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RESEARCH ARTICLE

Determination of fish consumption in Çanakkale

Fahri Saka[1*] iD • Musa Bulut[2] iD

[1] *Çanakkale Onsekiz Mart University, Graduate School of Natural and Applied Sciences, Department of Aquaculture, Çanakkale, Turkey*

[2] *Çanakkale Onsekiz Mart University, Faculty of Marine Sciences and Technology, Department of Marine Technology Engineering, Çanakkale, Turkey*

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ABSTRACT

Fish plays a key role in human consumption in terms of protein, mineral, and essential fatty acid contents. Unfortunately, despite its importance for the human health, there is lack interest on the fish consumption in Turkey. In this context, this paper aimed to determine the fish consumption habits in Çanakkale. It is estimated that fish consumption could be higher in the locations along the coasts of marine and inland waters. Therefore, consumers living in all districts of the city were surveyed to test this hypothesis. The questionnaire was carried out to provide an insight into the fish consumption habits of randomly selected 1056 consumers in Çanakkale. Socio-economic and demographic structures such as age, gender, educational status, profession, income level of the consumers were determined. Responses of the consumers were arranged and analysed by using SPSS and MS-Excel software. Moreover, fish consumption amount, consumption frequency, preferred fish species, most consumed fish species were also determined. The results give an excellent snapshot of fish consumption habits in Çanakkale. Both the most consumed and the most favourite fish species are identified as *Sarda sarda*. Fish consumption frequency was described as 33.3% (352 individuals) for consuming fish one a week followed by bimonthly frequency (21.9%, 231 individuals) and monthly frequency (21.5%, 227 individuals). 2.3% (24 individuals) of the participants noted that they never consume fish. Moreover, the majority of consumers specified that they consume fish 1-2 kg (39.0%, 312 individuals) and 27.3% (288 individuals) consume fish 0.5-1 kg. Socio-economic and demographic characteristics of consumers are affecting the fish consumption habits. In the present study, season, income level, and freshness of fish are found to be driving force for fish consumption in Çanakkale. Therefore, fish farmers and sellers are recommended to remain the freshness of fish and to follow the appropriate fishing season for providing fish to consumers.

* Corresponding author
E-mail address: fahri_saka@hotmail.com (F. Saka)

Introduction

Fish has a great importance for human health since its content including protein, mineral, vitamin and essential fatty acids. Therefore, fish consumption is vital for healthy life. Global fish consumption has reached 20.3 kg/year per capita in 2016 (FAO, 2018). On the other hand, fish consumption was 5.4 kg per capita in 2016 for Turkey which is the least consumption amount per capita since 2000 (GDFA, 2019). Recently, it increased to 6.14 kg/year per head in 2018 (TurkStat, 2019). Moreover, in 2018, aquaculture has provided more fish for human consumption than capture fisheries in Turkey.

The expansion in fish consumption has been driven not only by enlarged production, but also by a grouping of several other dynamics, containing better utilization, growing demand, reduced wastage, and developed distribution networks, connected with rising incomes, population growth, and urbanization (FAO, 2018). Moreover, increasing interest on dietetic aspects, waste reduction, food safety, and food quality has also supplemented the increase of the fish consumption.

FAO and WHO (2011) indicated that fish consumption has positive effects on mental health, age related macular degeneration, and inhibiting cardiovascular diseases. In case of low per capita consumption of fish, even slight amounts of fish are able to supply essential fats, amino acids, and micronutrients (e.g., calcium, iodine, iron, and vitamin D) which are not originate in plant-based diets (FAO, 2018). Authorities come to an agreement that the beneficial effects of high fish consumption mainly compensate the possible undesirable effects associated with contamination or further safety risks (FAO and WHO, 2011).

Average per capita fish consumption differs meaningfully within and across regions and countries due to the effects of geographic, economic, demographic and cultural factors. In the present study, it is aimed to determine the fish consumption in Çanakkale. This study investigated fish consumption behaviour of the consumers living in all districts of the city.

Material and Methods

The core material of the study is the original data recently collected through questionnaires from the participants living in Çanakkale. Questionnaire survey was conducted between February 2019 and December 2019. A total of 1056 people were surveyed in all districts of Çanakkale. The targeted consumers were requested permission to fetch data, and the data were obtained from the enthusiastic consumers within 5-10 min.

Total population of Çanakkale is reported as 540662 by TurkStat (2019). Required minimum sampling size was determined with equation (1) according to the random sampling method suggested by Collins (1986). The population, required minimum sampling size and applied sampling size for all districts are tabulated in Table 1.

$$n = \frac{N \times P \times Q \times Z_\alpha^2}{d^2} \tag{1}$$

In this equation, n is the sample size, N is the population of district, P is the probability of occurrence (assumed as 0.05), Q is the unoccurrence probability (Q=1-P), Z_a is the confidence coefficient (accepted as 2.58 for 0.01 error margin), d is the sampling error that is accepted according to the incidence of the event.

Table 1. The population, required minimum sampling size and applied sampling size for all districts

District	Population	Required Minimum Sampling Size	Applied Sampling Size
Ayvacık	33568	50	30
Bayramiç	29716	45	30
Biga	90576	136	48
Bozcaada	3023	5	30
Çan	48215	72	36
Eceabat	8912	13	57
Ezine	32003	48	44
Gelibolu	44809	67	110
Gökçeada	9783	15	72
Lapseki	27327	41	122
Merkez	180823	272	400
Yenice	31907	48	77

The data acquired from the questionnaire were statistically assessed by using SPSS v23.0 statistical package program. Frequency tables, distribution charts, Chi-square test, and one-way analysis of variance (ANOVA) were used. The statistical significance of the relationships between the variables was accepted as $p < 0.05$.

The statistical relationship between the frequency of fish consumption of consumers and their socio-economic, demographic and behavioural characteristics were evaluated using the Chi square test. Moreover, the effects of the socio-

economic, demographic and behavioural characteristics of the habits on the fish consumption frequency were also assessed.

Results

The socio-economic and demographic status of the consumers is presented in Table 2. The distribution of the participants according to the district of residence was presented in Figure 1. 57.6% of the respondents were male and 42.4% were female. 57.5% of the participants are married and 42.5% are single. When the ages of the participants were examined, 30.8% were in the 19-29 age range and 27.8% were in the 30-49 age range. When the educational status was evaluated, it was determined that 33.4% graduated from high school or equivalent schools and 19.1% graduated from undergraduate programs. When the professions of the participants were examined, 27% were students, 20% were self-employed, 18.6% were workers, 13.6% were homemakers, 13.3% were public officers, and 7% were retired. When the income levels are analysed, it is determined that 41.9% of the monthly income is 2020 TRY or less, which is the minimum wage for Turkey in 2019, and 24.5% is between 3001-4000 TRY. The majority of the participants have a minimum wage or less monthly income. The household size and the preference status for fish consumption of the participants are given in Table 2.
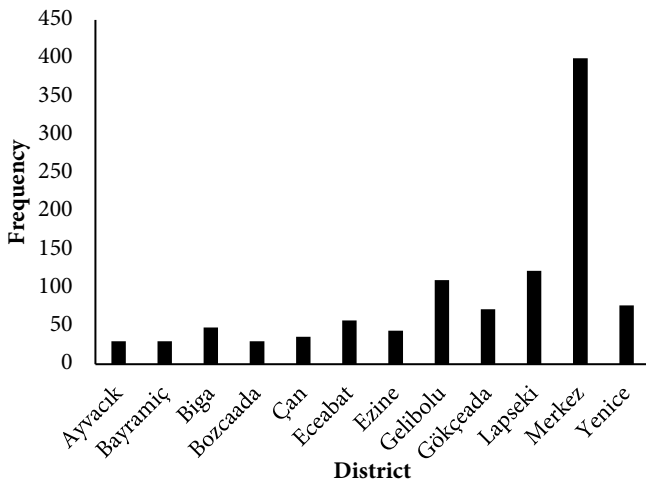

Figure 1. Distribution of the participants according to the district of residence

When the amount of fish consumption is analysed, 39% of the respondents stated that they consumed 1-2 kg, 27.3% consumed 0.5-1 kg, 17% consumed 0.1-0.5 kg, 14.4% consumed 2-3 kg, and 2.4% consumed 3 kg or more fish (Figure 2).

While 95.4% of the respondents stated that they bought fish instead of fishing (Table 2), 38.8% thought that fish prices were a bit expensive (Figure 3). 21.2% of consumers preferred peddlers for fish buying while 27.1% preferred fish stalls and 21.8% of consumers preferred fish markets. A total of 30.6% of

the participants preferred more than one place to buy fish (Figure 4). 59.1% of the respondents preferred to fish consumption according to the season when buying fish (Table 2).
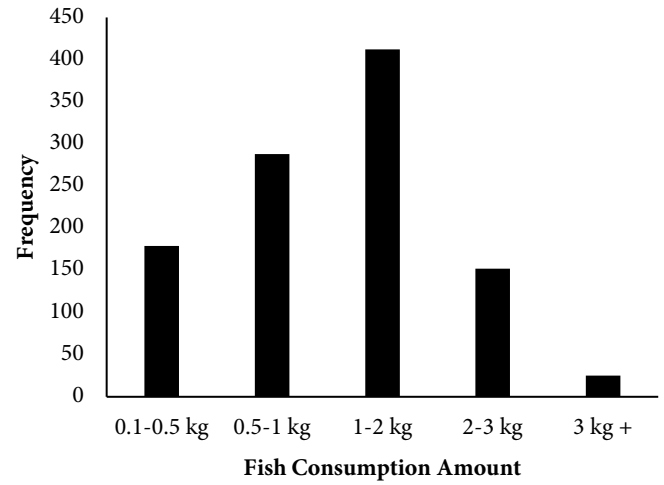

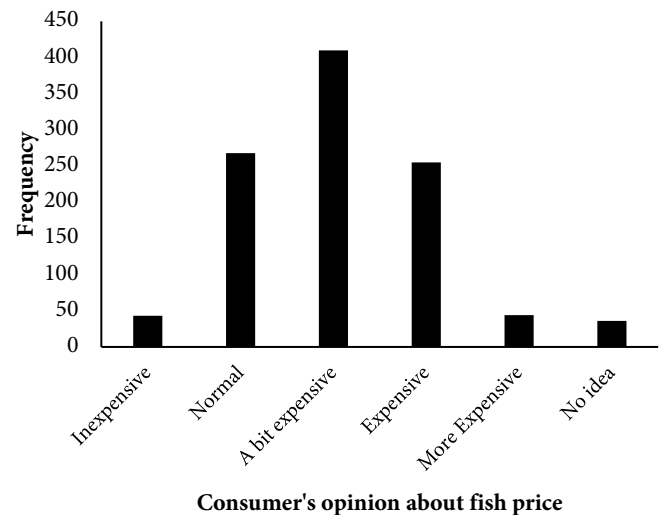**Figure 2.** Average fish consumption amounts of consumers

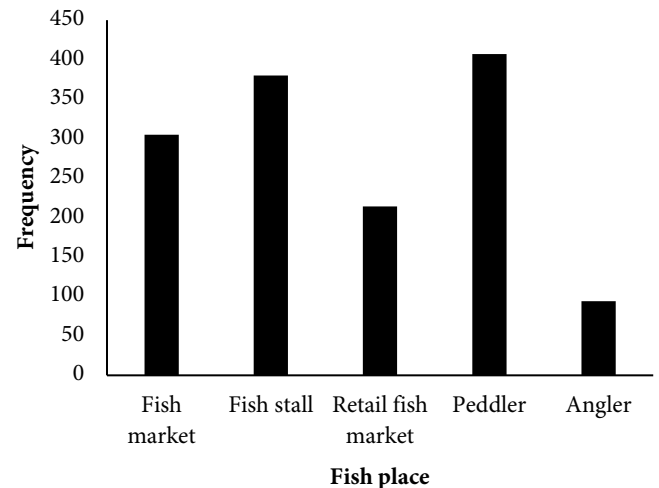**Figure 3.** Consumer's opinion about fish price

Figure 4. Consumer's preferences for fish buying place

With regard to fish consumption according to season, 33.1% of consumers stated that they consumed mostly in winter season while 43.5% of the respondents stated that they consumed fish in more than one season (Figure 5). The most fish consumed season was described as the winter followed by spring, autumn, and summer, respectively.
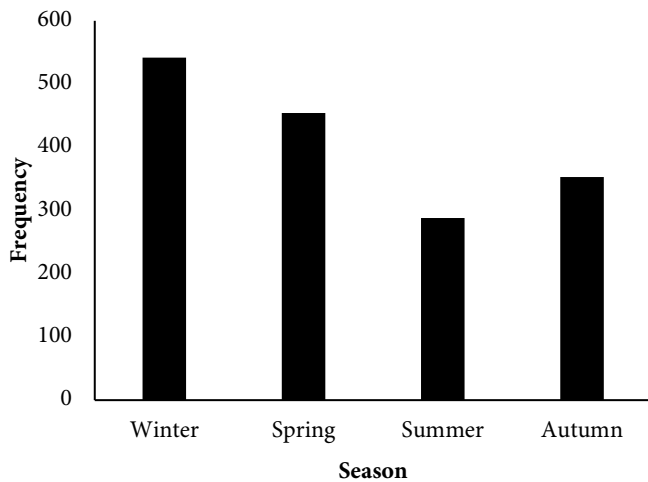
**Figure 5.** Seasonal preference of consumers for fish consumption

The majority of participants have preferred fresh fish for consuming (87.6%, 925 individuals). Moreover, consumers pay attention to the freshness of the fish during buying fish (26.0%, 746 individuals) while 15.9% of consumers take care to be appropriate to the season. The huge portion of the participants (50.0%, 528 individuals) shows ultimate attention for buying fish and checks more than one criterion (Figure 6).
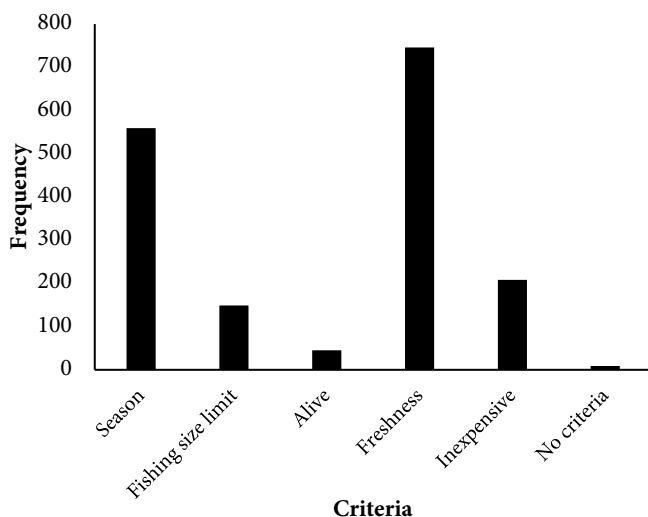
**Figure 6.** Main criteria that consumers take care of when buying fish

The most favourite fish species was determined to be Atlantic bonito (*Sarda sarda*) by 51% (538 individuals) of the consumers. After anchovy, the most favourite fish species was

determined to be anchovy (*Engraulis encrasicolus*) by 47% (496 individuals) and bluefish (*Pomatomus saltatrix*) by 37% (391 individuals) of the consumers (Figure 7).
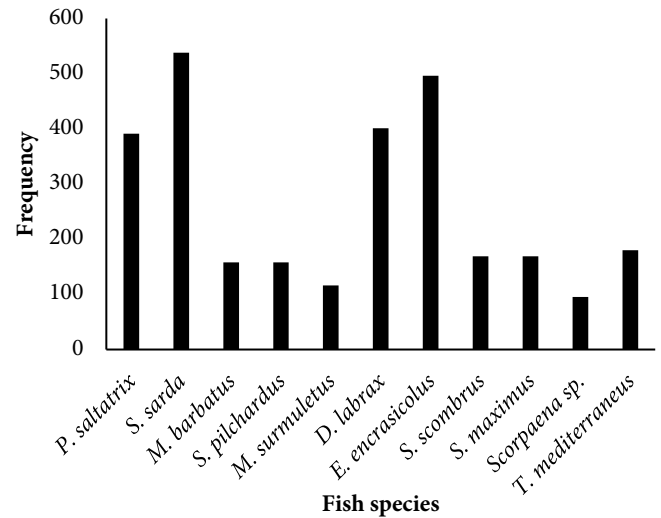
Figure 7. The most favourite fish species of consumers

It was determined that the most consumed fish species was Atlantic bonito (65%, 686 individuals). The most consumed fish species after anchovy were found as anchovy (53%, 560 individuals), sea bass (*Dicentrarchus labrax*) (43%, 454 individuals), and bluefish (27%, 285 individuals) (Figure 8).
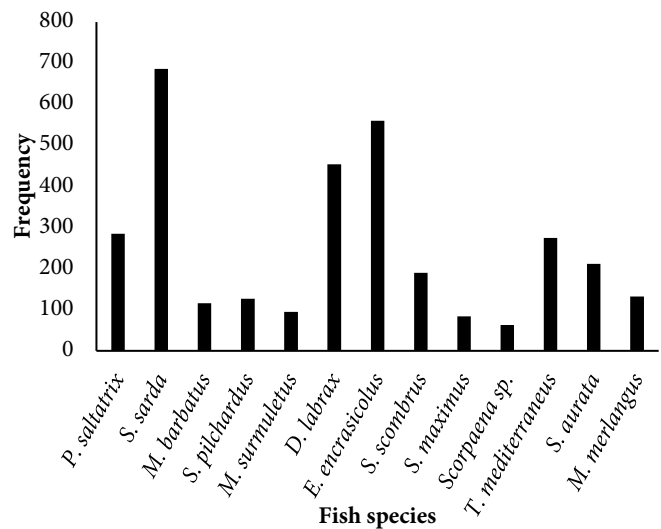
Figure 8. The most consumed fish species of consumers

When the frequency of fish consumption of the participants was examined, it was determined that 33.3% of the respondents consume fish once a week, 21.5% of the participants consume fish once a month and 21.9% of the individuals consume fish bimonthly. However, 2.3% of the participants stated that they never consume fish (Figure 9). When the fish consumption pattern of the participants is examined, it is understood that 87.6% of the participants prefer fresh fish consumption. While 31.6% of the respondents preferred to fry as cooking method,

Table 2. The socio-economic and demographic structures of consumers

Characteristics	Frequency	Ratio (%)
Gender		
Male	608	57.6
Female	448	42.4
Age		
18	149	14.1
19-29	325	30.8
30-49	294	27.8
50-49	168	15.9
60+	120	11.4
Marital Status		
Single	449	42.5
Married	607	57.5
Education Level		
Not graduated	5	0.5
Primary school	115	10.9
Secondary school	174	16.5
High school	353	33.4
Associate degree	148	14.0
Bachelor's degree	202	19.1
Master's degree	46	4.4
Doctoral degree	13	1.2
Profession		
Public officer	140	13.3
Worker	196	18.6
Student	285	27.0
Retired	80	7.6
Homemaker	144	13.6
Self-employed	211	20.0
Income Level (TRY/month)		
< 2020 TRY	442	41.9
2021-3000 TRY	224	21.2
3001-4000 TRY	259	24.5
4001-5000 TRY	103	9.8
> 5001 TRY	28	2.7
Household Size		
1	99	9.4
2	189	17.9
3	387	36.6
4	320	30.3
5+	61	5.8
Preference		
Optional	432	40.9
Seasonal	624	59.1
Fish Providing Method		
Buying	1007	95.4
Fishing	38	3.6
Both fishing and buying	11	1.0

26.2% preferred grilling method. However, 57.5% of the participants used more than one cooking method (Figure 10).
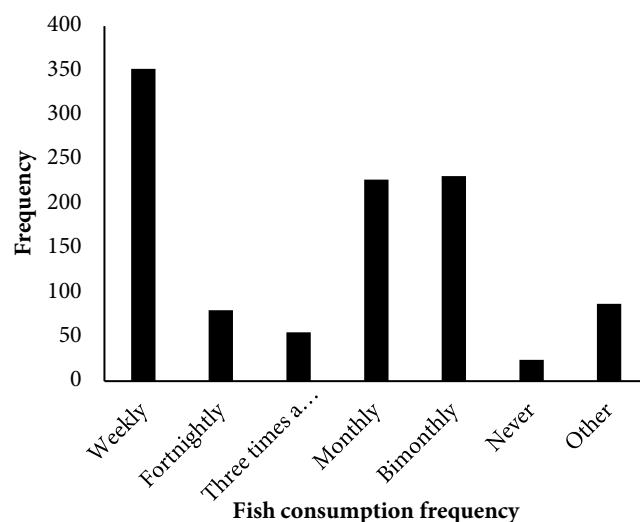
Figure 9. Fish consumption frequency of consumers
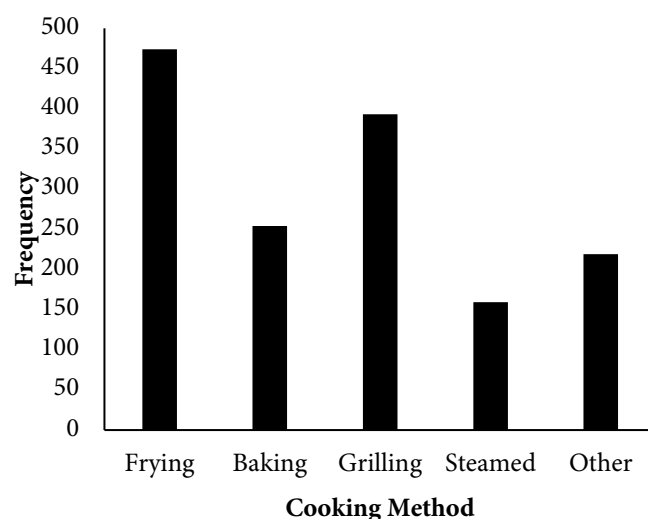
Figure 10. Cooking preferences of consumers

Discussion

The questionnaires are main methods to collect data and information about an issue. Therefore, this method was applied to the people living in Çanakkale and fish consumption habits were assessed. Socio-economic and demographic information about people could help to predict possible fish consumption prefers of people. In this context, fish consumption habits were evaluated with regard to socio-economic structures and demographic characteristics of the participants.

The results of the present study revealed that 39% of respondents consume fish 1-2 kg per consumption. On the other Bayraktar et al. (2019) reported that 47% of participants consumed fish less than 1 kg. Arık Çolakoğlu et al. (2006) stated that 87.46% of respondents consumed 1-6 kg fish monthly. This wide range could not help to preciously determine the fish

consumption of surveyed population. Therefore, more narrow range should be provided in the questionnaire survey. However, this study revealed that fish consumption amount was higher compared to both studies of Bayraktar et al. (2019) and Arık Çolakoğlu et al. (2006). Moreover, fish consumption amounts per capita were also determined as 13 kg for Tokat (Erdal and Esengül, 2008), 14.16 kg (Abdikoğlu et al., 2015) and 14.69 kg (Abdikoğlu and Unakıtan, 2019) for Tekirdağ, 12.2 kg for Diyarbakır (Aydın and Odabaşı, 2017), 13.28 kg for Çan (district of Çanakkale) (Selvi et al., 2019). Annual fish consumption per capita were also identified 3.4 kg for Ankara (Özer et al., 2016), 3.8 kg for Niğde (Bashimov, 2017), 5.06 kg for Amasya (Kızılaslan and Nalinci, 2013), 2.98 kg for Antakya (Can et al., 2015), 8 kg for Adana and Mersin (Cengiz and Özoğul, 2019), 29.59 kg for Giresun and Trabzon (Aydın and Karadurmuş, 2013), 26.3 kg for Ordu (Aydın and Karadurmuş, 2013).

Çanakkale has advantages in terms of fish consumption due to its location along the coasts of Marmara Sea, Çanakkale Strait, and Aegean Sea. Therefore, fish consumption might be supported by recreational fisheries as described by Ünal et al. (2010). Authors reported that shore-based fishing (68%) was the most popular fishing type for the respondents. In the present study, 6.4% (68 individuals) of the participants indicated that they got their fish by fishing instead of buying. Similarly, 0.81% (55 individuals) of respondents obtained their fish by hand-line fishing from the shore.

Some authors reported that the price of fish is the most imperative factor for fish consumption (Boughanmi et al., 2007; Akpınar et al., 2009; Claret et al., 2012; Hanis et al., 2013; Geslani et al., 2015; Abdikoğlu and Unakıtan, 2019). However, in the present study, price is not affecting the fish consumption for consumers in Çanakkale. Income level, season, and freshness of fish are affecting the fish consumption for respondents. Similarly, Dal et al. (2019) noted that freshness of fish was the most important factor determining of criteria that affecting fish consumption. Arslan (2019) indicated that income level was one of the most important factor affecting the fish consumption in Erzurum. Lee and Nam (2019) put forward that fish consumption frequency is affected by some factors including residential area, household income, preference, price, safety, and favourable fish species. Moreover, wild caught/cultured status of fish species, the age, marital status and number of family members of consumers have no impact on the determining of fish consumption frequency. Similarly, there is no significantly relationship was found between the fish consumption frequency and marital status/age, number of family members/wild-cultured status in the present study.

Kale (2017a) reported that the increase in temperature trends caused to climate change. Author stated that Çanakkale city will be affected by global warming and the climate change, and also will have a warmer climate in the future. Similarly, Kale (2017b) also reported that annual evaporation will increase in the future similar to temperature. Climatic factors are affecting the production of food and agricultural products. Thus, potential impacts of the climate change could have adverse effects on the fisheries and aquaculture sectors. Therefore, the amount of fish consumption per capita should be increased for healthy life without affecting by the adverse impacts of the climate change on fish resources.

Fish consumption could be increased by improving the awareness of consumers about benefits of fish for health due to its high nutritional content. Global health organizations also recommend to the consumption nearly 300 grams of fish per capita once a week to live a healthy life. Likewise, increasing interest on dietetic aspects, waste reduction, food safety, and food quality has also supplemented the increase of the fish consumption (FAO, 2018). Therefore, consumers should be learnt about the vitality and benefits of fish consumption to increase the consumption amount.

Conclusion

This paper determined the fish consumption habits in all districts of Çanakkale. Both the most consumed and the most favourite fish species are identified as *Sarda sarda*. Fish consumption frequency was described as 33.3% for consuming fish one a week followed by bimonthly frequency (21.9%) and monthly frequency (21.5%). 2.3% of the participants noted that they never consume fish. Moreover, the majority of consumers specified that they consume fish 1-2 kg (39.0%) and 27.3% consume fish 0.5-1 kg. Socio-economic and demographic characteristics of consumers are affecting the fish consumption habits. In the present study, season, income level, and freshness of fish are found to be driving force for fish consumption in Çanakkale. Therefore, fish farmers and sellers are recommended to remain the freshness of fish and to follow the appropriate fishing season for providing fish to consumers.

Acknowledgements

Conflict of Interest

Authors declare that there is no conflict of interest.

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