

Research Article**Consumer Preferences for Wild and Farmed Fish in Different Urban Communities of Central Cross River, Nigeria****Okey, IB**

Department of Fisheries, Cross Rivers University of Technology, Obubra Campus, Calabar, Nigeria

E-Mail: piusbass@yahoo.com, **Tel:** +234 07063302755

Current evolutions in aquaculture development have led to a growing interest and debates on the health, safety, nutritional qualities and sustainability of farmed fish. Knowledge of consumer perceptions of wild versus farmed fish has become a major factor for aquaculture operators to develop appropriate marketing strategy for the product. This will also help policy makers to design intervention plan for fisheries. This study aims to investigate consumer perceptions of wild caught and farmed fish in central Cross River state. A total of 1200 structured questionnaires were administered to fish consumers in markets, hotels, shops and landing sites. The results showed that majority of the respondents were males (64.41%) within the age class of 40–49 (30.43%) and have attained secondary education (36.52%). Majority of the respondents like eating fish (82.61%) and are aware that fish can be cultured (85.23%). Only a few can distinguish wild caught from farmed fish (38.26%) with 54.54% having preference for wild fish, although not significant ($p > 0.05$). Taste, availability, easy to cook and good health were all strong reasons for consuming fish ($p < 0.001$). The mean score for taste (2.37) shows it was not the reason for choosing farmed fish over wild caught fish. Majority of the respondent were in agreement that price (2.36), size (2.38), social status (2.26) and quality (2.31) influence consumers purchasing behavior. The results provided could play an important role when planning and designing efficient marketing strategies for promoting farmed fish by adapting the information provided to the perception of each segment of consumers identified by the present study.

Key words: Consumers, Perception, Wild Fish, Farm Fish, Urban Cities and Cross River.**INTRODUCTION**

The consumption of fish and fish products has increased globally during the recent decades. Fish provides comparatively cheap source of animal protein for human and livestock, hence increasing the focus on fish production, both from wild capture and Aquaculture source (Cochrane *et al* 2009). In 2016 global fish production was peaked at 171 million tons estimated as USD 262 billion with aquaculture representing 47% and USD 232 billion (FAO, 2018). In 2015 fish accounted for about 17% of animal protein consumed by global population and provides about 3.2 million people with almost 20% of their average per capita intake of animal protein (Cai, 2017). Fish consumption rate has grown from 9.0 kg per capita consumption in 1981 to 20.2 kg in 2015 at an average rate of about 1.5% per year world wide (FAO, 2017). This increase in consumption rates has been including reduced wastage, better utilization, improved distribution channels, population growth, rising income and urbanization (FAO,

2018). In Africa, fish consumption rates remain low with average per capita consumption rate of 9.9 kg ranging from a maximum of about 14 kg to 5 kg in western and eastern Africa countries respectively (FAO, 2017). According to FAO (2018), low per capita consumption rate in Africa is attributed to population increase, low income level, inadequate storage, processing in restructure and poorly developed aquaculture sectors. In response to these low consumption rates which is occasional by depletion of wild stock and increasing consumers demand for fish, aquaculture becomes a viable alternative (Cahu *et al.*, 2004). Aquaculture has continuous to grow faster than some other major food production sectors with estimated 80.0 million tons of food fish and 30.1 million tons of aquatic plant (Hasan, 2017). In Nigeria two main sources of fish production are domestic (Artisanal and Aquaculture) and imports which are mostly wild caught clupeids (Ogundari and Ojo, 2009).

According to FAO (2013), Nigeria spends about 125 billion annually on importation of fish to meet the yearly per capita consumption rate of not less than 13 kg/P/yr. Fisheries Committee West and Central Gulf of Guinea (FCWCGG, 2016) reported that the total fish demand based on 2014 population estimate of 180 million persons was 3.23 metric tons. Oyinbo and Rekwot (2013) estimated the average production around 800,000 metric tons, whereas the consumption is reported as 2.7 metric tons leaving a deficit of 1.9 metric tons. This deficit can only be bridged through aquaculture. In Nigeria aquaculture has grown steadily from 21,700 metric tons in 1999 to 316,700 metric tons in 2015 (FAO, 2016). Nigeria is the largest aquaculture producer in the Sub-Saharan Africa and has been driven by social and economic factors such as nutrition income, urbanization and generation of employment (FAO, 2017). Current evolution in aquaculture development has led to growing interest and debates on the health safety and sustainability of farmed and wild-caught fish (Tomic *et al.*, 2017).

Consumers knowledge represents the growth of aquaculture operators to develop appropriate marketing strategies for their product and policy makers to design intervention plans for Fisheries operators. Consumer – held perception of fish received a great deal of attention (Kole 2003; Batzios *et al.*, 2004; Verbeke *et al.*, 2005; Tomic *et al.*, 2017). According to Frank and Nowak (2010) consumers are becoming more interested in the choice of food that may have consequences for their health. A number of studies found that higher income people with improved knowledge of nutrition are concerned that can influence human health directly (Sidhu 2003; Johnson *et al.*, 2007). Modern consumers are also aware of the health benefit brought by eating fish (Augood *et al.*, 2008; Tomic *et al.*, 2017). Irrespective of the source, fish constitute important and healthy part of human diet, owing to the presence of polyunsaturated fatty acids (PUFA) which play essential roles in human diets (Ruxton *et al.*, 2004; Oztekin *et al.*, 2018). Despite of this importance and short falls in fish supply, some consumers especially in Asia and Europe still have preferences on wild and farmed fishes.

Rajani (2010) reported a significantly higher attitude of consumption of wild fish over farmed among people of Vietnam. European consumers perceived farmed fish as being of lower quality than wild fish (Kole 2003, Verbeke *et al.*, 2007). Verbeke and Brunso (2006) reported the majority consumers perceive that wild-caught products taste better than farmer raised ones consumers with a higher involvement in cooking prefer fish species that are not farmed and can elect the flavors of wild and farmed fish during consumption (Tomic *et al.*, 2001). Claret *et al* (2014) reported that consumers' preference of wild and farmed fishes depends on fish level of education, age and gender. Consumer's perception in favor of wild fish in terms of quality was reported, whereas availability and prices were in favor of farmed fish (Claret *et al* 2014). Cahu *et al.*

(2004) stated that the nutritional content of wild fish cannot be differentiated from that of farmed especially if raised under appropriate condition, and Oztekin *et al* (2018) reported that all fish either farmed, cage-aggregated or wild-caught fish met the minimum nutritional contribution for eicosapentaenoic acid (EPA) + docosahexaenoic acid (DHA) in the order of cage-farmed fish > cage-aggregated wild fish > wild-caught fish. Majority of consumers showed no perceived significant differences between farmed and wild fish however, the mean scores on the attributes of taste, health and nutritious value were slightly in favor of wild fish.

Cross River central have most communities located along the main tributary of the Cross River. They are mainly farmers, civil servants, business entrepreneurs and a few fishermen. Although the need for gaining insight into the consumers perception of farmed fish has been identified as key factor that determines aquaculture growth potential (Kaiser and Sleat 2002). Several studies in Europe, Asia and East Africa have shown ambiguity in consumers perceived preferences of wild versus farmed fishes (Cahu *et al.*, 2004; Claret *et al.*, 2014; Tomic *et al.*, 2017; Guithukia *et al.*, 2014). In Nigeria especially in Cross river state where this study is conducted there is paucity of information on consumers awareness, perception and opinion on farmed versus wild fish. This study focusses on the consumers' perception of wild and farmed fishes in some urban settlement of Central Cross River State. The information provided will help in promoting aquaculture growth and encourage more persons into the business.

MATERIALS AND METHODS

The survey was conducted in four urban communities namely Ikom, Obubra, Ugep and Itigidi of central Cross River State. These communities are located a few kilometers from the main tributary of the Cross River and incidentally are the Headquarter of their respective Local Government Area. They were chosen because of high population and commercial activities influencing major markets where fish is supplied and consumed. The study targeted hoteliers' whole sellers, retailers, fish folk and fish farmers.

One thousand two hundred (1200) questionnaires were administered across the four urban communities in the study area.

The questionnaires were structured in to 5 sections (A –B) to suit the objective of this study. Section A looked at the socio-economic characteristics of the B consumers perception of building farmed fish; C, reasoning for consuming fish; D, reason for chosen farmed after wild-caught and E, factors influencing consumers purchasing behaviors.

A total of one thousand and fifty (1150) questionnaires were recovered from the respondents had to express their opinion and agreement with the statements on the questionnaires. Simple descriptive statistic using frequencies percentages were used. Tables, charts, chi-square and liker scales were also used to explore consumers perceptions of wild and farmed fish in the study area according to Grunert *et al* (1993) and Claret *et al* (2014).

RESULTS

Demographic characteristics

The result of the demographic characteristic of respondents in the study area is presented of 1150

respondents there are more males (62.41%) than females (37.39%). Most of the respondents were in the age class of 40-49 years (30.43%) followed by 30-39 years (26.96%) most of which were either single (35.65%) or married (34.78%). Major of the respondents (36.52%) had a secondary education while 31.30% has tertiary education with a house hold size of 4-7 (46.09%). Only very few (13.91%) had a household of more than 7 minter individuals. The major occupation of the respondents was trading (33.91%) followed by civil service (24.35%) however with the least number of fisher folk (19.13%). The monthly average income of most respondents was ₦ 21,000 - ₦ 50,000 (35.65%) while few respondents had an average monthly income between ₦ 51,000 - ₦ 100,000 (10.44%).

Table 1: The Socio - demographic Characteristic of Respondents in the Study Area.

Item		Frequency	Percentage (%)
Sex	Male	720	62.61
	Female	430	37.39
Age	< 18	120	10.43
	18 – 29	230	20.00
	30 – 39	310	26.96
	40 – 49	350	30.43
	> 50	140	12.18
Marital Status	Single	410	35.65
	Married	400	34.78
	Divorce	260	22.61
	Widowed	80	6.96
Educational Level	Primary	230	20.00
	Secondary	460	36.52
	Tertiary	360	31.30
	Non- Formal	140	12.18
House Hold Size	1 – 3	460	40.00
	4- 7	530	46.09
	>8	30	13.91
Occupation	Civil Servant	280	24.35
	Trader	390	33.91
	Crop/Livestock	260	22.61
	Fisher Folk	220	19.13
Monthly Income (₦)	>10,000	240	20.87
	11,000 – 20,000	380	33.04
	21, 000 – 50,000	410	35.65
	51, 000 - 100,000	120	10.44
	>100,000	0	0.00

Fish Consumption

The result of fish consumption and perception of wild-caught and farm-raised fish is shown in Table 2. Most respondent, 82.61% like eating fish and 85.23% have awareness that fish can be cultured in ponds. Only a few 38.26% can distinguish pond raised fish from wild-caught fish, with 54.54% have preference for wild-caught over pond raised (36.36%) fish. The most common fish species

in the study area are Tilapia (27.83%) silver catfish (26.07%), Africa catfish (23.48%) while the least was *Heterotis niloticus* (8.70%). Silver catfish (30.43%) was the most preferred while *H. niloticus* (2.61%) was the least preferred by respondents in the study area. The result of the chi-square analysis revealed that the preference of wild-caught fish to farm-raised fish was not significant ($p>0.05$).

Table 2: Fish consumption and Perception of the Respondent.

Item		Frequency	Percentage (%)
Do you like eating fish?	Yes	950	82.61
	No	200	17.39
How often do you eat fish weekly?	Once	100	8.70
	2- 4	280	24.35
	5 - 6	430	37.39
	>7	340	29.56
Do you have any knowledge about fish culture?	yes	980	85.23
	No	170	14.77
Can you distinguish wild- caught fish from farmed raised fish?	Yes	440	38.26
	No	710	61.74
If yes which is the most preferred source?	Wild - caught	230	63.64
	Farmed raised	210	36.36
Which fish species are most common in your area?	African catfish	270	23.48
	Silver catfish	300	26.07
	Tilapia	320	27.83
	<i>H. niloticus</i>	100	8.70
	others	160	13.92
Which is your most preferred species?	African catfish	290	25.22
	Silver catfish	350	30.43
	Tilapia	330	28.70
	<i>H. niloticus</i>	30	2.61
	others	150	13.04

Reason for Consuming Fish

The results of the reason for consuming fish is presented in Table 3. Majorile of the respondent strongly agreed that the consume fish because it is easy to cook (56.52%) and readily available (47.83%) other agreed that they like the taste (58.26%) cheaper (40.00%) and health benefits (54.78%). However, most of them disagrees that fish consumption was based on social status (82.70%) and

lack of substitutes (62.61%). The respondent agreement on the reason for consuming fish showed that, easy to cook, Taste, availability and health benefit were highly significant ($P < 0.001$) while reasons for being cheap was not significant ($P > 0.05$). However, there was significant disagreement ($P < 0.001$) on social status of respondents and lack of substitutes as reasons for consuming fish in the study area.

Table 3: The distribution of respondent based on the reason for consuming fish

Reason	Scale	Frequency	Percentage (%)	Mean (M± SD)	X ²	Significant level
Easy to cook	SA	650	56.52	1.43± 0.50	60.44	***
	A	500	43.48			
	D	0	0.00			
Like the taste	SA	420	36.52	1.69 ± 0.57	49.06	***
	A	670	58.26			
	D	60	5.22			
Cheaper	SA	370	32.17	1.96 ±0.78	2.63	ns
	A	460	40.00			
	D	320	27.83			
Readily available	SA	550	47.83	1.62± 0.60	27.77	***
	A	480	41.74			
	D	120	10.43			
Healthy	SA	440	38.26	1.69± 0.60	40.71	***
	A	630	54.78			
	D	80	6.96			
Social status	SA	160	13.91	2.35 ± 0.71	21.72	***
	A	430	37.39			
	D	560	82.70			
Lack of substitutes	SA	110	9.57	2.53± 0.67	50.10	***
	A	320	27.82			
	D	720	62.61			

SA = Strongly Agree, A= Agree, D =Disagree and SA = Strongly disagree.

Farm-Raised and Wild-Caught Fish

The results of choice of farm-raised over wild caught fish in the study area were presented in Table 4. The mean scores on most of the attributes were within the midpoint of the four (4) point Likert scale denoting absence of major perceived difference between farm and wild fish. The results of mean scores of a four point Likert scale revealed that the attributes of safety, (3.08) healthier, (3.24) fresher, (3.17) more nutritious, (2.65) availability, (2.97) and cheaper (2.90) were significant ($P < 0.05$) for choosing farm-raised over wild-caught fish. The taste (2.37) of the fish from either of the sources had no effect ($P > 0.05$) on the preference of farmed -over wild-caught fish.

Table 4: Reasons for choosing farmed fish over wild fish

Reason	Scale	Frequency	Percentage (%)	Mean Score
Safer	SD	10	8.70	3.08
	D	17	14.78	
	A	42	36.52	
	SA	46	40.00	
Healthier	SD	5	4.35	3.24
	D	10	8.70	
	A	52	45.22	
	SA	48	41.74	
Fresher	SD	5	4.35	3.17
	D	20	17.39	
	A	40	34.78	
	SA	50	43.48	
More nutritious	SD	20	17.39	2.65
	D	26	22.66	
	A	43	37.39	
	SA	26	22.61	
Easier to find	SD	4	3.48	2.97
	D	25	21.74	
	A	56	48.70	
	SA	30	26.08	
Cheaper	SD	14	12.17	2.90
	D	26	22.61	
	A	32	27.83	
	SA	43	37.39	
Taste	SD	31	26.96	2.37
	D	26	22.61	
	A	42	36.52	
	SA	16	13.91	

Mean values in a 4-point Likert scale. Mean values greater and equal 2.5 indicate agreement and mean values less than 2.5 indicate disagreement

Factors Influencing Purchasing Behavior of Consumers

The result of the 3-points Likert scale of the respondents on the factors influencing consumers purchasing behavior in the study area is presented in Table 5. Majority of the consumers were in agreement that price (86.09%), smell (66.96%) appearance (57.39%), size (95.65%) social status (81.73%) and quality (78.26%) influence consumers

purchasing behavior. The mean scores show that all except color of fish were in agreement to influencing consumers purchasing behavior in the study area.

Table 5: Factors influencing purchasing behavior of consumers

Factor	Scale	Frequency	Percentage (%)	Mean Score
Price	D	16	13.91	2.36
	SA	42	36.52	
	A	57	49.57	
Smell	D	38	33.04	2.07
	SA	28	24.35	
	A	49	42.61	
Appearance	D	49	42.61	2.03
	SA	52	12.17	
	A	14	45.22	
Size	D	5	4.35	2.38
	SA	61	53.04	
	A	49	42.61	
Colour	D	53	46.09	1.98
	SA	11	9.57	
	A	51	46.09	
Social Status	D	21	18.27	2.26
	SA	43	37.39	
	A	51	44.34	
Quality	D	25	21.74	2.31
	SA	29	25.22	
	A	61	53.04	

Mean Values In A 3-Point Likert Scale. Mean Values > 2 Indicate Agreement And Mean Values < 2 Indicate Disagreement

DISCUSSION

Demographic information from respondents such as sex, age, marital status, educational level, house hold size, occupation and monthly income have been employed by several researchers to determine consumers preferences of farmed and wild fish (Erickson *et al.*, 2007; Claret *et al.*, 2014; Tomic *et al.*, 2017). The findings of more males in this study disagrees with most researchers who reported more female consumers than males (Darko, 2011; Obiero *et al.*, 2014; Claret *et al.*, 2014; Tomic *et al.*, 2017). According to Githukia *et al.* (2014) women mostly participates at the periphery of the fish value chain, such as fish post-harvest processing, marketing and trading. This study deviated from atypical African culture where principal shoppers of household are predominantly mature females (Darko, 2011). The dominant age class of youth in this study agrees with the studies of several other researchers who opined that it is the most economically active age group in the society and thus were easily found in urban center where majority were either employed or applicants. This was also in line with the findings of Githukia *et al.* (2014) and Claret *et al.* (2014) in Kenyan and Spanish fish consumers, respectively. A higher percentage of singles (35.65%) and those who have

attained at least primary education may have accounted for the result of gender in favor of males in this study. Studies have also shown that consumers with higher education background are enlightened on the health benefits of consuming fish which influences the preferences of consumers positively (Kinnucan *et al.*, 1993). Claret *et al.* (2014) reported that consumers with a higher objective knowledge and education level about fish are more ready to agree with scientific evidence and consequently more likely to make better and reasonable fish choices. Kaimakoudi *et al.* (2013) reported that high potential-aquaculture-consumers tend to have higher income, younger and higher education level attainment than the low income aquaculture consumers. In this study most fish consumers were traders (33.91%) with monthly income of ₦21,000 – ₦50,000 which indicate that they are petty traders with moderately low standard of living. This was in agreement with the findings of Githukia *et al.* (2014) and Darko (2011) that standard of living of fish consumers influences their choices. Consumers with high income and raised in coastal regions can detect differences in wild and farmed fish and make better choices (Tomic *et al.*, 2017; Verbeke and Vackier 2004). Consumers in the study area eat fish as often as 5 – 6 times weekly which is an indication that fish is a major source of animal protein and is easily affordable to the respondents. This corroborates the findings of many other researchers who reported that modern consumers are aware of the health benefits brought by eating fish, hence increasing demand due to increased human population (Smith *et al.*, 2000; Augood *et al.*, 2008; Claret *et al.*, 2014; Tomic *et al.*, 2017). Most consumers (61.74%) cannot distinguish farm-raised from wild-caught fish, however among the few who can distinguish, have perceived preference for wild-caught fish (54.54%). This was in agreement with the findings of many other researchers who reported consumers' preferences for wild-caught over farmed raised fish among consumers who eat fresh fish and are from coastal regions (Schlag and ystgaard, 2013; Uchida *et al.*, 2014; Claret *et al.*, 2014). Luten *et al.* (2002) and Cahu *et al.* (2004) reported no clear significant differences between wild -and farmed-fish when consumer's panel carried out sensory analysis. Cahu *et al.* (2004) further stated that the nutritional qualities of farmed fish were at least as beneficial as that of wild fish, particularly in terms of its potential to prevent cardiovascular diseases. Tilapia being the most common available species in the study area but not the most preferred. This was in agreement with the studies of Githukia *et al.* (2014) and Obiero *et al.* (2014) who reported Tilapia as the most available fish species in urban centers of Kenya. However, in this study silver catfish was the most preferred despite being least abundant to African catfish and Tilapia species. The main reason behind preference for Nile tilapia was ease of availability of wild-caught Nile tilapia compared to cultured Nile tilapia whose supply is seasonal and consumer's perception that wild Nile tilapia is tastier and healthier (Githukia *et al.*, 2014). Silver catfish

were all from the wild may have been the reason for its preference over Tilapia and African catfish some of which came from cultured environment. According to consumers who preferred farmed fish, the reasons for their choice were in disagreement with the findings of Verbeke and Brunso (2005) and Claret *et al.* (2014) who reported wild fish to be safer, tasty and better health benefit than farmed fish. In contrast to these researchers, and in agreement with perception of consumers who preferred farmed fish, Oztekin *et al.* (2018) reported two-times higher levels of fat content in farmed axillary seabream (*Pagellus acarne*) (7.70%) compared to the wild-caught fish (3.05%), which resulted in a higher nutritional contribution of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), that totally covered the recommended levels for EPA or DHA by the European Food Safety Authority (EFSA) with highest rates in cage-farmed (140%) and cage-aggregated wild fish (130%) compared to the wild populations of axillary seabream from distant area (99%), even though wild fish contained higher levels of polyunsaturated fatty acids (PUFA; 36.47 g/100 g lipid) compared to the cage-aggregated (30.16 g/100 g lipid) or farm-raised fish (29.20 g/100 g lipid). Some studies have reported that most consumers have indicated indifference between farmed and wild fishes while those with low preference for farmed fish dislike of its 'mud taste' and also felt that cultured fish were produced with genetically modified feed ingredients or chemicals like growth hormones and pesticides (Githukia *et al.*, 2014; Obiero *et al.*, 2014).

Food purchasing decisions are affected by a series of factors, including cultural, psychological, lifestyles, culinary trends and diet restrictions (Polanco and Luna, 2010). The main factors influencing consumer purchasing behavior of fish in this study included size (2.38), price (2.36), social status (2.26) and overall quality (2.31). The findings concur with those of Ahmed *et al.*, (2011) who studied the determinants of fresh fish purchasing behavior among Malaysian consumers and found that 68.6% of the respondents reported price to be the most important factor, 67.8% indicated quality of fish, 44.1% alluded to taste while 41.6% agreed that nutritional value is the most important factors when purchasing fish. Most consumers reported that due to recent economic hardships in the study area the price of fish is the main constraint especially when compared to other sources of meat. That notwithstanding, consumers were aware of the health benefits of eating fish and thus the quality, nutritional value and healthiness were regarded as very important factors. This study also showed that about 86.09% and 78.26% agreed that price and quality, respectively influenced purchasing behavior of consumers. Githukia *et al.* (2014) reported that the main factors influencing consumer purchasing behavior of Nile tilapia were price, overall quality standards, nutritional value, healthiness, taste, availability, fresh whole fish, size, and wild caught.

RECOMMENDATIONS

The study showed slight preference for wild fish over farmed fish and is important that the general public is educated about the safety, healthiness and nutritional value of farmed fish and other aquaculture products in general. I recommend further study on this in the other parts of the state and the nutritive quality and contribution of wild -and farmed-fish to affirm their similarity since taste was not a significant reason for choosing wild over farmed-fish.

REFERENCES

- Augood C, Chakravarthy U, Young I, Vioque J, de Jong and Bentham G. (2008). Oily fish consumption, dietary docosahexaenoic acid and eicosapentaenoic acid intakes, and associations with neovascular age-related macular degeneration. *The American Journal of clinical nutrition*, 88, 2, 398-406.
- Batzios C, Angelidis P, Papapanagiotou EP, Moutopoulos DK, Anastasiadou C, Chrisopolitou V (2004). Greek consumer's image of the cultured mussel market. *Aquacult Int* 12:239–257
- Cahu C, Salen P, de Lorgeril M. (2004). Farmed and wild fish in the prevention of cardiovascular diseases: assessing possible differences in lipid nutritional values. *Nutr Metab Cardiovas* 14:34–41
- Cai J. (2017). Aquaculture growth potential: projections from short-term projection of fish demand. *FAO Fisheries and Aquaculture Newsletter*, 57: 48.
- Claret A, Guerrero L, Gines R., Grau A, Hernandez M D, Aguirre E, Peleteiro JB, Fernandez-Pato C and Rodriguez-Rodriguez C. (2014). Consumer beliefs regarding farmed versus wild fish. *Appetite*, 79, 25-31.
- Cochrane K, De Young C, Soto D and Bahri T eds. (2009). Climate change implications for fisheries and aquaculture: overview of current scientific knowledge. *FAO Fisheries and Aquaculture Technical Paper No. 530*. Rome, FAO.
- Darko FA (2011). Consumer preference for farmed fish in Ghana and Kenya: Opportunities for domestic demand-driven aquaculture. M.Sc. Thesis, Purdue University, West Lafayette, Indiana, August, 177p.
- Erickson MC, Bulgarelil MA, Resurreccion AVA, Vendetti RA, Gates KA (2007). Consumer differentiation, acceptance, and demographic patterns to consumption of six varieties of shrimp. *J. Aquat. Food Prod. Tech.* 15 (4): 35-51
- FAO. (2007). Aquaculture development: Health management for the responsible movement of live aquatic animals. *FAO Technical Guidelines for Responsible Fisheries No. 5, Suppl. 2*. Rome.
- FAO. (2013). Food and Agriculture Organization of the United Nations for a world without hunger. Fisheries and Aquaculture Department.
- FAO. (2014). The Value of African Fisheries; Fisheries and Aquaculture Circular No. 1093; Food and Agricultural Organization: Rome, Italy, 2014.
- FAO. (2014). The State of World Fisheries and Aquaculture. Rome. 223 pp.
- FAO. (2016). The State of World Fisheries and Aquaculture 2016. Contributing to Food Security and Nutrition for all. Rome.
- FAO. (2016). The State of World Fisheries and Aquaculture 2016. Rome.
- FAO. (2018). The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals. Rome.
- Fishery Committee for the West Central Gulf of Guinea, (2016). Nigeria Fishery Statistics – 2016 Summary Report. <http://www.fcwc-fish.org/fisheries/statistics/nigeria/901-nigeria-fishery-statistics-2016-summary-report>. Accessed on 20th August, 2016.
- Franz A, and Nowak B. (2010): Functional food consumption in Germany: A lifestyle segmentation study, Discussion Papers, Nr. 1003
- Githukia CM, Obiero KO, Manyala JO, Ngugi CC and Quagrainie KK (2014). Consumer Perceptions and Preferences of Wild and Farmed Nile Tilapia (*Oreochromis niloticus* L.) and African Catfish (*Clarias gariepinus* Burchell 1822) in Urban Centres in Kenya
- Grunert KG, Brunso K, and Bisp S. (1993). Food-related life style: Development of a cross-culturally valid instrument for market surveillance. MAPP working paper no 12, October 1993 Available on <http://pure.au.dk/portal/files/88/wp12.pdf>. Pristupljeno 23.03.2015
- Hasan MR. (2017). Keynote presentation: Status of world aquaculture and global aquafeed requirement with special notes on *Artemia*. In *Report of the FAO Expert Workshop on Sustainable Use and Management of Artemia Resources in Asia*, Appendix 4, pp. 16–17. Tianjin, China, 7–9 November 2016. FAO Fisheries and Aquaculture Report No. 1198. Rome, FAO.
- Jonson A, Finnbogadottir GA, Porkelsson G, Magnusson H, Reykdal O. and Arason S. (2007). Dried fish as health food: Report. Matis food Research, innovation and safety, 1 – 6.
- Kaimakoudi E, Polymeros K, Schinaraki MG, Batzios C. (2013). Consumers' attitudes towards fisheries products. *Procedia Technology*, 8, 90–96.
- Kaiser M. and Stead SM. (2002) Uncertainties and values in European aquaculture: communication, management and policy issues in times of “changing public perceptions”. *Aquacult Int* 10:469–490
- Kinnucan H, Nelson R and Hiariey J. (1993). United State. Preferences for Fish and Seafood: An Evoked Set Analysis. *Mar. Resour.Econ.* 8: 273-91.
- Kole APW. (2003). Consumer opinions towards farmed fish, accounting for relevance and individual knowledge. In: Luten JB, Oehlenschlaeger J, O' lafsdottir G (eds) *Quality of fish from catch to consume Labelling, monitoring and traceability*. Wageningen Academic Publishers, Wageningen, pp 393–400
- Luten J, Kole A, Schelvis R, Veldman M, Heide M, Carleho M and Akse L. (2002) Evaluation of wild cod versus wild

- caught, farmed raised cod from Norway by Dutch consumers. *Konom Fiskeriforsk* 12:44–60
- Obiero KO, Opiyo MA, Yongo E, Kyule D, Githukia CM, Munguti JM, Charo-Karisa H (2014). Consumer preference and marketing of farmed Nile Tilapia (*Oreochromis niloticus*) and African Catfish (*Clarias gariepinus*) in Kenya: Case Study of Kirinyaga and Vihiga Counties. *Int. J. Fish. Aquat. Stud.* 1 (5): 67-76.
- Ogundari K, Ojo SO. (2009). An Examination of Income Generation Potential of Aquaculture Farms in Alleviating Household Poverty: Estimating and Policy Implications for Nigeria. *Turkish Journal Fisheries and Aquatic Sciences* 9, 39-45.
- Oyinbo O, Rekwot GZ. (2013). Fishery production and economic growth in Nigeria: Pathway for sustainable economic development. *J. Sustain. Dev. Afr.* 5(2).
- Oztekin A, Yigit M, Kizilkaya B, Ucyol N, Yilmaz S, Tan E, Bulut M, Ergün S, Ayaz A, 2018. Fatty Acid Profiles in Wild Axillary Seabream (*Pagellus acarne*) versus Cage-Aggregated and Cage-Farmed Fish with Reference to Nutritional Contribution for Human Consumers. *Aquaculture Studies* 18(2) 103-112.
- Rajani N. (2010). Values, attitudes and intention to consume wild fish versus farmed fish in Nha Trang. Master Thesis in Fisheries and Aquaculture. Management and Economics. The Norwegian College of Fishery Science. University of Tromso, Norway & Nha Trang University, Vietnam.
- Ruxton CH, Reed SC, Simpson MJ, Millington KJ (2004). The health benefits of omega-3 polyunsaturated fatty acids: a review of the evidence. *J Hum Nutr Diet* 17:449–459
- Schlag KA, Ystgaard K. (2013): Europeans and aquaculture: perceived differences between wild and farmed fish. *British Food Journal*, 115, 2, 209-222.
- Sidhu KS (2003). Health benefits and potential risks related to consumption of fish or fish oil. *Regul Toxicol Pharmacol* 38:336–344
- Smith W, Mitchell P., Leeder, R. S. (2000): Dietary fat and fish intake and age-related maculopathy. *Arch ophthalmol*, 118, 3, 401-404.
- Tomić, M., Lucević, Z., Tomljanović, T, Matulić, D. (2017). Wild-caught versus farmed fish – consumer perception. *Croatian Journal of Fisheries*, 2017, 75, 41-50
- Uchida, H., Onozaka, Y., Morita, T., Managi, S. (2014): Demand for ecolabeled seafood in the Japanese market: a conjoint analysis of the impact of information and interaction with other labels. *Food Policy*, 44, 68–76.
- Verbeke W, Brunso K (2006). Consumer awareness, perceptions and behaviour towards farmed versus wild fish, in “The economics of aquaculture with respect to Fisheries”, 237-251.
- Verbeke W, Sioen I, Brunso K, De Henauw S, Van Camp J. (2007). Consumer perception versus scientific evidence of farmed and wild fish: exploratory insights from Belgium. *Aquaculture International*, 15, 2, 121-136.
- Verbeke W, Vackier I (2005) Individual determinants of fish consumption: application of the theory of planned behaviour. *Appetite* 44:67–82
- Verbeke W, Vackier I. (2004) Profile and effects of consumer involvement in fresh meat, *Meat Science*, 67, 159– 168.
- Verbeke W, Vermeir I, Brunso K (2007). Consumer evaluation of fish quality as basis for fish market. *Food Quality and Preference*, 18, 4, 651-661.

Accepted 29 July 2019

Citation: Okey, IB (2019). Consumer Preferences for Wild and Farmed Fish in Different Urban Communities of Central Cross River, Nigeria. *Journal of Fisheries and Aquaculture Research*, 4(1): 016-023.



Copyright: © 2019 Okey, IB. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are cited.