Determinants of Frozen Fish Consumption by Households in Delta State, Nigeria

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Keywords:
Consumption,
frozen fish,
consumers,
determinants

Abstract

The research explored factors affecting the consumption of frozen fish in Delta State Nigeria. One hundred and 20 participants from 12 communities were randomly chosen. In order to obtain information from the respondents, a questionnaire was used. The findings indicate that 57.5% of those surveyed were females with mean of 43years old. Around 64.2% of the respondents were married and 81.7% of them were educated. The average household size was around 5 people; 92.5% were Christian and they had a mean income of N72,499.5. The mean consumption expenditure of frozen fish was N11,899.95. The average frozen fish intake per capita was 10.38 kg /year. Beef is the principal substitute of frozen fish. Owing to health reasons, most preferred consumption of frozen fish. Religion did not impede consumption of frozen. Majority of the respondents preferred to consume frozen fish in smoked form. The result revealed that age, educational status, household size, income level, frozen fish prices and frozen fish substitute prices influence the consumption of frozen fish. It is recommended price of frozen fish should be controlled to encourage its consumption considering the nutritional benefits.

1. Introduction

Fish production is a major source of livelihood for the poor countries of the world, and nutritional benefits have long been known for their consumption. Fish and fish products are world renowned as a cheap source of protein and are therefore very important for improving human health. They contain high nutrient content. It's rich in amino acids, unsaturated fatty acids, vitamins and trace elements (Pal et al., 2018., Balami et al., 2019).

Fish is valued not only for their protein and essential fatty acids, but also for many other nutrients as an integral part of a balanced diet (Gammone et al., 2019). Medical research has shown that high fish oil (omega-3) consumption reduces the risk of certain diseases (Rangel-Huerta and Gil,2018Trondsen et al., 2004). Consumption of fish contributes to cardiovascular disease, blood pressure, cholesterol, Alzheimer's disease and different types of cancer prevention (Zhang et al., 2018).

These factors are main causes that led consumers to change from the consumption of red meat to white meat, especially fish, which is on the rise worldwide.

The average annual per capita consumption of aquatic products worldwide is estimated at 20.5 kg for 2017, while in 1961, 2000, and 2015, it was estimated at 9.0 kg, 17.0 kg, and 20.2 kg respectively. The significant rise in average fish consumption per capita was mainly due to the increase in production, revenue, population and urbanization, and the development of the modern distribution channels (FAO, 2018). However, Nigeria, the average per capita consumption of fish is about 13.3kg per year which is still relatively low compared with the global average of 20.0kg (Johnson et al., 2020). Although the human health benefits of fish consumption are recognized, the consumption of frozen fish in the Delta State is still not adequate. Clupeahar engusscien (shawa), scornber sconbius (titus), and johnius diessumer (croaker) are examples of frozen fish eaten.

The neoclassical economist typically regards consumption level per individual as a key indicator of the productive performance of an economy (Ezeji and Ajudua, 2015). Understanding consumption of frozen fish is

essential in revenue and expenditure planning. Similarly, Obiero et al. (2019) has stated that income is a primary driver of Eastern Africa household consumption.

In the global sense, household income, consumption and wealth are viewed as main factors in citizens' well-being (Lustig, 2018). Observations shows that both macroeconomics and microeconomics policies play a key role in the study of consumption behaviour. A study by Akuffo et al. (2020) also identified the correlation between income and household expenditure. Applying the absolute income hypothesis of Keynes, Kueng (2018) examines the correlation between consumer spending and income and concludes that the average consumer inclination decreases with increased income. The correlation per capita spending and income was analyzed in Bangladesh by Uddin et al. (2019) and revealed that the increase in per capita spending resulted in changed of disposal income.

Fish consumption is affected by many factors, including socioeconomic context, general patterns of food consumption, consumer personal health status, and a variety of attitudinal dimensions (Wake and Geleto, 2019). Previous fish consumption studies have revealed that age, taste, health and convenience are significant determinants of frozen fish consumption (Samoggia and Castellini, 2018).

There are numerous studies in the literature on the fish preferences of consumers and the effect of socioeconomic factors on fish consumption (Yeşilsu et al., 2019; Lee and Nam, 2019; Uzundumlu, 2017; Korir et al., 2018; Terin, 2019). All these studies were conducted outside the Delta State. Previous researches of frozen fish centered on their commercialization and profitability. No earlier study analyzed frozen fish consumption and their determinants using the Theory of Planned Behaviour. The theory of planned behaviour has been used as an explanation for many food habits where it is found that the 3 constituents attitude, subjective norm, and perceived behavioural control have a positive influence on behaviour (Shah Alam and Mohamed Sayuti, 2011). Verbeke and Vackier (2005) explored the use of the planned behavior theory as a concept-based example of fish consumption in Belgium and their findings also showed a positive effect on behavioral intentions of the three components. The paper explicitly aims to recognize factors that affect the actions of households in the consumption of frozen fish.

2. Materials and Methods
The research was conducted in the state of Delta, Nigeria. Delta State is situated between 5 ° and 6o 30 'latitude north and 5o and 6o 45' longitude east. In the coastal areas and in the north the state has annual precipitation of around 2667 mm and 1905mm. The precipitation in July is most severe and in August it has a short break. The temperature is about 390c to 440c. This can be delimited into rainforests, coastal forests and mangrove swamp forests by natural vegetation. Delta state is thus a territory with a farming advantage. There are around 4,098,391 inhabitants in the state (NPC, 2006). It consists of 25 Local Government Areas divided into three agro-ecological areas: Delta North, Delta Central and Delta South. The people's primary economic activity is agriculture. Cultivated crops include rubber, palm oil, cassava, yams and cocoyam, maize, rice and vegetables. Pig, goats, sheep, poultry, fish, micro-animals such as snails, rabbits and grass cutters are often reared. Multistage random sampling technique was applied for this study. This was deemed fitting because every frozen fish user had the same chance to be chosen for the study with this technique. Firstly, two LGAs in each of the three agro ecological areas have been chosen randomly from their list of LGAs. A total of six LGAs were therefore given. Secondly, two communities were chosen, summing 12 communities for each of the six LGAs chosen. Thirdly, ten consumers were carefully chosen from each of the twelve communities. One respondent form a household this gave a total of one hundred and twenty consumers that were selected and used for the study. Data were collected through structured questionnaire. The data collected were analyzed using descriptive statistics such as frequency count, percentages and regression analysis.

The relationship between the endogenous and each of the exogenous variables was examined using four functional forms: linear, semi-log, exponential and double-log functions.

Linear form

$Y=b_0+b_1x_1 +b_2x_2+b_3x_3+b_4x_4+b_5x_5+b_6x_6+b_7x_7+b_8x_8 +e$

Semi- log form

$Y= b_0 + b_1logx_1 + b_2logx_2 + b_3logx_3 + b_4logx_4 + b_5logx_5 + b_6logx_6 + b_7logx_7 + b_8logx_8 +e$

Exponential form: $Log Y= b_0+b_1 x_1 +b_2x_2+b_3x_3+b_4+b_5x_5+b_6x_6+b_7x_7+b_8x_8+ +e$

Double-log

$LogY = b_0+ b_1logx_1+b_2logx_2+b_3logx_3+b_4logx_4+b_5logx_5+b_6logx_6+b_7logx_7+b_8logx_8 +e$

The lead equation was chosen based on statistical significance, the economic theory that supports consumption function concept and the expectation of the variables.

3. Results and Discussion

Socioeconomic Characteristics of Respondents

The gender distribution of consumers is presented in Table 1, the result showed that the female population was 57.5% while the male population was 42.5%. This shows that the proportion of females who eat frozen fish was predominant. The reason could be the role played by the females in planning and management of the home in purchase of frozen fish according to the amount of money at their disposal in cooking of domestic dishes. It can also be argued that most females like frozen fish because of health reasons. Majority of consumers fell within the age group of 50 years and above and represented by about 29.2%. This was followed by respondents with age group 30-39 years, less than 30 years and 40-49 years representing 25.8%, 24.2% and 20.8% respectively. The mean age is 39 years. This indicates that frozen fish consumers are able bodied, energetic men and women who are in their active stage of working life. This disclosed that the young people in this age bracket consume more fish than those in other age groups. This preference of frozen fish may be attributed to the availability of the form it is prepared in the open market. Age was found to significantly associate with interest in healthy eating. Furthermore, a positive relationship existed between age and consumption (Samoggia and Castellini, 2018).

Table 1. Socioeconomic characteristics of frozen fish consumers (N=120)

Variables	Frequency	Percentage	Mean
Gender			
Male	51	42.5	Female
Female	69	57.5	
Age			
Less than 30	29	24.2	
30-39	31	25.8	39 years
40-49	25	20.8	
50 and above	35	29.2	
Marital Status			
Single	34	28.3	
Married	77	64.2	Married
Widowed	6	5.0	
Divorced	3	2.5	
Education Level			
No formal education	6	5.0	
Primary education	16	13.3	Tertiary
Secondary education	45	37.5	
Tertiary	53	44.2	
Household size			
1-4	62	51.7	
5-8	40	33.3	5 persons
9-12	18	15.0	
Religion			
Christianity	111	92.5	
Islam	2	1.7	Christianity
Traditional	7	5.8	

Table 1 shows that 64.2% of respondents are married, 28.3% single, and 7.5% widows or divorced. This means that most the respondents are married. This showed that there is a trend towards more frozen fish purchases and increased consumption by married persons than single persons due to an expansion in family size and greater obligations in terms of food products expenditure. This is because every member of the home depends on frozen fish as a source of protein intake in their meals. Table 1 showed that respondents with tertiary education had the highest percentage of 44.2%. This was followed by respondents with secondary education having about 37.5% and household heads with primary education having 13.3% while the lowest percentage of 5.0% was recorded for respondents with no formal education. It could be seen from the above that majority of the respondents who had tertiary education showed preference for frozen fish. This showed that level of educational attainment determines and plays a significant role in the choice of fish and consumption pattern in the study area. Knowledge on high cholesterol content in animal protein would have made them to shift from animal protein intake to frozen fish for fish protein. Supartini et al., (2018) in their study on beef and food consumption pattern, noted education and

income level of respondents to positively influence consumption pattern including fish. Consumption of fishery products was also positively directly associated with education (Khan et al., 2018). Higher education levels were found leading to higher purchase but did not translate into higher fish consumption (Samoggia and Castellini, 2018).

It could be observed that high percentage of the respondents had between 1-4 members accounting for 51.7% of respondents sampled. This is followed by respondents with 5-8 members representing 33.3% of sample respondents and 9-12 members representing 15% of the sampled respondents. The mean household size was 5 people. This tendency towards small household size in the study area may be attributed to the level of education of the respondents and their corresponding awareness of family planning measures. This may be due to the fact that as family size increases, more food items need to be purchased at an affordable price and so the need for cheap form of fish like frozen fish. According to Genschick et al., (2018) fish consumption was found to be positively correlated with household size. The result on religion revealed that 92.5% of the respondents were Christians, 5.8% were traditional worshippers while 1.7% were Muslims. This suggests that most of those interviewed were Christians.

Monthly Income of consumers

Furthermore, Table 2 established that a higher percentage (40%) of the respondents earn less than N50,000 as their monthly income, 35% earn N50,000 to N99,000 while 15% earn between N100,000 to N149,000. The least was 10% who earn N150,000 and above. This indicates that 75% of the consumers earn between N10,000 to N99,999. This indicates the respondents' monthly income was high. The mean income of the respondents was N72,499.5. Their income was enough to buy any kind of protein product for their meals. Akuffo et al. (2020) and Gbigbi (2019) in their study on food consumption, concluded that consumption is a function of income.

Table 2. Monthly income of consumers

Income range (N)	Frequency	Percentage	Mean
Less than N50,000	48	40.0	
N50,000 – N99,999	42	35.0	N72,499.5
N100,000 – N149,999	18	15.0	
N150,000 and above	12	10.0	
Total	120	100	

Monthly Expenditure on Frozen Fish

Table 3 established that a higher percentage (39.2%) of the respondents spent between N5000 to N10,000 from their monthly income, 30.8% spent above N16000, 20% spent N11,000 to N16,000 while 10% spent less than N5,000. This indicates that 49.2% of the respondents spent between N1000 to N10000. The mean income spent on frozen fish was N11,899.95. This implies that respondents' monthly expenditure was low. This will enable them to improve their standard of living. This finding is consonance with Zani et al., (2019) study on determinants of household expenditure in Sulawesi that the lower the expenditure the higher the consumption rate.

Table 3. Monthly expenditure on frozen fish

Expenditure range(N)	Frequency	Percentage	Mean
Less than N5,000	12	10.0	
N5,000 – N10,000	47	39.2	N11,899.95
N11,000 – N16,000	24	20.0	
Above N16,000	37	30.8	
Total	120	100	

Quantity Consumed in (Kg)/year

The result in Table 4 showed that majority (30.8%) of the respondents consumes 6-10kg of frozen fish per year. This was closely followed by 28.3% who consumed above 15kg of frozen fish per year, 20.8% of them consumed between 1-5kg per year while 16.7% consumed 11-15kg per year. The least was 3.3% of the respondents that consumed less than 1kg per year. The average fish consumption per capita is 10.38 kg/year.

Frozen Fish Substitute

The result revealed that 25.0% of the respondents consumed beef, 21.7% consumed chicken, 18.3% consumed smoked fish, 15.0% consumed turkey, 9.2% consumed pork, 4:2% consumed snail, 4.2% also consumed dry fish and 2.5% consumed egg. The result suggests that inability to afford frozen fish will lead to an increase in the consumption of beef to complement protein deficiency.

Table 4. Distribution of respondents by quantity of frozen fish consumed in a year

Quantity consumed	Frequency	Percentage	Mean
Less than 1kg	4	3.3	
1-5kg	25	20.8	
6-10kg	37	30.8	10.38kg
11-15kg	20	16.7	
Above 15kg	34	28.3	
Total	120	100	

Table 5. Frozen fish substitutes

Substitute	Frequency	Percentage
Beef	30	25.0
Turkey	18	15.0
Chicken	26	21.7
Smoked fish	22	18.3
Snail	5	4.2
Dry fish	5	4.2
Pork	11	9.2
Egg	3	2.5
Total	120	100

Reasons for Preferring Frozen Fish

The result in Table 6 indicates that 36.7% of the respondents preferred frozen fish due to health reason. This was followed next by 28.3% who gave preference to frozen fish due to availability. About 25% of them said their preference was necessitated by taste and only 10% affirm due to unavailability of close substitute. This is in agreement with Temel and Uzundumlu (2015) who determined health and nutrition motivation and effect of advertising on consumption among the factors that increase fish consumption. Similarly, Azabagaoglu et al. (2016) found a positive relationship between fish consumption and health. Trondsen et al. (2004), indicated that with the increase in knowledge about health, seafood consumption would increase.

Table 6. Reasons for preferring frozen fish

Reason	Frequency	Percentage
Health	44	36.7
Taste	30	25.0
Available	34	28.3
Unavailability of substitute	12	10.0
Total	120	100

Religion Effect on Frozen Fish Consumption

The result in Table 7 revealed that 76.7% of the respondents affirmed that religion does not forbid the eating of frozen fish while only 23.3% of them agreed that religion forbid the consumption of frozen fish. This shows how religious values inform attitudes toward and behaviors influencing frozen fish consumption (Minton et al.,2018).

Table 7. Religion Effect on frozen fish consumption

Response	Frequency	Percentage
Yes	28	23.3
No	92	76.7
Total	120	100

Pattern of frozen fish consumption

Table 8 shows the consumption pattern of frozen fish of respondent in the study area. It shows that 49.2% of the respondents consume frozen fish in the smoked/dried form, 33.3% consume frozen fish when it is cooked fresh while 17.5% consume frozen fish when it is fried. This indicates that the respondents in the study area prefer consuming frozen fish when it is dried and cooked fresh. The respondents preferred it in the smoked/dried form because of taste and avoid spoilage.

Table 8. Frozen fish consumption pattern

Pattern of consumption	Frequency	Percentage
Cooked fresh	40	33.3
Smoked/Dried	59	49.2
Fried	21	17.5

Factors Affecting Frozen Fish Consumption

The result of Table 9 shows that the linear functional form of the regression results produced the lead equation having satisfied the econometric, statistical and economic criteria.

The coefficient for age is positive and statistically significant at 5% level of probability. This shows that the age of the respondent can also be directly linked to frozen fish consumption. It also shows that the higher the age of the respondent, the higher the consumption frozen fish. The coefficient of education is positive and statistically significant at 1% level of probability, thus suggesting that education is also directly related to consumption of frozen fish. It also implies that an increase in the educational level will lead to an increase in frozen fish consumption. The finding agrees with Jimoh, (2020) study on consumers' preference and behaviour pattern towards fresh and smoked catfish in Kwara state.

The coefficient of household size is positive and statistically significant at 5 % level of probability, thus suggesting that household size is also directly related to consumption of frozen fish. It also implies that an increase in the size of the household will lead to an increase in frozen fish consumption. This finding supports the work of Adeola et al. (2016) that household size had positive influence on catfish consumption. The coefficient of income is positive and statistically significant at 5% level, showing that income is directly related to frozen fish consumption. This suggests that a change in income will cause consumption on frozen fish to change in the same direction. That is, the higher the income, the higher the frozen fish consumption. This is in agreement with Abdullahi et al. (2011) who found direct relationship between income and consumer behaviour for fresh fish in Malaysia.

The coefficient for price of frozen fish is negative, thus indicating that the price of frozen fish is inversely related to consumption. This therefore suggests that the higher the price, the lower the consumption of frozen fish. The finding agrees with Terin, (2019) in a study on the influence of household characteristics on fish consumption in turkey. The coefficient for price of frozen fish substitutes is negative, thus indicating that the price of frozen fish substitutes has inverse relationship with frozen fish consumption. This therefore suggests that the higher the price of substitutes, the higher the consumption of frozen fish.

Table 9. Factors influencing frozen fish consumption

Variable	Coefficient	Std Error	t-value	p-value
Gender	-0.509	0.366	1.39	0.167
Age	0.072	0.028	2.54	0.012**
Marital status	0.173	0.331	0.52	0.604
Educational level	4.016	0.458	8.77	0.000***
Household size	0.341	0.110	3.11	0.002**
Monthly income	0.641	0.209	3.07	0.003**
Price of frozen fish	-0.454	0.019	24.34	0.000***
Price of frozen fish substitutes	-0.083	0.031	2.70	0.008**
R-squared	0.570			
F-ratio	21.180			

4. Conclusion and Recommendations

In the study, the factors influencing frozen fish consumption has been analyzed with the help of regression model. The result showed that age, education, household size, monthly income, price of frozen fish and price of frozen fish substitutes influence consumption. It has been determined that when these variables increase; fish consumption amount increases. According to the obtained findings, the average frozen fish consumption per capita is 10.38 kg/year. Most of the respondents preferred the consumption of frozen fish due to health reason. Majority of the respondents preferred frozen fish in the smoked form. Religion did not hamper the eating of frozen fish as opined by wider proportion. The foremost substitute for frozen fish consumption is beef. It is recommended that the price of frozen fish should be control to encourage its consumption considering the nutritional benefits, these substitutes snail, dry fish and eggs should be made available through massive production and encouragement from the government because of their dietary benefits. The government should provide consumption credit to enable the

consumers easily afford frozen fish as well as substitutes. Since religion is not a barrier to frozen fish consumption, good market should be provided for income generation. Finally, storage facilities should be made available through subsidies for affordability by the consumers.

References:
1. Abdullahi, F. A., Zainalabidin, M. and Mohd, M. I. (2011). Determinants of Fresh Fish purchasing behaviour among Malaysian Consumers. Current Research Journal of Social Sciences, 3(2), 126-131.
2. Adeola, A. A., Ayegbokiki, A. O., Akerele, D., Adeniyi, B. T and Bamidele, N. A. (2016). Marketing Perspective of Smoked Catfish by Consumers in Southwest, Nigeria. Applied Tropical Agriculture, 21(2), 58-66.
3. Adeyeye, E. I., Olatoye, R.A., Ibigbami, O., Adesina, A. and Gbolagade, A. (2019). Evaluation of pesticides residues distribution in fresh and smoked body parts of Clarias gariepinus and assessment of possible health risks in Nigeria. Journal of Environmental Science and Health, 54(3),163-169.
4. Akuffo, A.S., Quagrainie, K.K. and Obirikorang, K.A. (2020). Analysis of the determinants of fish consumption by households in Ghana. Aquaculture Economics and Management, 24(3),294-309.
5. Azabagaoglu, M., Abdikokoglu, O. D. I. and Unakitan, G. (2016). Consumer's Fish Purchase Behaviour in Tekitdag. Journal of Tekirdag Agricultural Faculty, 13(04), 145-151.
6. Balami, S., Sharma, A. and Karn, R. (2019). Significance of nutritional value of fish for human health. Malaysian Journal of Halal Research. Malaysian Journal of Halal Research, 2(2),32-34.
7. Ezeji, C.E. and Ajudua, E.I. (2015). Determinants of aggregate consumption expenditure in Nigeria. Journal of Economics and Sustainable Development, 6(5), 164-168.
8. FAO (2018). The state of World fisheries and aquaculture. www.fao.org/3/I9540EN/i9540en.pdf.
9. Gammone, M.A., Riccioni G., Parrinello, G and D'Orazio, N. (2019). Omega-3 Polyunsaturated Fatty Acids: Benefits and Endpoints in Sport. Nutrients, 11(1), 46. https://doi.org/10.3390/nu11010046
10. Gbigbi, T.M. (2019). Survival of the fittest: the choice between local and imported rice consumption in Delta central agricultural zone, Delta state, Nigeria. Agricultural science and technology, 11(3),262-266.
11. Genschick, S., Marinda, P., Tembo, G., Kaminski ,A.M. and Thilsted, S.H. (2018). Fish consumption in urban Lusaka: The need for aquaculture to improve targeting of the poor. Aquaculture, 492,280-289.
12. Jimoh, W. A. (2020). Consumers' preference and behaviour pattern towards fresh and smoked catfish in Ilorin metropolis, Nigeria. Journal of Agricultural and Marine Sciences [JAMS],25, 27–38.
13. Johnson, S.B., Mafimisebi, O.E., Ikuerowo, J.O. and Ijigbade, O. J. (2020). Determinants of consumers' choice behaviour for fresh fish types. Jurnal Perspektif Pembiayaan dan Pembangunan Daerah, 8(3),245-256.
14. Khan, A. Q., Aldosari, F. and Hussain, S.M.(2018). Fish consumption behavior and fish farming attitude in Kingdom of Saudi Arabia (KSA).Journal of the Saudi Society of Agricultural Sciences, 17(2), 195-199.
15. Korir, L, Rizov, M. and Ruto, E. (2018). Analysis of household food demand and its implications on food security in Kenya: An application of QUAIDS model. Agricultural Economics Society 92nd Annual Conference, April 16-18, 2018, Coventry (UK).
16. Kueng, L.(2018). Excess sensitivity of high-income consumers. The Quarterly Journal of Economics, 133(4),1693–1751.
17. Lee, M. and Nam, J. (2019). The determinants of live fish consumption frequency in South Korea. Food Research International, 120,382-388.
18. Lustig, N. (2018). Measuring the distribution of household income, consumption and wealth', in Stiglitz JE, Fitoussi J-P and Durand M (editors), For Good Measure: Advancing Research on Well-being Metrics Beyond GDP, Paris: Organisation for Economic Co-operation and Development Publishing.
19. Minton, E.A., Xie, H.J., Gurel- Atay, E. and Kahle, L.R. (2018). Greening up because of god: The relations among religion, sustainable consumption and subjective well- being. International Journal of Consumers Studies, 42(6),655-663
20. NPC. (2006). Analysis of Nigerian 2006 census results. National Population Commission (NPC), Abuja, Nigeria.
21. Obiero, K.; Meulenbroek, P.; Drexler, S.; Dagne, A.; Akoll, P.; Odong, R.; Kaunda-Arara, B and Waidbacher, H (2019). The Contribution of fish to food and nutrition security in Eastern Africa: emerging trends and future outlooks. Sustainability, 11, 1636.
22. Pal, J., Shukla, B.N., Maurya, A.K., Verma, H.O., Pandey, G. and Amitha. (2018). A review on role of fish in human nutrition with special emphasis to essential fatty acid. International Journal of Fisheries and Aquatic Studies, 6(2), 427-430.
23. Rangel-Huerta, O.D. and Gil, A. (2018). Omega 3 fatty acids in cardiovascular disease risk factors: An updated systematic review of randomised clinical trials. Clinical Nutrition, 37(1),72-77.

24. Samoggia, A. and Castellini, A. (2018). Health-orientation and socio-demographic characteristics as determinants of fish consumption. Journal of International Food and Agribusiness Marketing,30(3),211-226.

25. Shah Alam, S. and Mohamed Sayuti, N. (2011). Applying the theory of planned behavior in halal food purchasing. International Journal of Commerce and Management, 21, 8-20.

26. Supartini, A.; Oishi, T. and Yagi, N. (2018). Changes in Fish Consumption Desire and Its Factors: A Comparison between the United Kingdom and Singapore. Foods, 7, 97.

27. Temel, T. and Uzundumlu, A.S. (2015). Rize İlinde Hanelerin Balık Tüketimi Üzerine Etkili Olan Faktörlerin Belirlenmesi. Menba Su Ürünleri Fakültesi Dergisi, 3, 14-22.

28. Terin, M. (2019). Household characteristics influencing fish consumption in van province, Turkey. Italian Journal of Food Science, 31(3),416-426.

29. Trondsen, T., Braaten, T., Lund, E. and Eggen, A.E. (2004). Health and Seafood Consumption Patterns among Women Aged 45–69 Years. A Norwegian seafood consumption study. Food Quality and Preference, 15(2), 117–128.

30. Uddin, M.T., Rasel, M.H., Dhar, A.R, Badiuzzaman, K and Hoque, S. (2019). Factors determining consumer preferences for pangas and tilapia fish in Bangladesh: consumers' perception and consumption habit perspective. Journal of Aquatic Food Product Technology, 28(4),438-449.

31. Uzundumlu, A.S. (2017). Determining Fish Consumption Behaviour among Households and the Most Suitable Type of Fish in Erzurum Province. Iranian Journal of Fisheries Sciences, 16(2),684-697.

32. Verbeke, W. and Vackier, I. (2005). Individual determinants of fish consumption: application of the theory of planned behaviour. Appetite, 44(1), 67-82.

33. Wake, A.A. and Geleto, T.C. (2019). Socio-economic importance of fish production and consumption status in Ethiopia: A review. International Journal of Fisheries and Aquatic Studies, 7(4), 206-211.

34. Yesilsu, A.F, Ozyurt G, Dagtekin M and Alp-Erbay, E. (2019). Wild Fish vs. Farmed Fish: Consumer Perception in Turkey. Aquaculture Studies, 19(1): 37-43.

35. Zani, M. ., Saediman, H. ., Abdullah, S. ., Daud, L. ., and Yunus, L. . (2019). determinants of household food expenditure in a cassava growing village in Southeast Sulawesi. Academic Journal of Interdisciplinary Studies,8(3), 302.

36. Zhang, Y., Zhuang, P., He, W., Chen, J.N., Wang, W.Q., Freedman, N.D,, Abnet, C.C ., Wang, J.B and Jiao, J.J. (2018). Association of fish and long- chain omega- 3 fatty acids intakes with total and cause- specific mortality: prospective analysis of 421 309 individuals. Journal of Internal Medicine, 284(4),399-417.