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Redakcja wydawnicza: Dorota Pitulec

Redakcja techniczna i korekta: Barbara Łopusiewicz

Łamanie: Beata Mazur

Projekt okładki: Beata Dębska

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tel./fax 71 36 80 602; e-mail: econbook@ue.wroc.pl
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Wstęp

Oddajemy do rąk czytelników pierwszy numer kwartalnika o nowym tytule i w nowej oprawie graficznej, będącego kontynuacją czasopisma Nauki Inżynierskie i Technologie (NIT) (<http://nit.ue.wroc.pl/?lang=en>). Kwartalnik NIT był wydawany przez cztery lata. Powstał on na bazie Zeszytów Naukowych AE/UE Technologia.

Nowa nazwa i szata graficzna kwartalnika **International Journal of Food Science and Bioprocessing** odzwierciedla otwarcie się czasopisma na autorów spoza Polski. Profil naukowy pozostaje interdyscyplinarny, obejmując: technologię żywności i żywienia, towaroznawstwo żywności oraz zapewnienie jakości i bezpieczeństwa.

Zamierzamy publikować zarówno oryginalne prace naukowe, jak i prace przeglądowe. Będziemy się też starali, zamieszczając krótkie recenzje, informować czytelników o nowych pozycjach książkowych na rynku wydawniczym krajowym i zagranicznym oraz o zapowiedziach konferencyjnych z naszego obszaru tematycznego. Pozostajemy również otwarci na wszelkie sugestie odnośnie do naszego kwartalnika, mające na celu doskonalenie jego jakości.

Prace, tak jak uprzednio, są recenzowane przez dwóch recenzentów. Zgłaszanie i ocena prac są przeprowadzane elektronicznie z użyciem programu SENIR (<https://review.ue.wroc.pl>). Zachowujemy też wersję papierową, którą otrzymują członkowie komitetu naukowego i wydawniczego, a także recenzenci, autorzy oraz biblioteki.

W 2015 roku czasopismo Nauki Inżynierskie i Technologie (NIT) otrzymało 6 punktów przyznanych przez Ministerstwo Nauki i Szkolnictwa Wyższego (1038, 2080-5985, 2449-9773, points 6; http://www.nauka.gov.pl/g2/oryginal/2015_12/57768c2cb322779eb01734014ff4be38.pdf).

Redaktor Naczelny
prof. dr hab. inż. Tomasz Lesiów

Preface

We are giving readers the first issue of the quarterly with a new title and a new graphic design which is a continuation of the Journal of Engineering Sciences and Technologies (Nauki Inżynierskie i Technologie – NIT). Quarterly NIT have been published for four years. It was created on the basis of Scientific Working Papers AE / EU Technology.

The new name and the graphic design of **International Journal of Food Science and Bioprocessing** quarterly reflects the opening of the journal for the authors outside Poland. Scientific profile remains interdisciplinary and includes: food technology and nutrition, food commodity, and ensuring the quality and safety management.

We intend to publish both original scientific papers and review papers. We will also try by brief reviews to inform readers about new books on publishing domestic and foreign markets as well as on announcements about the conference from our subject area.

We will also welcome any suggestions for our quarterly in order to improve its quality.

Articles, just as before, are peer-reviewed by two reviewers. Reporting and evaluation work is carried out electronically via the on-line system SENIR (<https://review.ue.wroc.pl>). We have also a paper version, which is received by the members of the Scientific and Publishing Committee's and reviewers, authors and libraries.

In 2015 Engineering Sciences and Technologies (Nauki Inżynierskie i Technologie – NIT) was awarded 6 points by the Ministry of Science and Higher Education in Poland (1038, 2080-5985, 2449-9773, points 6; http://www.nauka.gov.pl/g2/oryginal/2015_12/57768c2cb322779eb01734014ff4be38.pdf).

Editor in Chief
prof. dr hab. inż. Tomasz Lesiów

Sławomir Kula

Diet Clinic Świat Odżywiania in Olsztyn
e-mail: slawomir_kula@o2.pl

Maria Śmiechowska

Gdynia Maritime University
e-mail: m.smiechowska@wpit.am.gdynia.pl

THE ASSESSMENT OF FISH CONSUMPTION BY UNIVERSITY STUDENTS OF DIFFERENT ACADEMIC PROFILES

OCENA SPOŻYCIA RYB PRZEZ STUDENTÓW UCZELNI O RÓŻNYCH PROFILACH KSZTAŁCENIA

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Summary: Fish are one of the basic food products which is considered as a valuable source of protein. Therefore, the low consumption rate of fish and processed fish products in Poland, which is about 13 kg per person, is alarming. The purpose of this study was to diagnose the factors influencing the consumption of fish and processed fish products by young Poles studying on different faculties and entering their adult age. The study has shown that 40% of medical students have declared fish consumption several times a month, whereas 17% of technology students and 15% of humanities students have declared the same. Students prefer to eat fish in the form of fillet and canned fish. Culinary preferences, health value and the price have been the most common factors taken into account while choosing a particular fish.

Keywords: fish, consumption assessment, students.

Streszczenie: Ryby to jeden z podstawowych produktów spożywczych, który jest uważany za wartościowe źródło białka. Dlatego niepokój budzi fakt niskiego poziomu spożycia w Polsce ryb i przetworów, wynoszącego ok. 13 kg/osobę. Celem pracy było zdiagnozowanie czynników wpływających na konsumpcję ryb i przetworów rybnych przez młodych, studiujących na różnych kierunkach Polaków, wchodzących w dorosłość. Badania wykazały, że spożycie ryb na poziomie kilka razy w miesiącu deklarowali studenci kierunków medycznych 40%, studenci kierunków ścisłych 17%, a nauk humanistycznych 15%. Studenci preferują spożycie ryb w postaci filetów i konserw. Preferencje kulinarne, wartość zdrowotna oraz cena to czynniki najczęściej brane pod uwagę przy wyborze ryb.

Słowa kluczowe: ryby, ocena spożycia, studenci.

1. Introduction

Fish are food highly valued by doctors and dietitians due to their health properties and their dietetic values [Kołakowska, Kołakowski 2001; Kapusta 2014]. Fish protein has an excellent amino acid composition, similar to the reference protein and its fat is rich in necessary n-3 polyunsaturated fatty acids. Fish and their products are rich in mineral elements such as: iron, zinc, selenium, iodine, potassium, fluorine, magnesium, copper and calcium and B vitamins or fat soluble vitamins – A, D and E [Grela, Dudek 2007; Grela et al. 2010].

Fish and fish products happen to be contaminated with harmful substances. These can be heavy metals: cadmium, lead or mercury, which is the most harmful due to its bio-accumulation properties, as well as halogenated compounds: dichlorodiphenyltrichloroethane (DDT), dioxins, polychlorinated biphenyls (PCB) [Staszowska et al. 2013; Vieira et al. 2015]. However, regardless of such hazards, experts have considered the consumption of fish as extremely beneficial for health so that its minor and scarcely probable side effect should be put aside to further attention. Therefore, it has been confirmed that fish and fish products should be consumed from once to twice a week. The growth of demand for sea food until 2030 has been prognosed. In spite of the growing fish supplies from aquacultures the increasing demand is not likely to be satisfied. Thus, Europe keeps becoming more and more dependent on the rest of the world in terms of fish and fish products supplies [FAO Fisheries Circular No. 972/4, Part 1].

The consumption of fish in Poland is not high and belongs to the lowest ones in Europe (EU). Fish consumption has been dropping gradually since 2008, being currently at the level of 13 kg per person per year whereas the European rate is 23 kg. Statistically, it is the Japanese who eat most fish and in Europe the Norwegians at the rate of 46 kg per person per year.

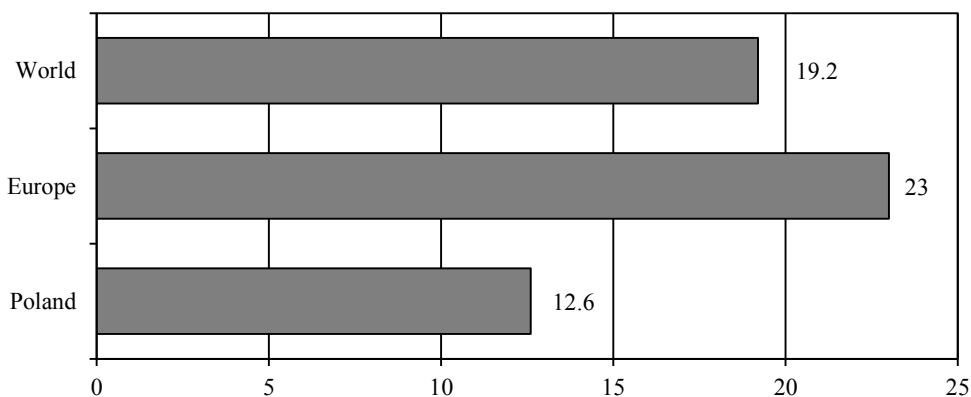


Fig. 1. Average annual fish consumption in 2013 (kg per capita).

Source: own study.

It is not only the dropping fish consumption in Poland which is alarming but also the rapidly growing consumption of slaughter animals at the rate of 74 kg per person at present. The pattern of meat consumption in the European countries is diversified. The Polish eat mostly pork and poultry whereas the British prefer beef and lamb [McAfee et al. 2010].

The purpose of this study was to diagnose the factors influencing the consumption of fish and processed fish products by young Polish students entering the adult age, independency and beginning to decide about themselves. The fact that the discussed group is in a reproduction age when the nutritional condition is exceptionally important, plays a significant role.

2. Methodology

A survey was conducted among the university students in 2015 by means of a specially prepared survey questionnaire including open-ended and closed-ended questions referring to fish and fish products consumption and so called respondent's particulars referring to the respondent's demographic and social conditions (Fig. 1). The questionnaires were distributed from December 2014 to March 2015 in printout,

Table 1. Social and demographic characteristics of the examined population

Respondents		No.	%
Sex	Women	302	83
	Men	63	17
Place of residence	City: above 200 000	163	45
	City: 50 000-200 000	90	25
	City up to 50 000	56	15
	Country	56	15
Place of residence during academic year	Family house	138	38
	Rented room or apartment	191	52
	Dormitory	36	10
Financial situation	Very good	38	10
	Good	164	46
	Average	151	41
	Bad	12	3
Place where meals are eaten	At home – by the student him/herself	245	67
	At home – by a family member	98	27
	Eating out	22	6
Educational profile	Technology universities	143	39
	Universities of humanities	122	34
	Medical universities	100	27

Source: own study.

as well as in electronic version, which allowed to reach a wider range of respondents in the entire Poland via the Internet. The online survey was chosen in order to minimize the bias resulting from better availability of fish and fish products depending on the region of Poland.

The questions in the survey pertained to the frequency of fish and fish products consumption, as well as the preferences as to the mode of its preparation and consumption, and the factors that influence consumer choices. All answers were analyzed in view of the declared study profile.

In total, 372 questionnaires were collected, of which 7 were rejected due to the impossibility of determining the respondents study curriculum. A representative group of 365 surveys qualified for the study and they were divided among different study profiles in order to verify whether the persons with medical education who have certain nutritional knowledge eat fish and fish products more frequently than the others. This division allows to correct the obtained results regarding fish and fish products consumption frequency which might be overstated by the individual high nutritional awareness.

The results were analyzed with the Microsoft Excel spreadsheet considering both the general population and the division among educational profiles. This method was chosen due to the high degree of subjectivity in the answers to the survey questions, which is a limitation in the present study.

3. Results and discussion

The survey was correctly responded by 365 students. The number of women (302) was significantly higher than men (63). It may be a result of the fact that mostly women attend universities of humanities and medical universities as well as the fact that women more often present health oriented behaviour and are more interested in proper nutrition. Therefore, the percentage of women taking part in this the survey is not surprising [Baran, Stocka 2008].

The majority of the young surveyors come from large cities of the population above 200,000 people, residing in privately rented rooms or apartments, being in good and average financial circumstances. As much as 245 respondents prepare their meals by themselves, which may be a result of the great number of women studying at the faculties of humanities and medicine who tend to cook more often.

The most frequent response regarding the frequency of fish consumption is “a couple of times per month” (Table 2). This answer was given by 43% of respondents, whereas 29% of the surveyors consume fish once or twice a week (Fig. 2).

The conducted study has shown that the frequency of fish and fish products consumption is influenced by the students' place of residence. Fish are consumed several times per month with the frequency of 25% by the students residing in Northern Poland whereas the students residing in the Southern Poland show 10% frequency of fish consumption.

Table 2. Respondents' answers to the survey questions

Question	Answer choices	Percentage of answers
1. Frequency of consumption	A couple of times per month	43
	1-2 per week	29
	A couple of times per year	13
	Never	9
	3-4 times a week	5
	Every day	1
2. Factors influencing the consumption of fish and fish products	Culinary preferences	60
	Nutritional value and health promoting value	45
	Price	43
	Easiness to prepare	39
	Availability	20
	Beliefs and moral values	13
	Wide choice of products	5
3. Fish origin	Saltwater fish	9
	Freshwater fish	3
	Both types	25
4. Form of the consumed fish	Fish fillets	79
	Canned fish	33
	Fish fingers and cubes	25
	Fish carcasses	22
	Whole fish	22
	Fish salads	12
	Fish products	12
	Fish in jars	5
5. Method of fish processing	Smoked fish	19
	Frozen fish	18
	Fresh fish	17
	Canned fish	11
	Live fish	1

Source: own study.

The influence of the faculty of study upon the frequency of fish consumption turned out to be surprising. The students of technology universities most frequently (17%) declared to consume fish several times per month, the students of the universities of humanities – 15% and the students of medical universities – 40% (Fig. 3). It is worth noting that the same percentage (40%) of medical universities students declared to consume fish 1-2 times per week.

These results confirm the previous observations provided by other authors that the students of faculties related to human nutrition have broader knowledge in this field and follow a recommended diet [Baran and Stocka 2008, Romanowska-

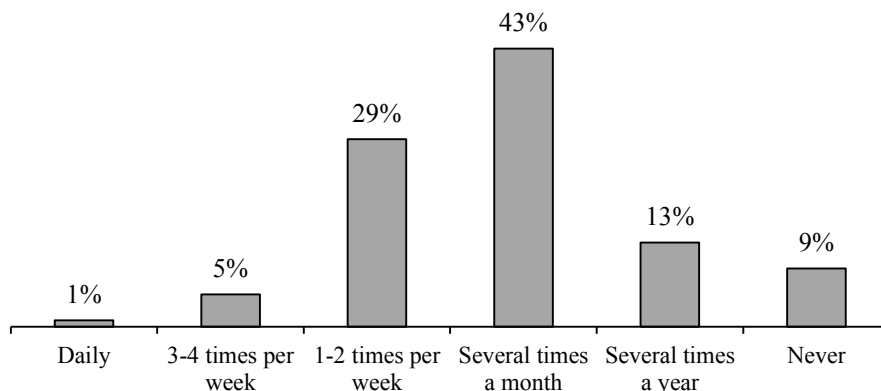


Fig. 2. Frequency of fish and fish products consumption by students

Source: own study.

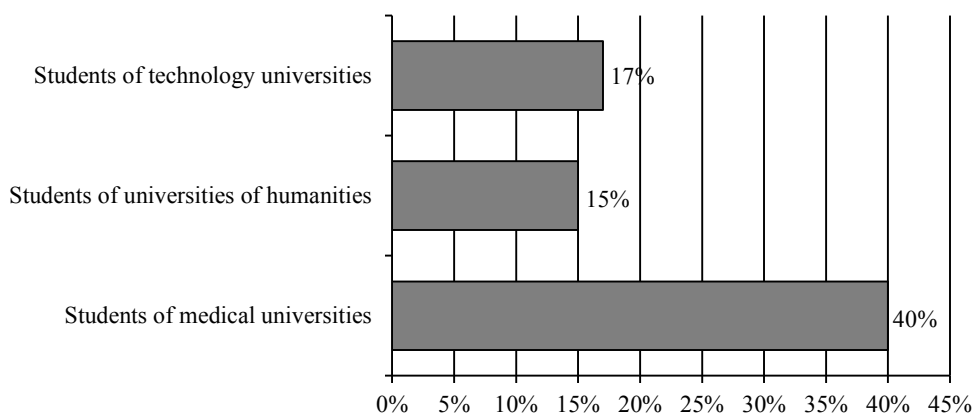


Fig. 3. Fish consumption with the frequency of several times per month by students of different faculties

Source: own study.

-Tołoczko 2011; Szczodrowska-Krysiak 2013]. However, there are also publications describing inappropriate nutritional habits of students of dietetics. [Charkiewicz et al. 2009].

The preference regarding the fish origin is as follows: 9% of the respondents prefer saltwater fish, 3% of the students prefer freshwater fish and 25% both types of fish. This preference is influenced by taste preferences, price, availability in the usual shopping area as well as nutritional and health value.

As far as the forms of processing of the purchased fish and food products are concerned, the respondents have stated to purchase the fish and fish products most

frequently in the form of smoked fish (19%), frozen fish (18%) and fresh fish (17%), whereas canned fish and live fish are purchased, respectively, by 11% and only 1% of students.

Fish fillets are the most popular choice among the young respondents. This form of consumption has been declared by 79% of the surveyors, whereas 33% prefer canned fish and 25% chose fish fingers and cubes (Fig. 4).

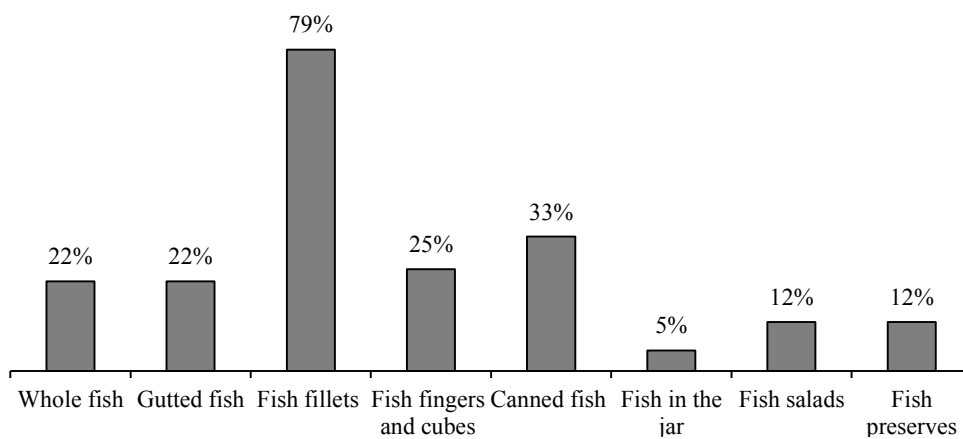


Fig. 4. The forms of fish products most frequently chosen by students

Source: own study.

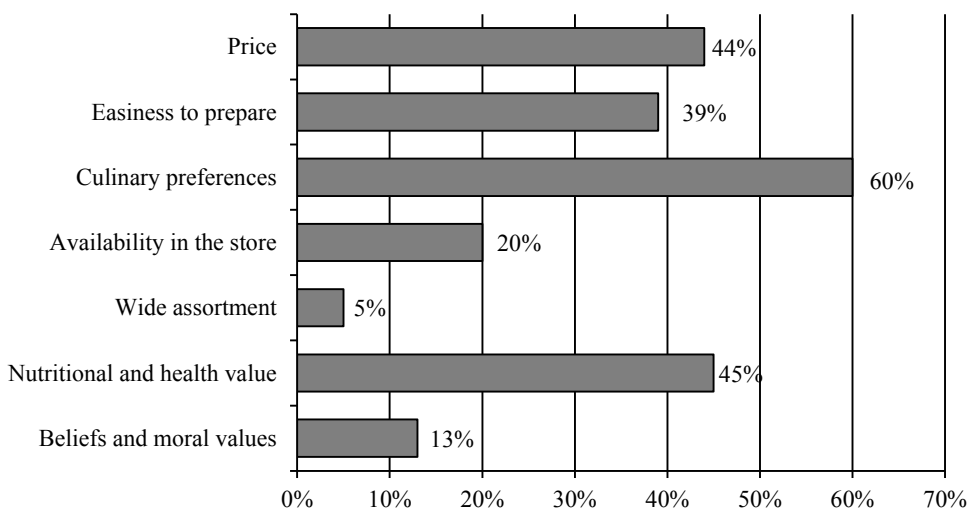


Fig. 5. Factors determining the consumption of fish and fish products by students

Source: own study.

Culinary preferences (60%), nutritional and health value (45%), price (44%) and the easiness to prepare (39%) turn out to be the most significant factors determining fish and fish products consumption (Fig. 5).

The respondents have also determined the form of the consumed fish and fish products. The majority of students prefer fried fish (54%) and baked fish (53%). The remaining answers included raw fish in the form of sushi or convenience food (26%), steam boiled fish (18%) and traditionally cooked fish (3%).

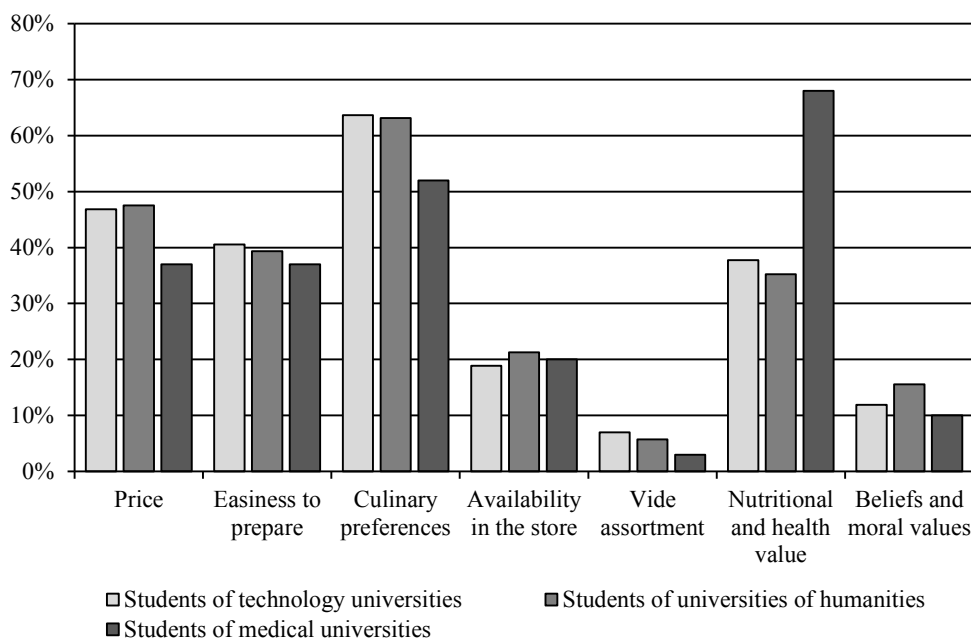


Fig. 6. Factors determining the consumption of fish and fish products by students of different educational profiles

Source: own study.

Analyzing the variation in answers according to the study profile (Fig. 6), students of medical studies pay more attention to the health properties of fish, judging them more important than culinary preferences or price. For the other groups, culinary preferences are unanimously the most important. These results are confirmed by the studies of other authors [Baran, Stocka 2008; Romanowska-Tolłoczko 2011; Szczodrowska-Krysiak 2013].

4. Summary and conclusions

The health recommendations encourage to consume a significantly greater amount of fish. However, the state of the worldwide fishing is difficult and complicated. According to the FAO, 80% of the fisheries are fully exploited and overfished. The implementation of the principles of sustainable fishing and restoration of world fish resources have provided a solution to this difficult situation in the form of the establishment of the Marine Standardship Council (MSC) which designed the system of certification of the chosen fish species on the basis of Code of Conduct for Responsible Fishing, FAO and the system of ecolabelling [Bykowski 2015].

Although the consumption of fish in Poland has increased slightly up to about 13 kg per person, the average rate is still twice lower than the average rate for the European Union. Poland is the country presenting one of the lowest fish and fish products consumption per person in the European Union.

There are only few studies in the literature that address the structure of fish and fish products consumption by the population of young Poles, which necessitates additional investigations that need to be performed in order to identify other aspects of this problem.

The results of the study allows for drawing the following conclusions:

1. Students consume fish definitely too rarely, most frequently several times per month.

2. The frequency of consuming fish and fish products a couple of times per month has been declared by 15% of technology universities students, 17% by the students of universities of humanities and 40% by medical universities students, whereas the latter group has declared to consume fish 1-2 times per week with the same frequency.

3. Students consume fish most frequently in the form of fillets and canned fish.

4. Culinary preferences, health value and the price have been the most common factors taken into account while choosing a particular kind of fish.

5. Students of medical studies have greater awareness about food and nutrition, which influences their consumer choices in respect of fish and fish products consumption.

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