Factors Influencing the Consumption of Seafood in Istanbul, Turkey

Birsen Eygi Erdoğan[1],[*], Sühendan Mol[2], Serap Coşansu[3]

[1] Marmara University, Arts and Sciences Faculty, Department of Statistics, 34722, Goztepe, Istanbul, Turkey.
[2] Istanbul University, Fisheries Faculty, Department of Seafood Processing and Quality Control, 34470, Istanbul, Turkey.
[3] Sakarya University, Engineering Faculty, Department of Food Engineering, 54187, Sakarya, Turkey.

Abstract

Scientific data on the attitudes and knowledge of Turkish people regarding seafood consumption is very limited. Therefore, consumption habits and preferences of Turkish people for seafoods were evaluated, based on the example of Istanbul, which is the most crowded and cosmopolitan city of Turkey. Only 15.53% (151) of the 972 participants stated they never consume seafoods but none of them considered seafoods unhealthy. Their main reason for not consuming is odor and taste. A significant proportion of the participants (84.47%) were well aware of the nutrition value of seafoods. Former negative experiences didn't decrease consumption frequency. The rate of seafood consumers and the consumption frequency increases proportional to the age of the consumers. Most of the respondents (34.84%) consume seafood once a week and they believe that they should consume seafoods more often. If seafoods were more available, many participants (44.10%) stated that they would consume seafoods. The top three preferred fish were fatty species, while the most favorite seafood was mussel. Octopus was the most unfavorable seafood, and most of the participants were not familiar with surimi. Respondents mostly (96.59%) preferred to consume fresh seafoods, and canning was the favorite (37.64%) processing technology.

Keywords: Seafood, survey, questionnaire, attitude, demand, habit.

İstanbul, Türkiye'deki Su Ürünleri Tüketimini Etkileyen Faktörler

Özet

Türk halkının su ürünleri tüketimi ile ilgili bilgi ve tutumu üzerine bilimsel veriler çok sınırlıdır. Bu nedenle, su ürünleri için Türk halkının tüketim alışkanlıkları ve tercihleri, Türkiye'nin en kalabalık ve kozmopolit şehri olan İstanbul örnek alınarak incelenmiştir. Toplam 972 katılımcının sadece %15,53'ü (151) asla su ürünü tüketmediklerini belirtmiş, ancak bunların hiçbiri su ürünlerini sağlıksız bulduğunu ifade etmemiştir. Tüketici olmamalarının temel nedeni koku ve tattır. Katılımcıların önemli bir kısmı (%84,47), su ürünlerinin besin değerinin çok iyi farkındadır. Eski olumsuz deneyimler tüketim sıklığını azaltmamaktadır. Su ürünleri tüketicilerinin oranı ve tüketim sıklığı, tüketicilerin yaşı ile orantılı olarak artmaktadır. Katılımcıların çoğunluğu (%34,84) haftada bir kez su ürünleri tüketmekte ve daha çok su ürünü tüketmesi gerektiğine inanmaktadır. Pek çok katılımcı (%44,10) su ürünlerine ulaşmak daha kolay olsaydı daha fazla su ürünü tüketmek isteyeceğini belirtmiştir. En favori su ürünü midye iken, ilk üç sıradaki balıklar yağlı balık türleridir. Ahtapot en az tercih edilen su ürünü olup katılımcıların çoğu surimiye aşina değildir. Katılımcılar, çoğunlukla (%96,59) taze deniz ürünleri tüketmeyi tercih etmektedir ve favori (%37,64) işleme teknolojileri konservedir.

Anahtar Kelimeler: Su ürünü, araştırma, anket, tutum, talep, alışkanlık.

Introduction

Consumption of Fish

Fish is known as an important part of a healthy diet not only for its protein and essential fatty acid contents, but also for many other nutrients (Feng *et al*., 2009). Medical research has revealed that a high consumption of fish oil (omega-3) reduce the risk of some diseases (Trondsen *et al*., 2004). It has been mentioned that the worldwide consumption of fish and derived fish products has greatly increased during recent decades. The increasing world population, higher living standards, and the good overall image of fish among consumers are the possible reasons of this increase (Verbeke *et al*., 2007).

Myrland *et al*. (2000) has also mentioned that there has been an increased demand for seafood at the consumer level particularly due to its benefits to health. This increase also might be associated with

other factors such as more choices for processed seafood products, increased availability of seafood and expanded role of supermarkets as seafood suppliers.

Fish and seafood consumption is influenced by many factors such as socioeconomic background, general food consumption patterns, personal health status of the consumers, and a number of attitudinal dimensions (Trondsen *et al.*, 2004). The previous studies regarding seafood consumption have shown that age, taste, health/nutrition and convenience, are important determinants of seafood consumption behaviour (Myrland *et al.*, 2000; Olsen, 1989; Olsen, 2003).

Consumers' Behavior and Consumption Habits

Knowledge of consumers' decision behavior will help businesses make sound decisions on what to produce and where to market for insuring efficiency of marketing (Al-Mazrooei *et al.*, 2001). It can be said that the consumer behavior and consumption habits regarding seafoods are important factors affecting the development of seafood sector. Therefore, attitudes and habits of consumers were studied to determine these factors in many countries (Feng *et al.*, 2009; Honkanen *et al.*, 2005; Kreider *et al.*, 1993; Myrland *et al.*, 2000 Trondsen *et al.*, 2004). However, data on the attitudes and knowledge of Turkish people regarding seafood consumption, which are very important for the marketing policies of national and international seafood trade, is very limited (Akpinar *et al.*, 2009). Turkey, having over 70 millions of population, and an intended member of EU, imports seafood mainly from Norway, France, India, US, Morocco, Georgia, New Zealand, Greece, Uzbekistan and Libyan (http://www.tuik.gov.tr). With limited resources available to increase the wild-harvest fishing industry, Turkey has started to import more seafood in recent years. Therefore, determining the consumption attitudes and customs of Turkish people will help international businesses to designate what types of fresh and processed seafoods for sale to Turkey. Determining the reasons for not consuming, and the possible ways to increase seafood consumption will also provide solutions to the international businesses for supplying more preferred products for Turkish customers.

Aim of the Study

This study evaluated the consumption habits and preferences of Turkish people for fresh and processed seafoods to determine the attitudes and knowledge regarding seafood consumption, based on the example of Istanbul, which is the biggest metropol of Turkey. The results will help international businesses to designate more preferable seafoods by Turkish consumers. Demographic variables (gender, age, education level, income and marital status) were studied to reveal their effect on seafood consumption behaviour.

Materials and Methods

Questionnaire Design and Data Collection

The survey examining seafood consumption of Turkish consumers was conducted in 2009. Data were collected via street interviews in Istanbul, which is a megacity expanded onto the grounds of Asia and Europe, having a surface area of 5,512 km². The population is 12,573,836, and the population intensity is 2,400 person/km² (http://www.ibb.gov.tr). The population of Istanbul is increasing more rapidly than that of 118 countries (http://www.turkishjournal.com). In terms of the country's export and import performance, Istanbul is ahead of other cities, with 44% of all exports, and 42 % of all import (http://www.aia-istanbul.org/tr). The intensity of population and the importance of this city's trade performance are the reasons of choosing it as the survey area.

Two trained interviewers carried out the questioners face to face to randomly selected 1,000 respondents. When determining the appropriate sample size we used an online sample size calculator (http://www.raosoft.com/samplesize.html) which is based on the amount of error that can be tolerated, the confidence level that is desired and the population size. In this research, error rate was set to 3.2%, confidence interval was set to 95% and population size was set to 12,000,000. With this settings sample size was calculated as 938. Data was collected from 20 different districts of Istanbul (Ataşehir, Avcılar, Bağcılar, Bahçelievler, Bakırköy, Beşiktaş, Beyoğlu, Çekmeköy, Eminönü, Esenler, Fatih, Gaziosmanpaşa, Güngören, Kadıköy, Kartal, Maltepe, Pendik, Şişli, Ümraniye, Üsküdar). The questionnaire contained 16 questions. Five of them were about demographic characteristics (gender, age, income, marital status, and education) and the others were about seafood consumption.

The first question regarding seafood consumption was "*Do you consume fish and other seafoods?*" If the answer was "*No*" the reason was asked and then the questionnaire was ended. Possible reasons offered were taste-odor, allergy, price, being troublesome to prepare, vegetarianism, unhealthfulness, bones, and other reasons. The frequency of consumption, the belief "seafood is a healthy food", most favorable fish species, consumption preferences of fresh and/or processed seafoods, former experiences of seafood poisoning, knowledge of nutritional properties were asked.

The other question was "do you think you consume seafoods less than you have to?" If the answer was "Yes"; the possibilities that may tend consumers to eat more seafoods were asked. Awareness of processed seafoods, i.e. smoked,

canned, brine salted, marinated, dried, fish paste, and surimi was questioned. The participants were also asked if there are seafoods other than fish that they do not consume, and the reasons.

Data Analysis

Questionnaires, applied to 1000 respondents, were examined and 28 of them were eliminated because of unreliable responses. Therefore 972 questionnaires were evaluated to obtain results. The answers were transferred to Microsoft Excel Office Program 2007 version, and coded, i.e. 1 for consumers, 2 for non-consumers. After a review process of the data, NCSS (2007) statistical software was used for the analysis. Frequency Tables, Cross Tabulation and Contingency Tables modules of the software were run in order to get statistical results.

Cross Tabulation is often used to show and analyse the relation between two or more categorical variables. It gives the frequency distribution of the variables in a matrix format. If the proportions of individuals in the different columns vary significantly between rows, it means that the two variables are not independent. Otherwise, it is said that the two variables are independent.

Results and Discussions

Consumer Characteristics

The questionnaire contained 18 questions. The first 5 questions were prepared to contain general information such as gender, age, income, marital status, and education of participants. The other 13 questions were about seafood consumption. The questionnaire was applied to 1,000 people, living in Istanbul, Turkey. However 28 of them had to be eliminated because of unreliable responses. Demographics of study population were given in Table 1. And the statistical results were given in Table 2.

Non Consumers and Their Reasons

Only 15.53% (151) of the 972 participants stated they have never consumed seafoods. When the reason / reasons for not consuming seafood were asked to these 151 participants, 56.95% of them stated that they dislike fishy odor and taste (Table 2). In US, thirteen percent of a survey respondents declared that, they decreased their consumption during the previous two years, because of the change in lifestyle and taste (Wessells *et al*., 1996). Taste-preferences towards seafood are known as the most important predictors of seafood consumption behavior (Bredahl and Grunert, 1997; Olsen, 1989). In a research conducted by Kreider *et al*. (1993) in Delaware-US, the taste is the most frequent reason given by respondents (42.3%) who do not consume fish and seafoods. Likewise, in

the study of Hicks *et al*. (2008) respondents were asked why they were not eating seafood, and they indicated that the primary reason was the taste.

Fishy odor is another important reason for eating less fish according to Trondsen *et al*. (2004). Similarly, Stutzman (1992) reported that consumers prefer fish and seafood that do not have a "fishy" taste or odor. However, dislike of fish and other seafoods may arise depending on many other factors (Leek *et al*., 2000). As it may seen in Table 2, which presents the consumers' attitudes, knowledge and preferences regarding seafoods; allergic problems (23.18%), bones (20.53%), and being vegetarian (12.58%) lead to the rejection of seafood consumption, as well. Allergies and vegetarianism (16% each) were pronounced by the non-seafood eaters according to Hicks *et al*. (2008) as well. The other reasons declared in present study were troublesome to prepare (2.65%), and price (1.99%). It was remarkable that, price was not a significant reason for rejection to eat seafoods in this study. This finding may support the hypothesis that the factors such as freshness, good appearance, flavor, safety, and nutrition were all ahead of price in importance (Kreider *et al*., 1993). According to Hicks *et al*. (2008) 45% of the consumers believe that seafood is too expensive. However, Xiang-guo (2002) was mentioned that price is not considered as an important factor affecting fishery products purchasing decisions of consumers as compared with quality. In our study, the rest of (15.23%) of non consumers put other reasons forward to explain their excuses of not consuming. It was also determined that none of the

Table 1. Socio-demographic characteristics of the respondents (n =972)

	n	%
Gender		
Females	429	44.14
Males	573	55.86
Ages		
20-30	257	26.44
30-40	295	30.35
40-50	187	19.24
50-60	129	13.27
Over 60	104	10.70
Education level		
Non educated-primary school	220	22.63
High school	390	40.12
Graduate	362	37.24
Income ($/month)		
<330	61	6.28
331-660	305	31.38
661-1000	279	28.70
1001- 1660	227	23.35
>1661	100	10.29
Marital status		
Married	669	68.83
Single	150	15.43
Single, with family	153	15.74

Table 2. Consumers' attitudes, knowledge and preferences regarding seafoods

	%(n)		%(n)		%(n)		%(n)		%(n)		%(n)
1-Sea food consumption		4-The belief "seafood is a healthy food" (C)		8-Negative past experience with seafoods(C)		11-Preferred consumption*		12-The frequencies of unknown products*		13-Most preferable species*	
Consumers	84.47% (821)	Yes	100% (821)	No	87.82% (721)	Fresh	96.59% (793)	Surimi	73.57% (604)	Anchovy	69.31% (569)
Non-consumers	15.53% (151)	No	0% (0)	Not sure	6.70% (55)	Canned	37.64% (309)	Fish paste	42.02% (345)	Bonito	50.30% (413)
2-Reasons for not consuming*(NC)		5-The belief "consuming less than it should be" (C)		Yes	5.48% (45)	Frozen	26.80% (220)	Marinade	36.18% (297)	Horse mackerel	49.33% (405)
Disliking taste-odor	56.95% (86)	Yes	66.02% (542)	9-Non preferable species (C)*		Brine-salted	9.74% (80)	Smoked fish	30.09% (247)	Sea bream	47.50% (390)
Allergy	23.18% (35)	No	33.98% (279)	Octopus	69.55% (571)	Salted	9.38% (77)	Brine-salted	22.78% (187)	Blue fish	39.34% (323)
Bones	20.53 % (31)	6-If "Yes", the possible ways to increase seafood consumption*		Lobster	47.99% (394)	Smoked	7.92% (65)	Dried fish	20.46% (168)	Sea bass	37.39% (307)
Being vegetarian	12.58% (19)	Becoming easily available	44.10% (239)	Calamari	33.01% (271)	Dried	7.80% (64)	Canned fish	3.29% (27)	Rainbow trout	31.43% (258)
Troublesome to prepare	2.65% (4)	Lowering the price	39.30% (213)	Shrimp	31.55% (259)	Marinade	7.67% (63)			Striped mullet	24.36% (200)
Expensive	1.99% (3)	Being ready to cook	25.09% (136)	Mussel	26.55% (218)	Fish paste	6.94% (57)			Mussel	23.51% (193)
Unhealthful	0% (0)	"I cannot eat more."	7.20% (39)			Surimi	5.48% (45)			Salmon	20.83% (171)
Other	15.23% (23)	7-Consumer awareness regarding benefits of seafood (C) *		10-Reasons of not consuming the species above (C)						Calamari	20.10% (165)
3-Consumption frequency		Contents of ω-3 and ω-6 fatty acids	72.11% (592)	Disgusting	43.24% (355)					Shrimp	14.86% (122)
Once a week	34.84% (286)	Low cholesterol	67.84% (557)	"Did not try but I can"	16.21% (133)					Turbot	12.79% (105)
Twice a month	24.24% (199)	Easily digestible	62.36% (512)	"Don't know prepare"	11.08% (91)					Sardine	11.81% (97)
Twice a week	19.48% (160)	Rich in vitamin and minerals	56.03% (463)	Dislike of taste	9.01% (74)					Flathead mullet	10.35% (85)
Once a month	16.08% (132)	High protein content	54.57% (448)	Expensive	5.12% (42)					Red mullet	4.63% (38)
Less than once a month	5.36% (44)	Low calorie	54.32% (446)	I consume all these species	15.34% (126)					Other species	8.16% (67)
		Essential amino acids	33.98% (279)								

(*)　More than one answer is available (C)　Asked only to participants, declared they consume seafoods
(NC) Asked only to participants, declared they do not consume seafoods

participants, who do not consume seafood, considered them as unhealthy.

Consumption Frequency

When respondents were asked how often they consume seafood, the answers were once a week (34.84%), twice a month (24.24%), twice a week (19.49%), once a month (16.08%) and less than once a month (5.36%). Similarly, 43-46% of respondents, participated to a survey in Canakkale-Turkey, declared they consume fish once a week (Colakoglu et al., 2006). In US, 46% of current seafood eaters consume seafoods one or more times per week, 29% of them consume a few times per month and 25% once a month or less according to Hicks et al. (2008). In Flanders, survey participants consume fish on average, 4.6 times per month, and 61.7% of them eat fish at least once a week (Verbeke et al., 2007). In Norway, seafood consumption is very intensive. According to Trondsen et al. (2004), the mean monthly consumption of women aged 45–69 years was 15 times.

A remarkable percentage (66.02%) of seafood consumers believe that seafoods take less place in their diet than that of it should be. During our survey, 44.10% of them stated that the place of seafoods in their diet will increase if seafoods became easily available. The other possible ways to increase consumption are lowering the price (39.30%), and preparing fish as ready to cook (25.09%). Some of the participants (7.20%) stated that they cannot eat more seafoods since they do not like too much, according to our questionnaire (Table 2). In Norway, lack of supply of fresh fish and variation of quality were pronounced as important reasons for not eating more fish by 69% of those who thought that they did not consume enough fish. The other reasons of the respondents, who felt that they did not eat enough fish were 'family did not like fish', 'there were too few product choices', 'they did not like the taste of fish', and 'prices were too high' (Trondsen et al., 2004).

Seafoods and Human Health

A considerable proportion, 84.47% (821) of the 972 participants stated that they consume seafoods, and they agreed that these products are beneficial for health. Likewise, Verbeke et al. (2007) reported that the general attitude toward eating fish was very positive in Flanders, and respondents were most strongly convinced that eating fish is healthy and nutritious. In US, 88% (932) of the participants considered themselves to be current seafood eaters (Hicks et al., 2008) Thirty-five percent of respondents from US indicated that they had increased seafood consumption during the previous two years, and their reasons were primarily related to health or to changes in taste and lifestyle (Wessells et al., 1996). The belief that seafood is important for health is the most

important factor influencing fish consumption (Trondsen et al., 2004). However, an interesting result was presented by Hicks et al. (2008), which shows that the majority (79%) of the consumers did 'not agree' or were 'not sure' about whether pregnant women should be eating seafood.

It is known that recommendations about healthy eating influence consumers' food consumption (Harel et al., 2001; Nayga, 2000; Variyam et al., 1998). Generally, health information is effective on seafood consumption (Foxall et al., 1998). Likewise, according to Chi-Square independence test results, our research reveals that consumption frequency is not independent of age (P<0.001). Most of (77%) Norwegian women aged 45-69 years agreed that food is important for health, and this belief resulted to the higher fish consumption (Trondsen et al., 2004). In Delaware-US, consumers perceived seafood to be more healthful than beef and pork, and the increased health awareness has led many consumers to turn to seafood (Kreider et al., 1993). In Spain, fish consumption was promoted by the dietary knowledge according to Kaabia et al. (2001). According to Blackstone (2001), quality and healthiness were positive influences for seafood consumers. Earlier studies have shown positive association between seafood consumption and products that contain healthy components such as polyunsaturated fatty acids (Foxall et al., 1998). In this study, most of the respondents were aware of the high content of ω-3 and ω-6 fatty acids (72.11%), low amount of cholesterol (67.84%), and digestibility (62.36%) of fish. Almost half of the seafood consuming contributors know fish as a good source of vitamins and minerals (56.03%), rich in protein (54.57%), and as a diet food (54.32%). Similarly the knowledge questions related to nutrition, such as omega-3 fatty acids, protein in fish scored from 64 to 70% correct in US (Hicks et al., 2008). In present study, only 33.98% of the respondents noticed fish contain essential amino acids (Table 2).

Regarding our results, 87.82% of seafood consumers reported no seafood-related poisoning episodes as far as they know. Honkanen et al. (2005) reported that past experiences are effective on seafood consumption. However, 88.88% of participants, who experienced seafood poisoning formerly, continue to consume fish and other seafoods twice a month or more often, regarding to our results. It is suggested that former negative experiences do not decrease consumption frequency. The belief "seafood is a healthy food" might be effective on this result.

Age

As a result of our questionnaire, 79.38% of the respondents between the ages of 20-30 consume seafoods, while the consumption rate was 76.95% between the ages of 31 and 40, 90.91% for age group 41-50, 93.80% for age group 51-60, and 95.19% for

older than 60 years of age. Therefore it is possible to say "seafood consumption increase depending on the age". Beside this the independence test results shows that consumption frequency is not independent of age (P<0.001). Similarly, the frequency of consumption also increases proportional to the age. The 14.71% of respondents consuming seafood twice a week were between the ages of 20-30 ages. However 26.47%, 25.62% and 23.23% of the older participants belonged to age groups 41-50, 51-60, and older than 60, respectively, consume fish twice a week. On the other hand, 8.33% of young respondents consume seafoods less than once a month, while this percentage was 2.35-5.79% for older people than 40 years old. Thus, it is possible to say that, the frequent seafood consumption is more common in older age groups.

Our results support the findings of Herrmann *et al.* (1994) who reported a positive relationship between seafood consumption and age in their northeastern US study. Likewise, Storey and Forshee (2007) found a significant increase in seafood consumption frequencies of those 45 years and older. It is known that older people are more health conscious than younger people are (Kearney *et al.*, 1998; Nestle *et al.*, 1998; Roininen *et al.*, 1999). They eat less, and choose a diet that may reduce cardiac disease. Therefore they are predicted to consume more fruits, vegetables and fish (Blisard *et al.*, 2002). In USA (Nayga and Capps, 1995), Taiwan (Li *et al.*, 2000), Norway (Myrland *et al.*, 2000; Olsen, 1989) and Denmark (Grunert *et al.*, 1996); older people prefer fish and other seafoods than younger people. They have more time to prepare their meals, and they are skilled over time to prepare a fish plate, which might be troublesome for naives, as well (Gofton, 1995). Therefore, the probability of responding positively to 'Do you eat enough fish?' increases with age (Trondsen *et al.*, 2004). Lower consumption of other foods, such as meat, among older consumers was explained as the other reason of the higher consumption of recommended healthy foods, such as fish by Trondsen *et al.* (2004).

Income

Income is another factor affecting the frequency of consumption. The percentages of participants consuming seafoods twice a week were 8.93%, 15.20%, 17.70%, 25.00%, and 31.82%, and their monthly incomes were <$330, $331-660, $661-1000, $1001-1660, and >$1661, respectively. However, respondents consume seafoods less than a month were 10.71%, 5.20%, 7.41%, 2.72%, and 2.27% in the same order, regarding their income. Because of these results were thought to be a link between income and consumption frequency. These findings are supported by the independence test results which states that consuming frequency is not independent of income level (P<0.001). Likewise increased weekly fish consumption with income was reported by Colakoglu

et al. (2006) in Canakkale City (Turkey). According to Jensen (2006), income is an important determinant of the level and types of foods and services purchased, and when income rises, people purchase more food. Likewise Hicks *et al.* (2008) reported that 60% of the respondents, whose household income is greater than $50 000/year, are frequently eating seafood two or more times per week. Higher fish consumption is associated with a higher level of income (Trondsen *et al.*, 2004). Yen *et al.* (2008) suggested that the consumption of muscle foods increase with income. However, consumers believe that seafood is more expensive than poultry, beef and pork, and if the price is too much higher than that of other muscle foods, consumers decrease their seafood purchases (Kreider *et al.*, 1993).

Gender and Household

There was no important difference (p≥ 0.05) between the consumption percentages of females (84.15%) and males (84.71%) in the present study. Earlier studies also show that gender does not affect the fish consumption levels (Myrland, 1998; Nayga and Capps, 1995).

While only 12.70% of married respondents declared they do not consume seafoods; this rate was 21.78% for singles. This shows an important effect of being a family on the consumption of healthy foods. Besides, Myrland *et al.* (2000) underlined the positive effect of kids at home on seafood consumption. It was also determined that the probability of responding positively to 'Do you eat enough fish?' increased if more than one people lived in the household (Trondsen *et al.*, 2004).

Education

Our results showed that 89.55% of non-educated or primary school-educated respondents consume seafoods, while this rate was 80.77%, and 85.36% for high school and university degree participants respectively. Although consumption attitude seems to be independent, according to χ^2 independence tests, consumption frequency is not independent of education (P<0.05). As a similar result, Colakoğlu (2006) reported that, university degreed people prefer to consume fish because it is healthy. Myrland *et al.* (2000) offered a hypothesized that, seafood consumption may have increased since the late 1980s and may grow through a more educated society. In US, a significant impact was found by Huang (1995) of household head's education on the seafood consumption patterns. Likewise Trondsen *et al.* (2004) reported that as the level of education increases, the market share of fatty fish in Northern Norway might move closer to the national level. They linked the increased fish consumption of educated people to the belief that food is important for health. Moreover, a relationship was observed by Myrland *et*

al. (2000) in that higher educated consumers demand better products. This means that there might be a potential for suppliers to obtain better quality products and more prepared dishes to educated consumers.

Consumer Attitudes Regarding Common Seafoods Other Than Fish

Although mussel, calamari and shrimp are the favorites of some respondents, 69.55%, 47.99%, 33.01%, 31.55%, and 26.55% of them expressed that they do not consume octopus, lobster, calamari, shrimp, and mussel, respectively. Most of the participants suggested that they found these products disgusting (43.24%). Some of them (16.21%) did not eat these products until now, but they tended to try these products. The other answers for rejection are: 'I do not know how to prepare/eat' (11.08%), 'I tried, but did not like' (9.01%), 'Expensive' (5.12%). Only 15.34% of the seafood consumers declared that they consume all these seafoods. Kinnucan *et al.* (1993) mentioned that, convenience was an important factor influencing the decision to purchase lobster, and that nutritional value and health considerations were important determinants in the decision to purchase shrimp.

Awareness and Consumption of Fresh and Processed Seafoods

The respondents were asked regarding their preference of fresh, frozen, and processed seafoods, stating more than one choice was possible. The most preferred type of consumption (96.59%) is fresh. As a similar result, 94-97% of the respondents in Canakkale City (Turkey) preferred fresh fish instead of canned, salted, and dried food (Colakoglu *et al.*, 2006). The previous studies have shown that fresh fish is preferred over packaged and frozen products in China by 76.7% (Feng *et al.*, 2009) and in US by a ratio over 96% (Kreider *et al.*, 1993). The feeling of consumers that fresh products are safer is the reason of this result.

In our study, the most preferred product type was canned seafoods (37.64%) following by frozen seafoods (26.80%). On the other hand the results show that, the other processed seafoods are less preferable. The preferences of brine salted, salted, smoked, dried, marinated, fish paste, and surimi products were 9.74%, 9.38%, 7.92%, 7.80%, 7.67%, 6.94%, 5.48%, respectively. The other question was on the awareness of various processed seafoods. A remarkable percentage of respondents were not aware of surimi (73.57%). Fish paste (42.02%), marinated fish (36.18), smoked fish (30.09%), brine salted fish (22.78%) and dried fish (20.46%) were not known by some of the participants, at all. Canned seafoods were not known only by a little percentage (3.29%). These results revealed that most of the processed seafood products are not known by consumer (Table 2).

Similarly, Jenkins (1991) stated that most consumers in US are familiar with only ten to 12 seafoods, although there are more than 300 species traded.

Most Preferable Seafoods

Preferences of respondents regarding seafood species were asked, stating more than one choice is possible. The most preferred species was anchovy (69.31%), following by bonito (50.30%), and horse mackerel (49.33%). The top three preferred species were fatty species. In the study conducted by Trondsen *et al.* (2004), fat and lean fish consumption is associated with the belief of food is important for health.

As it was shown in Table 2; the preference ratios of other species were as follow, sea bream (47.50%), blue fish (39.34%), sea bass (37.39%), rainbow trout (31.43%), striped mullet (24.36%), mussel (23.51%), salmon (20.83%), calamari (20.10%), shrimp (14.86%), turbot (12.79%), sardine (11.81%), flathead mullet (10.35%), red mullet (4.63%), and other species (8.16%). In a consumer study, carried out in Flanders, salmon, cod, and tuna were most frequently; but sole, Pollack, and trout were less frequently consumed species (Verbeke *et al.*, 2007). Lean seafood is the most consumed diner dish in US, processed seafods were the second, while fat seafood was the last in consumption frequency (Myrland *et al.*, 2000). According to Kreider *et al.* (1993) shrimp, flounder and crab were the most preferred seafoods for at home consumption; trout, salmon, and tuna followed as the overall most popular products, respectively in US. As stated by Verbeke *et al.* (2007), the preferences differ with the habits of consumer, region, and the accessibility of seafoods.

Conclusions

The current study showed that seafood is more preferable for older people. Education, income and being family are the other important factors. The common consumption frequency is once a week. Also results revealed that most of the respondents are aware of nutritional value of seafoods, although the essential amino acid content of fish is the least known issue. It is interesting that remarkable percentage of respondents believed that they should consume seafoods more often, while almost half of them stated that they may consume more frequently if seafoods became easily available. Another interesting result is that a very high percentage of respondents prefer to consume fresh fish than processed fish. Fatty fish species are most favorable, whereas mussel is the most preferable seafood other than fish. The findings about the consumer preferences mentioned above may be helpful for seafood sector to increase seafood consumption or for developing new seafood products such as more attractive products for young people.

References

Akpinar, M.G., Dagistan, E., Mazlum, Y., Gul, M., Koc, B. and Yilmaz, Y. 2009. Determining household preferences for fish consumption with conjoint analysis in Turkey. Journal of Animal and Veterinary Advances, 8(11): 2215-2222.

Al-Mazrooei, N., Chomo, G.V. and Omezzine, A. 2001. Consumer purchase behavior of seafood products in Oman. Journal of International Food and Agribusiness Marketing, 13(4): 5-22. doi:10.1300/J047v13n04_02

Blackstone L. 2001. Environmental Consumer Research. National Fisheries Institute: Arlington, VA., 67 pp.

Blisard, N., Lin, B.H., Cromartie, J. and Ballenger, N. 2002. America's changing appetite: food consumption and spending to 2020. Food Review, 25(1): 2-10.

Bredahl, L. and Grunert, K.G. 1997. Determinants of the consumption of fish and shellfish in Denmark: An application of the theory of planned behavior. In: J.B. Luten, T. Børresen and J. Oehlenschlager (Eds.), Seafood from Producer to Consumer, Integrated Approach to Quality, Elsevier, Amsterdam: 21–30.

Çolakoglu, F.A., Ismen, A., Ozen, O., Cakir, F., Yigin, C. and Ormanci, H.B. 2006. Çanakkale ilindeki su ürünleri tüketim davranışlarının değerlendirilmesi, E.U. Su Ürünleri Dergisi, 23: 387-392.

Feng, W., Jian, Z., Weisong, M., Zetian, F. and Xiaoshuan, Z. 2009. Consumers' perception toward quality and safety of fishery products, Beijing, China. Food Control, 20(10): 918-922. doi:10.1016/j.foodcont.2009.01.008

Foxall, G., Leek, S. and Maddock, S. 1998. Cognitive antecedents of consumers' willings to purchase fish rich in polyunsaturated fatty acids (PUFA). Appetite, 31(3): 391-402. doi:10.1006/appe.1998.0178

Gofton, L. 1995. Convenience and the moral status of consumer practices. In: D.W. Marshall (Ed.), Food choice and the consumer Blackie Academic & Professional. London, UK: 152–181.

Grunert, K., Bisp, S., Bredahl, L., Sørensen, E. and Nielsen, N.A. 1996. A survey of Danish consumers' purchase of seafood. MAPPreport. Aarhus School of Business.

Harel, Z., Riggs, S., Vaz, R., White, L. and Menzies, G. 2001. Omega-3 polyunsaturated fatty acids in adolescents: knowledge and consumption. Journal of Adolescent Health, 28: 10–15. doi:10.1016/S1054-139X(00)00179-8

Herrmann, R.O., Rauniyar, G.P., Hanson, G.D. and Wang, G. 1994. Identifying frequent seafood purchasers in the Northeastern U. S. Agricultural and Resource Economics Review, 4: 226-235.

Hicks, D., Pivarnik, L. and McDermott, R. 2008. Consumer perceptions about seafood-an Internet survey. Journal of Food Service, 19: 213–226. doi:10.1111/j.1748-0159.2008.00107.x

Honkanen, P., Olsen, S.O. and Verplanken, B. 2005. Intention to consume seafood—the importance of habit. Appetite, 45: 161–168. doi:10.1016/j.appet.2005.04.005

http://www.ibb.gov.tr/sites/ks/en-US/0-Exploring-The-City/ Location/Pages/Istanbulin Numbers.aspx [Accessed date: 30 July 2010]

http://www.aia-istanbul.org/tr/content.asp?PID= %7BFD6B 201A-8866-4435-934B-4D5640FA23AE% 7D&PT= An%20overview%20of%20Istanbul [Accessed date: 13 July 2010]

http://www.raosoft.com/samplesize.html [Accessed date: 21 June 2011]

http://www.tuik.gov.tr/balikcilikdagitimapp/balikcilik.zul [Accessed date: 8 August 2010]

http://www.turkishjournal.com/i.php?newsid=6288 [Accessed date: 8 August 2010]

Huang, C.L. 1995. Socio-demographic determinants of seafood consumption patterns in the United States. In: S.L. David (Ed.), International Cooperation for Fisheries and Aquaculture Development: Proceedings of the 7th Biennial Conference of the International Institute of fisheries Economics and Trade, National Taiwan Ocean University, Keelung, Taiwan: 200-211.

Jenkins, G.M. 1991. Consumer Concerns about Seafood. Journal of Food Distribution Research, 2: 57-66.

Jensen, H.H. 2006. Changes in seafood consumer preference patterns and associated changes in risk exposure. Marine Pollution Bulletin, 53: 591–598. doi:10.1016/j.marpolbul.2006.08.014

Kaabia, M.B., Angulo, A.M. and Gil, J.M. 2001. Health information and the demand for meat in Spain. European Review of Agricultural Economics, 28(4): 499–517. doi:10.1093/erae/28.4.499

Kearney, M., Kelly, A. and Gibney, M.J. 1998. Attitudes toward and beliefs about nutrition and health among a nationally representative sample of Irish adults: Application of logistic regression modelling. Journal of Nutrition Education, 30(3): 139–148. doi:10.1016/S0022-3182(98)70304-8

Kinnucan, H.W., Nelson, R.G. and Hiariey, J. 1993. U.S. Preferences for Fish and Seafood: An Evoked Set Analysis. Marine Resource Economics, 8: 273-291.

Kreider, C.R., Gempesaw, C.M., Bacon, J.R., Toensmeyer, U.C. and Groff, A.J. 1993. An Analysis of Consumer Perceptions of Fresh Fish and Seafood in the Delmarva Region. Journal of Food Distribution Research, 4: 37-48.

Leek, S., Maddock, S. and Foxall, G. 2000. Situational determinants of fish consumption. British Food Journal, 102: 18–39. doi:10.1108/00070700010310614

Li, H-S., Huston, J. E., Wang, S-M. and Lee, H-J. 2000. Factors affecting consumer preferences for fish in Taiwan. IIFET-Conference Proceedings, Oregon State University.

Myrland, O. 1998. Factors affecting seafood consumption in Norway: lifestyle and perceptions. Working paper, Department of Economics and Management, Norwegian College of Fishery Science, University of Tromsù.

Myrland, O., Trondsen, T., Johnston, R.S. and Lund, E. 2000. Determinants of seafood consumption in Norway: lifestyle, revealed preferences, and barriers to consumption. Food Quality and Preference, 11: 169-188. doi:10.1016/S0950-3293(99)00034-8

Nayga, R.M. 2000. Schooling, health knowledge and obesity. Journal of Agricultural and Applied Economics, 32: 815–822.

Nayga, R.M. and Capps, O.J. 1995. Factors affecting the probability of consuming fish and shellfish in the away from home and at home markets. Journal of Agricultural and Applied Economics, 27(1): 161-171.

Nestle, M., Wing, R., Birch, L., DiSogra, L., Drewnowski, A., Middleton, S., Sigmnan-Grant, M., Sobal, J., Winston, M. and Economos, C. 1998. Behavioral and social influences on food choice. Nutrition Reviews,

56(5): 50-74.
doi:10.1111/j.1753-4887.1998.tb01732.x

Olsen, S.O. 1989. Seafood in Norwegian households: differences in attitude and consumption behaviour. Norwegian Institute of Fisheries and Aquaculture (in Norwegian). Tromsø, Norway:

Olsen, S.O. 2003. Understanding the relationship between age and seafood consumption the mediating role of attitude, health involvement and convenience. Food Quality and Preference, 14: 199–209. doi:10.1016/S0950-3293(02)00055-1

Roininen, K., Lahteenmaki, L. and Tuorila, H. 1999. Quantification of consumer attitudes to health and hedonic characteristics of foods. Appetite, 33: 71–88. doi:10.1006/appe.1999.0232

Storey, M.L. and Forshee, R.A. 2007. Go Fish! An Analysis of Consumers' Understanding of the Health Risk of Consuming and Not Consuming Fish and Shellfish. Center for Food, Nutrition and Agriculture Policy, University of Maryland: College Park, MD.

Stutzman, C. 1992. Tilapia Status Report, American Tilapian Association. Amana, Iowa.

Trondsen, T., Braaten T., Lund, E. and Eggen A.E. 2004. Eggen Health and seafood consumption patterns among women aged 45–69 years. A Norwegian seafood consumption study. Food Quality and Preference, 15: 117–128. doi:10.1016/S0950-3293(03)00038-7

Variyam, J.N., Blaylock, J. and Smallwood, D. 1998. Informational effects of nutrient intake determinants on cholesterol consumption. Journal of Agricultural and Resource Economics, 3: 110–125.

Verbeke, W., Vanhonacker, F., Sioen, I., Camp, J.V. and De Henauw, S. 2007. Perceived Importance of Sustainability and Ethics Related to Fish: A Consumer Behavior Perspective. Ambio, 36(7): 580-585. doi: 10.1579/0044-7447(2007)36[580:PIOSAE]2.0.CO;2

Wessells, C.R., Kline, J. and Anderson, J.G. 1996. Seafood safety perceptions and their effects on anticipated consumption under varying information treatments. Agricultural and Resource Economics Review, 25: 12–21.

Xiang-guo, Z. 2002. Consumption trends and habits for fishery products in China, ASEM Aqua challenge workshop [Available at: http://www.imbc.gr/biblio serv/aquachallenge /xiang.html, Accessed date: 13th July 2010].

Yen, S.T., Lin, B.H. and Davis, C.G. 2008. Consumer knowledge and meat consumption at home and away from home. Food Policy, 33: 631–639. doi:10.1016/j.foodpol.2008.02.006