

# Edible Oil and Fat Consumption Patterns Among Turkish Consumers-A Case Study of Manisa city

Zeynep Aksoylu Özbek, Kıvılcım Çelik, Pelin Günç Ergönül\*

Manisa Celal Bayar University, Faculty of Engineering, Department of Food Engineering, Yunusemre, Manisa, Turkey

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\*Corresponding author: Pelin Günç Ergönül, Department of Food Engineering, Turkey

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## Abstract

The aim of this study is to identify the edible oils and fat consumption habits of Turkish consumers. A questionnaire to evaluate the attitude of consumers toward various edible oils and fats was administered to 300 individuals in Manisa central districts. Olive and sunflower oils were reported to be consumed daily, while hazelnut and corn oils were not preferred. "Brand" (35%) was the primary influencer of edible oil purchasing decision of Turkish consumers. On the other hand, the most important criterion in the oil consumption of the respondents was "flavor" (41%). The present study also showed that Turkish consumers have positive attitudes towards olive oil and other vegetable oils.

**Keywords:** Consumer; Consumption; Turkey; Fat; Manisa; Oil; Questionnaire

## Introduction

Proteins, carbohydrates and fats play important roles in a balanced diet. Among these three essential nutrients, the highest energy is provided by fats. Today, especially in developed countries, consumers willing to pay attention to their health also change their eating habits. In this context, edible OIL and fat choices have been influenced by healthy diet trend. However, this change highly depends on cultural habits of consumers.

Fats and oils are among our indispensable food sources in terms of their ability to carry fat-soluble vitamins. Moreover, they contain some essential molecules that cannot be synthesized in the human body [1,2]. Fats have great importance in human nutrition as an energy source. As a comparison, 9.3 calorie are produced as a result of 1 gram of fat, whereas 1 gram of protein gives 4 calories, and 1 gram of carbohydrate give 4.5 calories to human body [2-4].

In addition to meeting the energy needs, fats contribute to many physiological and biological functions in the body [5]. Fat-soluble vitamins are responsible for many biological functions in the body as well as they act as structural material of all cells and organs [2]. Fats and oils are essential components of foods. It creates the desired texture and flavor in addition to the fullness of the products [6,7]. Additionally, they create the feeling of satiety in humans [8]. They serve as insulators in maintaining body temperature [6]. Oils are located among the protein layers in cell membrane and act as filter for the substances to be taken by a cell [8]. Furthermore, they and/or their products are used for non-food applications [2,4]. They are essential to transfer heat in food processes [2].

In a regular diet, 25-30% of the total daily energy requirement should be provided by fats [4,9]. However, energy obtained from oils should not exceed 35% of the total energy, while it should not be less than 20%. Excess fat is stored in the human body and might cause cardiovascular diseases. Another issue to be considered in daily oil consumption is the saturation degree of the oil. The American Heart Association [10] recommends that 1/3 of your daily need be made from saturated (i.e. butter, margarine), 1/3 of unsaturated (i.e. olive oil), 1/3 of polyunsaturated (i.e. sunflower, corn, soybean oil) fatty acids.

A person who weighs an average of 70kg needs at least 1700kcal every day. When it is accepted that 35% of the daily energy need, which is 1700kcal according to healthy nutrition conditions, 595kcal should be provided by oils and fats [4]. According to regular nutrition

rules, liquid foods contribute to 1/3 of the daily fat intake, while solid fat consumed at breakfast contribute to 1/3, and other foods including cheese, milk, and nuts contribute to 1/3 of the daily fat intake [3]. An adult need to consume 24kg of fat per year for balanced nutrition [11]. According to 2016 data, including olive oil, in Turkey 966 thousand tons of vegetable oil are produced. The amount of vegetable oil per person was determined as 21.9kg [3,12]. However, per capita vegetable oil consumption is 19kg in Turkey [11]. On the other hand, vegetable oil consumption per person is 15kg in India, 26kg in China, 57kg in the USA and 60kg in EU countries [3]. Compared to developed countries, per capita consumption of vegetable oil in Turkey seems to be lower.

Fats used in human nutrition are classified in various ways. Edible oils are divided into two main classes, animal and vegetable oils. Of these, oils of animal origin, fats obtained from bovine and ovine animals and their milk and various fish. Vegetable oils are obtained from seeds and fruits of plants. Vegetable oils are divided into two groups as fats and oils. Solid vegetable oils are generally grown in tropical regions and are obtained from the fruits of cocoa, coconut and palm plants. These vegetable oils are solid at room temperature and rich in saturated fatty acids. Fats produced by hydrogenation of vegetable oils and margarines containing water or milk in emulsion are also included in this group [4,13]. On the other hand, liquid vegetable oils are mostly obtained from seeds such as sunflower, soybean, canola and cotton, and 97-99% of the compositions of these vegetable oils consist of triglycerides [14].

Products rich in olive oil in the Mediterranean region, rapeseed in Europe, sesame oil in India and soybean oil in China have been extensively used. Today, 80% of the world's edible oils and fat production is made from vegetable oils, and soybean oil is the most widely used oil [6]. In Turkey, sunflower, corn, peanut, soybean, cotton, canola and palm oil as well as butter, margarine and olive oil are frequently consumed [4,5,11].

So far, many studies have been conducted on the determination of the consumption habits of edible vegetable oil, olive oil and animal fats, and their effects on health and purchasing attitudes [11,15-36]. However, no study has been carried out to determine consumption patterns of edible oils and fats among individuals living in Manisa. Therefore, it was aimed

(a) to reveal the edible oil and fat buying behaviors of consumers with different income groups living in Manisa province,

(b) to determine the main factors that dominate the edible oil preferences.

## Material and Method

In this study, the questionnaire was applied to randomly selected 300 volunteer individuals, 150 of whom were women and 150 men, in the central districts of Manisa in 2014. Manisa is the one of the major cities of Aegean Region and Turkey with its booming economy and growing population. Manisa has two central districts, namely Şehzadeler and Yunusemre. Their populations were 166,443 and 204,436, respectively in 2014 [37]. The size of sample was estimated using population proportion through simple random sampling as follows:

$$n = ((N \times P(1-P))) / (((N-1) \wedge (\sigma^2 \cdot P \wedge 2 + P(1-P))))$$

Here,

N = the actual size of the target population (total of 370.879)

P = estimated proportion of the population (0.5)

$\sigma$  = desired variance of the population (confidence interval of the 95% and error margin of 0.075,  $1.96 \sigma = 0.0075$ ,  $\sigma = 0.038265$ ) (Newbold et al., 2013)

A sample of 171 observations is needed. However, the questionnaire was administered to 300 participants to ensure the reliability of the study. The questionnaire was conducted using face-to-face interview technique. The questionnaire was divided into two parts. In the first part, 6 questions about demographic characteristics and the second part 18 questions about fat and oil consumption habits were asked to the consumers. The questionnaire took approximately 15 minutes to complete. Data were evaluated using simple statistical methods in Excel.

## Results and Discussion

### Sociodemographic characteristics of the participants

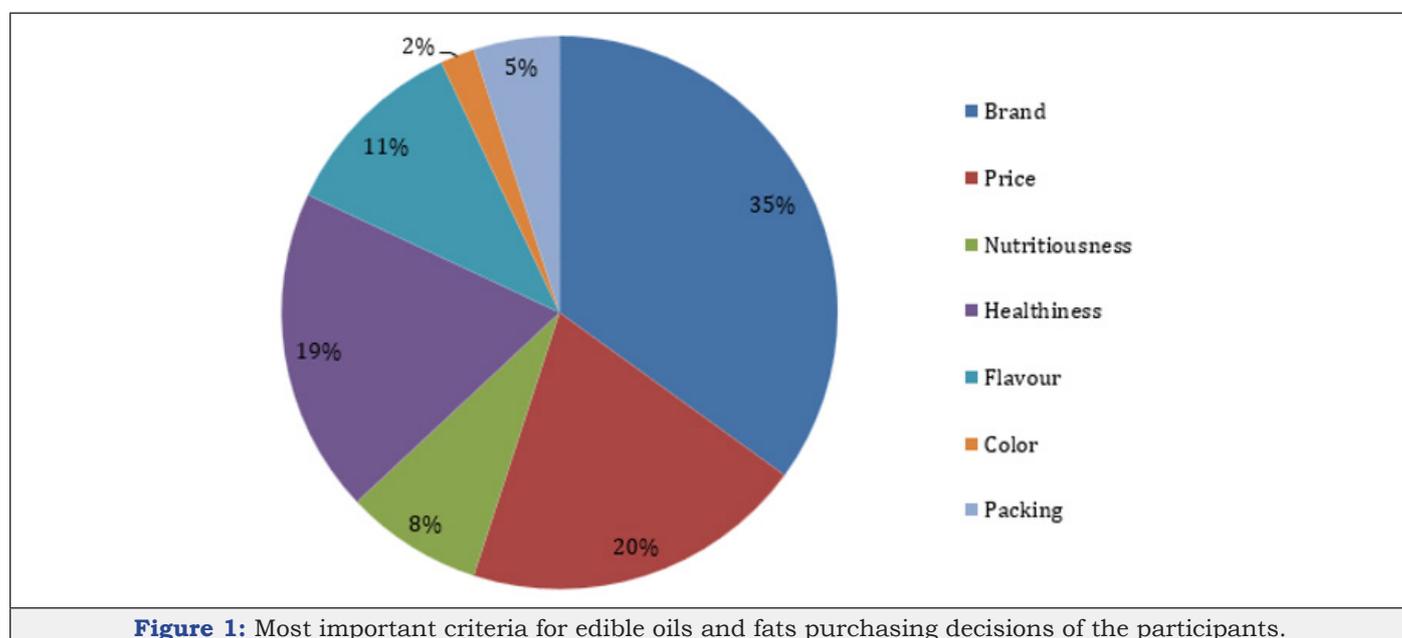
The sociodemographic characteristics of 300 people living in Manisa city center are given in Table 1. Individuals from different age groups, education levels, income levels and occupational status were included in the survey. The number of male and female participants were chosen equally (50% female and 50% male). Age distribution ratios of the participants were very similar. It was found that 57% of the respondents were married and 51% of them were the consumers who have university and college education.

**Table 1:** Separated in two pages. Please combine in one page

Characteristic	n	Frequency (%)
<b>Gender</b>		
Female	150	50
Male	150	50
<b>Age (Years)</b>		
18-30	102	34
30-45	99	33
45-60	99	33

Education		
Elementary School	63	21
High School	66	22
Undergraduate	153	51
Graduate	18	6
Marital Status		
Single	99	33
Married	171	57
Divorced or widowed	30	10
Occupation		
Full-time labourer and employee	111	37
Student	108	36
Unemployed	36	12
Retiree	21	7
Housewife	21	7
Part-time labourer	3	1
Monthly household income (Turkish Lira)		
<500	3	1
500-1000	48	16
1000-1500	21	7
1500-2000	48	16
2000-2500	51	17
2500-3000	45	15
>3000	84	28

### Consumption patterns of edible oils and fats among Turkish consumers



Important criteria which influenced the edible oil or fat purchasing decision of consumers are illustrated in Figure 1. "Brand" was the most significant factor for Turkish consumers (35%, n=105). Similar results were previously reported for different cities of Turkey. According to the findings of a survey carried out

in Samsun city (in Black Sea region), health was reported as the most important factor in oil consumption for the participants and followed by brand and taste [11]. Another study revealed that the most important reason for the oil preference of the individuals living in Ordu city (in Black Sea region) was health [33]. On the

other hand, the participants from Dikili district of Izmir reported that the least important criterion in oil consumption was packaging [15]. Similarly, as a result of a study performed in Dehradun city, consumers reported that the critical criterion in oil consumption was brand [28]. In a survey dealing with edible oil consumption habits and perception of Ghana individuals, consumers selected the type of meal as the most influential decision driver for unrefined oil and nutritional value for refined oil [24]. Contrary to our results, survey studies carried out in Spain, USA, Italy and Northern California showed that price was the most important factor affecting the olive oil purchasing decision of the consumers [18,21,31,32]. The most surprising output of this question in our survey is oil prices (20%, n=60) which was considered more important than nutritiousness (8%, n=24) by the consumers living in Manisa.

Table 2 summarized the frequent use of surveyed oils and fats in soups and vegetables (Question 1), fries (Question 2), pastry & pastries (Question 3) and salads (Question 4). As can be seen in Table 2, sunflower and olive oils were the most commonly used oils in vegetables and soups, while sunflower and corn oils were generally used for frying. Besides, margarine and butter were mostly chosen for pastry and pastry products, whereas Turkish consumers preferred to use sunflower and olive oils in salads. Our results are in accordance with the findings of [19], who reported that olive oil was generally used for cooking (59%, n=236) and salads (39%, n=156) in Gölbaşı district of Ankara (capital of Turkey). In another study conducted with 650 female participants in Gölbaşı district of Ankara, margarine (83.70%, n=544), sunflower oil (80.30%, n=522) and butter (58%, n=377) were found to be used mainly for cooking [38]. Consumers living in another Aegean region city, namely Aydın, stated that olive oil was consumed in hot meals (60.75%, n=113), breakfast (17.74%, n=33) and salads (4.84%, n=9) [34].

**Table 2:** Frequency and purposes of using edible oils and fats.

Type of Edible Oils and Fats	Number of Participants (n)			
	Q1	Q2	Q3	Q4
Margarine	127	8	228	1
Butter	55	13	136	4
Sunflower oil	196	174	84	194
Olive oil	201	52	30	256
Corn oil	41	125	14	65
Tail oil	0	0	0	0
Fish oil	0	0	0	0
Soybean oil	0	0	0	2
Hazelnut oil	2	2	4	0

In a study conducted in Samsun, sunflower oil was reported to be consumed in meals (89.19%, n=535), while olive oil in salads

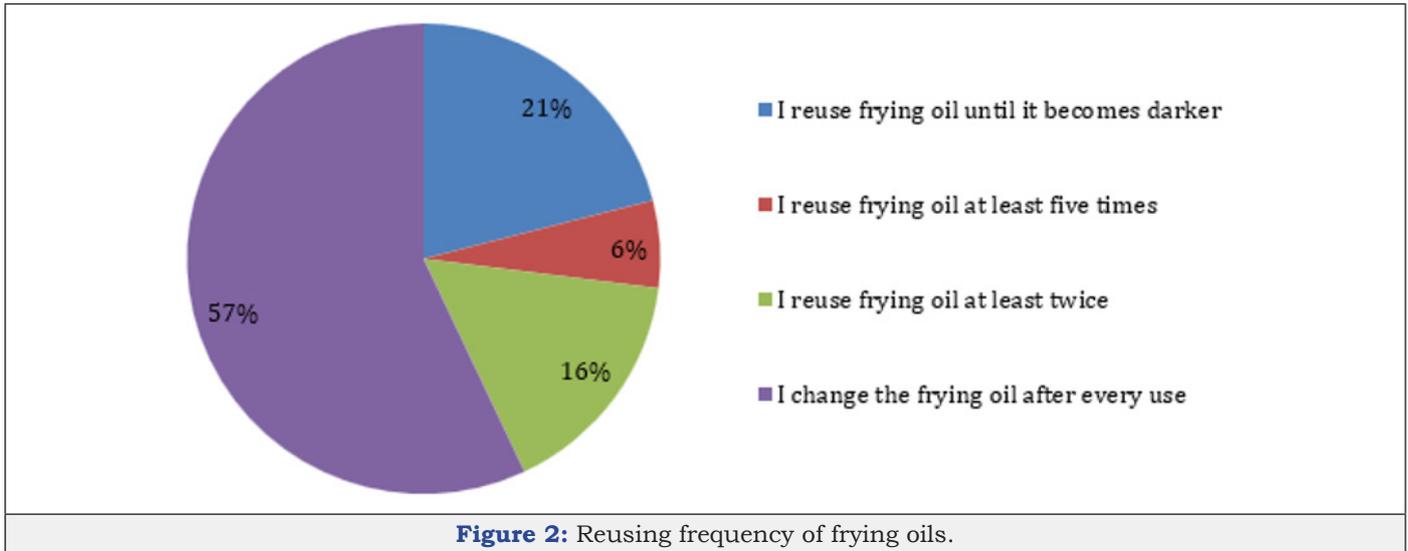
(84.62%, n=508) [11]. A recent study carried out in Muğla city (in Aegean region) revealed that olive oil was usually used in salads (95.40%, n=397) and cold vegetable dishes (92.50%, n=385) [29]. On the other hand, consumers living in Tekirdağ (Thrace Region) used olive oil as cooking (44.86%, n=83) and salad oil (43.8%, n=81) [35]. As can be understood from the findings of similar studies explained above, edible oil preferences are generally different in various regions of Turkey due to cultural differences. Due to the abundance of olive oil production in Aegean region of Turkey, the respondents living in different cities of this region prefer to consume olive oil commonly in their diet. Similarly, to studies in Turkey, a survey study carried out in the USA showed that olive oil was usually used for cooking [32]. In a survey dealing with edible oil consumption and preference of Ghana individuals, participants reported that both refined, and unrefined oils were used for cooking, frying, grill and in soups [24]. It is clear that the consumers' perceptions of oil selection can be influenced by their habits and cultures.

Edible oil and fat storage preferences of consumers are given in Table 3. More than half of the respondents (57%, n=171) stated that they stored oil in a dark and cool place, while some (38%, n=114) reported that they left it at room temperature in their kitchens. The majority of the respondents (96%, n=288) reported that they kept their fat in refrigerator conditions. Fats like margarine and butter should be stored under refrigerator conditions. Oils should be stored in dark and cool places, as pro-oxidants such as temperature, light and oxygen accelerate the oil oxidation reactions [2,39]. The findings of the present study showed that most of the participants living in Manisa kept the edible oils and fat under proper storage conditions.

**Table 3:** Storage conditions of edible oils and fats.

Storage Conditions	Edible Oil	Edible Fat
Refrigerator	5%	96%
Dark and cool place	57%	2%
In the kitchen at room temperature	38%	2%

Reusing or reheating of frying oils is an ordinary method but is not advisable in terms of health effects. As can be seen in Figure 2, most of the participants (57%, n=171) agreed with the statement "I change the frying oil after every use". However, some of the participants (21%, n=36) reused the frying oil until it becomes darker. In summary, these findings indicate that Turkish consumers are aware of the health risks related with the reusing of frying oils multiple times. Therefore, they replace the oil very often for frying purposes. The most important criterion for oil consumption of Turkish consumers was flavor (41%, n=123). This was followed by cooking (37%, n=111), health (14%, n=42) and habit (8%, n=24). Our results are not in accordance with the findings of [11,33], who reported being healthful as the most significant determinant for edible oil and fat consumption for Turkish consumers living in Samsun and Ordu cities, respectively.



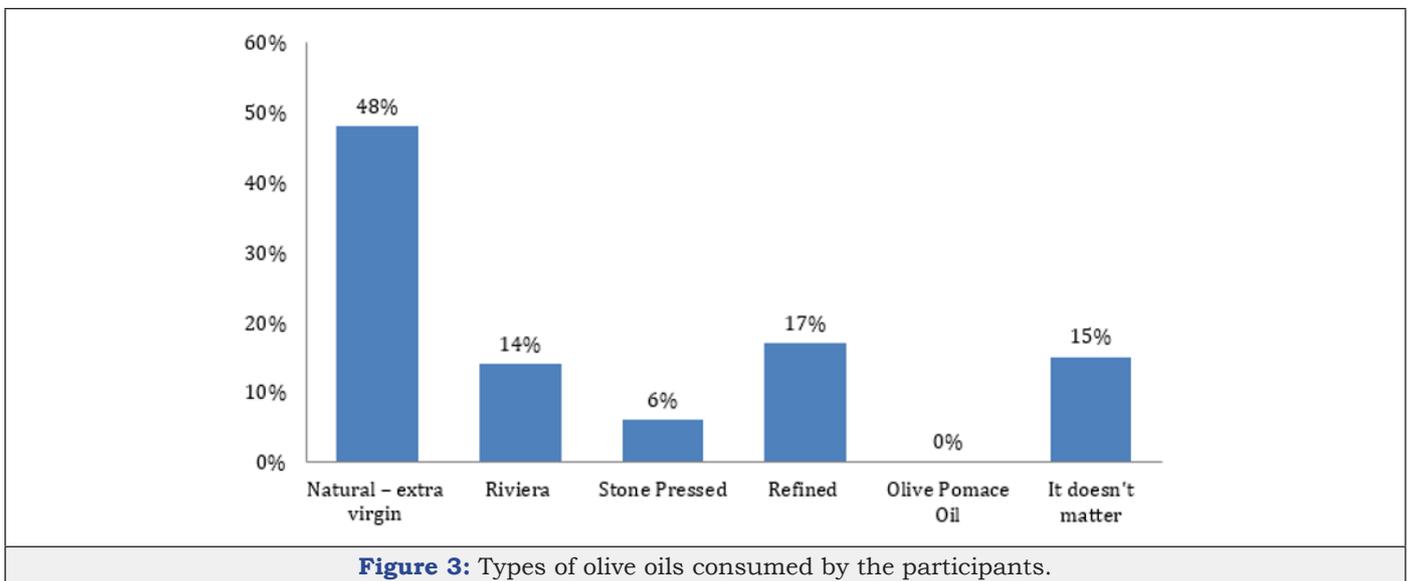
**Figure 2:** Reusing frequency of frying oils.

In the present study, we examined when butter and olive oil were mainly consumed. Participants reported that they consumed butter mostly at breakfast (66%, n=198), and olive oil mostly for cooking (91%, n=273). Our results are in accordance with the findings of [19], who stated that olive oil was generally used in cooking (59%, n=236) in Gölbaşı district of Ankara. Similarly, consumers living in cities of Aydın (60.75%, n=113) and Tekirdağ (44.86%, n=83) preferred to use the olive oil for cooking, while it was generally used as salad oil by consumers in Muğla city (95.4%, n=397) [29,34,35]. Contrary to our results, according to the results

of another study conducted in Gölbaşı district of Ankara, butter (58%, n=377) was generally used for cooking [38]. In conclusion, surveys conducted in Turkey show that olive oil is frequently used as salad oil and for cooking, whereas butter is generally consumed in breakfast and used for cooking (Table 4).

**Table 4:** Consumption of olive oil and butter.

Time of Consumption	Butter	Olive Oil
Breakfast	66%	9%
Meal	34%	91%



**Figure 3:** Types of olive oils consumed by the participants.

Olive oil production and consumption in the Aegean region of Turkey is very common. Most of the consumers surveyed reported that they preferred natural virgin olive oil (48%, n=144). In addition, some of the participants (15%, n=45) reported that type of olive oil was not a key determinant for consumption. The quality, flavor, smell and aroma of olive oil were not considered as essential influencers by these consumers. Our findings agreed with the results of [15,34], who reported that extra virgin olive oil was

the most consumed type of olive oil by consumers living in Dikili district of Izmir city as well as consumers in Aydın city. However, unlike consumers from Aegean region, individuals living in Ankara, the capital found in central Anatolia of Turkey, reported that they mostly preferred riviera olive oil [19]. Considering the findings of all these studies, there are differences in olive oil type consumed between consumers living in various regions of Turkey. Similarly, to our results, Spanish and Northern California consumers reported

that extra virgin olive was most preferred olive oil type [18,21]. Extra virgin olive oil is an essential quality parameter in olive oil for consumers around the world (Figure 3).

In our study, the place of purchase of the edible oils and fats was investigated. Turkish consumers living in Manisa city reported that they bought butter from dairy (64%, n=192), markets (25%, n=75) or directly from producers (unbranded) (11%, n=33). Additionally, bowl package (54%, n=162) was the most preferred package for margarines. Also, participants stated that they preferred brick margarine (23%, n=69), olive oil added margarine (18%, n=54), liquid margarine (4%, n=12) and tin-packed margarine (1%, n=3). Similar results were previously reported for different cities of Turkey. According to the findings of a survey carried out in Samsun, consumers reported that they generally bought vegetable oils from market (86%, n=516) [11]. Other study of [15,34,35], who reported that the participants usually bought olive oil from market in Dikili (30%, n=37), Aydın (32,26%, n=60) and Tekirdag (69.2%, n=128) cities, respectively. Consumers living in Ordu city, stated that the participants frequently bought hazelnut oil from market (89.99%,

n=245) [33]. Similar to our results and another studies, Ghanaian consumers purchased the unrefined oils from open markets and refined oils from supermarket [24]. Another study in Dehradun city reported that participants bought oils from a local store [28]. Consumers in the US and Northern California indicated that they bought oils from supermarkets or special (gurme) stores [21,32].

Comparison of edible oil types in terms of price affordability can be seen in Figure 4. Participants reported that butter (95.33%, n=286) was the most affordable, followed by olive oil (94%, n=282), corn oil (96.33%, n=289), and sunflower oil (92.33%, n=277). Olive oil was considered as more expensive than butter (90.66%, n=272), sunflower oil (92.33%, n=277), and corn oil (89%, n=267). On the other hand, consumers stated that butter was more expensive than sunflower oil (71%, n=213), and corn oil (70.33%, n=211), except olive oil. They also stated that corn oil was more expensive than sunflower oil (61.66%, n = 185). Our study showed that margarine was the cheapest edible oil, while olive oil was the most expensive edible oil in Manisa city.

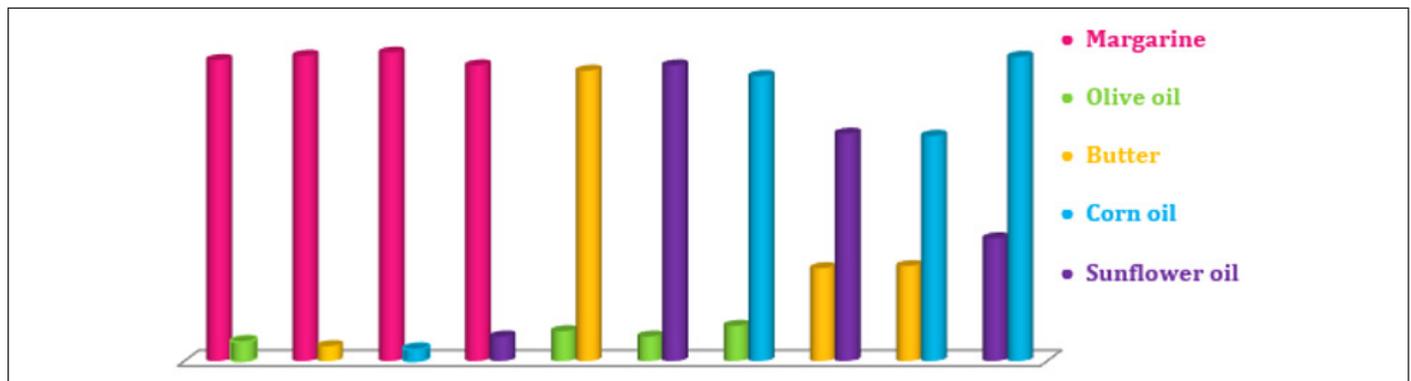


Figure 4: Comparison of edible oils and fats in terms of price compatibility.

The comparison of edible oils and fats in terms of taste is illustrated in Figure 5. Olive oil was more delicious than margarine (91.66%, n=275), butter (52.33%, n=157), sunflower oil (68%, n=204), and corn oil (70%, n=210). Participants stated that butter

was more delicious than margarine (95.66%, n=287), sunflower oil (92.66%, n=278), and corn oil (76.66%, n=230), except olive oil. In conclusion, olive oil was perceived as the most delicious oil by consumers living in Manisa.

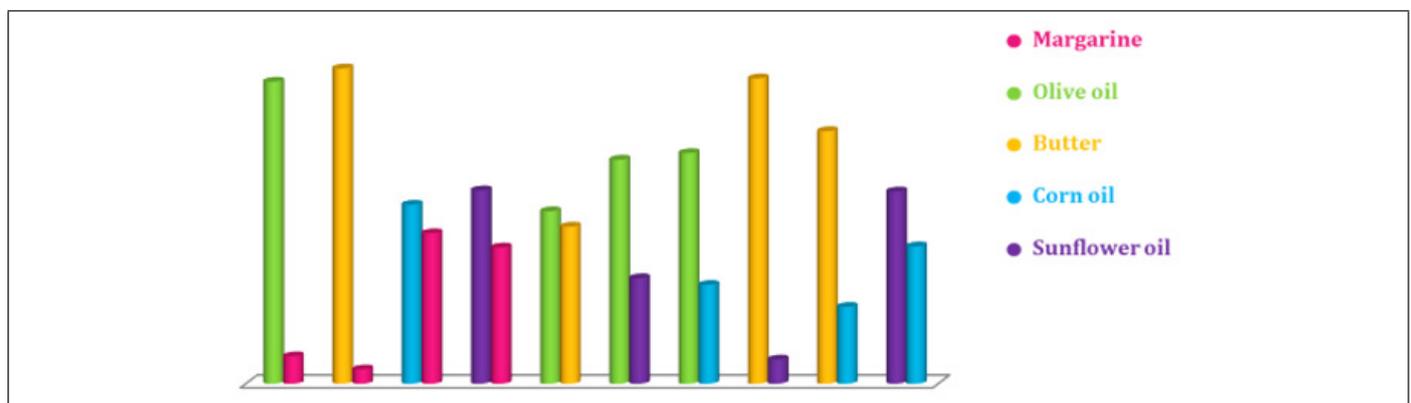


Figure 5: Comparison of edible oils and fats in terms of taste.

Ranking of importance of edible oils' properties are shown in Figure 6. Our results showed that taste (68.33%, n=205),

nutritiousness (52%, n=156), naturalness (73.66, n=221), boutique production (26%, 33, n=79), purity (37%, n=111),

appearance (41.66%, n=125), having an ISO certification (46.66%, n=140), price (44.66% , n=134), brand (47.33%, n=142), being organic (35%, n=105), texture-consistency (47.33%, n=142), and smell-aroma (64%, 33, n=193) were the important criteria for consumers. Also, the participants stated that the saturation degree of edible oils was important (35%, n=105). Similarly, being organic was reported as an important characteristic for olive oil by Spanish consumers [18]. Furthermore, Italians considered the

sensory characteristics as important influencers for olive oil [31]. In another study conducted in Ghana, participants revealed that the nutritional value and quality were important properties for refined oil. Also, consumers reported that price and nutritional value were significant properties of unrefined oils [24]. Important properties in edible oils for consumers living in different regions may vary due to personal preferences and cultural differences.

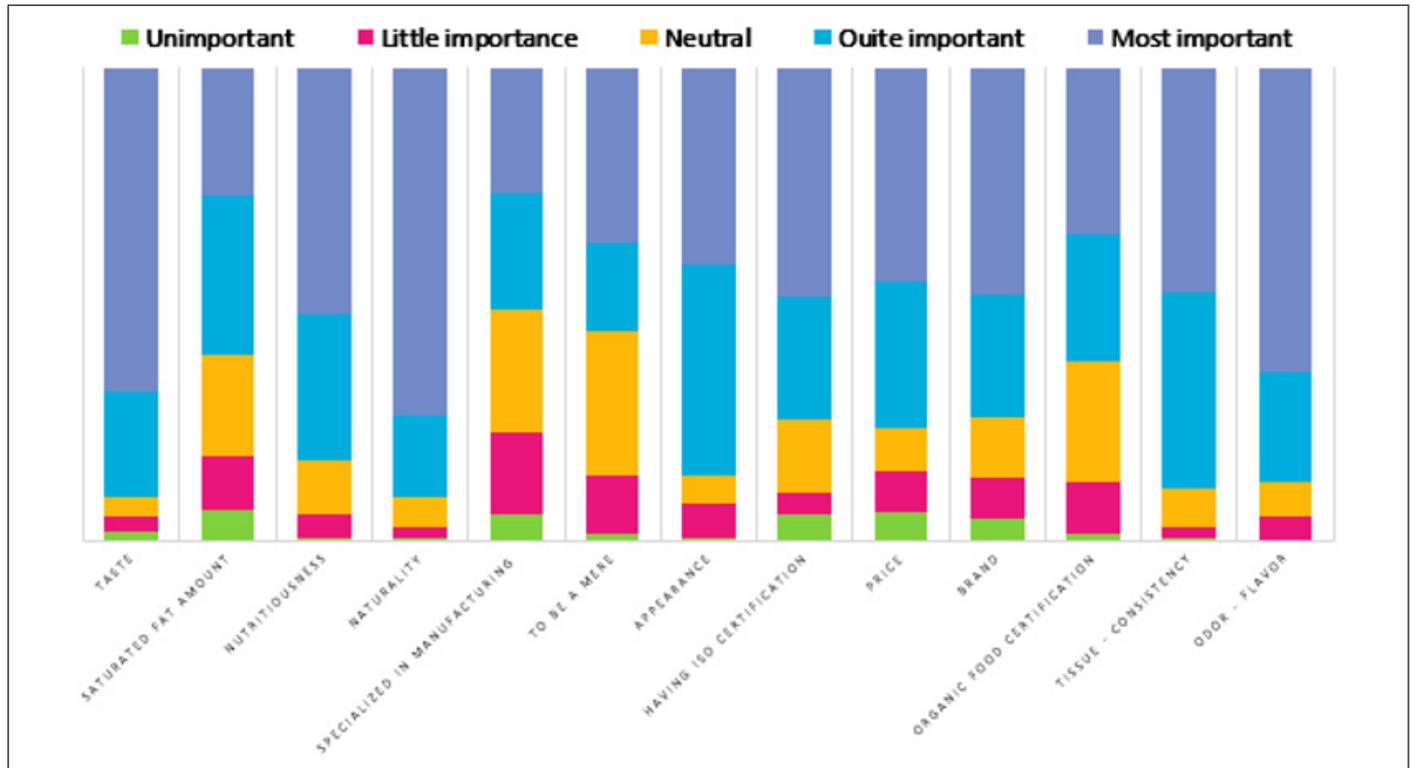


Figure 6: Ranking of importance of edible oils' properties.

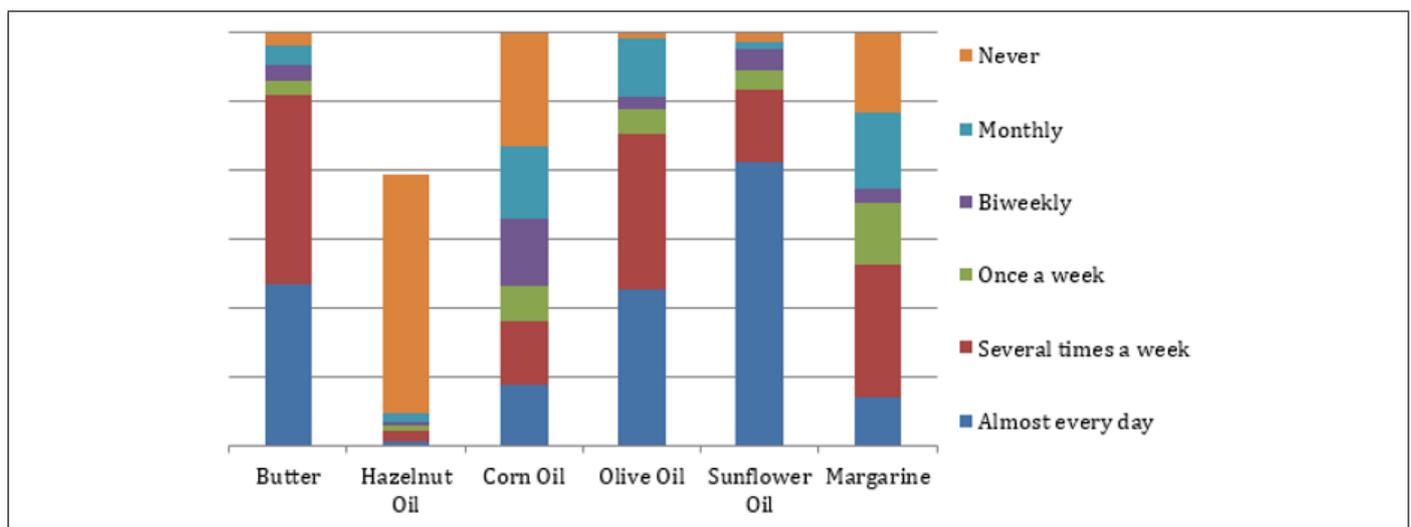


Figure 7: Frequency of Consumption of Edible Oil Types.

Figure 7 illustrates the frequency of edible oils and fats consumption by consumers living in Manisa. According to the findings of this survey, olive oil (38%, n=114) and sunflower

oil (68.66%, n=206) were the most frequently oils in daily diet. Participants stated that butter (45.66%, n=137) was used several times a week and margarine was used once a month (32%, n=96).

Besides, hazelnut oil (57.66%, n=173) and corn oil (27.66%, n=83) were not generally used by the participants. Our findings agreed with the results of [36] who reported that sunflower oil (48.9%, n=173) was the most consumed oil in Eskişehir city (in Central Anatolia Region). Similarly, as a result of a study, consumers stated that sunflower oil (55%, n=242) and butter (87%, n=383) were most frequently consumed edible oil and fat, respectively [26]. Our results are not in accordance with the findings of [19,38], who reported that participants living in Gölbaşı district in Ankara did not consume olive oil (40%, n=160), while margarine (83.7%, n=544) was the most frequently consumed fat. On the other side, participants living in Ordu city generally consumed butter (71.32%, n=194) and hazelnut oil (61.76%, n=168) [33]. A study performed in Italy revealed that olive oil was the most consumed edible oil [31]. In the Mediterranean culture, olive oil dominates the daily diet. Studies summarized above showed that olive oil is frequently consumed in the Aegean region of Turkey, where the Mediterranean-type diet is adopted [40,41]. On the other hand, a survey study carried out in Ghana showed that palm oil, palm kernel oil, coconut oil and shea butter were the most consumed edible oils [24]. Findings of similar studies prove that different societies have different food intake patterns thanks to their cultural variations. In addition, [16] reported that economic income was a key determinant in consumption quantity of edible oils and fats.

This survey study has some limitations. Firstly, the sample size is not enough to generalize the results of this study to all Aegean region of Turkey. Secondly, the number of participants from each sociodemographic group should be balanced to reduce variability.

## Conclusion

The criteria that dominate edible oil consumption of consumers living in Manisa city were determined. In conclusion, the majority of the participants consumed butter at breakfast (66%, n=198) and used olive oil for cooking (91%, n=273). Half of the participants preferred to consume extra natural virgin olive oil. Besides, margarine was considered as the cheapest and tasteless edible fat, whereas olive oil was the most expensive and delicious cooking oil. Furthermore, the majority of the consumers consumed olive oil and sunflower oil through their regular diet and never consumed hazelnut and corn oils. Regional differences as they reflect the habitual and cultural differences in Turkey cause differences in edible oil consumption habits. Further and detailed survey studies are needed to understand the roles of cultural differences in food consumption patterns.

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