



Consumer's Acceptability of Fresh and Smoked Catfish in Ogun State, Nigeria

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Abstract

This study investigated the consumer's acceptability of fresh and smoked catfish in Abeokuta Ogun, State. The study has three specific objectives, which include assessing the demographic characteristics of consumers, determining the consumer's consumption perception and to determine the consumer's choice of acceptability on fresh and smoked catfish. The study employed a multi-stage sampling method in randomizing a total population size of one hundred (100) respondents for this study. Data were analyzed using descriptive and inferential statistics. Majority (76%) of the respondents were female, with an age range of 14–52 years. The mean age was 35.8 years, this showed that youth consume catfish a lot in the study. However, the results of the t-test mean comparison indicate that there is a significant difference between the mean preferability score of smoked catfish and fresh catfish. The t-value for smoked catfish (56.973) and fresh catfish (52.169) are both much higher than the critical value of 1.96. Additionally, the p-value for both tests is less than 0.05, indicating that the difference in means is statistically significant. The mean difference for smoked catfish (13.78) is higher than the mean difference for fresh catfish (10.15), which suggests that consumers have a stronger preference for smoked catfish. More so, these results suggest that there are significant differences in consumer preferences between smoked catfish and fresh catfish, with smoked catfish being the more preferred option.

Keywords: Abeokuta, catfish, nutrition, preference, palatability.

Introduction

The consumption of fish plays a vital role in supporting the well-being and survival of numerous individuals worldwide. Fish is recognized as a valuable source of essential nutrients such as protein, lipids, vitamins, and minerals (Tsado *et al.*, 2012). It is renowned for its efficiency in converting food into consumable resources for humans, contributing to its nutritional value and protection against ailments like Kwashiorkor. In contrast to meat, fish is relatively more affordable and easily accessible, enabling the provision of quality protein to underprivileged populations in many developing countries, including Nigeria (Akinbode and Dipeolu, 2012). Fish serves as a primary food source for a significant portion of people, particularly in developing nations, and contributes substantially to their protein intake. Unlike beef, chicken, and mutton, fish is less tough and more easily digestible. Additionally, it encounters minimal religious opposition, giving it an advantage over pork and beef (Kumolu and Ndimiele, 2011). The African catfish, *Clarias gariepinus*, possesses remarkable

characteristics that make it a fascinating species. It displays exceptional hardiness and can thrive in adverse environmental conditions and unstable habitats. Fish demonstrates resilience against diseases and has the ability to consume various types of biowastes. It efficiently utilizes both animal and plant proteins. Furthermore, under natural conditions, this fish exhibits rapid growth. Farmers are attracted to its predatory nature, cannibalistic tendencies, and voracious feeding habits, which encourage its cultivation in freshwater bodies. Additionally, the fish's fast growth rate and relatively high market price entice farmers to engage in its cultivation.

Over the years, capture fishery production has remained steady at approximately 90 million tonnes per year, while aquaculture has consistently exhibited substantial growth, surpassing all other food sectors (FAO 2012, FAO 2013, and FAO 2014). In 2011, aquaculture production reached 62.7 million tonnes. Although adopting better management practices through an ecosystem approach may lead to some improvements in

capture fisheries, significant increases are unlikely. Nigerians have a significant appetite for fish, with a current consumption figure of about 2.0 million metric tonnes, and an annual import of approximately 700,000 metric tonnes (Okeke *et al.*, 2014).

Studying fish consumption is a valuable endeavor, not only for determining the national and local fish demand, but also for meeting the public's need for fish products. Research indicates that Nigeria's current demand for fish consumption stands at approximately 3.2 million metric tons per year. However, the country's production only amounts to 1.1 million metric tons, resulting in a significant supply gap of 2 million tons for fish and fish products (FAD 2016). Fish plays a crucial role in addressing hunger and malnutrition, serving as a rich source of proteins, healthy fats, and essential nutrients such as long-chain omega-3 fatty acids, iodine, vitamin D, and calcium. The exceptional nutritional value of fatty fish with high omega-3 content and small fish that can be consumed whole, including the skin and bones, cannot be replaced by any other food source. Prioritizing fish and its nutritional benefits, both developing countries and the developed world. In many developing nations, fish is the primary or sole source of animal protein, playing a vital role in providing essential micronutrients to vulnerable populations. Fish can also offer solutions to existing health issues. For example, often overlooked parts of the fish like the head, viscera, and backbones, which account for 30-70% of the fish, are particularly rich in micronutrients that contribute to children's neuro development. Fish consumption has increased significantly from 5.2 kg per capita in 1961 to approximately 17 kg per capita in 2009 (FAO 2012).

However, consumer preferences for catfish can vary between fresh and smoked options. Given the perishable nature of fish, various preservation methods are employed in Nigeria to extend its shelf life. These methods include freezing, drying, smoking, and others. Among these methods, smoking is the most widely used and practical approach (Eyo, 1992, 2001). This preference stems from its affordability and the enhancement of the final product's sensory properties. Both rural and urban residents adopt this method as a means of fish preservation. Moisture content of smoked fish is reduced to a level that inhibits the growth of spoilage microorganisms (Okonta *et al.*, 2005; Akinola, 2006). Also, the recent increase in the number of catfish processors in Ogun State warrants investigating consumers preference on fresh and smoked catfish.

Thus, the broad objective of this study is to evaluate the consumers' preference on fresh and smoke-dried catfish (*Clarias gariepinus*) products in Abeokuta, Ogun state. The specific objectives are as follows:

- i. To determine the socio-economic characteristics of the consumers
- ii. To determine the consumer's consumption perception.
- iii. To determine the consumer's acceptability of fresh

and smoked catfish

Methodology

Abeokuta is the state capital of Ogun State in southwest Nigeria. The state is situated on the east bank of the Ogun River, near a group of rocky outcrops in a wooded savanna. Abeokuta lies below the Olumo Rock, home to several caves and shrines. However, the town depends on the Oyan River Dam for its water supply. With the population of Abeokuta, above 500,000, a multi-stage random sampling procedure was adopted for this study. In the first stage, Abeokuta north was purposively selected out of the two Local Government Areas (LGA) in Abeokuta, because of the presence of Oyan Dam and Yemojinatural pool as an indicator of water availability for fish production. There are over 100 villages/town in Abeokuta North LGA therefore; the second stage involved a random selection of ten (10) towns/village in the selected LGA which included (Olorunda, Idi emi, Itaoshin, Lafenwa, Obada, Sangote, Sapon, Owode, Yagi, and Imala). While in the third stage, ten (10) catfish consumers were sampled from each town/village, making a total of one hundred (100) respondents sampled in all. The study used structured questionnaire and focus group discussion to elicit information on consumers' preference on fresh and smoked catfish for the study. The study analytically adapted descriptive and inferential statistics such as T-test and Pearson's Spearman moment correlation.

Results and Discussion

Socio-economic characteristics of respondents

The results in Table 1 show the socio-economic characteristics of the respondents in the study area. Majority (76%) of the respondents were female, with an age range of 14 – 52 years. The mean age was 35.8years this showed that youth consume catfish a lot in the study area; also this could be attributed to the health benefits related to fish consumption. Most (72%) of the respondents were married, showing attributes of responsibility and family care in their choice of animal-based protein. The two most prominent religions in Nigeria were well represented in the study area, while majority (74%) were Yoruba ethnic group. The respondents could be categorized as literate (well-educated) because 99.0% had post primary education. As suggested by Kevin *et al.*, (2014), education plays a crucial role in increasing consumer awareness about the health benefits associated with fish consumption, thus positively influencing consumer preferences. Educational qualification might have influenced catfish as their best choice of animal-based protein. The study also revealed that the primary occupations of the respondents were public/civil servants (49%) and trading/business/artisan (34%) while their estimated mean monthly incomes was ₦73,737.2. The findings showed that all segments of society in the southwest region of Nigeria showed interest in consuming both fresh and smoked catfish, which aligns with the findings of Adeoye *et al.*, (2016).

Consumption perception of respondents in the study area

The results presented in Table 2 revealed the consumption perception of catfish among the respondents in the study area. It was observed that majority (91%) of the respondents consume smoked catfish, the most preferred forms of consumption being pepper soup (43%) and catfish sauce (34%). These findings align with the research conducted by Adeola *et al.*, (2016), who reported that there is a high level of acceptance and consumption of smoked catfish in southwest Nigeria. Regarding receiving catfish as a gift, a larger proportion of respondents (57%) prefer fresh catfish over smoked catfish (43%). The attraction to smoked catfish is primarily due to its rich nutrient content (29%) and pleasant aroma (34%), while the appeal of fresh catfish lies in its nutritional richness (42%) and versatility in cooking (29%). The respondents consume catfish regularly, with 38% consuming it in low quantities (4-6 times per week) and 35% consuming it in high quantities (7-10 times per week). A similar study conducted in the southwest Nigeria indicated that over 80.0% of the respondents consume catfish either as fresh or smoked in the past two years due might be as a result of lifestyle changes, taste preferences, cost, or availability of the product (Adeola *et al.*, 2016).

Consumer choice on fresh and smoked catfish

Table 3 presents consumer choice on fresh and smoked catfish it was observed that more than half of the respondents reversed that smoked catfish is more nutritious, while about quarter strongly agree that smoked catfish is more nutritious while (4% and 7%) disagreed and strongly disagreed respectively that smoked catfish is more nutritious. Regarding the preferred processing methods for smoked catfish, 51% of the respondents preferred smoking kiln, while 41% preferred oven drying method. The preference for smoking kiln could be attributed to its hygiene level involved. Sun drying and charcoal pot methods were less preferred.

Consumer's acceptability of fresh and smoked catfish

Table 4 presents consumer's acceptability of fresh and smoked catfish. It was observed that it was the aroma, taste, skin condition, level of dryness, skin colour, body rigidity and affordability that majorly influenced the acceptability of smoked catfish in the study area. The most significant point influencing consumers' acceptability of fresh catfish in the study area was its natural freshness, followed by adaptability to various forms of cooking. Other attributes that impact consumer preference include skin condition, taste, body rigidity, skin color, and affordability. Overall, these findings suggest that consumers are willing to pay a premium for fresh catfish that possesses the desired attributes. These results are consistent with previous studies conducted by Adeyeye *et al.*, (2018) and Fufaet *et al.*, (2021), which also emphasized the importance of freshness as a key factor in consumer preference for fish products.

Mean comparison between fresh catfish preferability and smoked catfish preferability

The results of the t-test indicated that there is a significant difference between the mean preferability score of smoked catfish and fresh catfish. The t-value for smoked catfish and fresh catfish was 56.973 and 52.169 respectively, were both much higher than the critical value of 1.96. Additionally, the p-value for both tests is less than 0.05, indicating that the difference in means is statistically significant. The mean difference for smoked catfish (13.78) is higher than the mean difference for fresh catfish (10.15), which suggests that consumers have a stronger preference for smoked catfish. Overall, these results revealed that there is a significant difference in consumer preferences between smoked catfish and fresh catfish, with smoked catfish being the more preferred option. Thus, the hypothesis (H_1 : There is no significant difference between fresh fish and smoke fish market segment) is to be rejected.

Correlation analysis on the relationship between respondent's income and their consumption preferability

The correlation analysis reveals a weak negative correlation (-0.191) between the estimated monthly income of the respondents and their consumption preferability. The p-value of 0.058 suggests that the correlation is not statistically significant at the 0.05 level of significance. This implies that there is no significant relationship between the estimated monthly income of the respondents and their consumption preferability, contradicting the findings of Kevin *et al.*, (2014) that income commonly determine and influence consumer preferences. However, Kevin *et al.*, (2014) also noted that individuals may be compelled to purchase and consume certain food items to meet the needs of larger households, particularly in cases where income is low. In other words, the income level of the respondents does not appear to have a substantial impact on their choice between fresh and smoked catfish. Other factors such as taste, aroma, packaging, and skin condition may hold more significance in determining their preference. Thus, the null hypothesis H_0 : There is no relationship between consumer's income and the preferred choice of fish can be accepted.

Conclusion

The study indicates that there is a high level of acceptance and consumption of both fresh and smoked catfish in the study area. To capitalize on this, catfish producers and marketers should focus on enhancing product quality and meeting the specific preferences of consumers. The study reveals that smoking kiln is the preferred processing method for smoked catfish. Producers should consider investing in smoking kilns and ensuring proper smoking techniques to meet consumer preferences. Additionally, exploring alternative processing methods, such as oven drying, may attract a wider range of consumers and provide product diversification options. Freshness is a crucial attribute for consumers when selecting fresh catfish. Producers should prioritize maintaining the freshness of

their products throughout the supply chain, including proper handling, storage, and transportation. Emphasizing the nutritional richness of both fresh and smoked catfish can also be an effective marketing strategy to attract health-conscious consumers. By implementing these recommendations, catfish producers and marketers can enhance their understanding of consumer preferences, improve product quality, and develop effective marketing strategies to meet the demands of the market in Abeokuta, Ogun State.

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Table 1: Distribution of respondent's socioeconomic characteristics

Variable	Frequency	Percentage	Mean	Minimum	Maximum
Sex					
Male	24	24.0			
Female	76	76.0			
Age					
< 20	11	11			
20 – 30	32	32	35.8	14.0	52.0
31 – 40	43	43			
> 40	14	14			
Marital status					
Single	27	27.0			
Married	72	72.0			
Divorce	1	1.0			
Religion					
Christianity	58	58.0			
Islam	41	41.0			
Traditional	1	1.0			
Ethnic Background					
Yoruba	74	74.0			
Hausa	12	12.0			
Ibo	13	13.0			
Others	1	1.0			
What is your status of education					
Primary education	1	1.0			
Secondary education	24	24.0			
Tertiary education	75	75.0			
What is your primary occupation					
Public/Civil servants	49	49.0			
Trading/Business/Artisan	34	34.0			
Students	17	17.0			
Do you have any other job apart from your primary occupation					
No	47	47.0			
Yes	53	53.0			
What is your estimated monthly income					
≤ 20,000	1	1			
20,001 – 50,000	15	15	73,737.2		
50,001 – 100,000	60	60			
> 100,000	24	24			

Table 2: Consumption perception of catfish by respondents

Variable	Frequency	Percentage
Do you consume smoke catfish		
No	9	9.0
Yes	91	91.0
Preferred form of consumption		
Indifferent	1	1.0
Fried	3	3.0
Smoked catfish sauce	34	34.0
Pepper soup	43	43.0
Boiled	19	19.0
Do you consume fresh catfish		
No	4	4.0
Yes	96	96.0
Which form of catfish will you prefer as a gift		
Fresh catfish	57	57.0
smoked catfish	43	43.0
Attraction to smoked catfish		
Storage quality	18	18.0
More delicious	19	19.0
Rich source of nutrient	29	29.0
Sweet aroma	34	34.0
Attraction to fresh catfish		
Freshness	20	20.0
Rich source of nutrient	42	42.0
can easily fit in to desired form of cooking	29	29.0
Storage quality	8	8.0
Storage quality	1	1.0
How often do you consume catfish per week in quantities		
Very low(1 -3)	6	6.0
Low (4-6)	38	38.0
High (7-10)	35	35.0
High (7-10)	21	21.0

Table 3: Consumer choice on fresh and smoked catfish

Consumer choice	Frequency	Percentage
Smoked catfish is more nutritious		
I do not know	5	5.0
Disagree	4	4.0
strongly disagree	7	7.0
Agree	57	57.0
strongly agree	26	26.0
Preferred processing method		
Sun drying	5	5.0
Charcoal pot	3	3.0
Smoking kiln	51	51.0
Oven drying	41	41.0
Fresh catfish is more nutritious		
I do not know	1	1.0
Disagree	3	3.0
strongly disagree	7	7.0
Agree	28	28.0
strongly agree	61	61.0

Table 4: Consumer's acceptability of fresh and smoked catfish

Variables	No F (%)	Yes F (%)
Smoked catfish		
Aroma	7(7.0)	93(93.0)
Taste	8(8.0)	92(92.0)
Skin condition	14(14.0)	86(86.0)
Level of dryness	24(24.0)	76(76.0)
Packaging	61(61.0)	39 (39.0)
Skin colour	37(37.0)	63 (63.0)
Body rigidity	25(25.0)	75 (75.0)
Affordable	15(15.0)	85 (85.0)
Fresh catfish		
Freshness	2 (2.0)	98 (98.0)
Adaptable to various forms of cooking	7 (8.0)	93 (92.0)
Skin condition	18 (18)	82 (82.0)
Taste	15 (15.0)	76 (85.0)
Packaging	31 (69.0)	69 69.0
Skin colour	24 (24.0)	76 76.0
Body rigidity	14 (14.0)	86 86.0
Affordable	19 (19.0)	81(81.0)

Table 5: T-test means comparison between fresh catfish preferability and smoked catfish preferability

Sample	T	Significant (2- tailed)	Mean difference
Smoked cat fish	56.973	0.000	13.78
Fresh catfish	52.169	0.000	10.15

Table 6: Correlation analysis on the relationship between respondent's income and their consumption preferability

Variables	R	p value	Remark
Estimated monthly income of respondents	-0.191	0.058	Not significant