Assessment of Consumer Preferences for Boiled, Smoked, and Barbecued Catfish (*Clarias gariepinus*) in Awka, Anambra State, Nigeria

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ABSTRACT

Acceptability of smoked, boiled and barbecued catfish by consumers are dependent on numerous factors. Consumer acceptability study allows industries to tailor the supply towards the preference of consumers so that market could be optimized for their turn-over and profits. This study investigated consumer acceptability of boiled, smoked and barbecued African catfish in Awka, Anambra state, Nigeria. A total of 70 questionnaires were administered adopting multi-stage techniques to elicit information from the respondents about socio-economic characteristics of respondents, determinants of consumer preference, forms of fish consumed, The obtained data were subjected to descriptive and inferential statistical analysis. The results showed that majority of the respondents in the study preferred barbecued catfish (47.15) irrespective of their socio-economic profile when compared to smoked catfish (40.0%) and boiled catfish (12.9%).It is recommended that efforts from government, private sectors and fish folks should be put into subsidizing the production inputs of catfish as this will in turn reduce price of catfish and encourage increased regular consumption of catfish.

INTRODUCTION

Fish and fishery products play an important role in food and nutritional security around the world. Fish has been an important dietary source of protein and other nutrients throughout human history. Moreover, fish has little or no religious rejection which gives it an advantage over pork and beef (Akinola *et al*., 2016). Beside from being very nutritious, the protein in fish is said to be very easy to digest. Fish fiber is shorter than those in beef and chicken (Angelina, 2019). This makes fish meat easily cooked and digested in the body, especially for the children. The content of saturated fat and cholesterol in fish is very low compared to chicken or beef. Saturated fat has been said to increase chances of getting heart diseases. Nigeria is the world's largest producer of catfish, one of the most commercially important freshwater fish species in Africa (Agupusi, 2022). The FAO statistics showed that the country's aquaculture production grew from 22,000 tonnes in 1999 to over 300,000 in 2017. According to Okechukwu (2022), the Federal Government of Nigeria announced that the number of Nigerians engaged in primary and secondary fish production across the country is over 10 million. Okechukwu (2022) further said that Nigeria's total demand for fish in general is 3.6 million tonnes annually, while we are producing 1.1 million tonnes from all sources (artisanal, aquaculture and industrial sectors), leaving 2.5 million tonnes of deficit.

The catfish (*Clarias gariepinus*) is a remarkable fish species in Nigeria, where it is the leading aquatic crop (Megbowon *et al*, 2014*)* . It has the credentials of fast growth, resistance to disease and handling stress. Catfish can be preserved, processed and consumed in different ways ranging from smoking, freezing, canning, barbecuing, frying, filleting etc. In Nigeria, frozen fish, smoked catfish and catfish barbecue are most popular.

Smoking is one of the oldest methods of fish preservation developed in prehistoric period. In recent times smoking is used as a method of preservation with the incorporation of smoke flavour and development of colour. Dipanjan *et al.* (2017) states that in under-developed countries this method is used as a means of preservation only, while in developed countries this method is used to impart smoke flavour to the product since in these countries there are other sophisticated means of preservation of fish. Smoking is a method of preservation effected by the combination of drying, deposition of naturally produced chemicals resulting from thermal breakdown of wood and salting (Dipanjan *et al*, 2017). All these three factors help in preservation of fish. Smoked fish is ready to eat and has great demand in western sophisticated markets. Smoking is also used as an intermediary step in the preservation of canned smoked fish. Here before canning, fish is smoked to impart smoky flavour. Smoke is a good preservative since it contains bacteriocidal and antioxidant properties. According to Marit (2023), the composition of omega-3 fatty acids calculated as a percentage of the total lipids [fats] does not change during the smoking process. Around 2% of the total world catch is used for preparing smoked fish all over the world.Barbecue fish refers to any type of fish cooked over high heat on a wood pellet, gas, charcoal, or electric grill (Beverly, 2022). Grillers often coat fish with barbecue sauce towards the end of its cook time to infuse it with extra smoky flavor. Grilling can be used to enhance the value of fish to produce barbecued fish which is a recent delicacy in the study area.

Catfish (*Clarias gariepinus*) so far has being the most available species in Nigeria that suits the tropical region for culture in aquatic environment and is also a cheap and the most acceptable animal protein to the common man. It provides upto 40% of animal protein consumed by an average Nigerian (FOS, 1990: Fegbenro, 2014). Due to its wide spread availability in Nigeria, different forms and ways of consuming, preservation and processing of this catfish has been developed. The citizens of Awka, Anambra state is faced with three choices; either they preferred consuming the boiled *Clarias gariepinus*, the barbecued *Clarias gariepinus* or the smoked *Clarias gariepinus*. The preference of each individual depends on a number of factors which includes but no limited to: family use, knowledge of Agriculture, general educational level, income, age, occupation etc.

The evaluation of consumers` preference for fresh, smoked or barbecued catfish product can be used for production planning and distribution of fish across the country (Adeniyi, 2020). This work looks into the functional relationship between the type of fish consumers chooses to consume based on some selected variables which will reflect the socio-economic status of the residents of Anambra state, thereby furnishing fisheries experts, Agricultural firms, those responsible for the allocation of Agricultural and Aquacultural utilities in the government, sociologists and even economists with information useful to their work.The main aim of this study is to evaluate the consumers preference on fresh, barbecued and smoke dried catfish (*Clarias gariepinus*) products in Awka, Anambra state.

MATERIALS AND METHOD

Description of Area of Study

Awka is the capital of Anambra state, Nigeria. It coordinates: Latitude 6.2220ºN and Longitude 7.0821ºE, with an estimated population of 2.5 million as of a 2018 estimate. The city is located at 199.1 kilometres (123.7 mi), by road, directly north of Port Harcourt in the center of the densely-populated igbo heartland in South-East Nigeria.The major farm produce dominated in Awka is the food crops such as Cassava, Yam, Plantain, Maize and varieties of fruit. The citizens of Awka also engage in Fish farming and livestock farming.

Methodology Survey

Questionnaires were the major tool for the survey, which were designed to capture and record responses to specific questions on consumers` preference for fresh, smoked and barbequed catfish. The surveys were carried out in Awka, Anambra state, Nigeria.

Sampling Procedures and Data Collection

The study was conducted in Awka, Anambra state of Nigeria. The population of the study involved catfish consumers of different status in Awka metropolis. The primary data were collected using structured questionnaires, which were administered by random selection of respondent across the study area.

Data Analysis

The data collected were analyzed using both descriptive and inferential (Chi square) statistics. The descriptive statistics used include: percentages and frequencies of distribution to show the socio-economic profile of respondents in the study area. Bar charts were used to show respondents perception on general catfish consumption. The inferential statistics used was Chi-square test of Association to find out the relationship that exists between the choice of African catfish consumed by consumers and various socio-economic attributes in Awka, Anambra state. All the analysis was conducted using SPSS version 23.

RESULTS

The frequency table for sex of the respondents in the study area are presented in Table 1.This descriptive analysis showed that the response of 29 males (41.4%) and 41 females (58.6%) were samples in this research with females forming majority of the respondents. For the age of the respondents (Table 1), respondents within the ages of 20 -29 years dominates in this sample with a total number of 35 respondent and a percentage score of 50.0%. There are 9 respondents within the ages below 20 years (12.9%); 15 respondents within the ages of 30-39 years (21.4%); 6 respondents within the ages of 40-49 years (8.6%) and 5 respondents within the ages of 50 and above (7.1%). The marital status of the respondents as presented in Table 1 revealed that majority of the respondents for this research are the single group with a total number of 43, with percentage score of (61.4%). The total number of respondents who are married are 25 in number (35.7%) while the total number of respondents who are divorced and widowed is 1 each and having a percentage score of (1.4%) each. The household size of the respondents are presented in Table 1. The results indicated that the household size that are below 4 are 26 in number (37.1%), while those on 5-8 are 41 in number (58.6%); those on 9-12 are 3 in number (4.3%).

The income range of the respondents are presented in Table 1.Total number of respondents with the income range below ₦10,000 is 6 with a percentage score of (8.6%). Respondents with income range within ₦10,000 -₦ 50,000 dominates with a total of 32 (45.7%) while those within ₦50,000 - ₦150,000 are 12 in number (17.1%); those within ₦150,000 -₦ 250,000 are 9 in number (12.9%); those within ₦250,000 - ₦400,000 are 8 in number (11.4%) and lastly, those with income range above ₦ 400,000 are 3 in number (4.3%).The educational level of the respondents are presented in Table 1. The respondents that fall within B.Sc/HND category has the highest occurrence in this sample with a total count of 39 and a percentage score of 55.7%. Respondents within FSLC category are 3 in number (4.3%); within SSCE/Equivalent category are 16 in number (22.9%) within NCE/OND category are 5 in number (7.1%) while respondents within M.Sc/PhD and above category are 7 in number (10.0%). All respondents with a total number of 70 (100%) are Christians in the study area (Table 1).The frequency for the forms of African catfish preferred by respondents are presented in Table 2, the respondents (12.9%) prefer consuming boiled catfish, while 28 respondents (40.0%) prefer consuming smoked catfish and 33 respondents (47.1%) prefer consuming barbecued catfish. The result shows that the major reason for choosing the different forms of African catfish is taste, with a total response of 57 (81.4%). Those that chose cheap are 3 in number (4.3%) while respondents that chose how it looks and availability are 5 each (7.1%). The rate of catfish consumption in the study area is shown in Table 2, from the results, majority (48.57%) of the respondents consumed catfish on a regular basis, followed by those that consumed occasionally (30.0%) and those who rarely consume fish (18.57%), while those who are indifferent to fish consumption had 2.86%. The challenges affecting catfish consumption by the respondents in the study area are presented in Table 2. Price of the fish (50.0%) and income of the respondents (28.57%) were the major constraints affecting catfish consumption by the respondents in the study area.

Table 1: Socioeconomic Characteristics of Respondents in the study Area

Attributes	**Frequency**	**Percent (%)**
Sex		
Male	29	41.4
Female	41	58.6
Total	70	100.0
Age		
Below 20	9	12.9
20 - 29	35	50.0
30 - 39	15	21.4
40 - 49	6	8.6
50 and Above	5	7.1
Total	70	100.0
Marital Status		
Married	25	35.7
Single	43	61.4
Divorced	1	1.4
Widowed	1	1.4
Total	70	100.0
Family Size		
Below 4	26	37.1
5 - 8	41	58.6
9 - 12	3	4.3
Total	70	100.0
Educational Level		
FSLC	3	4.3
SSCE/Equivalent	16	22.9
NCE/OND	5	7.1
B.Sc/HND	39	55.7
M.Sc/PhD and above	7	10.0
Total	70	100.0
Income Range		
Below ₦10,000	6	8.6
₦10,000 -₦ 50,000	32	45.7
₦50,000 - ₦150,000	12	17.1
₦150,000 -₦ 250,000	9	12.9
₦250,000 - ₦400,000	8	11.4
Above ₦ 400,000	3	4.3
Total	70	100.0
Religion		
Christianity	70	100.0
Islam	0	0.00
Traditional	0	0.00
Total	70	100.0

Source: Field Survey, (2023)

Table 2: Preferrence, Rate and Challenges of Catfish Consumption

	Response	Frequency	Percent (%)
African Catfish Preference by Respondents in the Study Area	Boiled Catfish	9	12.9
	Smoked Catfish	28	40.0
	Barbecued Catfish	33	47.1
	Total	70	100.0
Reason for Preferred Catfish by Respondents	Cheap	3	4.3
	Taste	57	81.4
	How it looks	5	7.1
	Availability	5	7.1
	Total	70	100.0
Rate of Catfish Consumption by Respondents	Regularly	34	48.57
	Occasionally	21	30.00
	Rarely	13	18.57
	Indifferent	2	2.86
	Total	70	100.0
Challenges Affecting Catfish Consumption by Respondents	Income	20	28.57
	Price	35	50.00
	Availability	5	7.14
	Hygiene	10	14.28
	Religion	0	0.00
	Traditional belief	0	0.00
	Total	70	100.0

Source: Field Survey, (2023)

DISCUSSION

It was reported that socio-economic factors such as educational level, household size and the number of household members working, price of the commodity, occupation, age and expenditure on other food and non-food items could influence household consumption behaviour (Adeniyi *et al*., 2012; Adeleke *et al*., 2020). This result is similar to the report that the size of households, gender, taste and the nutritional value of fish significantly influenced the purchasing behaviour of people among Malaysian consumers (FarahAhmed *et al.,* 2011). Family size had been identified as one factor affecting the preference and consumption of fish products (Sari and Muflikhati, 2018). In this study, the females prefer barbecued catfish. This can be attributed to the delight females attach to food, cravings and higher nutrient requirement by a female (Sandra, 2021). A percentage total of 50.0% of the respondents are around the ages of 20-29. This may be due to easier co-operation when it has to do with response. Respondents who are below 20 and within the ages of 20-29 are observed to prefer barbecued catfish. This can be attributed to the fact that barbecued catfish is a more recent form of fish processing as opposed to smoked and boiled catfish which have been practiced for ages in Nigeria (Chukwuemeka, 2019). This supports the indication that respondents within ages of 30 and above would readily prefer smoked catfish. Although, respondent within the ages of 30-39 has slightly varying preference for the three catfish forms. Canm *et al.* (2015) observed that age group had significant influence on catfish consumption preference.

Marital state have been reported to influence catfish consumption as seen in this study. According to Idris *et al,* (2018), the married group would experience increased purchases and increased consumption due to household expansion and greater responsibility, therefore, smoked fish which is mostly used to prepare soup and other food comes first in scale of preference. Income of respondents appears to have no association with choice of catfish to consume (p=.363). This result is in support of the report of Musa and Ala (2013), that respondents consume any form of catfish of their choice regardless of their income. The majority of the respondents preferred barbecue catfish in the study area. What majority of the respondents liked about the fish was its taste. Taste, health benefits, nutrition, price and availability are identified factors guiding consumption behaviour (Kumar *et al*., 2008). Fish quality such as taste, health benefits, nutrition, price and availability are factors that could influence consumers' preferences (Dalhatu and Ala, 2011, Kumar *et al.,* 2008). Price of the fish and income of the respondents were the major constraints affecting catfish

consumption by the respondents in the study area. This results agrees with the findings of Adeniyi *et al*. (2012), who observed similar results among households in Ibadan North Local Government Area of Oyo State, Nigeria.

CONCLUSION AND RECOMMENDATIONS

Fish consumption is influenced by many factors and these factors mainly determine the consumers` acceptability for catfish. This study indicates that most of the respondents preferred barbecued catfish with a good number also having a preference for smoked catfish. Majority of the respondents agreed that taste is the main reason for making their preferencesS. Price and income level were agreed by the respondents to be a challenge to regular consumption of processed catfish. Based on the findings of this study, it is recommended that more effort should be made to maintain or improve on the taste of different forms of processed catfish as it largely determines how consumers consumes such form of processed catfish. Awareness measures should be taken to educate the populace about the nutritive components of various forms of processed catfish. Also, efforts from government, private sectors and fisher folks should be put into subsidizing the production inputs of catfish as this will in turn reduce price of catfish and encourage increased regular consumption of processed catfish.

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