Evaluate the Awareness of Fish Consumption among Female Students of Umm Al-Qura University in Mecca

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Authors' contributions

This work was carried out in collaboration among all authors. Author AQ contributed to obtain the found and the subject conception. Author NAAE conducted the research work and wrote the manuscript. The other six authors participated in the correction. All authors read and approved the final manuscript.

Review Article

ABSTRACT

Background: Fish is important animal sources for healthy diet. It's rich in amino and unsaturated fatty acids, vitamins, and metals. fish consumption is linked to decreased heart diseases, inflammatory disease as arthritis and prevention of cancer.
The Aim of Study: The study was to assess the Socio-demographic factors, personal attitudes, knowledge, preferences and awareness regarding fish.
Subjects and Methods: This study was conducted on 372 of UQU (Umm Al-Qura university) female students, questionnaire was used for data collection to study Socioeconomic status, fish consumption, preferences, knowledge, awareness and Statistical Analysis.
Results: This study is about the importance of fish consumption, (281) of participants were consumers. The highest consumption was (21-23) years (47.3%), scientific colleges (57.6%), single

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with family (84.6%) and (60.8%) their month income >6000 SR. results indicated that (55.8%) consumed fish because of nutritional value and, (31.3%) taste. Data showed (24,5%) don't consume, (37.3%) dislike fish consumption due taste and odor, most Participants (99.2%) were aware about nutritional value of fish this proves nutritional awareness, (96,2) knew that Omega-3 fatty acid in fish is useful in maintaining cardiovascular function, (92,2%) knew fishes content of micronutrients (75%) have an awareness regarding fish content of cholesterol.

Conclusion: present study revealed awareness about fishes consumption importance was the highest for older age, scientific colleges, high income, results indicated the highest ratio of participants had consumed fishes because of nutritional value, some because of taste. The majority of respondents were aware of about Omega-3 fatty acid in fish is useful in maintaining cardiovascular function, fish content of micronutrients and cholesterol.

1. INTRODUCTION

Fish is the most important animal source food in the diets of more than one billion people. Fish and seafood products, have a high nutritional value regarding beneficial amounts of protein, fat and essential micronutrients.

Aquatic animal foods are a rich source of protein and have a lower caloric density and higher content of omega 3 long chain polyunsaturated fatty acids (n-3 LC PUFA) compared to land living animal [1].

Furthermore, fish is easier to digest due to lack of connective tissue [2]. Due to easy digestion, soft tissue and high nutritional value, fish are highly recommended for both the young and the old [3].

It has been reported that micronutrient-dense SIF (small indigenous fishes) are particularly important for nutrition because they are eaten whole with bone, head and eye and all the nutrients [4].

Historically the main effects of fish consumption have been attributed to the high content of n-3 LC PUFA, but there's also other nutrients from fish that have positive effects on human health, it contains high proportions of taurine and choline, vitamins D3 and B12 and the minerals calcium, phosphorus, iodine, and selenium. Furthermore, it also might provide significant proportions of vitamin A, iron, and zinc to a population if other sources of these nutrients are scarce [1].

Several researchers have investigated the nutritional value of fish and its importance in human diet from various perspectives and it has been shown that decreased risk of coronary heart and cardiovascular diseases, decreased inflammatory disease as arthritis, prevention of cancer and other positive health effects are linked to fish and seafood consumption [5,6,7].

Another study revealed that fish consumption helps preventing high blood pressure, cholesterol, Alzheimer's disease [2].

The total seafood consumption in the world has consistently increased over the past 50 years duo to the improvement of living standards in developing countries, such as China, also due to the health awareness of some developed countries [8]. On the other hand, there's a significant decrease in fish consumption over the recent years in some countries of the former Soviet Union or the sub-Saharan African region. [9]. If fish equally distributed over the world the annual per capita availability would be 18.9 kg (a significant increase from the 9.9 kg available in the 60's) [10].

Various factors are considered to be related to seafood consumption in each country but the most important one is the increased interest in health consciousness. Understanding factors associated with fish consumption in each country is important to achieve successful strategies to increase the fish consumption in the country [11]. According to Armitage and Conner [12] attitudes, subjective norms, past experience, and health are the main factors that determine the purpose and frequency of fish consumption.

Therefore, we carried out this study to determine the prevalence of awareness about fish consumption importance among female students of UQU in Mecc to study the socio-economic status and to determine the consumption habits and preferences regarding seafood and State of knowledge over fish consumption.

1.1 The Aim of Study

The study was conducted to assess the Socio-demographic factors, distribution of personal Consumers attitudes, knowledge, preferences and consumers awareness regarding benefits of fishes.

2. SUBJECTS AND METHODS

Historically the main effects of fish consumption have been attributed to its high content of important nutrients, its effect on lowering the risk of heart attacks and strokes, increasing grey matter in the brain and protect it from age-related deterioration, help prevent and treat depression, making you a happier person, fish is the only good dietary source of vitamin D, also fish consumption is linked to reduced risk of autoimmune diseases, including type 1 diabetes, and may protect your vision in old age.

2.1 Subjects

A study was carried out in Makkah among a random sample female student of UQU in Mecca consisting of (372) participants from females. The age for cases ranged from 18-23 years old.

2.2 Methods

2.2.1 Data

In the first the participants were informed about the study and were given instructions on how to fill out the questionnaire completely and truthfully. Self-administrated questionnaire was used for data collection. The questionnaire was designed to study socioeconomic level, the consumption habits and preferences regarding seafood and state of knowledge over fish consumption.

2.2.1.1 Socioeconomic level

Socioeconomic includes: level of study, social status and family income.

2.2.1.2 The consumption habits and preferences regarding fishes

Questions indicate the Consumer's attitude including preferences of seafood and knowledge regarding fish consumption: This included inquiring about fish consumption, quantity of consumption, reasons for consumption and reasons for non-consumption.

2.2.1.3 State of knowledge over fish consumption

The third part was designed to state of knowledge over fish consumption: included nutritional value, An Omega3 fatty acid in fish is helpful in good cardiovascular function. Fish contain micronutrients, Low cholesterol of fish.

2.2.2 Statistical analysis

Statistical analysis was performed by using the statistical package for social science (SPSS version 25.0). Universal analysis was conducted using analysis of frequency.

3. RESULTS

3.1 Socio-demographic Factors

The present study was conducted on a total (372) participant of female students in UQU in Makkah. The distribution of socio-demographic characteristics of study participants was shown in Table 1. (281) of total participants were consumers of fish. Age range from (18-23) years, representing about 100% of the study respectively, was the result demonstrated the level of fish consumption for participants. Where was the highest fish consumption the age of (21-23), (18-19) first year / preparatory was (61) (21.7%), while fourth year was (133) (47.3%) of the total participants. With regard to the specialty of colleges results revealed that the highest percent of fish consumption from participations were from the scientific colleges (162) (57.6%) of the total participant. With regard to the social situation, the results also showed that the highest fish consumption percentage from the participants was from single with family, married (84.6%), (12.4%) respectively, while only (2.8%) of expatriate respondents declared they consume fish . This shows an important effect of family on the consumption of healthy foods. Income is another factor affecting the frequency of consumption. The highest percentages of participants consuming fish were (60.8%) their month income >6000 SR. Because of these results were thought to be a link between income and consumption frequency.

3.2 Consumers Attitudes, Knowledge and Preferences

As shown in Table 2, tabulated results indicated that (281) (75.5%) of the participants is consuming fish and their products while (91) (24.5%) of the participants is not. When respondents were asked how often they

consume seafood, the answers were twice a month (44.8%), once a month (24.1%), less than once a month (23.4 %) and twice a week (7.4%). Out of the 281 students who were consuming fish, (55.8 %) stated that consumption of fish is mainly because of concerning nutritional value. Meanwhile (31.3%) stated that consumption is primarily due to taste of the fish. None of the students mentioned that they eat fish due to Low Price, also (7.11%)

of respondents stated that the consumption is due to Peer reviews. Data also showed that (91) (24.5%) of the total participants stated that they weren't consumed fish, also (37.3%) of them stated that they dislike fishe consumption due to their taste and odor, while cost problem (29.6%) being the second highest reason, hard to prepare – don't know how to prepare (15.3%), as well allergies (10.9%) respectively.

Table 1. distribution of sociodemographic characteristics of study participants

| Socio-demographic factors	Departments	Consumers Frequency (N)	Percent %	Non consumers Frequency (N)	Percent %
Level of study	First year / preparatory age (18-19)	61	21.7	19	20.8
	Second year age (19-20)	55	19.5	34	37.3
	Third year age (20-21)	32	11.3	11	12.0
	Fourth year age (21-23)	133	47.3	27	29.6
Total		**281**	**100**	**91**	**100**
colleges	Scientific	162	57.6	42	46.1
	Non-Scientific	119	42.3	49	53.8
Total		**281**	**100**	**91**	**100**
Social status	Single with family	238	84.6	79	86.8
	Married	35	12.4	10	10.9
	Expatriate	8	2.8	2	2.1
Total		**281**	**100**	**91**	**100**
Family income	<3000 SR	67	23.8	22	24.1
	5000-6000 SR	43	15.3	20	21.9
	>6000 SR	171	60.8	49	53.8
Total		**281**	**100**	**91**	**100**
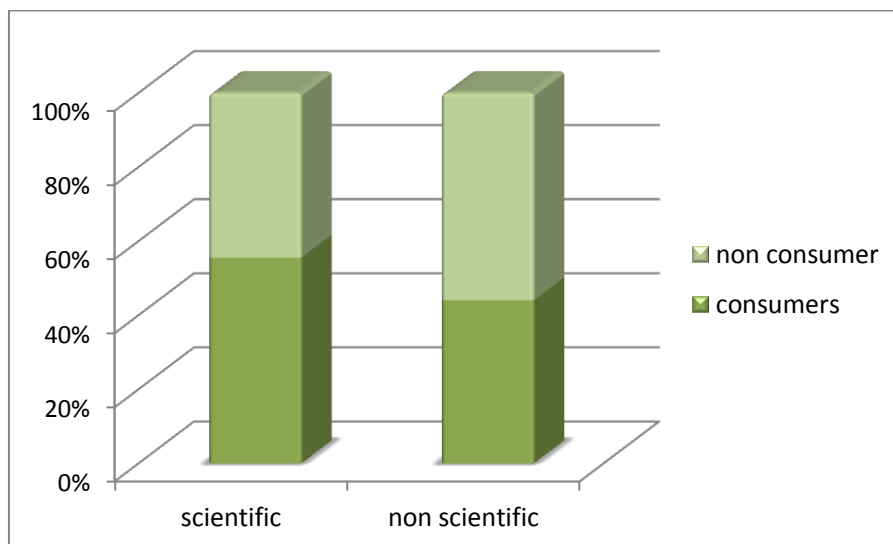
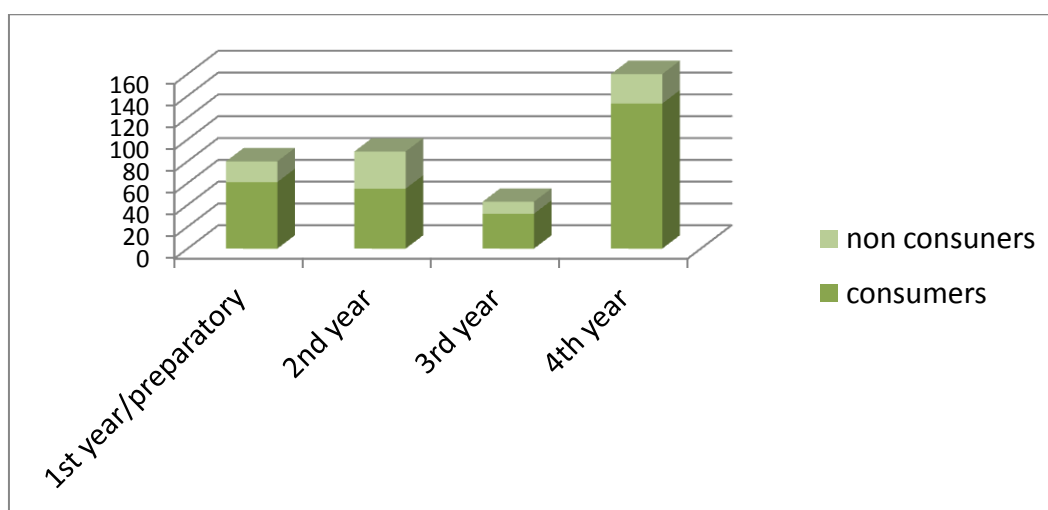**Fig. 1. The prevalence of consumption between scientific and non-scientific collages**

Fig. 2. The prevalence of consumption between different educational levels

Table 2. Distribution of personal consumers attitudes, knowledge and preferences among the study participants

Departments		Clinical nutrition	
Preferences regarding seafood		**(N)**	**(%)**
1- Do you consume fish and their products in general?	No	91	24,5
	Yes	281	75,5
Total		**327**	**100**
2- Frequency of consumption	Less than once a month	66	23.4
	Once A Month	68	24.1
	Twice A Month	126	44.8
	Twice A Week	21	7.4
Total		**281**	**100**
3- Reasons of consuming	Nutritional value	157	55.8
	Taste	88	31.3
	Peer Reviews	20	7.11
	Easily Available	8	2.8
	Low Price	0	0
	Ready to Cook	8	2.8
Total		**281**	**100**
4- Reasons of not consuming	Disliking the taste –odor	34	37.3
	Allergy	10	10.9
	Being vegetarian	6	6.5
	Hard to prepare – don't know how to prepare	14	15,3
	cost	27	29,6
	Unhealthy	0	0
Total		**91**	**100**

3.3 Consumers Awareness Regarding Benefits of Fishes

As it is clear in the results of Table 3 most of the participants in this study (99.2%) were aware about the nutritional value of fish, this proves their nutritional awareness. And the majority of the respondents (96,2%) knew that Omega-3 fatty acid found in fish is useful in maintaining cardiovascular function. also (92,2%) of the participants were aware of fishe content of micronutrients (vitamins+ minerals). As well three quarter of the participants (75%) have an awareness regarding fish content of cholesterol.
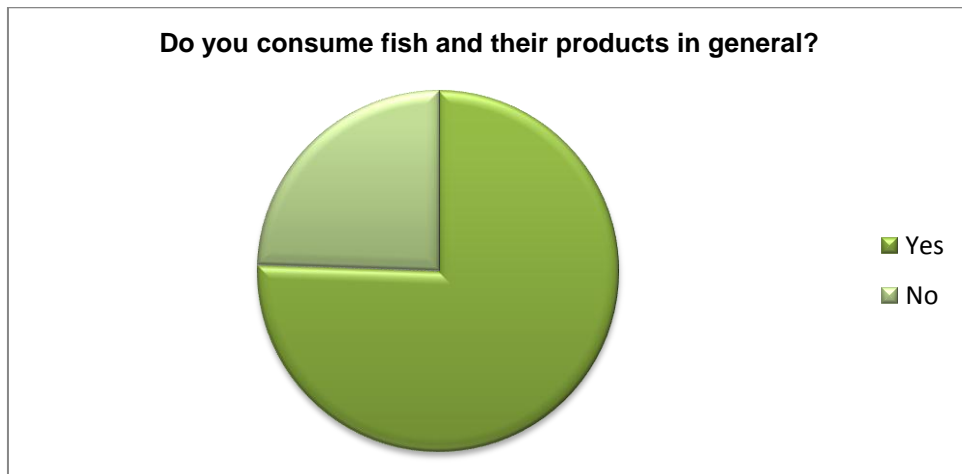
Do you consume fish and their products in general?

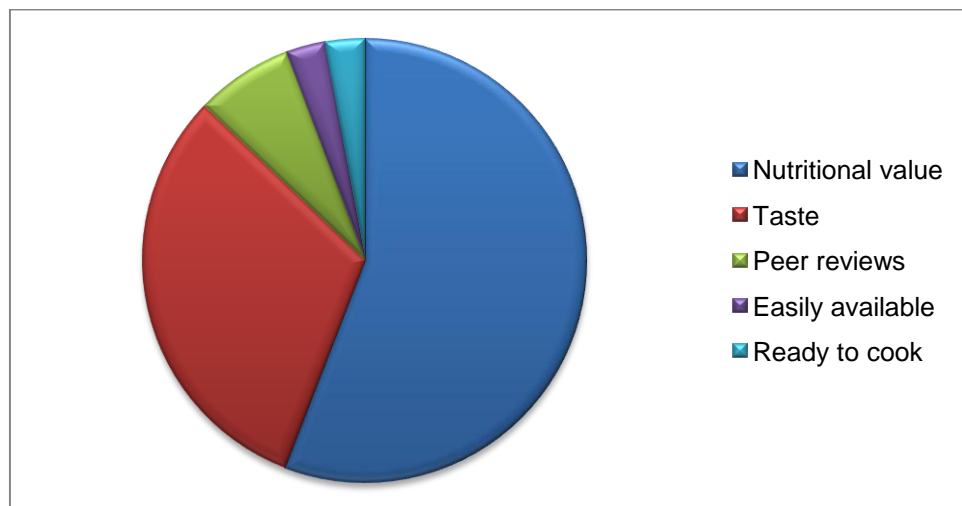**Fig. 3. Consuming fish and their products in general**
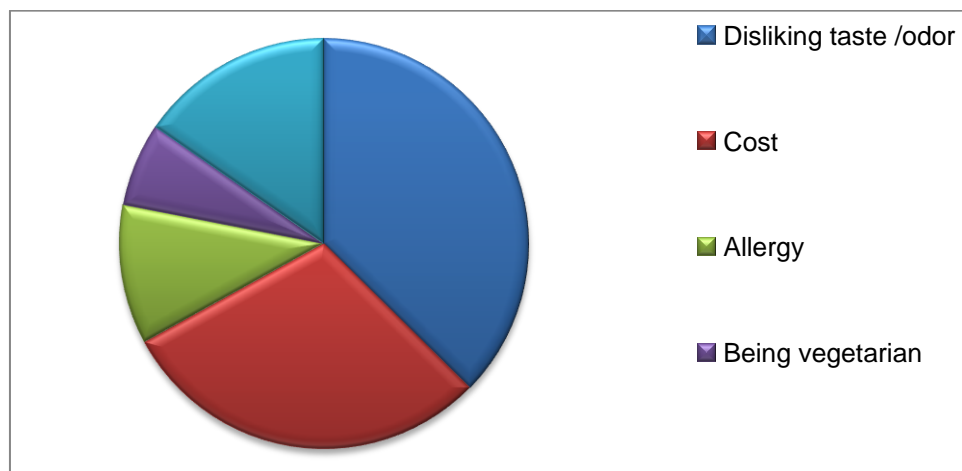

Fig. 4. Reasons of consumption in female students

Fig. 5. Reasons of non-consumption in female students

Table 3. Consumers awareness regarding benefits of fishes among study participants

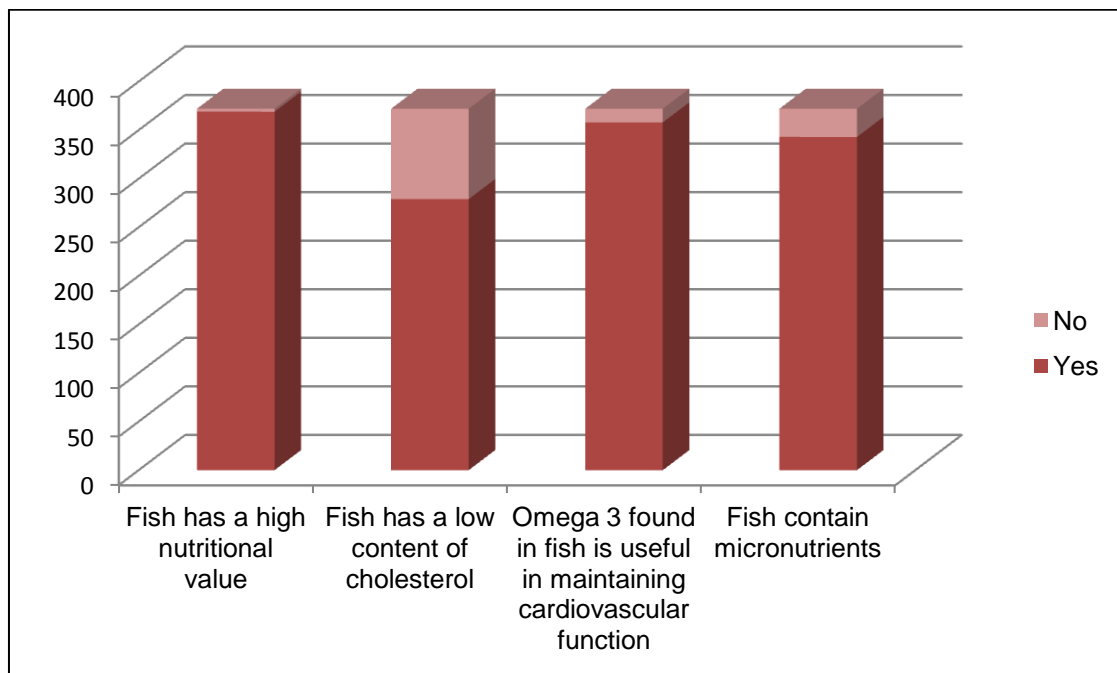| Departments		Clinical nutrition	
		(N)	(F)
State of knowledge over fish consumption			
Fish has a high nutritional	No	3	0.8
value	Yes	369	99.2
Total		**372**	**100.0**
Fish has a low content of cholesterol	No	93	25.0
	Yes	279	75.0
Total		**372**	**100**
Omega-3 fatty acid found in fish is useful in	No	14	3,8
maintaining cardiovascular function	Yes	358	96,2
Total		**372**	**100**
Fish contain micronutrients (vitamins+	No	29	7,8
minerals)	Yes	343	92,2
Total		**372**	**100**

Fig. 6. Consumers awareness regarding benefits of fish among study participants

4. DISCUSSION

This study showed that the highest level of fish consumption between students were found in scientific colleges, single with family, with increasing family income and students in level of fourth year where this results coincided with [13,14,15,16] respectively who found that the consumption of fish is influenced by many factors such as socioeconomic status, food consumption patterns, personal health status and attitudinal dimensions. With regard to the social situation, the results also showed that the highest percentage of consumption of fish from the participants was from single with family and married. these results are in coincided with [17] which stated that there was a positive effect of seafood consumption if there was a kids at home and it was also determined that the probability of responding "yes" to 'Do you eat enough fish?' If more people live in the house [13].

Burger et al. [18] and Hicks et al. [19] stated that the education and income levels might have an effect on fish consumption this result agree with our results. Also, our results are compatible with [17] who stated that university graduates

consume more fish compared to others. As well these results are in accordance with Barberger-Gateau et al. [20] who found that individuals with a bachelor's degree were more interested in fish-based diets. In contrast [18,21] mentioned that there is an inverse relation between fish consumption and education and income levels, which does not correspond to the general literature reviews.

Also Verbeke and Vackier [22] mentioned that people with lower income and in the younger age groups tend to consume less fish, but there is no meaningful relationship between education and fish consumption frequency. We found a significant difference in consumption between people of different age groups but further comprehensive studies are needed to estimate the influence of socio-economic and demographic determinants of fish consumption.

Our results showed that the highest level of frequency consumption is twice a month (44.8%). This result disagree with Can et al. [2] who stated that the highest frequency of consumption was once a month (48%) particularly increases during the winter, also our results don't coincide with [19] who found that the highest ratio of fish consumption frequently is (once or more than once a week).

To return to our study, the lowest frequency ratio we found was twice a week (7.4%) and this result almost agrees with Can et al. [2] who mentioned that the least frequent ratio is more than once a week (3%). While Pieniak et al. [23] found that 75% of the consumers in Spain consume fish at least twice a week and this is quite different about our result which may be related to the geographic location.

Also our study showed that the most common reason of fish Consumption was the nutritional value, where this result coincided with [24] who stated that the most respondents consume fish and fish products because of their nutritional value, also results of Can et al. [2] were in accordance with Ilibezova et al. [24] who detected that health concerns play an important role in the selection of fish consumption. In contrast consumption preferences were reflected in data from different areas by AMSAT [25] and Taste was the primary reasons why people eat fish. In addition, this result is compatible with Karakaş [26] who stated that the most significant reason of fish consumption was taste.

However, we found a significant difference in reasons of consumption between people of different age groups. In addition, our study showed the highest reason of not consuming fish was the dislike of the taste or odor. Where this result coincided with Leek et al. [27] who mentioned that the odor is the most important reason affecting the choice of consumers, as well as our results are in accordance with Can et al. [2] who found that the factors that lead to non-consumption of fish were the smell, taste and high prices. also Verbeke and Vackier [22] reported that the taste, in addition to price, age and income level affect the consumption of fish.

The present study found that the participants have a very strong belief that eating fish is healthy, this result coincided with Pieniak et al. [28]. In addition, a study by [10] showed that about (83%) of the participants knew that fish contain omega 3 while (31.8%) didn't know.

Contrariwise [29] revealed that, there is significantly low knowledge regarding benefits of fish consumption in students of university of Ruhuna, Sri Lanka.

However, there was a positive knowledge and awareness regarding fish health benefits which may be related to the high educational level of the participants, about (99.2%) of the participants knew that fish has high nutritional value while (25%) did not know that fish has a low content of cholesterol. Since the sample size is small further studies are needed to assess the knowledge and beliefs of UQU female students regarding fish consumption more accurately.

5. CONCLUSION

In the present study we mentioned that the level of fish consumption for first year / preparatory was lower than the level of consumption for the fourth year and the results also showed that the highest percent of fish consumption was from the scientific colleges and it was a lack of fish consumption due to dislike of taste and odor, so we recommended increasing the awareness of fish consumption by increasing nutrition education programs by using social-media and advertisements to support this topic. Also we should encourage people to learn how to reduce the strong taste or odor of fish by using the natural flavors like herbal seasoning or spices.

CONSENT

As per international standard informed and written participant consent has been collected and preserved by the authors.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Tilami SK, Sampels S. Nutritional value of fish: Lipids, proteins, vitamins and minerals. Reviews in Fisheries Science & Aquaculture; 2017.
2. Can MF, Günlü A, Can HY. Fish consumption preferences and factors influencing it. Food Science and Technology (Campinas). 2015;35(2):339-346
3. Eyo AA. Fish processing in the tropics. The Journal of National Institute for Fresh Water Fisheries Research (NIFER); 2002.
4. Kongsbak K, Thilsted SH, Wahed MA. Effect of consumption of the nutrient-dense, freshwater small fish on biochemical indicators of vitamin A status in Bangladeshi children, a randomized, controlled study of efficacy. The Journal of Nutrition. 2008;99:581–597.
5. Dyerberg J. Coronary health aspects of fish food lipid; 1985.
6. Calder P. n-3 fatty acids and cardiovascular disease; evidence explained and mechanism explored; 2004.
7. Lund E. Health benefits of seafood; is it just the fatty acid? Food Chem. 2013;140: 413-420.
8. The Fisheries Agency of Japan. White paper on fisheries; 2011.
   Available:http://www.jfa.maff.go.jp/j/kikaku/wpaper/h23/pdf/04_dai2shou.pdf
9. FAO. The state of world fisheries and aquaculture. Fisheries and Aquaculture Department; 2018.
   Available:http://www.fao.org/docrep/013/i1820e/i1820e.pdf
10. Food and Agriculture Organization of the United Nations – FAO. Statistical databases; 2013.
    Available: http://faostat3.fao.org
11. Supartini A, Oishi T, Yagi N. Changes in fish consumption desire and its factors: A comparison between the United Kingdom and Singapore. Foods (Basel, Switzerland). 2018;7(7):97.
    DOI:10.3390/foods7070097
12. Armitage CJ, Conner M. Efficacy of the theory of planned behaviour: A meta-analytic review. Br. J.Soc. Psychol. 2001;40:471–499.
13. Trondsen T, Braaten T, Lund E, Eggen AE. Health and seafood consumption patterns among women aged 45–69 years. A Norwegian seafood consumption study. Food Quality and Preference. 2004;15(2): 117-128.
14. Anderson AS, Morris SE. Changing fortunes: Changing food choices. Nutrition & Food Science. 2000;30(1):12-15.
15. Yadin DL. The International Dictionary of Marketing: Over 2000 Professional terms and Techniques. Kogan Page Publishers, London; 2002.
16. Olsen SO, Scholderer J, Brunsø K, Verbeke W. Exploring the relationship between convenience and fish consumption: A cross-cultural study. Appetite. 2007;49(1):84-91.
17. Myrland Ø, Trondsen T, Johnston RS, Lund E. Determinants of seafood consumption in Norway: Lifestyle, revealed preferences, and barriers to consumption. Food quality and Preference. 2000;11(3): 169-188.
18. Burger J, Stephens WL, Boring CS, Kuklinski M, Gibbons JW, Gochfeld M. Factors in exposure assessment: Ethnic and socioeconomic differences in fishing and consumption of fish caught along the Savannah River. Risk Analysis. 1999;19 (3):427-438.
19. Hicks D, Pivarnik L, McDermott R. Consumer perceptions about seafood–an Internet survey. Journal of Foodservice. 2008;19(4):213-226.
20. Barberger-Gateau P, Letenneur L, Deschamps V, Pérès K, Dartigues JF, Renaud S. Fish, meat, and risk of dementia: cohort study. Bmj. 2002;325 (7370):932-933.
21. Çolakoğlu FA, İşmen A, Özen Ö, Çakır F, Yığın Ç, Ormancı HB. The evaluation of fish consumption in Çanakkale EU. Journal of Fisheries and Aquatic Sciences. 2006; 23(3):387-392.
22. Verbeke W, Vackier I. Individual determinants of fish consumption: application of the theory of planned behaviour. Appetite. 2005;44(1):67-82.
23. Pieniak Z, Verbeke W, Perez-Cueto F, Brunsø K, De Henauw S. Fish consumption and its motives in households with versus without self-reported medical

history of CVD: A consumer survey from five European countries. BMC Public Health. 2008;8(1):306.

24. Ilibezova E, Sharafutdinova M, Kerimbekov A, Invei Y, Tenizbaeva J, Ilibezova L, Siriwardena SN. Fish marketing and consumption survey in the Kyrgyz Republic. FAO Fisheries and Aquaculture Circular, (C1087), I; 2015.

25. AMSAT International. Notes on the focus group discussions and in-depth interviews for the fish and animal protein consumption survey. Canberra: Amsat International; 2011.

26. Karakaş G. A research on the determination of factors; affecting of consumer decisions on meat; and meat products in urban area of Tokat province; 2010.

27. Leek S, Maddock S, Foxall G. Situational determinants of fish consumption. British Food Journal. 2000; 102(1):18-39.

28. Pieniak Z, Verbeke W, Scholderer J. Health-related beliefs and consumer knowledge as determinants of fish consumption. Journal of Human Nutrition and Dietetics. 2010;23(5):480-488.

29. HMTNB H, Radampola K. Consumption behavior and pattern of fish consumption among university students: A case study from university of Ruhuna, Sri Lanka. Age. 2016;20(21):47.

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