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**Faculty of Tropical AgriSciences**



**Consumers' Attitudes Towards Functional Food in  
Turkey**

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## **Declaration**

I hereby declare that this thesis titled: "Consumers' Attitudes Towards Functional Food in Turkey " is a product of my work and that the findings presented in this thesis are unique, original and not shown in another college in fulfillment of the requirements for graduation with honors. I also acknowledge that I have used the actual sources in conducting the research and that the references are admitted through the references.

In Prague .....

Ismail Burak Karademir

## **Acknowledgement**

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## **Abstract**

In recent years, functional foods have become popular within wellness and health circles. Despite the numerous health benefits of functional foods in Turkey and across the globe, the total market share in the consumption of functional foods is still much lower when comparing the incumbent drink and foods that are more prevalent in the market. Therefore, there is an urgent need to conduct more research studies and evaluations on the significance of functional foods and why more customers should include these nutritional food products into their daily diet. The main objectives of the thesis were to evaluate and analyze with logistic regression method consumers' behaviour towards functional foods and to examine customers' awareness of functional food in Turkey. A questionnaire survey was used for data collection in Istanbul, Turkey. A sample of 182 respondents participated in the study. Both descriptive and inferential statistics were used to analyze the data. Results revealed that 51.1% of respondents do not know the term 'functional food'. Nevertheless, 80% of Turkish consumers purchase at least one of the FF products once per year. The most popular FF categories were functional drinks, functional cereals, and probiotics. Participants were consuming functional food products due to their health-enhancing effects, such as physical and sports performance, protecting against cancer, and regulating stress and sleep. 73.9% of women respondents agreed that FF consumption could regulate on stress and sleep, while 64.9% of men respondents agreed on protector against cancer effect of FF consumption. Statistical significance appeared in the regulation of stress and sleep reasons for the FF consumption in gender.

**Keywords:** *Consumer Behaviour, Functional Foods, Turkey, Consumption*

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## **List of Abbreviations:**

CBT: Consumer Behaviour Theory

CFP: Convenience Food Products

EU: European Union

FAO: Food and Agriculture Organization

FDA: Food and Drug Administration

FF: Functional Food

FOSHU: Food for Specified Health Uses

GRAS: Generally Recognized As Safe

IFIC: Investment Funds Institute of Canada

TUIK: Turkey Institution of Statistics

WHO: World Health Organization

# 1.Introduction

Eating functional food is not sufficient for a simple positive dietary outcome, however; its inclusion in daily consumption can significantly increase the individual's wholesomeness. FF is vital for humans to maintain healthy body growth and it is essential for long-term survival and general effectiveness. Moreover, consumption of a healthy diet helps achieve a qualitative and hale life (Hui 2007).

FF is a frequently used term that refers to products providing healthy and nutritious benefits to their consumers. The term can also be used in reference to enhanced, enriched, and fortified dietary options and supplements, which might ameliorate the consumer's physical and psychological condition and decrease the incidence of diseases. The individual ingredients responsible for stimulating these health benefits may occur naturally or may be added during food processing.

The food industry's innovative approach relies heavily on the FFs, making it an essential factor in further food-related development. The FFs' natural qualities enable them to contribute to the nutritional enhancements in newly processed food significantly (Frewer et al. 2003).

Although the FF offers numerous health benefits, its consumption is significantly lower worldwide, compared to incumbent foods and drinks, which prevail in the market. Hence, such a gap in the academic literature needs timely addressing, namely conducting more research studies concerning the importance of FF and why customers should include such food in their daily consumption.

This thesis addresses the existing knowledge gaps about the individual consumer patterns or behaviours towards FF. The main objectives are to evaluate consumers' perceptions, attitudes, purchasing patterns, and consumption behaviours towards FF. Additionally, the thesis examines the factors determining consumer preferences, attitudes, and knowledge about the FF in Istanbul, Turkey.

## **2. Literature Review**

### **2.1 Concept and Definition of Functional Foods**

The phrase "functional" food was initially introduced during the 1980s. It referred to the processed or enhanced food products, which contained ingredients, supposedly essential for certain metabolic activities and functions of the human body (Siro et al. 2008). Although the current procedures for developing functional (fortified) food are nearly identical worldwide, the term "FF" 's underlying meaning is steadily evolving across various nations and cultures such as the USA, Japan, or Europe. The global food market does not have a universal definition of FF, which has further consequences. The global consequences emerge from the lack of a universal definition of "FF" between different nations (Akabay et al. 2007).

Lacking a universal definition enabled publishing unregulated nutrition health claims of some FF products. Therefore, the general public adopted a mistrusting attitude towards the FF due to gaps in the proper definition, and so did professionals in the public health sector and government officials. A vast number of research studies done in recent years attempted to arrive at a comprehensive definition of FF. They differed across nations and institutions researching (industries, academic institutions, relevant authorities), arriving at various definitions ranging from simple statements to complex explanations. (Annunziata & Vecchio 2011).

According to Akabay et al. (2007), the FF products significantly contributed to billions of dollars in sales globally. Although FF products effectively increased sales, the absence of a universal definition prevented most nutritional scientists from providing the population suffering from chronic ailments with access to such foods. The FF concept was introduced and promoted by Japanese scientists in 1984. Later, the Japanese Ministry of Health successfully approved the hale food options category known as F.O.S.H.U. It recognized the particular health benefits directly connected to the consumption of such foods (Johnson & D.A.T. 1940).

Szakály et al. (2012) noted that F.O.S.H.U. recognized the hale benefits effectively from specific food packages, which supposedly help prevent the health-related challenges

resulting from the misleading promises of better health associated with other food categories. Since 1993, the FF gained recognition for their improvements in consumers' wholesomeness. The pioneering FF to get recognized as an enhanced and improved functional food was "Fine Rice". Its production is thought to be immunological via specific advanced technological enzyme processes. The total number of F.O.S.H.U. FF products consistently increased over the years, and in 2013 there were 1,095 functional (fortified) foods recognized.

Halsted (2003) highlighted that nutraceuticals are often mixed with the FF general definition, creating uncertainties. Classification of foods as nutraceuticals was more prevalent during the 1990s. Still, the unique description of the FF varies from nation to nation. Such foods (designer, vita, medi, and farm), whose classification and definition emanate from their natural ability to enhance health and act as disease inhibitors, also have other further-reaching functions.

Defining all the food as nearly similar in its type or using kindred headlines will eventually cause more significant ambiguity and confusion (Szakály et al. 2012). Apart from severely lacking a proper definition, confusion also arises due to various food categories' broad utilisation. The ambiguity around the concept of FF is causing problems in determining correctly which type of food could be considered a fortified food. It complicates the inclusion of items in the food market and challenges the effectiveness of customer-oriented actions. There is an urgent need to adequately define the meaning of the phrase "FF" (Bekoglu et al. 2016).

## **2.2. Functional Food Categories**

FF evolved by fortifying naturally beneficial food with added vitamins (C, E), minerals, folic acid, zinc, and calcium. The evolution continued, increasingly fortifying foods with various different micronutrients (omega-3 fatty acids, phytosterol, soluble fibre) (Siro et al. 2008). Another step came from the food companies, a shift in focus trying to incorporate as many health benefits as possible in a single food item. The everchanging market FF products have been mainly launched in the dairy, confectionery, soft drinks, bakery, and baby-food began progressively including the FFs market. However, these

products were not homogenous across most food and drink market segments (Menrad 2003).

### **2.2.1. Functional Drinks**

Functional drinks are non-alcoholic beverages belonging to the FFs. They are fortified with vitamins A, C, and E, protein, minerals, and probiotics. Despite a relatively high number of available products in this subcategory, the market is still limited in most European countries. Germany has a sizeable functional drink market as the only country in Europe. The European functional drink market was estimated to be around 7% of the total soft drink market in 2004, further increasing to 8% in 2005, and the consumption has reached 5.1 billion by 2009, which conforms to a 23% increase compared to consumption of 2005 (Siro et al. 2008).

### **2.2.2. Functional Cereals**

The subcategory of functional cereals is an alternative option of the FF, especially oat and barley. Cereals can be used as fermentable substrates for the growth of probiotic microorganisms. They can also serve as sources of non-digestible carbohydrates (prebiotics) and aid in the growth of lactobacilli and bifidobacteria. Cereals contain water-soluble fibre, such as beta-glucan, fructooligosaccharides, and resistant starch, which supposedly act as prebiotics. (Slavin 2013).

### **2.2.3. Probiotics**

The FF market in Japan and the EU is dominated by gut health products, particularly probiotics with 379 product launches worldwide in 2005 (Bilgic & Yuksel 2012). Probiotics can be defined as "live microorganisms (bacteria and yeasts)", which maintain homeostasis in the human body. However, there is an ongoing controversy concerning whether the cultures fortified in the gut health products should be viable, concerned about the product's efficacy. Most research studies and currently employed

probiotic bacteria are lactic and bifidobacteria. These naturally-occurring bacteria in the intestinal microbiome have a long-standing application within the food industry. Dairy products with probiotics are the leading production sector, accounting for sales of around 1.35 billion US\$ in 1999 and about 56% of FF's total 31.1 billion US\$ of the worldwide sales in 2004 (Siro et al. 2008). The most significant developing markets of probiotic dairy products are Scandinavia, The Netherlands, Switzerland, Croatia, Estonia, Greece, France, and Spain.

#### **2.2.4. Prebiotics**

Prebiotics are non-digestible plant fibers that act as fertilizers stimulating the growth of healthy bacteria in the gut. In the gastrointestinal tract, prebiotics can alter the composition of the organisms residing in the gut microbiome. Prebiotics are estimated to be around 167,000 and 390 million Euros worth globally (Siro et al. 2008). The main prebiotic components are fructooligosaccharide, inulin, isomalto-oligosaccharides, polydextrose, lactulose, and resistant starch. Foods containing a combination of these ingredients are often referred to as symbiotic due to the potential synergy between probiotics and prebiotics (Menrad 2003).

#### **2.2.5. Functional Meat**

Functional meat is a subcategory of the FF. The idea to consume meat for its practical purpose arose after recognizing that meat already contains several assortments. The meat industry can capitalize on the possibility of influencing the composition of raw and processed meat products. Pogorzelska-Nowicka et al. (2018) noted that some changeable materials include fatty acids, vitamins, minerals, dietary fibers, probiotics, plant antioxidants, and bioactive peptides.

#### **2.2.6. Functional Eggs**

Eggs are generally labelled as a natural functional food because they contain nutraceuticals (carotenoids, lutein, zeaxanthin), which protect against chronic diseases (Fernandez & Lemos 2019). They are also a good source of choline. VITA eggs from Freshlay foods (Devon, UK) are enriched with omega 3-fatty acids and vitamins (D, E, B12), folic acid, and selenium. In the United States companies such as the Pilgrim's Pride,

Gold Circle Farms, and Omega Tech began producing the functional eggs (Fernandez & Lemos 2019). However, Columbus eggs enriched with vitamin E and omega three fatty acids were the first to appear on the market in 1997 in Belgium, then the Netherlands in 1999 . Since 2000 they were available also in Japan, India, South Africa and nowadays the production of these functional eggs exceeded 50 millions yearly, in Europe only (Surai & Sparks 2001).

**Table 1**

*The Summary of FF and Their Sources Retrieved from Menrad 2003; Siro et al. 2008; Davari et al. 2019; Demirel et al. 2021*

Functional Food Categories	Examples
Functional Meat	Flaked meat
	Mince
	Meatball
Functional Cereals	Oatmeal
	Bread
	Cereal
	Flour
Probiotics	Yogurt
	Milk
	Cheese
	Kefir
Prebiotics	Whole grains
	Onion
	Garlic
	Honey
Functional Drinks	Beverage fortified with vitamins A, C, E
Functional Eggs	The increased omega-3 fatty acid content

### 2.3. Classification of Functional Foods

The successful development of FF initially started with including some of the critical nutrients, for instance: vitamins (e.g., C, E), and minerals (calcium, iron, zinc, folic acid). Additionally, to enhance the health benefits of the FF, other micronutrients were added, such as phytosterol, omega-3 fatty acids, and soluble fibres. Bekoglu et al. (2016) thoroughly investigated the numerous health benefits and nutrients gained from FF consumption, which has drastically increased in recent years. The majority of FF are currently thought to possess the ability to enhance bodily functions, significantly reducing the chances of diseases of its consumers (Kauffman et al. 1986).

Bekoglu and colleagues (2016) declared that the overall growth of the healthy foods market and particularly the rapid increase in FF products contributed to the consumers' awareness of such products. They also underlined the knowledge "gap" that surfaced, particularly in analyzing a specific food under the umbrella term of FF. Hence, the FF category's structure is neither single nor homogenous.

FF may be analyzed in all food categories. Functional eggs, beneficial meats, spreads, bakery products, good cereals, functional drinks, prebiotics, and probiotics are only some examples of FF in the nutrition market. Nevertheless, the most advanced products of FF in Turkey are dairy products (altered milk, yoghurt, quark, and kefir, for instance) (Isleten et al. 2007; Siro et al. 2008; Bekoglu et al. 2016). Siro et al. (2008) classified the FF products as shown below:

- **Fortified food products:** these are foods with added extra minerals or vitamins that are generally not present.
- **Enriched food products:** these are FF enriched with the vitamins and minerals that got stripped away during its refinement.
- **Altered food products:** these are the FF products designed by removing the harmful ingredients or components and further replacing them with a standard nutritional part, for instance, utilizing the degreasing ability of the fibre found in meat and ice cream.



- **Enhanced food products:** these types of FF are designed by increasing a specific ingredient or nutritional component, for instance, adding the ratio of omega-3 found in eggs (Elgasim & Al-Wesali 2000).

Apart from the classification mentioned above, Bekoglu et al. (2016) also highlighted that FF might be classified based on their health benefits (increase probiotic and prebiotic levels, improve stomach and colon function and so on). The final categorization of FF can be done according to their specific health-related purpose, regulating its consumers' cholesterol levels or blood pressure. Gluten-free food can be an example of FF products that ease the consumers' lives, providing greater comfort and enabling, for instance, lactose-intolerant consumers to enjoy a glass of lactose-free milk (Fakolade & Omojola 2008).

## **2.4. International Functional Food Market**

The recent technological advancements in food production and the variety of sciences involved have increased and diversified considerably. Therefore, the global interest in evaluating FF has rapidly escalated since the 1990s, contributing to the steep growth in the consumption of these foods and their accessibility on the market (Fakolade & Omojola 2008).

Notably, the success of "Yakult" contributed to the rapid spread of polyunsaturated fatty acids on which adequately capitalized Unilever in the 1960s. Flora and Becel were some of the first FF products from Unilever with related health claims (Dogan et al. 2011). The FF has been increasingly reported as "trending" throughout the food market. During the 1990s, the leading biotechnology, pharmaceutical, and food companies elaborated on and focused their strategic efforts on supporting FF's growth. However, after the end of this period, the total annual rate of growth for the FF industry was believed to be around 20% (Elgasim & Al-Wesali 2000)

Additionally, Bekoglu and colleagues (2016) further indicated that the overall demand for FF in industrialized nations drastically expanded. Its value in sales increased in 5 years (from 2003 to 2008) by 40% (Bekoglu et al. 2016). FFs' global market potential has been estimated to grow to \$192B by 2020 (Bekoglu et al. 2016). The global rise of FF

in the nutrition market is mainly influenced by the aggressive consumer awareness and recognition of the FFs' health benefits (Fakolade & Omojola 2008).

In the EU, the essential food markets include Italy, France, and Germany, Poland, and Hungary, which fall into the growing food markets bracket. Food markets classified as still growing are situated mainly in Eastern Europe, including Russia, Poland, and Hungary. Annunziata and Pascale (2009) highlighted that the EU food market has a heterogeneous structure primarily due to the recognizable differences in the acceptance and use of the FF at the local food market with the consumers' interest in such products. In northern and central Europe, the use of FF is believed to be influenced by more than solely the consumers' interest. For instance, FF consumers in the Mediterranean nations steadily prefer fresh foods, which is beneficial to their overall health (Grabein & Raebur 1988).

Moreover, in northern Europe (the Netherlands, Sweden, Finland), consumers growingly acknowledge the use of the FF products, raising the overall percentage of awareness in the population. Anderson and Berry (2000) marked Belgium as the European country with the lowest FF consumption. In contrast, the Brazilian FF industry grew by 11% between 2006 and 2007, accounting for more than \$6B. Lastly, as Annunziata and Pascale (2009) concluded in their research study, the FF market was expected to grow at approximately a 10% rate each year.

## **2.5. Overview of Functional Food Consumption**

During the early 21st century, customers began growingly concerned about their health (Frewer et al. 2003). They paid more attention to improving their lifestyle by consuming enhanced health-oriented diets. Some of the main reasons for increased FF consumption were the ageing population's desire to become healthier, the rapidly changing demography, and the effects of the urbanization process. The transition became apparent, particularly in the healthcare system (Frewer et al. 2003).

For many years already, Nutritional sciences have linked the consumed diet with its beneficial ability to fight diseases. Such associations are critical for introducing FF into the nutritional market (FAO 2004). However, some of the mainstream dietary trends, lifestyles, and consumption habits are major risk factors contributing to worsening health

by contributing to periodontitis, osteoporosis, obesity, type 2 diabetes, cancer, and coronary heart disease (WHO 2003). It is vital to confirm that FF plays an essential role in the overall quality of life, without harmful side effects (Hui 2001).

As stated, the term FF was initially introduced in Japan during the 1980s. Besides the extraordinary nutritional constituents, FF possesses tremendous psychological effects, which significantly aid innovation in food sciences (FAO 1992). There are varying opinions concerning consuming conventional foods that are important when considering a specific food type or category. The FF products have been continuously viewed as food options to provide enhanced, added health and nutritional benefits as opposed to traditional food products (Igene & Mohammed 1983).

Hippocrates stated that *“Allow food to be the medicine and the medicine is the food.”* It goes a long way in informing on the importance of food products. Several clinical trials and far-reaching research studies have revealed that the consumption of FF comes with numerous health benefits (Vella 2013). These include reduction in antiviral activities, antibacterial activities, reduced high blood pressure level, several effects of anti-inflammation, general enhancement of the gastrointestinal health status, low symptoms of menopause, improvement of the immune system, growth of the condition of the heart, and lower cancer risks. FF can also reduce the overall risks of acquiring several ailments like diarrhea, ulcer, high cholesterol level and high blood pressure level. Moreover, the designer FF are synonymously used to refer to the enhanced fortified nutritional ingredients present in the food products (Kotilainen et al. 2006). These unique nutritious ingredients and other complementary dietary ingredients may be understood as tailor-made foods that meet the individual health requirements and serving other therapeutic purposes. Moreover, the functional meals are adequately prepared by deliberately manipulating the genetic engineering and conventional formulation processes critical in providing the desired results (Hui 2007).

According to Bleiel (2010), the U.S., Japan, China, and the European food markets are among the most significant FF markets worldwide. Gracia et al. (2002) revealed that the overall statistical data reliably utilized in making the practical comparisons on the market size for the consumption of FF was based on the rate of expenditure. However, the rate of spending on food products continually changes with the population. For instance,

as the most populous country in the world, China has the most significant expenditure on FF amounting to \$33.01 (Kauffman et al. 1986). However, depending on the total size of the entire population, despite the market share, the per capita consumption of FF is significantly lower, which makes it more confusing in certain situations. Hence, Kapsak et al. (2011) established that both values studied were effectively utilized in evaluating the growth rates in the food market between different nations.

The functional foods in the U.S. initially started to successfully sell during the early 2000s, which increasingly depicted in the rapid growth rate, effectively reaching 50% of the entire US food market. The practical consumption of food witnessed a rapid growth rate during past five years, with about 52%. However, when analyzed with the European nations, the consumption of fast foods in the U.S. was still lower (Hoadley 2011).

## **2.6. Consumption of Functional Food in Turkey**

According to Bleiel (2010), Turkey is one of the most eminent nations in Europe, with approximately 80 million of population in the country. However, when Turkey is compared to other leading nations worldwide, the total consumption of FF in Turkey is much lower. The consumption patterns of the FF in Turkey may be considered an essential commercial gap that entrepreneurs should exploit in this affluent market (Grabein & Raebur 1988). Therefore, it is mainly attributed to the rapid increase in the demand for FF. The high demand for FF occurs particularly among the domestic population living in the big cities (e.g., Istanbul, Ankara, and Izmir). It primarily includes individuals who adopted a hectic lifestyle and are thus concerned with sourcing their bodies with sufficient nutrients throughout their daily product consumption (Bleiel 2010).

Over the past five fiscal years, 52% of market sales of the FF significantly indicated a drastic difference in the consumer's attitudes and preferences of FF consumption. The FF's total demand snowballs, thus presenting a lucrative environment for development (Kauffman et al. 1986).

According to Kapsak et al. (2011), the primary type of FF products that is increasingly consumed in Turkey are functional dairy foods, for instance: kefir, cheese, ayran, and yogurt, which are rich sources of probiotic nutrients. Despite their generally

beneficial effects on the human microflora in the digestive system, they can also harm the body by improving the indigenous microflora properties. Specifically, probiotics as essential forms of microorganisms may not be ingested and stimulate any of the body's specific bacteria, significantly influencing the person's overall health (Kauffman et al. 1986).

In summary, about 52% of the entire growth rate in the FF consumption from F.Y. 2012 to F.Y. 2017 indicated that customers in Turkey depicted tremendous potential in consuming the FF and including them in their daily diet (Fernandez-Lopez et al. 2003). Lastly, Kapsak et al. (2011) disclosed that dairy products were considered the most consumed FFs in Turkey. Hence, companies operating in Turkey might significantly benefit from providing access to these foods and bringing them into the broader Turkish market.

## **2.7. Factors Influencing Consumption of Functional Food**

The entire size of the FF market in Turkey may be viewed as very limited. Most convenience food products have increasingly earned more popularity in the rapidly changing foods market.

The level of employment and household income are two significant socio-economic factors that play a critical role in identifying the customer's decisions about food consumption. Such factors are also vital indicators of Turkish consumers' actions and attitudes towards the FF (Szakály et al. 2012).

Argin et al. (2019) conducted a study on Turkish consumers' perception of functional dairy products to determine taste factor of FF. The study observed that the taste of the product is a very important parameter for consumers. Therefore, consumers had chosen milk with a natural smell and taste instead of soymilk and processed milk. In addition to the above finding, regardless of their awareness and education, dairy product consumers still were not willing to compromise on the taste of dairy foods independent of how healthy the product is.

A study conducted by Isleten et al. (2007) revealed that socio-demographic properties, prices, and labels of food products also affected consumer choice of functional

food. Especially for women consumers, labels of food products were significant while young respondents were less interested in labels except for energy tables and nutrition. This study had also shown that an increase of the respondents' age and level of education leads to an increase of expectation limit for health improving characteristics of FF.

The C.F.P. have also increasingly gained popularity over the past decade. Further, empirical evidence increasingly proves how important individual socio-demographic factors are, including age, gender, and income (Igene & Mohammed 1983).

Verbeke (2006) studied the willingness to compromise on taste for health reasons in FF according to consumers' attitudinal determinants and the socio-demographic aspects (age, gender, income, and education) in a Belgian sample. Results showed that the perceived importance of food for health reasons increased significantly during the data collection interval. On the other hand, FF in a healthy and tasteful diet decreased within the data collection interval (İşleten et al. 2007).

Developing the FF market, with consumer-based products, and making a profit with market opportunities go together with consumer acceptance of the concept of FF and a better understanding of its determinants (Ares & Gambaro 2007; Grunert et al. 2007; Verbeke 2005). Acceptance of failure rates from recent food cases have shown that consumer acceptance is often neglected or at least far from being understood. Most of the studies investigated consumer reactions towards FF during the second half of the 1990s in the U.S. and Europe (Hopkins 1981; Siro et al. 2008).

A vast amount of current research indicated that factors such as product-related characteristics (Coxa et al. 2004; Nocella & Kennedy 2012; Pinto et al. 2017) play a role in the purchasing behaviour of the FF (Verbeke 2006; Bimbo et al. 2017). Moreover, consumer-related elements also significantly influence the purchasing of the FF, such as psychological factors, eating habits, traditions, culture, education, age, and gender (Gulseven & Wohlgenant 2014; Bornkessel et al. 2014; Kaur & Singh 2017).

However, the minority of consumers do not want to compromise the taste of healthy food (Verbeke 2006), while others simply do not believe in the health claims of the FF products. Although the health-enhancing claims regarding FF consumption are crucially effective on consumers' purchasing decisions, this finding clearly showed that individual preferences of the consumer still play an important role.

## **2.8. Legislation of Functional Food in Global and Turkey Food Market**

Fernandez-Lopez et al. (2003) highlighted that some vital worldwide nations actively enacted an FF regulation into their legislation. The role of umbrella legislation regarding FF is critical in influencing the manufacture and marketing of such food products (Fernandez-Lopez et al. 2003). Respectively, due to the legislative system constantly changing between different nations, it is prudent to provide a comprehensive evaluation of how the FF are labelled and the regulations guiding the consumption of FF. Some of the major nations strongly advocate for consuming FF due to their ability to contribute to a better overall health.

China and Japan are believed to be perfect examples of nations making little progress towards the legal distinctions in FF. Other countries actively regulate the important use of nutrition health claim via nation-specific organizations. For instance, the F.D.A. which operates in the U.S., "Health Canada" which operates in Canada, the "Food Control Department" that operates in Singapore, the "State Food and Drug Administration" that actively operates in China, the "Ministry of Labor, Health and Welfare that operates in Japan and finally, the Food and Drug Administration in Korea are just some examples of regulatory organizations (FAO 2004). Europe has also its own organization, which regulates the functional foods market, the European Food Safety Authority (EFSA). Lenssen et al. (2018) reported that EFSA created a uncertainty regarding the evaluation of health claims, further slowing and impairing the development of FF and the investment required.

Over the past years, some of the major government institutes allowed nutrition health claims, but the regulative aspect of the nutritional claims was left to the private corporations in countries like the U.K. and Sweden. Kapsak et al. (2011) highlighted additional countries which focused on developing the proper nutrition and health regulations, particularly the E.U., Australia, and New Zealand. As mentioned above, the F.D.A. is in charge of nutritional health regulations in the United States. However, they are also in charge of managing three significant health nutrition claims based on: 1. pre-determined scientific formal agreement, 2. statements of authority, and 3. qualified health claims (Kapsak et al. 2011).

According to Khanal and Olson (2004), some of the regulations of the food ingredient requirements dictate the ordinary levels of usage of the food ingredients in the nations. These nations also incorporate very strict limitations on individual health and nutrition claims related to all the FF' individual components. There are three various types of application of the health claims: 1. the content of nutritional claims, 2. the function and structure of these claims, and 3. the nutrition claims for the food products/supplements in the diet put together by the F.D.A., Applied Nutrition, and Centre for Food and Safety institutions.

According to Hardy (2000), the content of the nutrition claims merely describes the individual amounts of a specific ingredient component that serves the important function of a product. The function of the nutritional claims is vital because it explains how the product ingredients are responsible for affecting the function of the human body. Individual health claims are also described as the relationship between the food components and their ability to decrease the overall health.

In the current market, FF have a limited amount of nutrition claims that are approved. However, critical research studies revealed that FF' health effects and benefits would drastically decrease in the following years. Accordingly, the F.D.A. continuously focused on a precise definition of the FF and what such foods should be among its manufacturers and particularly its consumers (Khanal & Olson 2004). Even the individuals, who project negative perceptions on the appropriate FF definition, should acknowledge the prevailing statutory practices. Such practices are constantly used to design the proper cooking food ingredients that could effectively serve the FF's purpose. Finally, Kwak and Jukes (2001) also concluded that there is a need for increased regulations unless the part of the FF is G.R.A.S.

According to Kapsak et al. (2011), legislation of the FF in Turkey was mainly viewed as the key factor affecting the manufacturing and labelling of the FF. The varied food product ingredients, which have the unique ability to proclaim their health nutritional aspects within the potential limits, may be effectively determined within the foods act's legal framework. It is prudent to actively use the nutrition claims found on the labels of the FF for all their advertisements to remove all the fraudulent commercial trading practices that are imminent within the food sector.



The usefulness of the FF in various foods is not yet clearly defined. Because of that the estimation of the FF market cannot be done easily. The global market of FF is expected to be at least \$33 billion according to the definition of FF, by which ingredients with an additional health value have been added to foods, which was announced to the consumers. Menrad (2003) estimated the global FF market to be 47.6 billion US\$ worth, United States being the largest market segment, followed by Europe and Japan. In total, FF has a market share of around 2% to 3% in the U.S.

It is not surprising that in Japan, regarded as the birthplace of FF, the market for these products is significant. In total, more than 1700 useful food products have been launched in Japan between 1988 and 1998, with an estimated turnover of around 14 billion US\$ in 1999 (Kapsak et al. 2011). The market was expected to be 5 billion US\$ in 2003 and 5.73 billion US\$ in 2006, while more than 500 products were labelled as F.O.S.H.U. in 2005 (Side 2006; Fern 2007). The European market for FF was estimated to be between 4 and 8 billion US\$ in 2003, depending on which foods were regarded as useful. This value has increased to around 15 billion US\$ by 2006 (Kotilainen, Rajalahti, Ragasa & Pehu 2006).

Kapsak et al. (2011) considered the current market share of FF as still below 1% of the total food and drink market. The most important European countries within the FF market were France, Germany, the Netherlands, and the United Kingdom. Even though the FF market in Turkey is in the early stage, it has a big potential for development, which is increasing daily. It is stated that the FF market reached 356 million US\$ in 2007, with increasing 18.3% according to the previous year. It is thus considered that the Turkish Food Codex deficiencies are a big drag in the FF sector, which has the potential of up a coming FF market.

## **2.9. Theoretical Consumption Framework**

### **2.9.1. Consumer Behaviour Theory**

The Consumer Behaviour Theory is a theoretical framework mainly utilized to explain how the customers in the economy purchase their services and goods. The model is also useful in describing how the customers effectively allocate their household income towards purchasing commodities, goods, or products based on preferences and how the price of the underlying products influences the consumer's purchasing decisions. The leading consumer behaviour theoretical framework that will be useful in analyzing consumer behaviour towards the FF in Turkey is the Utility Theory (Hardy 2000).

### **2.9.2. The Utility Theory**

The utility theory explains the total satisfaction gained by one consumer from consuming a particular product. The overall level of consumption efficacy for a specific product and service may not be the same for every individual because people's preferences may vary, which also implies varied tastes and choices in the consumption of different products. Human satisfaction posits a great challenge to measure because of personal differences and the lack of a specific unit of measure. However, researchers can utilize "utils" to analyze the satisfaction gained from consuming a specific commodity. Valid comparisons may not be achieved between different people when evaluating the satisfaction gained from consuming different products. It is mainly because the "utils" may only be used in assessing the individual's level of satisfaction from the consumption of a product or service (Hopkins 1981).

Because most individuals prefer different products or services, the "utils" may not be viewed as individual units of measuring in evaluating their fulfilment. Therefore, the utility function is a unique way to explain the connection between the innate desire of an individual to consume varying amounts of the products or services in the market (Hopkins 1981; Juster 1990). Additionally, the utility consumer theory also shows that marginal utility may be viewed as the total quantity of a product or service (Hardy 2000). The total

number of the consumed units either adds or subtracts to the entire consumer utility. A marginal utility may also be viewed as a change in satisfaction and experience by either one or more product units consumed. According to Hardy (2000), the utility theory is established based on the following assumptions:

The customers in the market are rational individuals, and they always focus on maximizing the total level of satisfaction from consuming goods and services available in the market.

Customers decide to purchase the products or services by evaluating the satisfaction gained from consuming various products and services. The customers also adhere to and ultimately face a constrained budget, which goes a long way in limiting their spending ability and curbing the number of products they could purchase during a particular period.

The Utility theory aids in explaining the consumers' reasons for purchasing the FF, such as multiple health enhancing effects, awareness of product ingredients, purchasing frequency, product price, and taste. Hence, the usefulness of the FF for the consumers is a crucial factor in determining the consumers' satisfaction with the said products (Hardy 2000). FFs are primarily used for their substantial benefits for the human body, therefore the Utility theory has a place in most FF research.

Finally, the utility theory is established on the innate belief that the consumers in the market prefer certain products or services instead of other products for satisfactory reasons. This may effectuate the real difference between the products and services they prefer more than other consumers in the market.

### **3. Thesis Objectives**

The main objective of this thesis is to investigate consumers' attitudes towards functional food (FF) in Turkey. More specifically, this thesis' aims are:

- To understand and evaluate customers awareness of FF among the respondents in Turkey;
- To identify the main FFs consumed by the Turkish consumers and the frequency of consumption;
- To identify the main reasons for FFs consumption by Turkish consumers;
- To examine the impact of socio-demographic characteristics of the respondents (age, gender, educational level, income, and residence place) on FFs consumption;
- To identify and evaluate the most frequently reported health reasons for FFs consumption by Turkish consumers.

#### **3.1. Research Question**

With the changing patterns in FFs markets in Turkey, there is an increase in demand for FFs by Turkish consumers. There is a need to further study consumers' behaviour and the factors influencing the FFs consumption in the Turkish market. To achieve that, this research attempts to answer the following questions:

- 1) Are the consumers in Turkey aware of FF?
- 2) Which socio-demographic factors of the respondents have an impact on FF consumption?
- 3) What are the main motivating factors leading to the consumption of FF in Turkey?
- 4) Where do the consumers in Turkey get information about FF?

## 3.2. Hypotheses

Following the literature review, this research have the following hypotheses:

- **Hypothesis H1:** Gender has a significant influence on FFs consumption (Siegrist et al. 2008).
- **Hypothesis H2:** The internet as the main source of information for FF' consumers is associated with FF consumption (Kolbina et al. 2020).
- **Hypothesis H3:** Educational level of the respondents significantly affects the consumption of FFs (Siegrist et al. 2015).
- **Hypothesis H4:** Income of the respondents has a significant effect on FFs consumption (Buyukkaragoz et al. 2014).

## 3.3. Research/Knowledge Gap

Despite the numerous health benefits of FF across the globe, the total market share in the consumption of fortified foods is still much lower when comparing the incumbent drink and foods that are more prevalent in the market. Therefore, there is an urgent need to conduct more research studies and evaluations on the significance of FF and why more customers should progressively focus on including this nutritional food product into their daily diet. Several stakeholders should work together in an attempt to create an intensive awareness initiative to shed light on the importance of consuming FF in Turkey.

This thesis was focused on addressing the existing knowledge "gaps" about the individual consumer patterns or behaviours towards FF. Therefore, this thesis evaluated the consumers' perceptions or attitudes, buying patterns, or consumption behaviour in Turkey towards FF. Additionally, the study evaluated and analyzed consumer preferences, attitudes, and knowledge about the fortified foods in Turkey by conducting a comprehensive research study on an identified sample of representative respondents (Kotilainen, Rajalahti, Ragasa & Pehu 2006).

## **4. Materials and Methodology**

### **4.1 Research Design**

To collect secondary data, mainly journals and articles from trustable sources were used. The main sources were ResearchGate, Emerald, Web of Science, Science Direct in order to compare results and provide a discussion to this study. Furthermore, information from relevant institutions (e.g. WHO, FAO) and official governmental documents were researched.

Primary data was collected through questionnaire-based survey. The target group was Turkish residents that are actively living in Turkey. A sample of 217 respondents was selected using convenient sampling technique. The data collection took place in Istanbul, Turkey in January 2020. Completion of questionnaires, which were written and served verbally, took 30 days to obtain required data from all respondents.

During data collection, a letter of introduction which consist of partly abstract and literature part of this thesis has been presented to respondents. This letter introduction was effective in helping the researcher to gather information from the respondents easily.

In order to collect primary data of this research structured questionnaire was used. The questionnaire consisted of closed questions and it was conducted with face-to-face interview method. Respondents were interviewed in the Turkish language and the average time per questionnaire was 15 minutes.

The study was conducted in Istanbul, the most populous city in Turkey. The knowledge of consumer behaviours towards FF is limited and outdated in this area. Nearly 20% of the Turkish population (84.3 million) live in Istanbul, and there is one of the largest domestic immigrations throughout Turkey (TUIK 2021). Moreover, Istanbul is also uniquely situated at the border of the Asian and European continents, providing a blend of both cultures and easy access to FF products.

Following the purpose of the survey, the respondents were selected from 18-65 years old adults who are responsible for grocery shopping and are living in Istanbul.

**Figure 1.**

*Map of the study area Istanbul, Turkey*



*Source: Encyclopedia Britannica, Inc.: Istanbul (Inc EB, 2009)*

## **4.2. Questionnaire Design**

Structured questionnaires were used to collect primary data using face-to-face interviews. The questionnaire is divided into two parts. The first part of the questionnaire is composed of 7 questions that focused on the aspects related to FFs consumption. Likert-type scale (Likert 1932), and multiple-choice closed-ended questions with tables were used in this section. These 7 questions were measuring detailed information about FF consumption preferences, purchasing reasons, information sources, purchasing frequency, purchasing location, monthly expenditure on FF. The second section, which is comprised of 6 questions, was used to retrieve socio-demographic characteristics of the respondents such as gender, education level, age, net income, size of residence, economic activity.

The questionnaire is listed in the Appendix of this thesis.

### **4.3. Data Analysis**

The questionnaire was administered to 217 respondents of which 182 were valid to analyze after data coding and cleaning.

The collected data was edited, coded and analyzed using Microsoft Excel 2020 and IBM SPSS software version 27. The researcher used descriptive statistics to describe and summarize the main characteristics of the sample. This enabled the researcher to examine the main features of the sample and to establish the baseline for the hypothesis testing. To effectively comprehend the inherent relationship between the food preference of the consumers' in Turkey, the following variables were considered: the reason for purchasing the FF, how consumers gather information concerning the FF, and if the respondents know the meaning of FF.

Binary logistic regression was used to investigate the factors affecting the awareness of Turkish consumers towards FFs. The dependent variable Y specified whether the respondents were aware of the FF products (Yes=1, No=0). This was measured based on the question "Do you know the terms functional food?". Multiple independent variables were chosen as potential factors that have an impact on FF awareness. These variables comprised; age, gender, educational level, household income, residential area and occupation.

The model is described in Table 2.



**Table 2.** *Table 2 Description and Measurement of the Variables Used in the Binary Logistic Regression Model*

Variables	Description
<b>Dependent Variable</b>	
<i>Do you know the terms functional food?</i>	1= Yes, 0= No
<b>Independent Variables</b>	
Gender	1= Female, 0= Male
Age	1= <19
	2= 19-29
	3= 30-39
	4= 40-49
	5= 50-59
	6= 60 +
Education	1= Primary
	2= Apprentice
	3= Secondary
	4= Undergraduate
	5= Graduate
Residential area	1= Up to 10,000 inhabitants
	2= between 10,001 – 50,000 inhabitants
	3= between 50,001 – 100,000 inhabitants
	4= between 100,001 – 1,000,000 inhabitants
	5= 1,000,001 inhabitants and more
Occupation	1= Student
	2= Employed
	3= Entrepreneur
	4= Unemployed
	5= Pensioner
	6= Maternity leave
Family income (Turkish Lira)	1= Less than 2,000
	2= 2,001 – 3,000
	3= 3,001 – 5,000
	4= 5,001 – 8,000
	5= 8,001 – 15,000
	6= 15,001 – 30,000
	7= 30,001 – 50,000
	8= 50,001 and more

## **5. Results**

### **5.1. Characteristics of the Respondents**

About 88 respondents were women, while 94 of the selected study respondents were men. The female respondents signified 48.4% of the total sample population, while the men respondents represented 51.6% of the sample population.

The majority of the respondents (35.7%) were between 19-29 years old. The smallest age group was 60 years and more which consisted of only 1.1% of respondents. The majority (49.5%) has secondary education and just 3.8% of participants graduated from university. Participants of the survey lived primarily in the urban area (84%), while the rest lived in the rural areas (16%). The majority (57.7%) were employed. 49.5% of respondents had a net household income of 3,001 – 5,000 TRY (370 - 620 EUR) and the second common income level (36.3%) was 2,001 – 3,000 TRY (250 - 370 EUR). Typical respondent of the survey was a man who had a secondary education, was employed, and had an income of 3001 - 5000 TRY (370 - 620 EUR) (Table 3).

**Table 3**  
*Socio-demographic characteristics of the Respondents*

Variables	Frequency (n=182)	Percentage
<b>Gender</b>		
Women	88	48.4
Men	94	51.6
<b>Age</b>		
< 19	15	8.2
19-29	65	35.7
30-39	48	26.4
40-49	38	20.9
50-59	14	7.7
60 +	2	1.1
<b>Educational level</b>		
Primary	16	8.8
Apprentice	29	15.9
Secondary	90	49.5
Undergraduate	40	22.0
Graduate	7	3.8
<b>Residence area</b>		
Urban	153	84.0
Rural	29	16.0
<b>Occupation</b>		
Student	38	20.9
Employed	105	57.7
Entrepreneur	17	9.3
Unemployed	7	3.8
Pensioner	10	5.5
Maternity leave	5	2.7
<b>Net income of household (Turkish Liras*)</b>		
< 2 000 TRY	16	8.8
2 001 - 3 000 TRY	66	36.3
3 001 - 5 000 TRY	90	49.5
> 5001 TRY	10	5.4

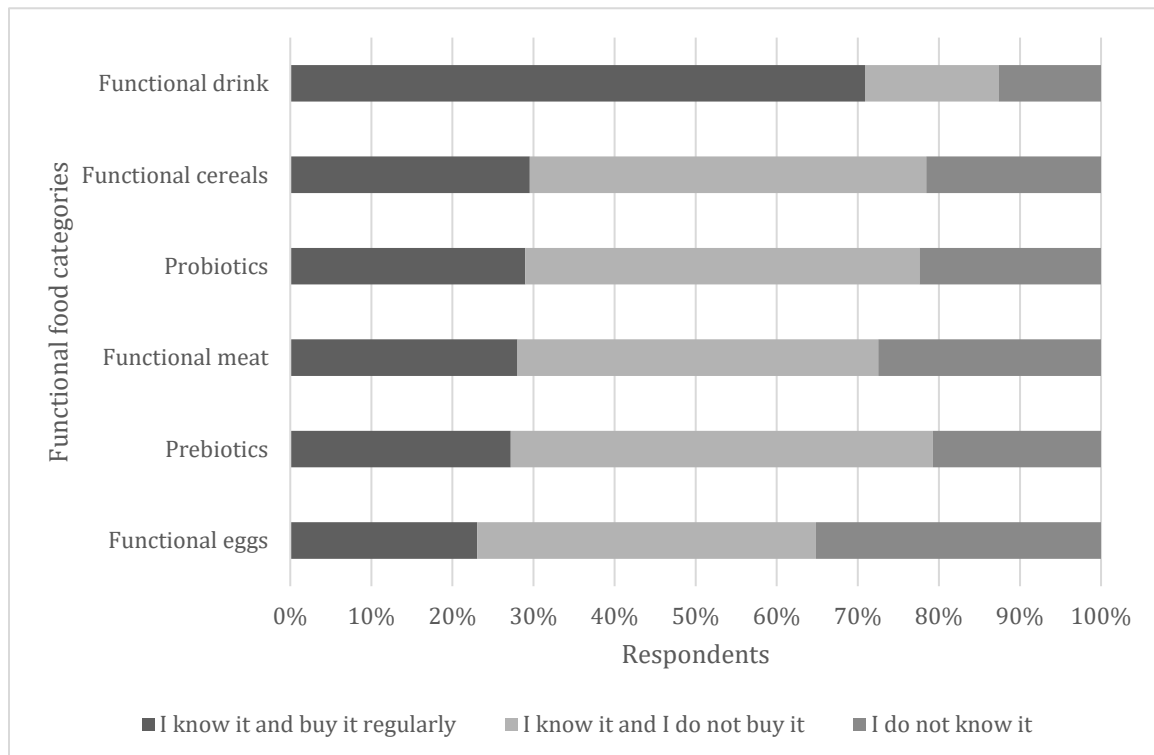
\*1 EUR= 8.0547 Turkish Lira  
(ECB 2021)

## 5.2. Consumers Attitudes towards Functional Foods

Analysis of respondents' answers revealed that 51.1% of participants were not familiar with the term FF, while 48.9% knew the term. As the results show the majority of Turkish consumers tend to purchase less of the functional food that they know of. The respondents were asked whether they knew the type of FF products and whether they usually bought it. The most common preference of the participants were functional drinks (71%), functional cereal (30%), and probiotics (29%) which they knew and bought regularly. Prebiotics was chosen by 52% of respondents as FF category which they knew but did not buy. Additionally, functional egg (35%) was the least familiar FF category for the participants.

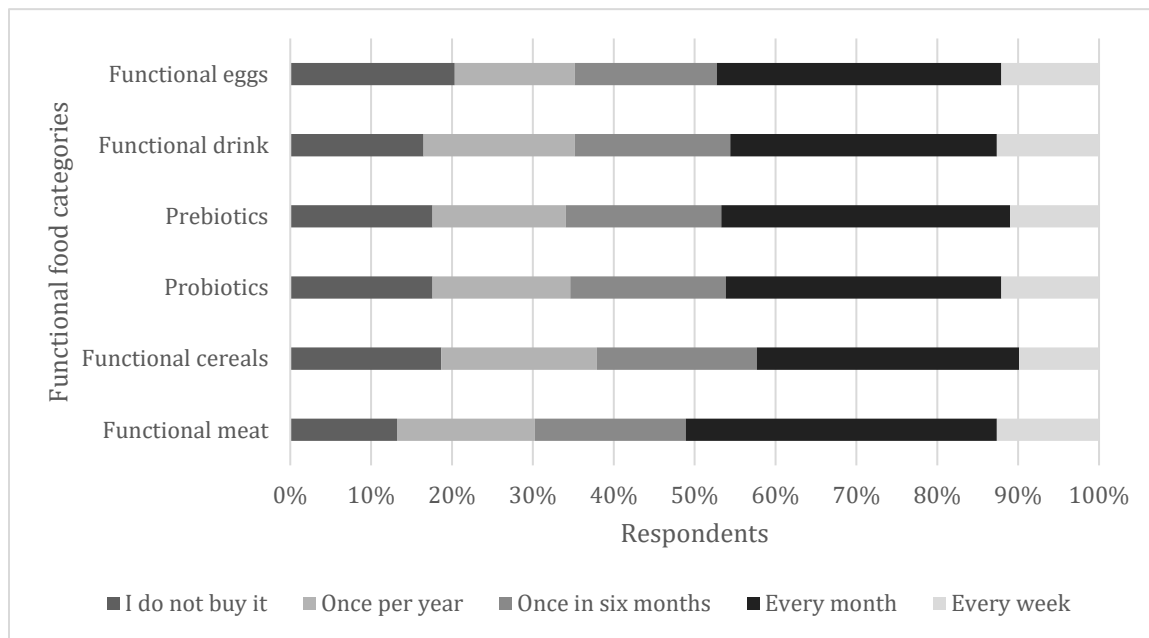
Out of the 182 participants, 45% disclosed that they knew about functional meat, but did not buy it (Figure 2).

**Figure 2**  
*Awareness of Turkish Consumers Towards FF Categories*



With regards to FF purchasing frequency, 35.7% of respondents effectively had prior knowledge of the prebiotics but did not purchase them regularly (for instance once per year, once in six months). Additionally, about 45.6% mentioned that they knew about functional drinks and purchased them regularly (Figure 3). The functional eggs were chosen by 32.4% of the respondents, informing that they knew about the functional eggs, but they did not purchase them regularly. These findings indicated how consumers in Turkey prefer buying functional drinks and probiotics. However, most Turkish consumers knew about functional meats, functional cereals, and prebiotics, but they did not purchase these products regularly.

**Figure 3**  
*FF Purchasing Frequency by the Respondents*

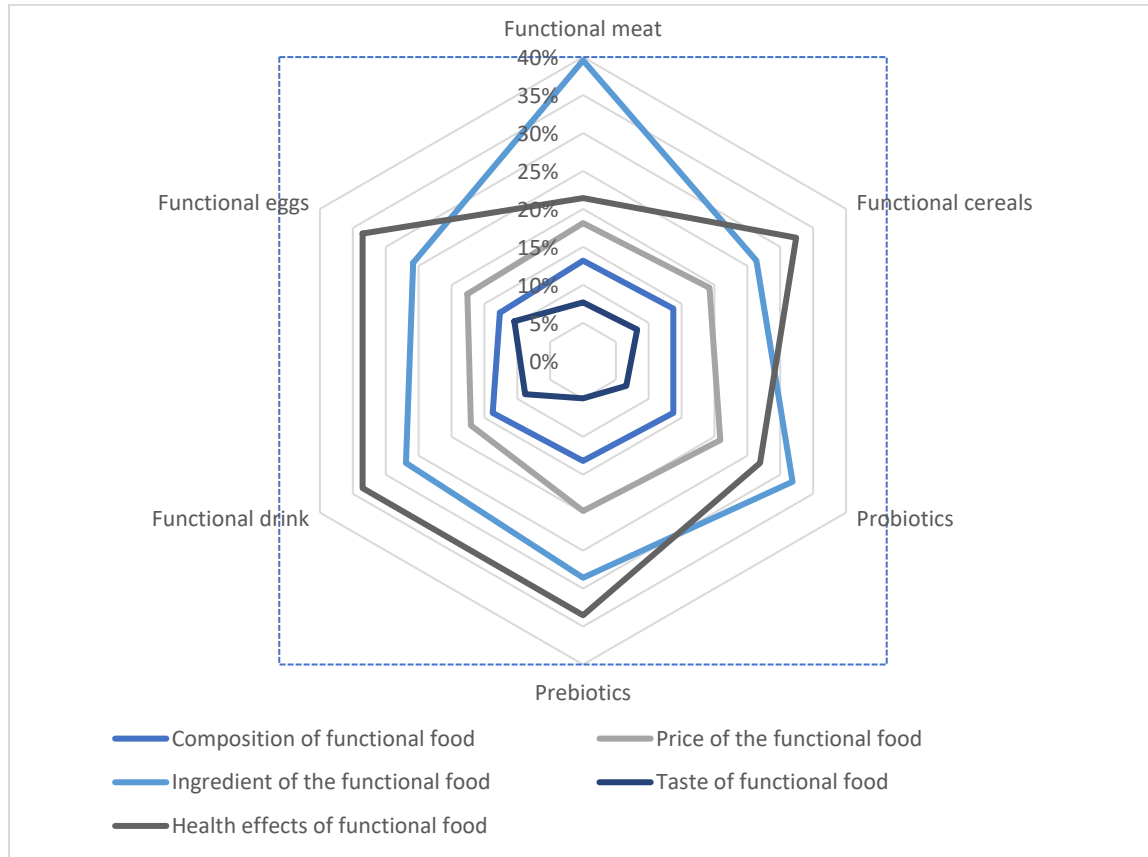


Detailed analysis of the most effective reasons for FF consumption unveiled that majority of participants were consuming FF due to its health benefits with 56.1% (Figure 4). It, therefore, support the second hypothesis, stating that the majority of Turkish consumers consumed FF because of its health-improving effects. Prebiotics, functional drinks and eggs were the three main categories for the health-enhancing effect of FF. The taste of prebiotics was among the most negligible factor of effectiveness in determining the

reasons for consumption indicated only by 4.9% of participants. The functional meat category's composition skyrocketed in reason effectiveness for FF consumption, as 72% of participants stated. Lastly, the price of FF was the minor influential determinant of FF consumption, supported only by 18.8% of the total sample.

**Figure 4**

*Effective Reasons for Consumption of Functional Food (Composition: Nutritive Substances as Vitamins, Minerals, Ingredients: Food Additives)*



Regarding effect of health-life reasons on FF consumption, 51.1% of participants agreed that FF consumption could improve physical health and sports performance. Other 17.6% strongly believed that FF consumption protects against cancer. However, 24.2% of participants disagreed with FF's reproductive and sexual health effects, and 8.2% strongly disagreed with the weight loss and body control claims related to FF consumption.

Nevertheless, over 60% of participants agreed on all health benefits while 30% disagreed on all health benefits of FF consumption.

Gender differences appeared in the percentages related to agreement with the FF's health benefits in almost all presented categories. They did not appear or were very small in antiaging effect (women 60.2%, men 59.6%), physical and sports performance (women 60.2%, men 61.7%), and protection against hypertension (women 50%, men 48.9%). Female respondents agreed more with the FF's benefits for regulating stress and sleep, weight loss and body control weight, mental activity and performance, resistance against fatigue, and reproductive and sexual health. Male respondents agreed more with the FF's ability to protect against cancer and enhance the immune response. Statistical significance appeared in the regulation of stress and sleep reasons for the FF consumption (Table 4).

**Table 4**

*The Most Frequently Reported Reasons for Consumption of Functional Foods with respect to Gender of the Respondents*

Variables	Female		Male		<i>p</i> -value
	%	Rank	%	Rank	
Health reasons for use FF					
Regulation on stress and sleep	73.9	1	45.7	9	.001**
Weight loss or control body weight	62.5	2	53.2	6	.442
Mental activity and performance	61.4	3	52.1	7	.135
Physical and sport performance	60.2	4	61.7	2	.805
Antiaging effect	60.2	5	59.6	3	.397
Body's resistance against fatigue	56.8	6	54.3	5	.220
Protector against cancer	54.5	7	64.9	1	.057
Reproductive and sexual health	52.3	8	43.6	10	.505
Improvement of the immune response	52.3	9	56.4	4	.221
Protector against hypertension	50	10	48.9	8	.907

\*\*= significant at  $p \leq 0.05$

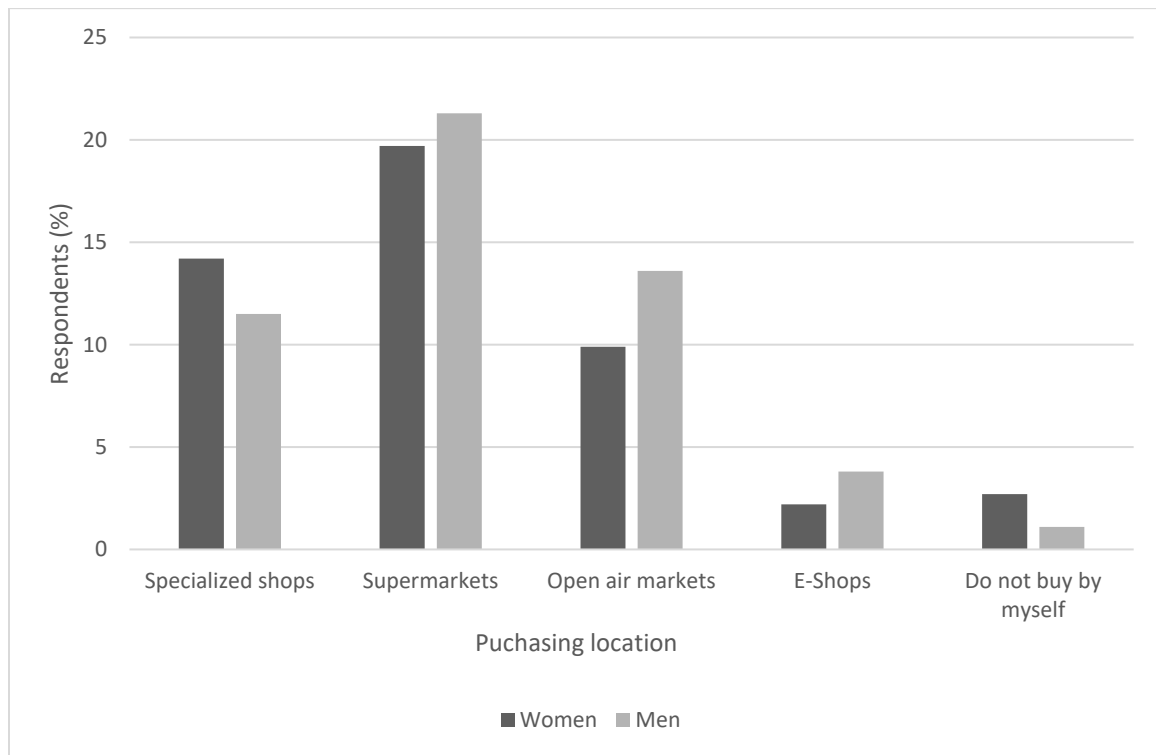
41.2% of respondents preferred to purchase FF at the supermarket, males (39) and females (36) almost equally, while only 6% used e-shops and 3.8% did not buy FF

themselves (Figure 5). Women were more interested in purchasing FF from specialized shops than men.

Regarding monthly expenditure, nearly half of respondents (46.7%) desired to spend less than 250 TRY (31 EUR) monthly on FF products. This result might be related to the income level in Turkey. Men and women participants were divided almost equally on the overall expenditure of FF consumption. On the other hand, only 2.2% of participants were informed that they could afford to buy FF products that cost more than 2000 TRY (250 EUR). Another important finding reported that 87.4% of participants could not spend more than 499 TRY (62 EUR) on FF.

**Figure 5**

*FF Purchasing Location*

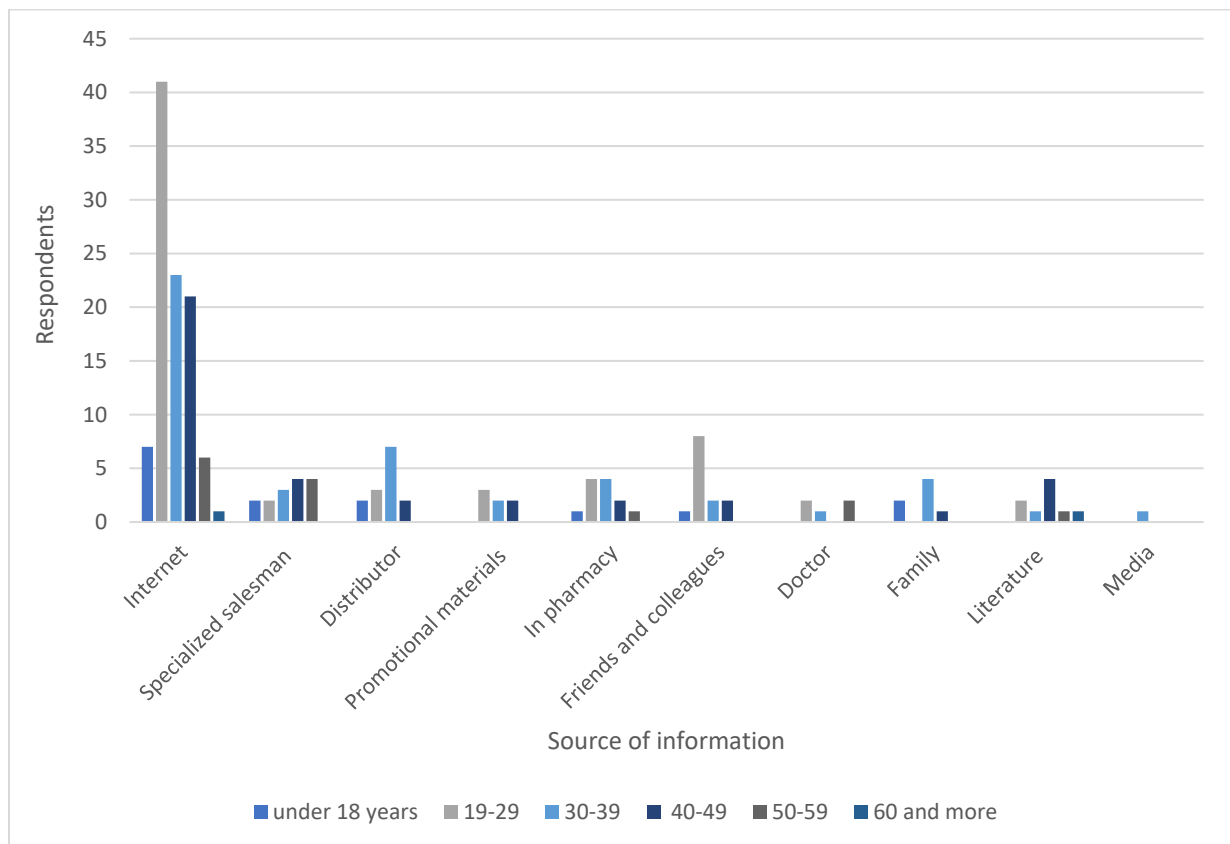


Participants' preferred source of information in all age groups was the Internet (54.4%), followed by sales specialists (8.2%), and television was the least used means of information about FF, with only 1% of participants using it (Figure 6). Hence, the third



hypothesis was confirmed, proving the internet to be the primary source of information for the current sample. Additionally, the 19-29 age range participants used the internet the most. Lastly, other available sources besides the internet did not reach statistical significance.

**Figure 6**  
*Information Sources of FF Among Age Groups*



### 5.3. Factors Affecting Consumers Awareness towards Functional Foods: Results of Binary Logistic Regression

In order to identify if the independent variables significantly predicted participants' FF awareness, the logistic regression method has been chosen.

The variables in the model explain between 13.6% and 18.2% of the variance of consumers awareness of FF in Turkey (Table 5).

**Table 5**

*Model Summary*

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	225.568	0.136	0.182

The Hosmer-Lemeshow Goodness of Fit test was 9.698 with a significance level  $p=0.287$ . This value is higher than 0.05 which support the model.

The results of the model analysis are found in Table 6 which is consist of socio-demographic factors and respondents awareness level (considering yes/no reply of the survey' first question). Only two factors showed statistically significant contribution to the model. First factor is the residential area, it showed two significant values for residence in towns up to 10,000 inhabitants and residence in areas populated between 50,001-100,000 inhabitants (p-values 0.077 and 0.016 respectively). The positive B-value for both categories indicate that people residing in these two areas are more likely to be aware of FFs.

The second socio-demographic predictor of FF awareness is occupation which only showed a significant value as being a student (p-value 0.039, significant at  $p\text{-value} \leq 0.05$ ). At the same time, gender, age, education level, income level does not have any statistically significant influence on FF awareness. Other occupations (employed, entrepreneur, unemployed, pensioner and maternity leave) were tested but not found significant.

**Table 6***Results of Logistic Regression Analysis of Factors Influencing FF Awareness*

Socio-demographic factors	<i>B</i>	<i>S.E.</i>	<i>p</i> -value	Odds Ratio
Gender (being Female)	-0.539	0.338	.111	0.583
Age	-0.190	0.144	.187	0.827
Education	-0.178	0.175	.310	0.837
Residential area				
Up to 10,000 inhabitants			.077*	
Between 10,001 – 50,000 inhabitants	1.457	0.947	.124	4.292
Between 50,001 – 100,000 inhabitants	2.818	1.168	.016**	16.744
Between 100,001 – 1,000,000 inhabitants	0.574	0.594	.334	1.775
More than 1,000,001 inhabitants	0.164	0.530	.757	1.178
Occupation				
Student			.039**	
Employed	-0.524	1.130	.643	0.592
Entrepreneur	0.931	1.086	.391	2.537
Unemployed	0.828	1.181	.483	2.288
Pensioner	0.356	1.352	.792	1.428
Maternity leave	1.348	1.285	.294	3.850
Family income (Turkish Lira)	-0.045	0.153	.766	0.956

\*\*= significant at  $p \leq 0.05$ , \* significant at  $p \leq 0.1$

Based on the binary logistic regression results, we can conclude that residential area and occupation (being student) are the significant factors on FF awareness.

In order to test hypotheses, Chi-square analysis of independence was employed to test the relationship between each of the following factors (gender, educational level, income, and having internet as the main source of information for FFs) and the FF consumption variables represented by the question about the frequency of purchasing

different FFs (every week, every month, once in six months, once per year, I do not buy it).

The results are presented in Table 7. The values reported in this table are for P *p*-values.

**Table 7**

*Pearson Chi-Square Correlation Between FFs Consumption Frequency, Gender, Education, Income, and Internet Access*

Functional Foods	Gender	Internet	Educational level	Income
Functional meat	.399	.589	.969	.116
Functional cereals	.601	.478	.136	.524
Probiotics	.351	.030**	.657	.790
Prebiotics	.801	.508	.902	.351
Functional drink	.100	.729	.355	.575
Functional eggs	.465	.044**	.676	.968

\*\*= significant at  $p \leq 0.05$

The results for hypothesis testing show that:

- **Hypothesis H1:** Gender has a no statistically significant relation with the consumption of FFs investigated in this study. *H1 was not confirmed.*
- **Hypothesis H2:** The internet as the main source of information for FF' consumers was confirmed to be associated with FF consumption for only two products: probiotics and functional egg. *H2 was confirmed for probiotics and functional eggs.*
- **Hypothesis H3:** Educational level has a no statistically significant relation with the consumption of FFs investigated in this study. *H3 was not confirmed.*

- **Hypothesis H4:** Income has a no statistically significant relation with the consumption of FFs investigated in this study. *H4 was not confirmed.*

Table 8 showed the statistical significance of correlations between participants' attitudes and the consumption of various functional food products (considering FF products awareness question). Gender correlated significantly more flour, cheese, and whole grains, hence more males than females consumed these products. Higher educational levels correlated significantly with garlic mainly, and also with flaked meat and flour. More educated people (undergraduate and graduate levels) are therefore more open towards these FF products. Moreover, the bread and mince were significantly related to a denser populated residential area according to the correlational analyses. Further, higher net income was significantly correlated with the consumption of onion and milk. Awareness was significantly linked to longer employed consumers and more populous residential area (Table 8).

### **Table 8**

*Relative Values of Reported Use of Functional Foods According to Socio-Demographic Characteristics of Respondents (N=182)*

Variables	Total sample		Aw	FlM	Mi	Me	Oa	Br	Ce	Fl	Yo	MI	Ch	Ke	WhG	On	Ga	Ho	BfW	IoF
	N	%																		
<i>Gender</i>										*			*		*					
Women	88	48.4	43.2	22.3	25.5	28.7	34.0	33.0	26.6	16.0	31.9	29.8	23.4	28.7	30.9	36.2	16.0	29.8	35.2	13.6
Men	94	51.6	54.3	30.6	30.7	30.7	35.2	35.2	26.1	30.7	34.1	37.5	20.5	26.1	17.0	39.8	23.9	23.9	50.0	10.6
<i>Age</i>																				
< 19	15	8.2	53.3	13.3	40	40.0	33.3	46.7	20.0	40.0	33.3	40.0	26.7	20.0	33.3	13.3	20.0	26.7	40.0	0.0
19-29	65	35.7	50.8	23	21.5	27.7	29.2	40.0	24.6	16.9	29.2	32.3	27.7	24.6	24.6	41.5	16.9	30.8	40.0	10.8
30-39	48	26.4	58.3	29.1	31.3	39.6	41.7	29.2	29.2	29.2	37.5	35.4	16.7	35.4	25.0	41.7	16.7	27.1	54.2	27.1
40-49	38	20.9	47.4	31.5	28.9	23.7	34.2	26.3	26.3	23.7	28.9	34.2	18.4	23.7	23.7	34.2	23.7	23.7	42.1	7.9
50-59	14	7.7	28.6	35.7	35.7	14.3	42.9	28.6	21.4	7.1	42.9	28.6	21.4	21.4	14.3	50.0	28.6	21.4	28.6	0.0
60 +	2	1.1	0.0	0	0	0.0	0.0	50.0	100.0	50.0	50.0	0.0	0.0	100.0	0.0	0.0	50.0	0.0	0.0	0.0
<i>Educational level</i>				*						*							**			
Primary	16	8.8	56.3	18.7	31.3	37.5	25.0	31.3	25.0	18.8	50.0	31.3	37.5	37.5	12.5	50.0	37.5	12.5	56.3	12.5
Apprentice	29	15.9	55.2	24.1	31	17.2	31.0	37.9	24.5	31.0	34.5	31.0	20.7	31.0	27.6	51.7	10.3	34.5	58.6	13.8
Secondary	90	49.5	45.6	31.1	22.2	31.1	33.3	33.3	26.7	18.9	31.1	35.6	23.3	25.6	25.6	27.8	16.7	26.7	36.7	11.1
Undergraduate	40	22	52.5	20	40	35.0	42.5	37.5	25.0	20.0	27.5	32.5	15.0	25.0	25.0	42.5	25.0	32.5	42.5	17.5
Graduate	7	3.8	28.6	28.6	14.3	14.3	42.9	14.3	0.0	71.4	42.9	28.6	14.3	28.6	14.3	57.1	28.6	0.0	28.6	0.0
<i>Residence area <sup>1</sup></i>			**		**			**												
<10,000	7	3.8	71.4	57.1	42.9	14.3	42.9	14.3	28.6	28.6	57.1	42.9	42.9	14.3	14.3	14.3	14.3	0.0	71.4	28.6
10,000-50,000	7	3.8	85.7	28.6	14.3	14.3	28.6	14.3	28.6	42.9	42.9	57.1	42.9	14.3	0.0	14.3	0.0	14.3	71.4	14.3
50,001-100,000	15	8.2	66.7	33.3	26.7	33.3	20.0	33.3	13.3	26.7	26.7	13.3	20.0	46.7	46.7	46.7	33.3	33.3	53.3	6.7
100,001-1,000,000	18	9.9	50.0	44.4	50	22.2	27.8	16.7	16.7	16.7	44.4	50.0	11.1	27.8	33.3	33.3	11.1	22.2	44.4	11.1
>1,000,001	135	74.2	44.4	21.4	25.2	31.9	37.0	37.5	28.9	22.2	30.4	31.9	21.5	26.7	22.2	40.0	20.7	28.9	38.5	11.9
<i>Occupation</i>			**																	
Student	38	20.9	28.9	26.3	26.3	36.8	34.2	28.9	31.6	13.2	36.8	31.6	26.3	39.5	28.9	36.8	15.8	36.8	26.3	5.3
Employed	105	57.7	54.3	26.6	32.4	31.4	33.3	36.2	24.8	24.8	34.3	32.4	20.0	26.7	22.9	40.0	21.9	24.8	43.8	14.3
Entrepreneur	17	9.3	52.9	29.4	11.8	11.8	35.3	23.5	35.3	29.4	11.8	47.1	23.5	23.5	23.5	29.4	23.5	29.4	47.1	5.9

Unemployed	7	3.8	42.9	28.6	28.6	14.3	14.3	57.1	28.6	14.3	57.1	42.9	14.3	14.3	28.6	28.6	0.0	0.0	42.9	28.6
Pensioner	10	5.5	70.0	30	10	30.0	70.0	40.0	10.0	30.0	10.0	30.0	30.0	10.0	20.0	40.0	20.0	30.0	70.0	10.0
Maternity leave	5	2.7	40.0	0	40	20.0	20.0	20.0	20.0	40.0	60.0	20.0	20.0	20.0	20.0	40.0	20.0	20.0	40.0	20.0
<i>Net income of household<sup>2</sup></i>												**				**				
< 2 000 TRY	16	8.8	62.5	12.5	18.8	31.3	43.8	50.0	18.8	25.0	18.8	62.5	25.0	12.5	18.8	37.5	31.3	18.8	62.5	18.8
2 001 - 3 000 TRY	66	36.3	47.0	19.7	19.7	30.3	33.3	39.4	25.8	22.7	37.9	27.3	22.7	27.3	33.3	47.0	16.7	24.2	39.4	15.2
3 001 - 5 000 TRY	90	49.5	48.9	33.3	35.6	28.9	34.4	24.4	26.7	22.2	33.3	32.2	22.2	30.0	18.9	32.2	21.1	30.0	42.2	10.0
> 5001 TRY	10	5.4	40.0	30	30	30.0	30.0	60.0	40.0	30.0	20.0	40.0	10.0	30.0	20.0	30.0	10.0	30.0	20.0	10.0

*Note(s): 1\*Population of the residential area where the respondent lives 2\* Net family income average per month in TRY (exchange rate according to the Europe Central Bank: 1 EUR = 8.0547 TRY. 2021 average), Aw = awareness, FLM = flaked meat, Mi = mince, Me = meatball, Oa = oatmeal, Br = bread, Ce = cereal, Fl = flour, Yo = yoghurt, Ml = milk, Ch = cheese, Ke = kephir, WhG = whole grains, On = onion, Ga = garlic, Ho = honey, BfW = beverage fortified with vitamins A, C, E, IoF = increased omega-3 fatty acid content ; \*\*p < 0.05. \*p < 0.1*

## 6. Discussion

This study is focused on consumer behaviour towards FF in Turkey. The term ‘‘FF’’ does not have a clear and well-accepted definition globally (Akbay et al. 2007; Baker et al. 2022). As the result of our study revealed 51.1% of respondents did not know the FF term, however the measured consumption frequency indicated that 80% of Turkish consumers purchased at least one of the FF products once a year. Hence, the current study results further proved that Turkish consumers purchase FF while unaware of the FF categorization of food due to the lack of comprehensive and worldwide definition and the general unpopularity of the FF term (Akbay et al. 2007). Özen et al. (2014) noted that in the Scandinavian countries the FF consumption and knowledge is quite high, however, in Belgium, the FF awareness is much lower. Similarly, Bilgic and Yuksel (2012) conducted a study in Istanbul, and their results resembled the present findings, specifically that 59.7% of respondents were not familiar with the FF. Further, the low consumption of FF was due to the lack of knowledge and access, as reported by Bilgic and Yuksel (2012). Barrios et al. (2008) observed a similar situation in Spain, where only 25% of consumers knew the FF term. Özen et al. (2014) mentioned that FF products are most common in central and northern Europe compared to the southern part of Europe near the mediterranean. Other studies such as Grochowska-Niedworok et al. (2017) and Markovina et al. (2011) also concluded that the knowledge of FF is more petite than unsatisfactory among general consumers.

Results uncovered that the most consumed FF products by the Turkish consumers (71%) were beverages fortified with vitamins A, C, and E.. Hacıoglu and Kurt (2012) also concluded similar findings, reporting that mineral water was among the most consumed functional drink in a sample of 300 Turkish respondents from Izmir, the third-largest city in Turkey. Not only mineral water but also mineral supplemented milk and herbal teas were popular FF drinks among respondents in Gezgin and Gok's (2016) study.

Moreover, as the current results indicated, probiotic dairy products, especially Kefir, was among the most consumed probiotics in the Turkish sample (28%). Kotilainen



et al. (2006) and Stanton et al. (2001) simultaneously agreed that Kefir was the most common probiotic produced and consumed in Turkey. Ozdemir et al. (2009) confirmed that probiotic dairy products were the most frequent FFs.

Lastly, the present study observed that 24.4% of the sample consumed FF whole grains as prebiotics. Bilgic and Yuksel (2012) reached an agreeable conclusion with the current results, confirming that baked products with whole grains were the most consumed FF (16.9%) in the sample population.

Many studies (Goetzke et al. 2014; Cakiroglu & Ucar 2008; Gautam et al. 2018; Quan et al. 2020; Verbeke 2006; Chaloupkova et al. 2020) observed that people generally consume FF because of their health benefits. Dogan et al. (2011) reported that the majority of the participants (81.38%) believed in the practical health benefits of the FF. The result of Bilgic and Yuksel (2012) reported that 14.4% of respondents definitely agreed on the effectiveness of FF and 41% of respondents stated that functional foods are healthier than conventional foods according to their view. Baker et al. (2022) noted that consuming food fortified with various vitamins, probiotics, and antioxidants could improve physical and mental well-being, while also decreasing the chances of chronic diseases.

Furthermore, FF in the 2009 health consumer trending survey revealed that 89% of consumers considered that some foods provide more than basic nutrition and that they also may reduce the risk of disease and other health concerns (IFIC 2019). Iwatani and Yamamoto (2019) emphasized that the new FF products available in Japan possess added health benefits, mainly regarding fatigue, blood flow, Body Mass Index, temperature, muscles, memory, stress, and sleep. Japanese people in particular strive towards maintaining good health without medication, therefore there is a potential for future of the FF (Iwatani & Yamamoto, 2019). Another research by Van Kleef et al. (2005) reported that Dutch respondents recorded that health effect framing could be important, but the effect is dependent on health-related benefits. According to research conducted by Verbeke (2005) around 215 Belgian respondents believe in the health benefits of FF and think of it as the main positive determinant of consumer acceptance. As a result, all the above studies

support the present findings that 56.1% of respondents consume FF for its health benefits while 24.6% refuse this effect.

One of the most important reasons for FF consumption are health-enhancing effects such as higher mental activity and better performance, effective regulation of stress and improved sleep, enhanced physical and sports performance, protector against cancer and improvement of the immune response. Nonetheless, as Chaloupkova et al. (2020) declared, consuming the FF in addition to supplements for weight loss and muscle gain can be ineffective or dangerous in many cases. According to Siegrist et al. (2008) in a sample of 249 Swiss respondents, the majority was more interested in FF with physiological than psychological health benefits. The present study has also observed that 61% of current respondents believed in the physical and sports performance-enhancing effects of FF consumption while 23% of respondents refused it. Chaloupkova et al. (2020) found that students in their study consumed FF for their sport and physical performance enhancing effects. Moreover, Urala et al. (2011) discovered that among 1027 American citizens, boosting the immune system was the primary health concern of FF consumers. Urala et al. (2011) therefore confirms the present finding as 54% of respondents believed in the improvements of the immune response effect of FF while 25% of respondents did not. Another similar study among 149 Australian respondents revealed that prevention of serious diseases was more effective on consumers' FF purchasing decision (Williams et al. 2008). As Chaloupkova et al. (2020) found, czech consumers's main reasons were stress relief (67.5%), digestive care (54.2%), and immunity boosting (47.4%). Females had other reasons for FF consumption, such as better mental capacity and performance, urinary tract care, and weight loss. Males expressed concerns about cardiovascular and respiratory health with physical and sports performance as reasons for FF consumption (Chaloupkova et al.). Interestingly, Demirel et al. (2021) discovered that participants consumed FF products with omega 3 fatty acids because of their effects of decreasing heart attack risks. Additionally, nowadays one of the most common health concerns is stress. Dogan et al. (2011) further highlighted that most of their respondents believed in the positive effects of FF consumption on effectively lowering stress levels, as Chaloupkova et al. (2020) observed also, which is parallel to the present findings, agreeing with 59.4% of the current participants.

Product characteristics can have an influence on consumer acceptance of the FF. Baker et al. (2022) in their review highlighted that ingredients, price, taste, or brand affected the consumer views of FF. Most Turkish consumers considered ingredients, composition, and health effects of FF as the main reasons for FF consumption. This finding has indicated the importance of FF knowledge and awareness among consumers. Argin et al. (2019) additionally reported that the consumers relied heavily on the taste being one of the main factors in the FF acceptance. Baker et al. (2022) noted that consumers were more accepting of FF products in which the enrichment occurred naturally. Naylor et al. (2009) confirmed it in their research conducted on a sample of 178 American students, examining the consumption of FF based on the level of awareness of the health benefits the FF provides. They concluded that students who are more aware of the health benefits of the FF consumed them more than those who had lower health awareness (Naylor et al., 2009). According to Ares et al. (2008), in Uruguay, consumers with inadequate nutritional knowledge were not interested in FF consumption. Another supportive research conducted by Del Giudice and Pascucci (2009) uncovered that the most important factor in FF acceptance is knowledge. Sample in Chaloupkova et al.'s (2020) study identified the composition of the product as the main factor in deciding whether to purchase FF reported by 63.6% of their respondents. Further, within the age range of 19-59, respondents labeled the composition of FF an essential factor in its purchase (Chaloupkova et al. 2020).

With regards to the other factors of FF consumption such as price, label, and taste, only 15.6% of the present participants consumed FF due to its price. Supporting research of Dogan et al. (2011) also revealed that 20% of respondents were purchasing FF for the same reason. Chaloupkova et al. (2020) supported the present finding, however, they also found specific age differences. Price only became a significant factor in purchasing FF in the under 19 and above 60 age groups (Chaloupkova et al. 2020). According to a survey in Uruguay, food label design is an important strategy to create health-related allusions (Oliviera et al. 2016; Rasanjalee and Samarasinghe 2019). Baker et al. (2022) further found that in the case of Chinese consumers, they tend to purchase FF according to their brands, ranging from most purchased foreign brands, then familiar brands, and unfamiliar brands being the least used for FF purchasing. Moreover, people with broader knowledge of the leading brands purchased more FF compared to those not as knowledgeable (Baker et al.

2022). Similarly, to Bilgic and Yuksel (2012), the present study found that only 7.8% of participants consumed FF because of its taste. Contrary to the present findings, Baker et al. (2022) reported that in a Sri Lankan study, taste was among the most important motivations for FF consumption. Additionally, Kraus et al. (2017) observed that for women in the Netherlands, the composition of FF was vital for their decisions regarding FF consumption.

Recent studies showed that several socio-demographic factors are influencing FF consumption decisions and consumer awareness such as age, gender, level of education, marital status, nationality, household characteristics, geography, and income (Baker et al. 2022). In the study of Buyukkaragoz et al. (2014), 808 responses were analyzed to determine consumer attitudes influenced by the above factors. Within the 20–80 age range of participants, it was reported that socio-demographic factors were significant determinants of FF consumption and awareness. The awareness of FF was three times higher for older participants and four times higher for female participants than in the groups of males and younger respondents. FF awareness is differing across the gender groups: women were the most aware gender of the study. Özen et al. (2014) agreed that it is problematic to reach a general conclusion about the gender differences in FF interest, awareness, and consumption, because each market has their own specifics. Another research had discovered parallel results as older participants were more interested in FF consumption (Siegrist et al. 2008). According to Szakos et al. (2020) disease-prevention effect of FF was more popular among older people, who have a high cholesterol level in their blood. Nevertheless, Markrovina et al. (2011) discovered that young consumers were more attracted to the FF's taste and price-quality ratio, relating specifically to the younger consumer generation.

Moreover, Sevilimis et al. (2017) observed that younger Turkish participants with higher levels of education were more likely to consume FF compared to the European Union consumers and Baker et al. (2022) supported this finding. Another study conducted by Kaur and Singh (2017) further confirmed that personal, psychological, cultural, and social factors were determinants of consumer attitude and behaviour towards FF. According to a culture survey conducted by Siegrist et al. (2015), 945 Chinese and German participants reported that cultural factors had a significant role in FF acceptance. The

present study uncovered a similar finding that the residential area and occupation (being student) were significant determinants of FF consumption. If the participant comes from higher populated area, their FF awareness level was decreasing which might be related to stereotypes and traditions of their resident area. Additionally, the current results highlighted that student participants were less likely to be aware of FF. The potential reason behind it might be consumption habits of younger generation.

On the contrary, the present study did not reveal any significant correlations between socio-demographic factors (age, gender, education, income) and FF consumption and Demirel et al. (2021) supported this finding. Further, Bekoglu et al. (2016) supported the current findings in their study of 695 respondents from Istanbul. Reportedly, the consumption of FF did not differ across genders, similar to the present results (Bekoglu et al., 2016). Dogan et al. (2011) agreed, adding further that the link between gender, income levels, and age of participants and FF consumption was insignificant. Ozdemir et al. (2009) supported such findings of unimportant differences in consumption frequency of males and females and age-related variability. Nonetheless, Baker et al.'s (2022) review reported that age, gender, and education levels contributed to the consumers' acceptance of FF. Particularly, more educated people increasingly inclined towards purchasing FF (Baker et al. 2022). Nevertheless, as Baker et al. (2022) noted, the findings regarding the link between FF consumption and socio-demographic factors are still inconsistent due to the ungeneralizable conditions in which FF products occur and how they are available to which population.

Apart from other socio-demographic factors, the current study has confirmed that the source of information regarding FF was the internet with 54.4% among participants, similarly to the findings from Kolbina et al. (2020) and Bilgic and Yuksel (2012). Predominantly, the Internet and the TV provided consumers with the relevant FF information (Kolbina et al. 2020; Bilgic & Yuksel 2012; Demirel et al. 2021). Chaloupkova et al. (2020) further supported the present findings, stating that 73% of their sample reported Internet as the main source of information regarding FF. Family and friends proved to be a significant factor in acquiring information about the FF in addition to the internet (Chaloupkova et al. 2020).

Limitations of the current study presented various challenges from convenience sampling to the influence of the COVID-19 pandemic. This study relied on self-reported measures and convenience sampling done online, all of which limited the outcomes of this study. Self-reported measures could be subject to self-enhancing bias and untruthful information. Convenience sampling method could not have considered the inclusion of participants from various backgrounds to provide a more generalizable conclusion.

## **7. Conclusion**

Nowadays, the FF market has boomed. This expansion can be explained by the fact that consumers are becoming more and more open to these new types of food, which are recognized for their health and psychological benefits, which reduce the risk of chronic diseases. However, many studies have found that consumers differ in their perceptions of FF.

Structured questionnaire has been conducted to reveal; FF awareness level, popular FF products, consumption level, purchasing frequency, main factors on purchasing decision, purchasing location, level of expenditure on FF and relation between socio-demographic determinants and FF consumption. It has been found that most respondents were having limited awareness of FF. Functional drinks, functional cereals and probiotics were the most consumed FF categories among Turkish participants. Participants tend to consume FF products to receive their health benefits. The most effective reasons for FF consumption were protector against cancer, physical and sport performance, regulation on stress and sleep, weight loss or control body weight, antiaging effect.

Additionally, socio-demographic factors such as age, gender, education, income were not effective determinants of FF consumption. However, residential area and occupation (being student) was significant. Internet was the main source of information on FF. The present findings can contribute to an understanding of general preferences and attitudes regarding FF among Turkish consumers population, which can help to improve marketing strategies.

### **7.1. Recommendations**

It is important to engage in more efforts for the enhancement of the FF sector in Turkey. The growing importance of health concerns will have a lasting impact on the Turkish FF market and society over the coming decades. Additionally, the FF market can positively influence the health level of the population. The next research is supposed to explore diverse kinds of domains in reference to FF and its importance for a better

understanding of the concept. To find out more comprehensive findings, it is recommended to conduct a similar study on a larger sample.



## References

- Akbay C, Tiriyaki GY and Gul A. 2007. Consumer characteristics are influencing fast food consumption in Turkey. *Food Control* **18**(8):904-913.
- Anderson ET, and BW Berry. 2000. Sensory, shear, and cooking properties of lower-fat beef patties made with inner pea fiber. *J. Food Sci.* **65**: 805-810.
- Annunziata A and Vecchio R. 2011. Functional Food development in the European market: A consumer perspective. *Journal of Functional Food* **3**(3): 223-228.
- Annunziata A, and Pascale P. 2009. Consumers' behaviours and attitudes toward healthy food products: The case of Organic and Functional Food. 69-82.
- Ares D, Gimenez A, Gambaro A. 2008. Influence of nutritional knowledge on perceived healthiness and willingness to try functional foods. *Appetite* **51**:663–668.
- Ares G and Gambaro A. 2007. Influence of gender, age and motives underlying food choice on perceived healthiness and willingness to try functional foods, *Appetite* **49**:148-158.
- Argin S, Eskinazi B, Tavli D. 2019. A Consumer Perception Study on Functional Dairy Products Among Consumers in Istanbul, Turkey **7** (7): 963-970.
- Baker MT, Lu P, Parrella JA, Leggette HR. 2022. Consumer Acceptance toward Functional Foods:A Scoping Review. *International Journal Environmental Research Public Health*, **19**: 1217.
- Barrios EX, Bayarri, S, Carbonell I, Izquierdo L. and Costell E. 2008. Consumer attitudes and opinions toward functional foods: a focus group study. *Journal of Sensory Studies* **23**:514-525.
- Bekoglu FB, Ergen A and Inci B. 2016. The impact of attitude, Consumer innovativeness, and interpersonal influence on Functional Food consumption. *International Business Research*, **9**(4):79-87.
- Bilgic S. and Yuksel A. 2012. University Students' Perception and Attitudes Towards Functional Food in Istanbul 1127-1137.
- Bimbo F, Bonanno A, Nocella G, Viscecchia R, Nardone G, De Devitiis B, Carlucci D. 2017. Consumers' acceptance and preferences for nutrition-modified and functional dairy products: A systematic review. *Appetite* **113**:141-154.

- Bleiel J. 2010. Functional Food from the perspective of the consumer: How to make it a success? *International Dairy Journal* **20**(4):303-306.
- Bornkessel S, Bröring S, Omta SWF, van Trijp H. 2014. What determines ingredient awareness of consumers? A study on ten functional food ingredients. *Food Qual Prefer* **32**:330-339.
- Büyükkaragöz A, Bas M, Sağlam D, Cengiz ES. 2014. Consumers' awareness, acceptance, and attitudes towards Functional Food in Turkey. *Int J Consum Stud* **36**:628-635.
- Çakiroglu FP, Uçar A. 2018. Consumer attitudes towards purchasing functional products. *Prog. Nutr* **20**:257–262.
- Chaloupkova P, Petryl M, Verner V, Kokoska L. 2020. Dietary supplements versus Functional foods: consumers' attitudes to their consumption, *British Food Journal*, DOI 10.1108/BFJ-10-2019-0767.
- Coxa DN, Koster A, Russell CG. 2004. Predicting intentions to consume functional foods and supplements to offset memory loss using an adaptation of protection motivation theory. *Appetite* **43**:55-64.
- Davari DD, Negahdaripour M, Karimzadeh I, Seifan M, Mohkam M, Masoumi SJ, Berenjian A, Ghasemi Y. 2019. Prebiotics: Definition, Types, Sources, Mechanisms, and Clinical Applications. *Foods* 2019 Mar; **8**(3): 92.
- Del Giudice T, Nebbia S, Pascucci, S. 2009. The role of consumer acceptance in the food innovation process: Young consumer perception of functional food in Italy. In *Proceedings of the 3 International European Forum on System Dynamics and Innovation in Food Networks*; University of Bonn. Bonn, Germany 75–90.
- Demirel B, Bilsel A, Yesilcubuk N. 2021. Attitudes and Preferences of Consumers Towards Functional Foods Enriched with Omega-3 Fatty Acids. *European Journal of Science and Technology* **25** : 485-492.
- Doğan İS, Yıldız Ö, Eydurhan E and Köse Ş. 2011. A study on the determination of Functional Food consumption habits and awareness of consumers in Turkey. *Bulgarian Journal of Agricultural Science*, **17**(2):246-257.
- Elgasim EA and MS Al-Wesali. 2000. Water activity and hunter color values of beef patties extended with samh (*Mesembryanthemum forsskalei* Hochst) flour. *Food Chem.* **69**: 181-185.

- ECB.2021. Europe Central Bank Euro/Turkish Liras 2020 Year Average Rate. Available from [www.ecb.europa.eu](http://www.ecb.europa.eu) (accessed December 2021).
- Fakolade PO and Omojola AB. 2008. Proximate composition, pH value, and microbiological evaluation of 'Kundi' (dried meat) product from beef and camel meat. Conference on International Research on Food Security, Natural Resource Management, and Rural Development. Meat Science Laboratory, Animal Science Department, University of Ibadan. Nigeria. October 7-9.
- FAO 1992. Legumes Trees and Other Fodder Trees as Protein Sources for Livestock. Food and Agriculture Organization of the United Nations, FAO, Rome. Animal Production Health Paper **102**:14-18.
- FAO 2004. Food and Agricultural Organization of the United Nations. Retrieved July 15, 2004; from F.A.O.S.T.A.T. online database, Available from; <http://faostat.fao.org/faostat/default.jsp?language=EN&version=ext&hasbulk=0> (accessed January 2021)
- Fern E. 2007. Marketing of functional foods: a point of view of the industry. International developments in science & health claims, ILSI international symposium on functional foods in Europe.
- Fernandez-Lopez J, L Sevilla, E Sayas-Barbera, C Navarro, F Marin and JA Perez-Alvarez. 2003. Evaluation of the antioxidant potential of hyssop (*Hyssopus officinalis* L.) and rosemary (*Rosmarinus officinalis* L.) extract in cooked pork meat. *J. Food Sci.* **68**:660-664.
- Fernandez, ML, Lemos B. 2019. Food Chemistry, Function and Analysis: Eggs Are a Natural Functional Food **14**: 22-39.
- Frewer L, Scholderer J and Lambert N. 2003. Consumer acceptance of Functional Food: issues for the future. *British food journal. functional foods: consumers' attitudes to their consumption. British Food Journal* **122**(12):3853-3868. DOI: 10.1108/BFJ-10-2019-0767.
- Garcia ML, R Dominguez, MD Galvez, C Casas and MD Selgas. 2002. Utilization of cereal and fruit fibers in low fat dry fermented sausages. *Meat Sci.* **60**:227-236.
- Gautam SRB, Maurya KK, Rai M, Singh RJ, Maurya RM, Mehta RK, Kumar S, Kumar S, Verma S. 2018. Consumer Behavior Towards Functional Food in Eastern UP-A

- Study of Market Drivers & Challenges 7:15–30.
- Gezginç Y and Gök S. 2016. Adana ili örneği ile tüketicilerin fonksiyonel gıdalara yönelik farkındalığı. Atatürk Üniversitesi Ziraat Fakültesi Dergisi **47**(2):01-106.
- Goetzke B, Nitzko S, Spiller A. 2014. Consumption of organic and functional food. A matter of well-being and health. *Appetite* **77C**:94–103.
- Gök I and Ulu E. 2018. Functional Food in Turkey: marketing, consumer awareness, and regulatory aspects. *Nutrition & Food Science*. DOI:10.1108/NFS-07-2018-0198.
- Grabein P and Raebur HJ. 1988. Automation of the cutting process.II. Studies on the cutting and mixing process, in sausage emulsion **68**:1111-1115.
- Grochowska-Niedworok E, Brukalo K, Kardas M. 2017. Consumer Choice Determinants in Context of Functional Food. *Int. J. Nutr.Food Eng.* **11**:605–608.
- Grunert K G, Bech-Larsen T and Bredahl L. 2000. Three issues in consumer quality perception and acceptance of dairy products, *International Dairy Journal* **10**:575-584.
- Gulseven O, Wohlgenant M. 2014. Demand for functional and nutritional enhancements in specialty milk products. *Appetite* **81**:284-294.
- Hacioglu G and Kurt G. 2012. Tüketicilerin fonksiyonel gıdalara yönelik farkındalığı: Kabulü ve Tutumları: İzmir İli Örneği. *İşletme ve Ekonomi Araştırmaları Dergisi* **1**(3):161-171.
- Halsted CH. 2003. Dietary supplements and Functional Food: 2 sides of a coin. *Am. J. Clin. Nutr.* **77**:1001-1007.
- Hardy G. 2000. Nutraceuticals and Functional Food: Introduction and meaning. *Nutrition* **16**:688-698.
- Hoadley JE. 2011. Concept of Product Woodhead Publishing Series in Food Science, Technology and Nutrition. 41-63.
- Hopkins DT. 1981. Effects of variation in protein digestibility. In *Protein Quality in Human: Assessment and in Vitro Estimation*. 169.
- Hui YH, Richard, G Murrel, K D and C Dean. 2001. *Foodborne disease handbook* **4**(2): 542-601.
- Hui YH. 2007. *Food Drying Science and Technology*. Destech pub. Inc. 29.

- IFIC. 2009. Functional Foods for Health Consumer Trending Survey. Available from [www.ific.org](http://www.ific.org) (accessed December 2020).
- Igene JO and Mohammed ID. 1983. Consumer preferences and attitudes to Suya, an indigenous meat product, *Annals of Borno*. 169-178.
- Isleten M, Yuceer K, Yilmaz E, Mendes M. 2007. Consumer Attitudes and Factors Affecting Buying Decision for Functional Foods **32**:25-32.
- Iwatani S, Yamamoto N. 2019. Functional food products in Japan: A review. *Food Science and Human Wellness* 8: 96-101.
- Johnson, I.T., and D.A.T. Southgate. 1940. Dietary Fiber and Related Substances. In: *Food Safety Series*, Edelman, J. and S. Miller (Eds.). Chapman and Hall, London. 39-65.
- Juster F.T. 1990. Rethinking Utility Theory. *The Journal of Behavioural Economics* **19**(2): 155-179.
- Kapsak WR, Rahavi EB, Childs NM and White C. 2011. Functional Food: consumer attitudes, perceptions, and behaviours in a growing market. *Journal of the Academy of Nutrition and Dietetics* **111**(6):806.
- Kauffman RG, Eikeleboom G, Vander Wal PG and Zaar MA. 1986. Comparison of methods to estimate water-holding capacity in post-rigor porcine muscle. *Meat Sci.* **18**:307-322.
- Kaur N, Singh DP. 2017. Deciphering the consumer behaviour facets of functional foods: A literature review. *Appetite* **112**:167-187.
- Khanal RC and KC Olson. 2004. Factors affecting conjugated linoleic acid content in milk, meat, and egg: A review. *Pak. J. Nutr.* **3**:82-98.
- Kolbina AY, Ulrikh EV, Voroshilin RA. 2020. Analysis of consumer motivations of the Kemerovo city residents in relation to functional food products. *EurAsia J. BioSci.* **14**:6365–6369.
- Kotilainen L, R Rajalahti, C Ragasa and Pehu. 2006. Health enhancing foods: Opportunities for strengthening the sector in developing countries. *Agriculture and Rural Development Discussion* **30**:117-119.
- Kraus A, Annunziata A, Vecchio R. 2017. Sociodemographic factors differentiating the consumer and the motivations for functional food consumption. *J. Am. Coll Nutr.* **36**:116–126.

- Kwak NS and DJ Jukes. 2001. Functional Food. Part 1. The development of a regulatory concept. *Food Control* **12**:99-107.
- Lenssen K, Bast A, Boer A. 2018. Clarifying the health claim assessment procedure of EFSA will benefit functional food innovation, *Journal of Functional Foods* **47**:386-396.
- Likert R. 1932. A technique for measurement of attitudes. *Archives of Psychology* **140**:5-55.
- Markovina J, Čačić J, Kljusurić JG and Kovačić D. 2011. Young consumers' perception of functional foods in Croatia, *British Food Journal* **113**(1):7-16.
- Menrad K. 2003. Market and Marketing of Functional Food in Europe. *Journal of Food Engineering* **56**:181-188.
- Naylor RW, Droms CM, Haws KL. 2009. Eating with a purpose: Consumer response to functional food health claims in conflicting versus complementary information environments. *J. Public Policy Mark* **28**:221–233.
- Nocella G, Kennedy O. 2012. Food health claims-What consumers understand. *Food Policy* **37**:571-580.
- Oliveira D, Machín L, Deliza R, Rosenthal A, Walter EH, Gimenez A, Ares G. 2016. Consumers' attention to functional food labels: Insights from eye tracking and change detection in a case study with probiotic milk. *LWT Food Sci. Technol.* **68**:160-167.
- Özdemir Ö, Fettahlioğlu PS, Topoyan M. 2009. Fonksiyonel gıda ürünlerine yönelik tüketici tutumlarını belirleme üzerine bir araştırma. *Ege Akademik Bakış* **9**(4):1079-1099.
- Özen AE, Bibiloni MM, Pons A, Tur JA .2014. Consumption of functional foods in Europe; a systematic review, *Nutr Hosp* **29** (3): 470-478.
- Pinto VRA, Freitas TBO, Dantas MIS, Lucia SMD, Melo LF, Minim VPR, Bressan J. 2017. Influence of package and health-related claims on perception and sensory acceptability of snack bars. *Food Res Int.* **101**:103-113.
- Pogorzelska-Nowicka E, Atanasov AG, Horbańczuk J, Wierzbicka A. 2018. Bioactive Compounds in Functional Meat Products. *Molecules (Basel, Switzerland)*, **23**(2): 307.

- Quan NHK, Yen NTN, Chung DD. 2020. Functional food in Viet Nam: Trends consumer online shopping in Ho Chi Minh city. IOP Conference Series: Materials Science and Engineering **991**. In Proceedings of the 5th International Conference of Chemical Engineering and Industrial Biotechnology (ICCEIB), Kuala Lumpur, Malaysia.
- Rasanjalee RMKS, Samarasinghe DSR. 2019. Influence of Antecedents on Consumer Attitudes towards Functional Food: Empirical Study in Sri Lanka. JTSRD **3**:2456–6470.
- Sevilmiş G, Olgun A, Artukoglu, M. 2017. Fonksiyonel gıdalarda tüketici kararlarını etkileyen faktörler üzerine bir araştırma: İzmir İli Örneği. Ege Üniversitesi Ziraat Fakültesi Dergisi **54**(3):351-360.
- Side C. 2006. Overview on marketing functional foods in Europe. In Functional food network general meeting. 8-10.
- Siegrist M, Shi J, Giusto A, Hartmann C. 2015. Worlds Apart. Consumer acceptance of functional foods and beverages in Germany and China. *Appetite* **92**:87–93.
- Siegrist M, Stampfli N, Kastenholz H. 2008. Consumers' willingness to buy functional foods. The influence of carrier, benefit and trust. *Appetite* **51**:526–529.
- Siro I, Kapolna E, Kapolna B and Logasi A. 2008. Functional food product development, marketing and consumer acceptance- a review. *Appetite* **51**:456-467.
- Slavin J. 2013. Fiber and Prebiotics: Mechanism and Health Benefits. *Nutrients*, **5**(4): 1417-1435
- Stanton C, Gardiner G, Meehan H, Collins K, Fitzgerald G, Lynch PB and Ross RP. 2001. Market potential for probiotics. *American Journal of Clinical Nutrition* **73**(2):476-483.
- Surai PF, Sparks NHC. 2001. Designer eggs: from improvement of egg composition to functional food. *Trends in Food Science & Technology*, Volume 12, (1): 7-16.
- Szakály Z, Szente V, Kövér G, Polereczki Z and Szigeti O. 2012. The influence of lifestyle on health behaviour and preference for Functional Food. *Appetite* **58**(1):406-413.
- Szagos D, Ózsvári L, Kasza G. 2020. Consumer demand analysis in the Hungarian functional food market focused on the main health problems. *Gradus* **7**:62–66.
- TUIK. 2021. Provincial in-migration, out-migration, net migration and rate of net migration, 2008-2020. Available from data.tuik.gov.tr (accessed February 2021).

- Urala N, Lähteenmäki, L. 2004. Attitudes behind consumers' willingness to use functional foods. *Food Qual. Prefer* **15**:793–803.
- Van Kleef E, van Trijp HCM, Luning P. 2005. Functional foods: Health claim-food product compatibility and the impact of health claim framing on consumer evaluation. *Appetite* **44**:299–308.
- Vella Megan N, Laura M Stratton, Judy Sheeshka and Alison M Duncan. 2013. Exploration of Functional Food Consumption in Older Adults in Relation to Food Matrices, Bioactive Ingredients, and Health, *Journal of Nutrition in Gerontology and Geriatrics* **32**(2):122-144.
- Verbeke W. 2005. Consumer acceptance of functional foods: sociodemographic, cognitive and attitudinal determinants, *Food Quality and Preference* **16**:45-57
- Verbeke W. 2006. Functional foods: Consumer willingness to compromise on taste for health? *Food Quality and Preference* **17**:126-131.
- WHO. 2003. Diet, Nutrition and The Prevention of Chronic Diseases. World Health Organization, Geneva. Technical Report Series **916**:136-137.
- Williams P, Ridges L, Batterham M, Ripper B, Hung MC. 2008. Australian consumer attitudes to health claim-food product compatibility for functional foods. *Food Policy* **33**:640–643.



## Appendix – Questionnaire

### Questionnaire on Consumer attitudes when purchasing FFs in Turkey

1. Do you know the terms functional food? (Opening Question)

- Yes
- No
- Not sure

Type of functional food	Source	I know it and buy it regularly	I know it and I do not buy it	I do not know it
<b>Functional meat</b>	Flaked meat			
	Mince			
	Meatball			
<b>Functional cereals</b>	Oatmeal			
	Bread			
	Cereal			
	Flour			
<b>Probiotics</b>	Yoghurt			
	Milk			
	Cheese			
	Kephir			
<b>Prebiotics</b>	Whole grains			
	Onion			
	Garlic			
	Honey			
<b>Functional drink</b>	Beverage fortified with vitamins A, C, E			

<b>Functional eggs</b>	Increased omega-3 fatty acid content			
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2.How often do you buy these products?

<b>Functional Foods</b>	<b>Every week</b>	<b>Every month</b>	<b>Once in six months</b>	<b>Once per year</b>	<b>I do not buy it</b>
<b>Functional meat</b>					
<b>Functional cereals</b>					
<b>Probiotics</b>					
<b>Prebiotics</b>					
<b>Functional drink</b>					
<b>Functional eggs</b>					

3.How much you spend on functional food on average per month? (Turkish Liras)

- Less than 250
- 250 - 499
- 500 - 999
- 1000 - 1999
- 2000 and more

4.How do you gather information regarding functional food?

- Internet
- Salesman in specialized shops
- Distributor

- Promotional materials (leaflets, brochures, etc.)
- In pharmacy
- Friends and colleagues
- Doctor
- Family
- Literature (books, scientific journals)
- Media (TV, radio)

5. Where do you usually buy functional foods? (Choose one or several)

- Specialized shops
- Supermarkets
- Open air markets
- E-Shops
- I do not buy it, because I gather it myself (or my family gathers it)
- Other, please specify \_\_\_\_\_

6. What is the most effective reason on your purchasing decision of functional food ?  
 (Please tick only one box for each category of functional food)

<b>Type of functional food</b>	Composition of functional food	Price of the functional food	Ingredient of the functional food	Taste of functional food	Health effects of functional food
<b>Functional meat</b> (flaked meat, mince, meatball)					
<b>Functional cereals</b> (oatmeal, bread, cereal, flour)					
<b>Probiotics</b> (yoghurt, milk, cheese, kephir)					
<b>Prebiotics</b> (whole grains, onion, garlic, honey)					
<b>Functional drink</b> (beverage fortified with vitamins A,C,E ex; fruit juice, mineral water)					
<b>Functional eggs</b> ( with increased omega-3 fatty acid content)					

7. Pace in order of importance to you the following health-life reasons for using functional foods? (Tick where appropriate)

<b>Health-life reasons</b>	<b>Totally agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Totally disagree</b>
<b>Body's resistance against fatigue</b>					
<b>Mental activity and performance</b>					
<b>Weight loss or control body weight</b>					
<b>Reproductive and sexual health</b>					
<b>Physical and sport performance</b>					
<b>Protector against cancer</b>					
<b>Protector against hypertension</b>					
<b>Improvement of the immune response</b>					
<b>Regulation on stress and sleep</b>					
<b>Antiaging effect</b>					

## **Personal Details**

8. Gender:

- Female
- Male

9. Highest education level:

- Primary
- Apprentice
- Secondary
- Undergraduate
- Graduate

10. Age:

- <19
- 19-29
- 30-39
- 40-49
- 50-59
- 60 +

11. Economic activity:

- Student
- Employed
- Entrepreneur
- Unemployed
- Pensioner
- Maternity leave

12. Where do you live? City/village with a population:

- to 10 000 inhabitants
- 10 001 - 50 000
- 50 001 – 100 000
- 100 001 – 1 000 000
- 1 000 001 and more

13. What is the **net income** of your household **per month**? (Turkish Liras)

- Less than 2 000
- 2 001 - 3 000
- 3 001 – 5 000
- 5 001 – 8 000
- 8 001 – 15 000
- 15 001 – 30 000
- 30 001 – 50 000
- 50 001 and more