



RESEARCH ARTICLE

## Comparative analysis of fish consumption habits in coastal and inland districts of Samsun province

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### ABSTRACT

This study aimed to investigate the seafood consumption habits of individuals in Samsun Province, a region noted for its intensive fishing activities in the Middle Black Sea, and to determine the differences between coastal and inland districts. Primary data were gathered through online questionnaires. The analysis included descriptive statistics and chi-square tests. Among the participants, 53.7% considered fish prices to be expensive, 34.3% found them to be normal, 10.4% viewed them as very expensive, and 1.5% thought they were cheap. The most preferred fish type was anchovy, chosen by 48% of respondents, followed by sea bass at 18%. Coastal residents showed a higher frequency of weekly fish consumption, while inland residents had a higher rate of annual fish consumption. Significant differences were observed in fish consumption preferences, such as the type of fish and cooking methods, with coastal residents favoring fried fish and inland residents preferring grilled fish. Additionally, the study found that canned fish was significantly more preferred by inland residents ( $\chi^2=55.49$ ,  $p<0.0001$ ). These findings highlight the impact of geographical location on seafood consumption habits and suggest the need for targeted interventions to promote healthier and more sustainable consumption patterns.

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### Introduction

Aquatic foods have been a significant part of the human diet since ancient times. In the past, individuals were consumers who lacked knowledge about the nutritional composition of fish. Fish is now recognized as a significant protein source

through the analysis of dietary constituents and the comprehension of the impact of nutrients on human well-being. Fish is an excellent source of high-quality proteins and is rich in omega-3 fatty acids. Additionally, it provides various vitamins and minerals, including vitamin D, vitamin B12, iodine, selenium, and zinc (Naem & Selamoglu, 2023).

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In 2022, global fish production reached over 179 million tons, with 54% of it sourced from captured fishing, according to the FAO. The average per capita fish intake has steadily increased from 9 kg in 1961 to 20.5 kg in 2022, representing an annual growth rate of around 1.5% (FAO, 2022).

A significant portion of the fish caught in Türkiye comes from the Black Sea, accounting for approximately 76% of the country's total fish production. The types of fish caught in the Black Sea include red mullet, hake, anchovy, horse mackerel, whiting, turbot, sea bass, bluefish, haddock, and bonito. This high catch rate makes the Black Sea region the most intensive fishing area in Türkiye (Yücel et al., 2020a).

Samsun, situated in the Middle Black Sea region and the largest city in the area with a population of around 1.3 million, plays a significant role in Türkiye's fishery and aquaculture industries. According to 2023 data from the Samsun Agriculture and Forestry Directorate, 58,579 tons of fishing were conducted at sea, and 210 tons in inland waters. Additionally, 7,926 tons of aquaculture were carried out at sea, and 5,343 tons in inland waters. Production through fishing constitutes 81% of the total production, while production through aquaculture constitutes 18% (Anonymous, 2023; TUIK, 2024).

Türkiye sustains an important amount of fish output since fish is considered one of the most abundant sources of protein. Nevertheless, Türkiye's per capita fish consumption in 2022 has been recorded as 6.1 kg, which remains lower than the worldwide average (TUIK, 2023). The relatively low levels of fish consumption in Türkiye highlight the necessity for measures aimed at boosting fish consumption, while also addressing the underlying causes of this issue. The studies on seafood consumption habits in the Black Sea region are quite limited. This research aims to analyze the seafood consumption patterns of residents in both coastal and inland districts of Samsun Province, an area noted for its intensive fishing activities. The objectives of the research include understanding the priorities in fish consumption, identifying the reasons for non-consumption, determining which types of seafood are most consumed, and revealing the methods of consumption.

## Material and Methods

In May 2024, a survey consisting of 26 multiple-choice questions was conducted with 403 randomly selected individuals from the inland districts (Asarcık, Ayvacık, Havza, Kavak, Ladik, Salıpazarı, Vezirköprü) and coastal districts (Alaçam, Atakum, Bafra, Canik, İlkadım, Tekkeköy, Yakakent,

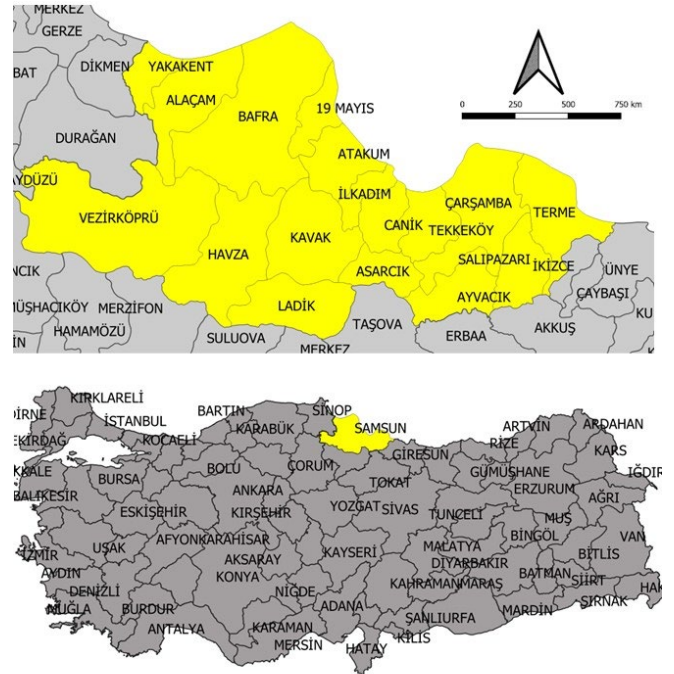
Terme) of Samsun province (Figure 1). The population of Samsun province is 1.377 million (Anonymous, 2024), and the number of participants was determined by the following Equation (1) according to proportional sampling (Cochran, 1977):

$$n = \frac{Z^2 \cdot p(1-p)}{E^2} \quad (1)$$

In this equation,  $n$  is the required sample size,  $Z$  is the value for the confidence level (for 95% confidence level,  $Z=1.96$ ),  $p$  is the estimated probability of the event in the population (for example, 50% probability of fish consumption, so  $p=0.5$  is used),  $E$  is the accepted margin of error (0.05 is used).

A higher sample size was preferred because the study covered 15 districts. The survey was conducted through face-to-face interviews or the Google Survey program. The pool can be reached at <https://docs.google.com/forms/d/1xc89-p6zqM3MjReo3fxaH5NNeh2zKh66NzYHcumEAeA>.

A chi-square test was performed to evaluate the differences in fish consumption preferences and frequencies between coastal and inland districts. The significance levels ( $p$ -values) were used to determine whether the observed differences were statistically significant.



**Figure 1.** Location of Samsun and its districts

## Results and Discussion

Based on the survey results, the distribution of participants in Samsun according to certain socio-economic and demographic characteristics is shown in Table 1. In the Samsun

region, 50.9% of the participants were women, and 49.1% were men. The average age of the survey participants was primarily between 50-57 years (22.6%), with 30 and above age group comprising the majority.

Regarding educational background, most of the participants were university graduates (45.7%). When evaluating the profession, the public employee group ranked first (36.5%), followed by the self-employed. Considering income levels, a significant portion of the participants had an income between ₺41,000-50,000 (21.4%), followed closely by those earning ₺50,000 and above (18.7%). In the study conducted on the fish consumption habits of consumers in the Bursa region, 11.99% had postgraduate education, 38.9% had undergraduate education, 28.79% had high school education, and 21.49% had primary education. Additionally, 8.39% of participants had an income of ₺2,500 or less, 9.79% had an income between ₺3,500-4,250, 29.49% had an income between ₺4,250-8,000, 21.49% had an income between ₺8,000-10,000, and 31.19% had an income of over ₺10,000 (Bora Balaban, 2023). The increased monthly income in our study could be related to the high inflation rates, which affect consumers' purchasing power and financial stability.

When examining the individuals who participated in the survey, it was determined that the most preferred meat in the Samsun province is red meat, with a preference rate of 48.4%.

Additionally, other preferences were found to be poultry meat at 44.4% and fish meat at 20.2%. Red meat was preferred more in inland areas (49%) than in coastal areas (31%). Poultry meat was more preferred in coastal regions (62%) than inland areas (49%). Fish meat was more commonly preferred in coastal regions (7%) than inland regions (2%) (Table 2). In inland areas, meat consumption is more preferred due to the barbecue culture and taste preferences. In a study conducted by (Yücel et al., 2020a), participants' meat consumption preferences were analyzed, revealing that red meat was preferred by 48%, poultry by 31%, and fish by 21%. Similar studies reported fish consumption rates as 5% in Adıyaman (Olgunoğlu et al., 2014), 25% in Giresun (Türkmen et al., 2016) and 22% in Tunceli (Yüksel et al., 2016) and %74 in Elazığ (Çiçek et al., 2014). Our results show similarities with Yücel et al. (2020a).

Examining the survey participants, it was found that in the Samsun province, 78% of the participants consumed 1-3 kg of fish per month on average, 20% consumed 4-7 kg, 1% consumed 8-10 kg, and 1% consumed 10 kg or more. In a comparison of coastal and inland regions, 79% of coastal participants and 83% of inland participants reported consuming 1-3 kg of fish per month, while 20% of coastal participants and 16% of inland participants consumed 4-7 kg. Only 1% of rural people consumed 8-10 kg, whereas 1% of coastal participants consumed 10 kg or more.

**Table 1.** Distribution of participants in Samsun based on socio-economic and demographic characteristics

<b>Gender</b>	<b>Women</b>	<b>Men</b>					
Total (%)	50.9	49.1					
Number of People	205	198					
<b>Age</b>	<b>18-25</b>	<b>26-33</b>	<b>34-41</b>	<b>42-49</b>	<b>50-57</b>	<b>58-64</b>	<b>65 and above</b>
Total (%)	16.3	13.1	15.6	19.3	22.6	11.4	1.7
Number of People	66	53	63	78	91	46	7
<b>Education Level</b>	<b>Primary School</b>	<b>Middle School</b>	<b>High School</b>	<b>University</b>	<b>Postgraduate</b>		
Total (%)	4.7	6.9	29.1	45.7	13.6		
Number of People	19	28	117	184	55		
<b>Profession</b>	<b>Public Employee</b>	<b>Private Sector</b>	<b>Self-Employed</b>	<b>Retired</b>	<b>Student</b>	<b>Housewife</b>	<b>Unemployed</b>
Total (%)	36.5	11.6	13.6	10.1	13.6	12.6	2.0
Number of People	147	47	55	41	55	51	8
<b>Monthly Income (₺)</b>	<b>5000-10000</b>	<b>11000-20000</b>	<b>21000-30000</b>	<b>31000-40000</b>	<b>41000-50000</b>	<b>Above 50000</b>	
Total (%)	8.3	14.2	21.1	16.3	21.4	18.7	
Number of People	33	57	85	66	86	75	

**Table 2.** Food preferences and consumption patterns between coastal and inland districts of Samsun

	Category	Coastal Districts (Counts)	Inland Districts (Counts)	Chi-Square ( $\chi^2$ )	p-value
<b>Most Preferred Meat Type</b>	Red meat	62	99	8.18	0.0042
	Poultry	125	99	3.02	0.0822
	Fish	14	4	11.41	0.0007
	Total	201	202	22.61	0.0004
<b>Monthly Fish Consumption Amount (Monthly)</b>	1-3 kg	159	168	0.20	0.6507
	4-7 kg	40	32	0.93	0.3351
	8-10 kg	0	2	1.99	0.1583
	10+ kg	2	0	2.01	0.1563
	Total	201	202	5.13	0.1622
<b>Fish Consumption Frequency</b>	Once a week	47	6	31.92	< 0.0001
	Once a month	62	73	0.84	0.359
	Twice a month	46	48	0.03	0.855
	Once a year	8	50	30.21	< 0.0001
	Several times a year	24	22	0.10	0.755
	Do not consume fish	14	3	7.17	0.007
	Total	201	202	70.27	< 0.0001
<b>Most Preferred Fish type</b>	Seawater fish	163	115	8.0	0.0047
	Freshwater fish	16	85	47.6	< 0.0001
	Farmed fish	22	2	18.4	< 0.0001
	Total	201	202	74.0	<0.0001
<b>Most Preferred Processed Fish Quality</b>	Canned fish	62	178	55.49	< 0.0001
	Fish finger	7	0	7.03	0.00799
	Smoked fish	20	8	5.20	0.02255
	Marinated fish	7	0	7.03	0.00799
	Frozen fillet	14	0	14.06	0.000176
	None	91	16	52.94	< 0.0001
	Total	201	202	141.77	< 0.0001

The pool showed no significant differences in monthly fish consumption frequencies between coastal and inland districts for any specified ranges (1-3 kg, 4-7 kg, 8-10 kg, 10+ kg). The overall chi-square test also indicated that no significant difference was observed in the distribution of fish consumption frequencies between the two groups. This suggests that fish consumption patterns, in terms of quantity consumed monthly, are relatively similar across coastal and inland districts (Table 2).

Upon analyzing the survey participants, it was found that in the Samsun province, the most common frequency of consumption was once a month, accounting for 31.3% of the respondents, while the least common frequency was twice a week, representing just 0.5% of the participants. The analysis revealed highly significant differences in fish consumption frequencies between coastal and inland residents. Coastal residents consumed fish once a week significantly more frequently than inland residents. Conversely, inland residents consumed fish once a year at a significantly higher rate than

coastal residents. Additionally, there was a significant difference in the number of individuals who did not like fish, with a higher percentage of coastal residents indicating a dislike for fish than inland residents (Table 2).

According to a survey study conducted in Uşak on fish consumption preferences, when the fish consumption frequency of the participants was investigated, it was found that 38.19% of consumers consumed fish once a week, 26.49% every fifteen days, 22.39% once a month, 11.39% more than once a week, and 1.29% did not consume fish at all (Kuşat & Şahan, 2021). A study by Karakaya & Kırıcı (2019) in Bingöl revealed that 18.5% of participants consumed fish weekly, while 35.1% ate fish every 15 days. Additionally, 33.2% of participants consumed fish once a month, and 13.2% reserved fish consumption for special occasions. In a survey conducted among 250 participants from Kırklareli, 52% indicated that they ate fish 1-2 times per month, 25% consumed it 3-5 times, 21% had fish 5 or more times, and 2% mentioned that they did not eat fish at all (Tozakçı & Bulut, 2021).

A comparison of fish consumption between the landlocked city of Ankara and the coastal city of Çanakkale was conducted. The chi-square test yielded a chi-square value of 3.21 with a p-value of 0.36, indicating no statistically significant difference in fish consumption frequency between Ankara and Çanakkale which is similar to our result (Bayraktar et al., 2019).

An examination of the survey participants revealed that in Samsun, the most consumed type of fish was saltwater fish (80%), followed by freshwater fish (15%) and farmed fish (5%). A significant preference for seawater fish among coastal district residents was observed compared to inland district residents ( $\chi^2=8.0$ ,  $p=0.0047$ ). Inland district residents demonstrated a highly significant preference for freshwater fish compared to coastal district residents ( $\chi^2=47.6$ ,  $p<0.0001$ ). Coastal district residents showed a significantly higher preference for farmed fish than inland district residents ( $\chi^2=18.4$ ,  $p<0.0001$ ). The chi-square test revealed a highly significant difference in fish type preferences between coastal and inland districts ( $\chi^2=74.0$ ,  $p<0.0001$ ) (Table 2). This indicated that the type of fish preferred varied greatly depending on whether the district was coastal or inland, highlighting the impact of geographical location on fish consumption patterns. In a study conducted in the Bursa region, when consumers were asked, "What type of fish do you prefer the most?", 62.2% of the consumers stated that they prefer sea fish, 13.7% stated that they prefer freshwater fish, and 24.2% stated that they consume both types of fish (Bora Balaban, 2023). In a study by Çadır & Duman (2013) performed in seven villages along the Keban Dam Lake, it was found that 80.59% of the consumers preferred freshwater fish, 3.69% preferred marine fish, and 15.8% consumed both. Another study in Elazığ revealed that 33% of consumers preferred freshwater fish, 16% preferred marine fish, and 44% consumed both types (Şen et al., 2008). In a study carried out in Sinop, it was found that nearly all participants consumed fish fresh, with 90% preferring saltwater fish and 48% specifically choosing anchovy (Yücel et al., 2020a). Inland residents tended to prefer freshwater fish due to their proximity to rivers or lakes, a pattern that aligned with our findings.

Among the survey participants in all the districts in Samsun, it was found that the most consumed processed seafood product was canned fish at 58.5%. This was followed by frozen fillet at 11.7%, marinated fish at 8.4%, fish fingers (breaded fish) at 3.1%, and smoked fish at 1.7%. Additionally, 16.7% of the participants reported not consuming any of these products. The pool revealed significant differences in processed fish quality preferences between coastal and inland districts. Canned fish was significantly less preferred by coastal district residents

compared to inland district residents ( $\chi^2=55.49$ ,  $p<0.0001$ ), while fish fingers were significantly more preferred. Smoked fish ( $\chi^2=5.20$ ,  $p=0.02255$ ), marinated fish ( $\chi^2=7.03$ ,  $p=0.00799$ ), and frozen fillet ( $\chi^2=14.06$ ,  $p=0.000176$ ) were also significantly more preferred in coastal districts. Conversely, none of the processed fish options was significantly less preferred by coastal district residents compared to inland district residents ( $\chi^2=52.94$ ,  $p<0.0001$ ) (Table 2). In a study made in Yozgat, it was found that 97.79% of consumers prefer to eat fish fresh, 1.39% consume it frozen, and 1.9% eat it canned (Erdoğan Sağlam et al., 2018). Meanwhile, a study in Burdur revealed that 99.29% of consumers prefer fresh fish, 11.39% consume canned fish, 9.49% eat frozen fish, and 0.89% prefer smoked fish (Orhan & Yüksel, 2010). In a study conducted in Isparta, it was found that individuals show different preferences for the form of fish they consume as food, choosing between fresh, frozen, salted, and canned fish (Gençler, 2024). According to the results, 70.00% of individuals prefer fresh fish, 18.60% opt for frozen fish, 7.70% choose canned fish, and 3.70% select salted fish. In Türkiye, approximately 70% of fish is consumed fresh. Globally, the consumption methods of seafood for human consumption are distributed as follows: 39.8% is consumed fresh, 19% is frozen or preserved, 7.1% is salted, and 8.29% is canned (Anonymous, 2002).

Among the survey participants in Samsun, anchovy was identified as the most consumed marine fish at 46.3%. This was followed by whiting at 23.3%, salmon at 10%, red mullet at 7.2%, bluefish at 4.2%, bonito at 3%, horse mackerel at 2%, and both bluefish and mullet at 1.5%. Sea bass was the least consumed at 1%.

The analysis of saltwater fish preferences between coastal and inland districts revealed significant differences for most of the fish types (Table 3) Coastal district residents showed a significant preference for anchovy ( $\chi^2=25.66$ ,  $p<0.0001$ ), whiting ( $\chi^2=7.22$ ,  $p=0.0072$ ), salmon ( $\chi^2=20.01$ ,  $p<0.0001$ ), red mullet ( $\chi^2=6.60$ ,  $p=0.0102$ ), bonito ( $\chi^2=10.09$ ,  $p=0.0015$ ), horse mackerel ( $\chi^2=9.22$ ,  $p=0.0024$ ), and sea bass ( $\chi^2=12.05$ ,  $p=0.0005$ ) compared to inland district residents. Conversely, there were no significant differences for bluefish ( $\chi^2=0.67$ ,  $p=0.4107$ ), mullet ( $\chi^2=1.31$ ,  $p=0.2518$ ), and bluefish (small) ( $\chi^2=0.00$ ,  $p=0.9944$ ).

In a study conducted in Bursa, when consumers were asked "Which fish do you consume the most?", the majority (39.4%) responded with anchovy. Sağlam & Samsun (2018) reported that the most preferred fish species for consumption was anchovy in Yozgat, with 94% of consumers favoring it. Siirt, located in the Southeastern Anatolia region, reported anchovy

as the most consumed fish at 42.1%, consistent with our findings that anchovy is the most preferred fish across Türkiye, regardless of region (Karakaya et al., 2018). Saka & Bulut (2020) reported that Atlantic bonito (65%, 686 individuals) was the most consumed fish species, with Atlantic bonito being the second most consumed fish after anchovy in Çanakkale, while Tozakçı & Bulut (2021) determined that bonito was the most preferred fish species, followed by bluefish as the second most preferred. Anchovy is widely recognized as the most consumed fish in Türkiye, which corresponds with its status as the most frequently caught fish in the country. This high consumption rate is likely due to its abundant availability, cost-effectiveness, and cultural preference for dishes made with anchovy. The significant presence of anchovy in the Turkish diet underscores its crucial role in local fisheries and its importance in fulfilling the nutritional requirements of the population.

Among the survey participants in Samsun, it was found that the most consumed freshwater fish is trout at 77%. The other types of freshwater fish consumed are carp at 10%, catfish at 5.2%, mullet at 4.7%, silverfish at 1.7%, and pike at 1.2%.

Freshwater fish preferences varied significantly between coastal and inland districts for several fish types. Coastal residents showed a significant preference for gray mullet

( $\chi^2=12.46$ ,  $p=0.0004$ ) and silverside ( $\chi^2=12.80$ ,  $p=0.0003$ ). Additionally, catfish showed a significant difference ( $\chi^2=6.00$ ,  $p=0.0143$ ). No significant differences were found for trout ( $\chi^2=0.88$ ,  $p=0.3482$ ), carp ( $\chi^2=3.00$ ,  $p=0.0833$ ), and pike ( $\chi^2=0.00$ ,  $p=1.0000$ ) (Table 3). In the Süleymanpaşa district of Tekirdağ, trout emerged as the most consumed freshwater fish, accounting for 46.78% of the total consumption (Abdikoğlu et al., 2015). In a study conducted in Kayseri, 28.2% of consumers stated that they prefer trout, 15.5% prefer Norwegian salmon, 15.1% prefer sea bass, 9.8% prefer gilthead seabream, and 6.2% prefer horse mackerel (Sarıözkan & Deniz, 2020). The preference for rainbow trout can be attributed to its availability and affordability, making it a convenient and cost-effective option for consumers. Similarly, the preference for catfish can be linked to its prevalence in inland areas with rivers, where it is commonly caught.

Among the survey participants in Samsun, it was found that the most common place to purchase fish was from a fishmonger, accounting for 54.1%. Other places include marketplaces (18%), supermarkets (12%), fish markets (8.5%), and street vendors (4.2%). Additionally, 3.2% of the participants reported that they prefer to catch the fish themselves.

**Table 3.** Comparative analysis of most preferred fish and shellfish species between coastal and inland districts

	Category	Coastal Districts (Counts)	Inland Districts (Counts)	Chi-Square ( $\chi^2$ )	p-value
<b>Most Preferred</b>	Anchovy	43	105	25.66	< 0.0001
	<b>Saltwater Fish</b>				
	Whiting	30	55	7.22	0.0072
	Salmon	30	4	20.01	< 0.0001
	Red mullet	22	8	6.60	0.0102
	Bonito	30	10	10.09	0.0015
	Horse mackerel	22	6	9.22	0.0024
	Bluefish	4	2	0.67	0.4107
	Mullet	4	8	1.31	0.2518
	Sea bass	12	0	12.05	0.0005
	Bluefish	4	4	0	0.9944
	<b>Total</b>	201	202	92.88	< 0.0001
<b>Most Preferred</b>	Trout	139	156	0.88	0.3482
<b>Freshwater Fish</b>	Carp	18	30	3.00	0.0833
	Catfish	0	6	6.00	0.0143
	Gray mullet	22	4	12.46	0.0004
	Silverside	18	2	12.80	0.0003
	Pike	4	4	0	1.0000
	<b>Total</b>	201	202	35.14	< 0.0001

**Table 4.** Comparative analysis of fish purchase places, cooking methods, consumption locations, and seasonal preferences between coastal and inland districts

	Category	Coastal Districts (Counts)	Inland Districts (Counts)	Chi-Square ( $\chi^2$ )	p-value
<b>Fish Purchase Place</b>	Fishmonger	87	121	5.39	0.0202
	Market place	26	57	11.42	0.0007
	Fish market	38	6	23.43	< 0.0001
	Supermarket	42	4	31.58	< 0.0001
	Street vendor	4	2	0.67	0.4107
	Self-caught	4	12	3.96	0.0466
	Total	201	202	76.46	< 0.0001
<b>Cooking Method</b>	Baked	64	60	0.14	0.6989
	Grilled	18	74	33.80	< 0.0001
	Fried	80	34	18.79	< 0.0001
	Steamed	22	2	16.76	< 0.0001
	Electric grill	12	2	7.19	0.0073
	Air fryer	5	30	17.73	< 0.0001
	Total	201	202	94.44	< 0.0001
<b>Fish Consumption Places</b>	At home	129	91	6.75	0.094
	Bought as cooked	26	34	1.02	0.3108
	Picnic	12	73	43.47	< 0.0001
	Restaurant	34	4	23.83	< 0.0001
Total	201	202	75.08	< 0.0001	
<b>Fish Consumption Season</b>	Winter	141	155	0.59	0.4407
	Autumn	53	34	4.24	0.0394
	Spring	4	9	1.89	
	Summer	3	4	0.13	0.7103
	Total	201	202	6.87	0.0760
<b>Fish Price</b>	Very expensive	12	8	0.82	0.3652
	Expensive	121	91	4.40	0.0360
	Normal	56	101	12.68	0.0004
	Cheap	12	2	7.19	0.073
	Total	201	202	25.08	< 0.0001

The analysis of fish purchase places between coastal and inland districts implied significant differences for several categories. Residents in coastal districts showed a strong preference for buying fish from supermarkets ( $\chi^2=31.58$ ,  $p<0.0001$ ), fish markets ( $\chi^2=23.43$ ,  $p<0.0001$ ), and marketplaces ( $\chi^2=11.42$ ,  $p=0.0007$ ). The preference for fishmongers was notably higher in coastal regions ( $\chi^2=5.39$ ,  $p=0.0202$ ) (Table 4). There was a notable preference for catching fish oneself in inland regions compared to coastal districts ( $\chi^2=3.96$ ,  $p=0.0466$ ). This may be attributed to the relative ease of fishing in lakes and rivers, which is common in Samsun.

In another study, when evaluating the responses of survey participants regarding their sources of seafood, it was found that in Ordu, 32.6% preferred fish markets, while in Samsun, 20.4% did. Conversely, 21.4% of participants in Ordu and 34.9% in Samsun preferred fishmongers (Güvenin & Sağlam,

2020). Bolat & Cevher (2018) reported that 53% preferred fish markets, (Temel & Uzundumlu, 2015) found 80% preferred fish markets. The preference for fishmongers in Samsun and its districts may be attributed to the ease of access and lower prices.

Among the survey participants in Samsun, it was found that when cooking fish, 31% use an oven, 26% use a grill, 25% fry it, 11% use an air fryer, 4% steam it, and 3% use an electric grill.

Significant differences were determined in cooking methods between coastal and inland districts. Coastal residents significantly preferred frying, steaming, and using an electric grill. In contrast, inland residents favored grilling and using an air fryer. In many previous studies, it has been found that frying is the preferred method for cooking fish (Orhan & Yüksel, 2010; Aydın & Karadurmuş, 2013; Olgunoğlu et al., 2014; Baydede, 2018; Sivri, 2018). In Samsun, cooking fish in the oven was the most preferred method. Additionally, the newer method of

using an air fryer has started gaining popularity due to its time efficiency and the need for less oil.

Analyzing the survey participants from the Samsun region, it was observed that 51% of them eat fish at home, 26% during picnics, 16% have it cooked outside but eat it at home, and 7% consume it in restaurants. The analysis of fish consumption between coastal and inland districts revealed significant differences in several locations. Coastal residents significantly preferred consuming fish at home ( $\chi^2=6.75$ ,  $p=0.0094$ ) and in restaurants ( $\chi^2=23.83$ ,  $p<0.0001$ ), while inland residents significantly preferred consuming fish at picnics ( $\chi^2=43.47$ ,  $p<0.0001$ ). No significant difference was observed for buying fish as cooked ( $\chi^2=1.02$ ,  $p=0.3108$ ) (Table 4).

In a study conducted in Bursa, consumers were asked where they prefer to eat fish. It was found that 63.9% prefer to eat fish at home. Additionally, 23.6% of respondents indicated a preference for eating fish at fish restaurants, while 13.4% preferred to eat it outdoors (Bora Balaban, 2023). In their study carried out in Erzurum and Van (Güngör & Ceyhun, 2017) found that frying was the most preferred cooking method. Other studies on fish consumption methods also found that frying was generally preferred (Aydın & Karadurmuş, 2013; Çadır & Duman, 2013). Yüksel et al. (2016) concluded that baking (42%) was slightly more preferred than frying (37%) in Tunceli. The decline in dining out in our study can likely be attributed to recent economic challenges, leading people to prefer eating at home.

Examining the survey participants, it was found that in the Samsun province, 87% of the participants consume fish in winter, 11% in autumn, 1% in spring, and 1% in summer. The analysis of fish consumption seasons between coastal and inland districts reveals significant differences for some seasons. Inland residents significantly preferred consuming fish in autumn ( $\chi^2=4.24$ ,  $p=0.0394$ ). No significant differences were found for winter ( $\chi^2=0.59$ ,  $p=0.4407$ ), spring ( $\chi^2=1.89$ ,  $p=0.1692$ ), and summer ( $\chi^2=0.13$ ,  $p=0.7103$ ) (Table 4).

Although the income levels in our study were not particularly low, most participants perceived fish prices as high (Table 1). Specifically, 53.7% of participants considered fish as expensive, 10.4% believed prices were very expensive, and only 1.5% thought the prices were cheap. This indicates that even with relatively moderate to high-income levels, there is a general perception that fish prices are high in Samsun. The analysis of fish price perceptions between coastal and inland areas reveals several significant differences. Coastal residents are significantly more likely to perceive fish as being “expensive” and “cheap” compared to inland residents. The

perception of fish prices as “normal” is also significantly different, with inland residents more likely to view fish prices as normal.

These findings suggest that geographical location influences how residents perceive fish prices, possibly due to factors such as availability, transportation costs, and local market dynamics. The significant difference in the “cheap” category might indicate that coastal residents have better access to fresh fish at lower prices, while inland residents may face higher prices due to transportation and limited supply. The overall highly significant difference ( $p=0.000015$ ) underscores the impact of these geographical factors on consumer perceptions of fish prices.

The “Very expensive” category, however, does not show a significant difference, indicating that the perception of fish being very expensive is relatively consistent between the two areas. This might suggest that both coastal and inland residents experience similar pricing for high-end fish products.

In a study conducted in Uşak in 2021, 42.2% of the survey participants found fish prices to be normal, 29.5% considered them expensive, 12.3% thought they were cheap, and 16% had no opinion (Kuşat & Şahan, 2021). In Malatya, 29% of the respondents stated that fish prices are reasonable, 18% considered them expensive, and only a small fraction, 2%, thought they were cheap (Yücel et al., 2020b). Kızılaslan & Nalinci (2013) found that among consumers residing in the central district of Amasya, 60.61% considered fish prices to be normal, while 30.91% found them to be expensive. In our results, the higher percentage of respondents considering fish prices to be expensive is attributed to the changes in economic conditions and persistent inflation in recent years.

## Conclusion

This study provides a comprehensive analysis of fish consumption habits in both coastal and inland districts of Samsun province, revealing significant differences in consumption patterns, preferences, and socio-economic factors. Coastal residents exhibit higher fish consumption frequencies, particularly for saltwater fish, and show a preference for processed seafood products. In contrast, inland residents prefer freshwater fish and consume fish less frequently.

Among the 403 survey participants in Samsun, it was determined that 78% consume an average of 1-3 kg of fish per month, 20% consume 4-7 kg, 1% consume 8-10 kg, and 1% consume over 10 kg. Considering the 5-month fishing ban



season, the average annual fish consumption in Samsun is about 19.96 kg per person. This value is significantly higher compared to the national average of 6.22 kg per person per year, as reported by the Turkish Statistical Institute (TUIK, 2020) in 2020, but lower than the European average of 24 kg per person annually (EUMOFA, 2024). Most of the consumed products were fresh fish, indicating that fish is predominantly eaten during specific seasons. However, to encourage fish consumption throughout the entire year, there is a need to further promote and support processed fish products.

The study highlights the need to increase knowledge about the nutritional advantages of fish and make educational efforts to promote increased consuming of fish. Studies performed at a regional level, such as this one, provide useful insights that may inform policies and activities focused on promoting higher fish consumption and enhancing public health.

To promote fish consumption, it is crucial to engage families, educational institutions, public organizations, and non-governmental organizations in accomplishing public awareness initiatives. Enhancing the availability of diverse, reasonably priced seafood and promoting local fishing and fish farming will play a crucial role in boosting fish consumption and attaining improved health outcomes within the community.

### **Compliance With Ethical Standards**

#### **Conflict of Interest**

The authors declare that there is no conflict of interest.

#### **Ethical Approval**

This study was approved by the Social and Human Sciences Ethics Committee of Ordu University (Ethics approval number: 2024-139, Date: 30/09/2024).

#### **Funding**

Not applicable.

#### **Data Availability**

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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