p * (1 - p)} = \frac{136155 * 0.5 * 0.5}{(136155 - 1) * 0.0025 + 0.5 * 0.5} \cong 384$$

In the formula; n:sample size, N:number of farm in the population, σ_p^2 : variance of the ratio, r:margin of error allowed from the average (5%), $Z_{\alpha/2}$:Z value (1.96), p: shows the possible proportion of producers (50%).The survey questions were prepared by the authors as a result of extensive literature review. Later, it took its final form with interviews with subject experts. Data was consisting of 5 sections: (1) socio-demographic factors, (2) health-related variables, (3) factors to be considered in food purchasing, (4) knowledge about FF definition, adoption and the willingness to consume FF. A 5-point Likert scale (1:Never, 2:Rarely, 3:Occasionally, 4:Usually, 5:Always) was used to determine the factors affecting consumers' purchasing food.

If the dependent variable expresses the presence (1) and absence (0) of an event, Limited Dependent Variable Regression Models is used (Gujarati, 2006). In this study, Binomial Probit model was used to reach the goal of determining the factors that are effective on the willingness to consume functional food. The probit model has been used in calculating the willingness to pay for FF (Munene 2006; Markosyan et al., 2007; Pasquale et al., 2011).

While the values of zero and one were observed for the dependent variable in the probit model, there was a latent, unobserved continuous variable, y^* (Formula1).

$$y^* = \sum_{k=1}^k \beta_k \chi_k + \varepsilon \quad (1)$$

Where the symbol k is number of variable, β is coefficient, χ is independent variable, ε is $N(\mu=0, \sigma=1)$ The dummy variable, y, was observed and was determined by y^* as follows (Formula 2).

$$y = \begin{cases} 1, & \text{if } y^* > 0 \\ 0, & \text{otherwise} \end{cases} \quad (2)$$

The point of interest relates to the probability that y equals one. From the above equations, we see that (Formula 3):

$$\begin{aligned} Prob(y = 1) &= Prob\left(\sum_{k=1}^k \beta_k \chi_k + \varepsilon > 0\right) \\ &= Prob\left(\varepsilon > -\sum_{k=1}^k \beta_k \chi_k\right) \\ &= 1 - \Phi\left(-\sum_{k=1}^k \beta_k \chi_k\right) \end{aligned} \quad (3)$$

Where Φ was the cumulative distribution function of ε (Liao, 1994).

Table 1. Socio-economic characteristics of consumers

Çizelge 1. Tüketicilerin sosyo-ekonomik özellikleri

	Minimum (<i>Minimum</i>)	Maximum (<i>Maksimum</i>)	Mean (<i>Ortalama</i>)	Std. Error (<i>Std. hata</i>)
Age (year)	20	67	40.05	0.52
Household Size (person)	1	7	3.71	0.06
Income \$/month	263.16	1973.68	823.85	18.55
Food \$/month	39.47	526.32	149.56	3.99

Results showed that 50.39% of the respondents were women, 87.27% were married, 67.01% were over 35 years old, 63.12% of the households had 4 or more individuals, and 65.71% of whom had 9 years or more of education (high school and university). Employees in the health and food sector have adequate knowledge and equipment on healthy nutrition. Overall, 12.73% of consumers work in the health and food sectors and 25.97% of whom exercise sports regularly (Table 2). In a study conducted in Turkey also indicated that 44.3% of participants sustained some kind of hereditary diseases (Büyükkaragöz et al., 2014).

The most important reasons for consuming FFs were to protect health, to contribute functional foods, and the level of awareness (Urala, 2005). According to results, 13.51% of respondents had knowledge about FF and 92.99% willing to get information. In addition, 55.32% of participants wanted to consume somehow these foods (Table 2).

Consumers always paid attention to the production and expiration date, the conditions of preservation and the brand of the products that they buy, but they

In the model, the willingness to consume FF was taken as a dependent variable (Y). The dependent variable FF is encoded as (1), while the unwanted variable is encoded as (0). Independent variables were gender (male = 1, female = 0), age (35 years and older = 1, <35 = 0), education (≤ 8 year=0, 9 year and more=1), income (households with 900\$ or more income = 1, others = 0), number of households (households with 4 or more individuals = 1, others = 0), occupation (working in the health and food sector = 1, others = 0), FF consumption (consciously consumed=1, others =0) and reading labels on food products (give attention=1, do not give attention=0).

RESULTS

Socio-economic characteristics such as, age, education, numbers of households, physical activity and income of consumers have an important role in FF consumption. The average age of participating consumers in the survey was 40.05 and the average number of individuals of households was found to be 3.71 persons. Consumers spend 18.15% (149.56 \$) of average monthly income of 823.85 \$ on food expenditures (Table 1).

rarely pay attention to the energy and nutrients content written on the nutrition label, the place of production and the food safety and quality standards such as HACCP, TSE, ISO (Table 3).

The Binomial Probit model was used to determine how the socio-demographic characteristics of consumers (gender, age, education, income, number of individual households, occupation) and features related to food consumption (functional food consumption, food items of ambiguous foods) influences consumers' willingness to consume FF (Table 4). A model was found to be statistically significant (χ^2 : 77.069; p: 0.000). In the model, education, income, household size, occupation of consumers, FF consumption status, nutrition content of packaged food are statistically important variables.

Consumers with a high education level (9 years or over) have a 4.02% higher willingness to consume FF than low ones (8 years or less). As a result of the probit analysis, it was determined that education and income had a significant influence on consumers' willingness to consume FF. Consumers with higher education and income levels were more willing to

consume FF. Previous studies based on questionnaire data supports the results of this study (Cranfield, et al., 2011; Brecic, et al., 2014; Büyükkaragöz, et al., 2014; Kraus, 2015a; 2015b; Schnettler, et al., 2016). Similarly, there was a positive relationship between FF consumption and income ($p<0.05$). The FF consumption increased by 12.55% when participants

had a higher income than the low-income group. FF consumption decreases by 10.12% ($p<0.05$) when the number of individuals in households is increased from a nuclear family (consisting of 4 or fewer) to a large family (consisting of 5 or more). Employees working in the health and food sector are 15.47% more likely to consume FF than others (Table 4).

Table 2. Socio-demographic characteristics of consumers
Çizelge 2. Tüketicilerin sosyo-demografik özellikleri

		N (N)	Percent (Yüzde)			N (N)	Percent (Yüzde)
Gender	Female	194	50.39	Occupation group	In other occupational groups	336	87.27
	Male	191	49.61		Health and food sector	49	12.73
	Total	385	100.00		Total	385	100.00
Marital Status	Single	49	12.73	Sport	No	285	74.03
	Married	336	87.27		Yes	100	25.97
	Total	385	100.00		Total	385	100.00
Age (year)	<35	127	32.99	Having knowledge about FF	No	333	86.49
	35+	258	67.01		Yes	52	13.51
	Total	385	100.00		Total	385	100.00
Household Size (person)	<4	142	36.88	Request information about FF	No	27	7.01
	4+	243	63.12		Yes	358	92.99
	Total	385	100.00		Total	385	100.00
Education (year)	≤8	132	34.29	Request to consume FF	No	172	44.68
	9+	253	65.71		Yes	213	55.32
	Total	385	100.00		Total	385	100.00
Income	Low-income consumers	195	50.65	FF consumption	No	128	33.25
	High-income consumers	190	49.35		Yes	257	66.75
	Total	385	100.00		Total	385	100.00

Table 3. Consumer's review of product packaging
Çizelge 3. Tüketicilerin ürün ambalajını inceleme durumu

	Mean* (Ortalama)	Std. dev. (Std. sapma)
Date of product/expiry date	4.58	0.03
To storage the product in good condition	4.16	0.05
Brand of product	4.12	0.05
Information on the package	3.81	0.06
Additive materials	3.12	0.07
Imitated product brands that GTHB publishes	2.62	0.06
Energy and nutritional ingredients	2.48	0.06
Production place/origin	2.47	0.06
The product should have food safety and quality standards	2.34	0.06

*1: Never, 2: Rarely, 3: Occasionally, 4: Usually, 5: Always

In the study, FFs were divided into three groups: natural foods (rich in lycopene tomatoes, beta-carotene storage carrots etc), functional factor added (omega-3 fatty acid eggs, calcium-rich orange juice etc.), and foods that are removed from a harmful compound (sodium reduced salt etc.). 32.98% of the consumers consume natural foods, 13.45% consume

additive food and 7.22% consume non-additive food. However, the vast majority of interviewees do not know if these foods are FF or not. According to the consumers, who consciously consume the FFs, the willingness to consume FF increases by 17.00% ($p<0.01$). On the food packaging, there are information such as the date of production/expiry

date, the amount of production, the contents of the product and the nutritional ingredients. There was a positive correlation between FF consumption and attention to nutritional ingredients information on

the packaging ($p < 0.10$). According to those who do not pay attention to the nutritional ingredients on the packaging, FF consumption is increased by 3.52% (Table 4).

Table 4. Binomial Logit Model estimation for consumers' willingness to consume functional foods
Çizelge 4. Tüketicilerin fonksiyonel gıda tüketme isteği için Binomial Logit Model tahmini

	Coefficient (Katsayı)	Standard Error (Std. hata)	Partial Effect (Kısmi etki)	Standard Error (Std. hata)
Constant	-0.7641**	0.3160		
Gender (Female=0, Male=1)	0.0851	0.1425	0.0284	0.0475
Age (<35 year=0, ≤35 years and more=1)	-0.1586	0.1607	0.0536	0.0546
Education (≤8 year=0, 9 year and more)	0.1203*	0.0708	0.0402*	0.0234
Income (low income=0, high income=1)	0.3630**	0.1511	0.1255**	0.0531
Household size (<4 individual=0, ≤4 individual=1)	-0.2979**	0.1497	0.1012**	0.0510
Occupation group (working in the health and food sector=1, others=0)	0.4681*	0.2450	0.1547**	0.0777
FF consumption state (do not consume=0, consume=1)	0.4823***	0.1512	0.1700***	0.0544
Attention to nutritional ingredients (do not give attention=0, give attention=1)	0.1051*	0.0634	0.0352*	0.0210
Log likelihood function	-2.261.396	Chi square test	77.06954***	

Note: ***, **, * ==> Significant at 1%, 5%, 10% level.

Foods serve not only to meet basic nutritional needs, but also to reduce the risk of food-borne illness and to lead a healthy and long life. In recent years, studies were conducted in order to determine FF awareness, acceptance and factors affecting the willingness to pay for these foods and variables that are effective in FF consumption (Krystallis, et al. 2008; Bornkessel, et al., 2014; Büyükkaragöz vd., 2014; Annunziata et al. 2015; Pappalardo and Lusk, 2016; Zielinska and Zychowicz, 2017).

In this study, the relationship between consumers' willingness to consume FF and social, economic and personal variables was revealed. According to the survey results, 86.49% of consumers did not have knowledge about FF. One of the most important determinants of functional food consumption was knowledge (Brecic, et al., 2014). Knowledge has been identified as an important variable in FF consumption in many studies. On the other hand, Naylor et al. (2009) found that 45% had moderate knowledge of FF.

A negative relationship was found between the number of members in household and willingness to consume FF. The increase in the number of households' members also reduces the willingness to consume FF.

Employees in the health and food sector are more eager for FF consumption, which includes food /food ingredients that protect body and mental well being,

reduce the risk of illness, and prolong life expectancy. Similarly, Bui (2015) indicated that as health awareness increases, FF consumption also increases.

Consciously, consumers are willing to consume FF compared to the others food types. As the level of knowledge about FF increases, consumers want to consume more as they see positive effects of them on health. Büyükkaragöz et al., (2014) indicated that consumers who are knowledgeable about the content of natural foods, active supplementary foods and modified foods, were more willing to consume these foods. Similarly, the frequency of consumption (Hung, et al., 2016) and those who were conscious of the relationship between FF consumption frequency and healthy living (Schnettler, et al., 2015) and those who thought that regular consumption prevented the illnesses (Annunziata and Vecchio, 2011) found that they consume more FF. It has been found that consumers' FF consumption and purchasing decisions are positively influenced (Barrios, et al., 2008) by the nutritional value, the date of production/expiry date, the quality guarantee indicators on food packages (such as ISO, HACCP) (Kraus, 2015b).

CONCLUSIONS

In this study, it was determined that socio-economic variables including education, income, household size, and FF consumption situation, working in the health sector and looking label information on packaged food

affect the consumers' willingness to consume FF. According to the survey results, FF producing and marketing firms should give a seminar on "what is FF" which will affect consumer perceptions positively and contribute to their awareness and increase their knowledge about FF. Thus, as the number of conscious consumers increase, the demand for Functional Foods will also increase. In the marketing phase, food properties must be specified in detail on the packaging of functional foods and emphasis should be made on functional food. It should be stated that the factor is reduced or increased when advertising these foods. In order to increase the functional food consumption of crowded families with low educational and income levels, advertising campaigns can be organized for these families. Consumers should have easy access to functional food and the marketing network should be expanded.

To live a healthier life and reduce health costs, public spots on foods containing fatty acids, antioxidants (natural foods) such as kefir, wheat cheddar, cocoa mineral in its own constitution should be organized for consumers across the country.

Statement of Conflict of Interest

Authors have declared no conflict of interest.

Contribution of the Authors as Summary

Authors declares the contribution of the authors is equal.

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