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Methods of processing and distribution employed by fish processors in Ikpoba-Okha local government area, Edo State Nigeria

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Abstract
This study was aimed at determining the methods of processing and distribution employed by fish processors in Ikpoba-Okha local Government Area, Edo State.
The study was carried out with well-structured questionnaires, which were administered to fish processors and marketers. Four major processing settlements and markets in the local government area were investigated and they are; Okha market, Uteh community, Ogheghe community and Ikpoba Hill (Army barracks) and they were purposively selected. 100 smoked fish processors were interviewed during the course of the research.
The study has shown that (73.0%) of the fish processors were female, and (72.0%) of the women were mostly married in the four areas. This research has also shown that majority of the processors about (94.8%) had primary university educations. Majority (88.0%) of the fish processors belonged to family size of 4-6 people. The research also shows that most of the processors use firewood and wood shavings as their source of energy (48.9%). (62.8%) of the processors revealed that they take their smoked fish directly to markets or consumers on a daily basis, (66.7%) of the processors revealed that they can be stored for up to a day before reaching the final consumers and majority (60.2%) of the processors stored their fish by covering up in the open. Majority (37.5%) of the respondents complained of insect and breakage problems while processing their fish. The research also reveals that majority (46.2%) of the respondent's use trays and cartons to distribute their processed fish from point of processing to where it will be consumed or marketed. While majority (66.7%) of the respondents also revealed that processed fish products can be stored for at least a day before getting to the final consumer in good condition.
The study revealed that fish processing is a profitable venture in the study area but needs economic and technological enhancement in processing, handling and storage in order to reduce postharvest losses. The study recommends that agricultural extension's arm of state should improve the network for market price information and dissemination among all participants (fishermen, processors and traders) to improve marketing efficiency, Federal Department of Fisheries should assist in subsidizing and regulating prices of raw materials required for processing and provide adequate extension personnel to educate the processors and marketers on effective practices, the state extension arm should also educate fishermen, processors and traders or marketers with techniques and methods of reducing fish loss and post-harvest losses.

Keywords: Ikpoba-Okha, fish processing, distribution, methods, fish processors

1. Introduction
Foods from the aquatic environment are a complete and unique source of both the macro and micronutrients required in a healthy diet (FAO, 2011) [18]. Fish provides nutrients and micronutrients that are essential to cognitive and physical development, especially in children, and are an important part of a healthy diet. As an affordable animal source of protein in some of the poorest countries, fish is the primary source of nutrition, creating growing demand for this staple.
In Nigeria, fish is eaten cooked, preserved or processed (Smoked) and form a much cherished delicacy that cuts across socio-economic, age, religious and educational barriers. Fish is a major protein food that requires careful handling and it is an extremely perishable commodity which begins to deteriorate as soon as it dies after it is caught (Obasohan *et al*., 2012) [26].

As a nutrient rich food, the implication is that delayed processing of fresh fish has a major impact on nutritional quality and organoleptic qualities of fish amongst other problems such as accelerating spoilage (Kapute *et al.*, 2012) [21]. Fish are nutrient rich foods but highly perishable due to its high water activity, protein content, neutral pH and presence of autolytic enzymes. This explains why fresh fish quality deteriorates rapidly if not properly stored after catch (Makawa *et al.*, 2014) [35].

If fish is not sold fresh, preservation methods should be applied to extend its shelf-life. Efficient preparation of fish is important when top quality, maximum yield and highest possible profits are to be achieved (Davies and Davies, 2009) [36]. Various factors are responsible for fish spoilage, notable among these spoilage factors are fish health status, quality of capture, the presence of parasite, bruises and wounds on the skin and the mode by which the fish was captured (Omoruyi *et al*., 2015) [29]. In Nigeria due to poor handling, about 30-50% of total catch/ harvest is wasted. Although, these large figures could be drastically minimized by the application of proper handling, processing and preservation techniques (Bate and Bendall, 2010) [37]. A central concern of the fish processor is to prevent fish from deteriorating and this remains an underlying concern during other processing operations. The processing and preservation of fresh fish is of utmost importance since fish is highly susceptible to deterioration immediately after it is harvested so as to prevent economic loss (Okonta and Ekelemu, 2005; Akinyemi *et al.*, 2011) [28].

Fish is one of the proteinous foods that needs careful handling. Studies like that of Adeyeye (2015) [7] revealed that fish is not always properly handled before, during and after processing. Lack of adequate fish handling, processing techniques and storage facilities contribute significantly to the low supply of fish to poor rural dwellers like in Ikpoba Okha Local Government Area which has high processing activities that form three quarters of the general population. Fish post-harvest losses is as high as 45% (Ayuba and Omeji, 2006) [10] due to so many factors. According to Oyelese (2006) [31], fish smoke-drying still remains the main method of fish preservation in Nigeria as over 70 percent of the catch is smoke-dried. The quality of smoke-dried fish from Nigeria has been found to be unacceptable in terms of standards set up by National and International regulatory agencies. However, there is limited information to the general public on methods of fish processing. This study is aimed at investigating the processing and distribution methods employed by fish processors in Ikpoba Okha Local Government Area so as to identify the problems associated with the different processing methods adopted by the processors in order to proffer adequate workable solutions in a way so as to reduce post-harvest losses. The study will therefore investigate the processing and distribution methods employed by fish processors in Ikpoba Okha Local Government Area of Edo State.

Materials and Methods

The area of the study is Ikpoba Okha Local Government. Ikpoba Okha Local Government area of Edo State in Nigeria is located approximately between latitude $6^{0}10'$ and $6^{0}17$ North of the equator and longitude $6^{0}09$ and $6^{0}11'$ east. It is drained by the popular Ikpoba River which acts as a reservoir and receives almost all run-off within the catchment area. The area falls within the equatorial climate (AfKoppen's climatic classification) with a double maxima rainfall in the months of July and September and short break in August often referred to as the August Break which experiences a minimum temperature of about 28 °C and maximum of 38 ^{0}C with relative humidity of over 90%.

The data for the study was collected using a well-structured questionnaire which was administered to the respondent. This was used to collect information from the 4 major areas, making a total of 100 questionnaires. The questionnaire was divided into three sections. Section A captured the socioeconomic characteristics of the respondents. Section B was to determine the level of awareness of the respondents about the various fish processing methods and various processing activities carried out by the fish processors. Section C captured the distribution methods, how long it takes to make sales of them and possible recommendations on how to reduce post-harvest losses.

Data collected were analyzed using Statistical Package for the Social Sciences (SPSS) version 23. Descriptive and inferential statistics were used to analyze the data. The descriptive statistics such as frequency and simple percentage method were used to analyze the data collected.

Results and Discussion

The findings of this study revealed that the most preferred fish product was smoked fish because its appearance, taste, availability, nature of the fish and market preference. The study shows that majority of the processors were female and that smoking is the most practiced method of preservation due to its effectiveness, easy operation, availability of raw materials, and stability of products and impartation of pleasant taste, which is most preferred by most consumers. Although there was a challenge of expensive materials for processing, the factors influencing the choice of processing technique were its ease of usage, shelf life, market preference and availability of materials. It was observed that there is a thriving profitable small-scale traditional processing, handling, storage and distribution of smoked fish business in Ikpoba-Okha local government area. From the study, it was also discovered that the channel for the distribution of smoked fish in the local government area is decentralized in the sense that the consumers can also obtain their fish directly from the producers without the involvement of the middlemen in the distribution channel. Majority of the respondents opined that care should be taken to ensure that the processing of fish is done in clean environments and it should be carried out to reduce post-harvest losses and improve food security.

Location of fish processors

Respondents in all four (4) major areas interviewed were 25% each located in Uteh community, Ikpoba Hill (Army Barracks), Okha market and Ogheghe community.

Age Distribution of Respondents

Table 1 shows that in Ikpoba-Okha local government area, major fish processors were (47.0%) which were 47 respondents in were between the ages 30-39 years. Followed by (32.0%) from 32 respondents that was between the ranges of 40-49 years. (15.0%) was from 15 respondents which were between 20-29 years. Also (6.0%) from 4 respondents were above 55 years. This research shows that majority of the fish processors are between the age range of 30-39 and the second highest, 40-49 which is in accordance with Abolagba and Chukwu (2008) [1] and Omoruyi *et al.* (2015) [29] which revealed that majority of fish processors fell between an age

range of 40 years and above. This also implies that the trade is dominated by very active individuals who have strength and experience. Studies have also shown that this category of persons is the most preferred group for granting loans by informal and formal banking institutions (Onwumere, 2008) [30].

Sex of Fish Processors

Table 1 also shows that major fish processors in Ikpoba-Okha local government area were female with (73%) from 73 while (27%) from 27 respondents were male. This confirms the findings of other authors who categorize fish processing as female business by economically active ages (Abolagba and Odiko, 2005; Lawal and Idega, 2004) [38, 39]. Abolagba and Nuntah, (2011) [3] reported that disparity in gender disposition could be accounted for by occupational emphasis which in fisheries activities apparently restricts the females to processing while the male counterpart predominates in the catch.

Marital Status of Respondents

Table 1 shows that a total of 100 respondents were interviewed in Ikpoba-Okha local government area. Majority of fish processors (67.0%) of 67 respondents were married, (20.0%) of 20 respondents were single followed by (9.0%) of 9 respondents were widows and (4.0%) from 4 respondent was a widower in Ikpoba-Okha local government area.

This result confirms the survey carried out by Abolagba and Chukwu (2008) [1], Obasohan *et al.* (2012) [26] which revealed that majority of the fish processors were married and it implies that fish processing marketing may be a business for those who have the desire to provide some financial support towards the upkeep of their families.

Educational Status of Respondents

Table 1 shows that majority of fish processors in Ikpoba-Okha Local Government Area were holders of HND or B.sc. with 14 (14.0%) while 13 (13.0%) have OND and NCE education, 40 (40.0%) have secondary education and 9 (9.0%) had junior secondary education, 19 (19.0%) had primary education and lastly 5 (5.0%) had no formal education. This result indicates that majority of fish processors in the four processing areas of the local government had secondary education followed by those who attended primary school and then, those who had graduated from higher institutions. This means that fish farming is a highly technical enterprise that requires learned farmers (Penta, *et al.*, 2013) [32]. This also indicates that fish processing is not only for people with no formal educational background but for all educational background with higher institutional graduates inclusive. The business requires technical and scientific knowledge to be carried out successfully.

Household Size of Respondents

In Table 1, Majority of fish processors (43.0%) from 43 respondents belongs to a family size between the ranges of 4-6 followed by (35.0%) from 35 respondents with family size of 7-9 while (19.0%) from 19 respondents with family size of 1-3 and another (3.0%) from 3 respondents with family size of 10-12 in Ikpoba-Okha local government area.

The result corresponds to the findings of Adeparusi *et al.*, (2003) [6] which found that majority of fish processors had between 1-5 children. The children of the fish processors also assisted in the processing of the fish.

Major Occupation of Respondents

In Table 1, 100 respondents were interviewed in Ikpoba-Okha local government area. Majority of fish processors in Ikpoba-Okha local government area with (65.0%) of 65 respondents were both fish processors and marketers, 22 respondents indicating (22.0%) were only fish processors and (13.0%) from 13 respondents were civil servants and processors.

This shows that majority of the fish processors are both marketers and processors which means processing and marketing of processed fish can be done by one person.

Duration in Fish Business

Table 1 shows Majority of fish processors in Ikpoba-Okha local government area revealing (37.0%) from 37 respondents had been into fish business for a range period of 7-9years, (27.0%) from 27 respondents had been into the business for 4-6 years while (22.0%) from 22 respondents had been into the business for a period range of 10-12 years, (8.0%) from another 8 respondents responded to only been into the business between 1-3 years and lastly (6.0%) of 5 respondents were above 12 years. This result is in agreement with Abolagba and Chukwu (2008) [1] which revealed that majority of fish processors had started this business earlier than today, which also shows that fish business is a lasting business.

Table 1: Socio-economic Status of Respondents

Respondents	Ikpoba-Okha LGA Count	Percentage (%)
Gender		
Male	27	27
Female	73	73
Age in years		
20-29	15	15.3
30-3	47	48
40-49	32	32.7
>50	4	4.1
Married Status		
Married	67	72
Single	20	21.5
Widow	5	5.4
Widower	1	1.1
Family size		
1-3	19	19.2
4-6	43	43.4
7-9	35	35.4
10-12	2	2
Educational Status		
No formal	5	5.2
Primary	19	19.8
JSCE	7	7.3
Secondary	40	51.7
OND/NCE	11	11.5
Tertiary	14	14.6
Major Occupation		
Civil servant and processing	20	21.2
Processing only	10	10.5
Marketing & processing	65	68.4
Years in Fish Business		
1-3	4	8.1
4-6	27	27.3
7-9	37	37.4
10-12	22	22.2
Above 12 years	5	5.1

Source: Field Survey, 2021

Fish Processing

Opinion on the source of fish for processing

Table 2 shows that a total of 100 respondents were interviewed in Ikpoba-Okha LGA. The result revealed that majority of fish processors in the local government area with 29 respondents (29.0%) got their fish from fish farms while 21 respondents (21.0%) bought their fish from markets and (10.0%) of the respondents got their fish from artisanal fisher folks who are also into fish processing. Majority of the respondents (35.0%) got their fish from cold rooms while only (5.0%) of respondents got their fish from both Artisanal fisher folks and fish farms.

Table 2: Source of fish for Processing

Source of fish	Ikpoba-Okha LGA Count	Percentage (%)
Fish farms	29	29.0%
Markets	21	21.0%
Artisanal fisher folks	10	10.0%
Cold rooms	35	35.0%
Both fish farms & fisher folks	5	5.0%

Source: Field Survey, 2021

Nature of the fish before processing by the respondents

Table 3 shows that majority of the processors (39.0%) from 39 respondents got their fish frozen, 23 (23.0%) got theirs live, 3 (3.0%) of respondents got theirs dead while 24 respondents (24.0%) got their fish both dead and alive. Lastly, 11 (11.0%) respondents got their fish both alive and frozen.

Table 3: Nature of fish before processing

Nature	Ikpoba-Okha LGA Count	Percentage (%)
Live	23	23.0%
Frozen	39	39.0%
Dead	3	3.0%
Alive and frozen	11	11.0%
Alive and dead	24	24.0%

Source: Field Survey, 2021

Plate 1: Frozen fish before processing

Processing duration of respondents

Table 4 shows that 36 respondents (36.0%) said it takes overnight to process their fish, (24.0%) from 24 respondents said it takes 1 day to process while 22 (22.0%) respondents said it takes 4-6 hours to process fish, 5 (5.0%) respondents said it takes 2-3 hours to process their fish, 13 (13.0%) respondents said it takes above 6 hours to process their fish.

In accordance with Abolagba and Chukwu (2008) [1] which revealed that majority of the fish processors process their fish during the morning hours, the result indicates that to completely smoke the fish for consumption by customers, one has to invest at least 4 to 6 hours of his/her time or more.

Table 4: Processing duration

Processing Duration	IKP LGA Count	Percentage (%)
2-3 hours	5	5.0%
4-6 hours	22	22.0%
Above 6hrs	13	13.0%
Overnight	36	36.0%
Full day	24	24.0%

Source: Field Survey, 2021

Method of Processing adopted by the Fish Processor

Table 5 shows the method adopted by fish farmers during processing. From the result presented, it was observed that fish processors in Ikpoba-Okha Local Government Area revealed that 100 (100%) of respondents said they smoke their fish either by the use of oil drums or ovens. This result agrees with Agbolagba and Nuntah (2011) [2], which smoking method is the most practiced processing method and it was an effective and economical technique of fish curing in Edo State due to the availability of raw materials, increased shelf life, and stability of the products and the impaction of pleasant taste and aroma that is most preferred by consumers.

Table 5: Processors' response on methods of processing

Respondents	IKP LGA Count	Percentage (%)
Smoking	100	100

Source: Field Survey, 2021.

Source of Energy Used in Fish Processing

Table 6 shows that a total of 100 respondents were interviewed in Ikpoba-Okha local government area. The result gathered also shows that majority of fish processors with (36.0%) of 36 respondents uses firewood to process their fish and (9.0%) of 9 respondents uses charcoal, 11 (11.0%) of respondent use wood shavings only and lastly, 44 (44.0%) respondents used both firewood and wood shavings. This result shows that majority of the fish processors uses firewood as their main source of energy for smoking and processing fish. This result is in agreement with Obasohan *et al.* (2012) [26] who revealed that majority of fish processors used firewood as their source of energy for smoking. This could also be attributed to the abundance of wood and high level of lumber jerking activities in the study area agreeing with survey done by Abolagba *et al.* (2012) [40].

Table 6: Respondents response to source of energy used in fish processing

Source of Energy	No Respondent	Percentage (%)
Firewood	36	36.0%
Charcoal	9	9.0%
Both Wood Shaving and Firewood	44	44.0%
Wood Shaving	11	11.0%

Source: Field Survey, 2021

Respondent's response on treatment before Smoking

In Table 8, 100 respondents were interviewed Ikpoba-Okha local government area. The result shows that majority of fish processors with (32.0%) from 32 respondents revealing that

they cure the fish by salting or gutting before smoking while 68 respondents (68.0%) said they do not treat fish before smoking. This result shows that those processors that treat their fish in all four areas of the local government use both salting and gutting methods. According to Bolorunduro *et al.*, (1998), gutting and washing of fish helps prevent bacteria of the fish before and during processing, preservation and storage. Salting delude the slime on the surface of the fish, which also in-activates the surface bacteria (Abolagba, 2006) [2].

Table 7: Respondent's response on treatment before Smoking

Respondents	Ikpoba Okah LGA Count	Percentage (%)
Yes we treat fish before smoking	32	32.0
No we do not treat fish before smoking	68	68.0

Source: Field Survey, 2021.

Preservation technology adopted by respondents

Table 9 shows that 100 respondents were interviewed in Ikpoba-Okha local government area and the result gathered shows that majority of fish processors in the local government 65 (65.0%) respondents responded to have using half drum smoking kiln, 30 (30.0%) respondents responded to using locally fabricated ovens and lastly 5 (5.0%) respondents responded to using Magbon Alade smoking kiln. This is in line with the findings of Adeyeye *et al.* (2015) [7] who revealed that majority of the processors uses half metal drum as processing equipment to smoke their fish.

Table 8: Response of respondents to the type of preservation technology adopted

Preservative technology adopted	No of Respondent	Percentage (%)
Half drum smoking kiln	65	65.0%
Locally fabricated smoking kiln	30	30.0%
Magbon Alade smoking kiln	5	5.0%

Source: Field Survey, 2021

Type of Smoking

The result in Table 10 shows that 100 (100%) respondents do hot smoking which is when the fish is fully cooked and reaches high temperatures as high as 82 °C. This result is in agreement with Obasohan *et al.*, (2012) [26] and Agbolagba and Nuntah (2011) [2] which revealed that majority of fish processors used hot smoking in processing their fish. The reason is likely because during hot smoking fish products are well cooked thus increasing shelf life.

Plate 2: Half and full drum smoking kilns in Okha market

Table 9: Type of Smoking

Types of Smoking	Ikpoba Okah LGA Count	Percentage (%)
Hot smoking	100	100
Cold Smoking	0	0

Source: Field Survey, 2021

Smoking Point for fish

The result gathered as shown in Table 11 showed that majority of fish processors with 46 (46.0%) respondents processed their fish at the market while 23 (23.0%) respondents processed from the waterside and 20 (20.0%) respondents processed at home. 4 (4.0%) of respondents smoked from the point of sales also known as smoking site and lastly (7.0%) from 7 respondents smoked their fish at the farm. This result shows majority of processors in the four areas of the local government area processed their fish at the market but early enough before sales in order to serve best fresh products to their consumers.

Table 10: Smoking point for fish

Smoking Point	No Respondent	Percentage (%)
Market	46	46.0%
Waterside	23	23.0%
Homes	20	20.0%
Farm	7	7.0%
Point of Sale	4	4.0%

Source: Field Survey, 2021

Storage period of smoked Fish by the Respondents

The result in Table 15 shows that majority of fish processors in the LGA, (57.9%) from 55 respondents stored their smoked fish products for 2-5 days before spoilage set in, 18 (18.9%) of respondents said it took 6-10 days for spoilage set in, 13 (13.7%) respondents said no spoilage before sales, 5 (5.3%) respondents said it took more than 15 days for spoilage to set in and lastly, 4 (4.2%) respondents said it required 11-14 days for spoilage to set in. This result shows that well smoked fish can last for more than 2-5 days before spoilage which indicates smoking fish can increase the shelf life of the fish. This result is in agreement with Omoruyi *et al.*, (2015) [29] which revealed that smoked fish could stay for at least 2-5 days before spoilage begins to set in.

Table 11: Storage period of smoked fish by the respondents

Storage period	No Respondent	Percentage (%)
2-5 days	55	57.9%
6-10 days	18	18.9%
No spoilage before sales	13	13.7%
11-14 days	4	4.2%
More than 15 days	5	5.3%

Source: Field Survey, 2021

Storage problem of processed fish encountered by Respondents

In Table 16, a total of 100 respondents were interviewed in Ikpoba-Okha local government area and majority of processors 36 (37.5%) encountered problems due to insect and breakage, 30 (31.3%) respondents had insects, rodents attack and breakage problem, 22 (22.9%) respondents encountered the problems of insect, rodents and mold attack plus breakage problems, (3.1%) from 3 respondents had breakage problems due to packaging only, 3 (3.1%) respondents had rodents attack, breakage and mold attack problems, (1.0%) from 1 respondent had the problem of

breakage due to packaging and mold attack and lastly, (1.0%) from 1 respondent encountered the problem of only rodents attack. This result is in agreement with Ayuba and Omeji, (2006) [10] who reported that insect infestation is the cause of prominent losses in quantity and quality of stored, smoked and dried fish in Nigeria. These losses result in the physical disintegration of stored smoked fish leading to economic losses on the curer. However, proper scaling up of storage areas, use of domestic cats as predators to ward off rodents and the application of anti-coagulant rodenticide in accordance with the manufacturer's instruction would limit losses incurred during storage of cured fish.

Table 12: Storage problems Encountered by the Respondents

Storage problems Encountered	Nο of Respondents	Percentage (%)
Insects and breakage problems	36	37.50
Insects, rodents and breakage problems	30	31.30
Insects, breakage, mold and rodent problems	22	22.90
Breakage problem due to packaging	3	3.10
Rodent, breakage and mold attack problems	3	3.10
Breakage problems and mold attack	1	1.00
Rodents attack	1	1.00

Source: Field Survey, 2021

Distribution

Method of Distribution of smoked fish by the respondents.

Figure 5 shows 100 respondents from Ikpoba-Okha local government area were interviewed and only (86.0%) responded to this question. Of all respondents, majority 36 (46.2%) respondents indicated that tray and cartons were used to distribute the processed products by carrying from point of smoking to point of sales, 21 (26.9%) respondents used baskets to distribute from point of smoking to point of sales, 17 (21.8%) respondents used distribution vans to distribute their products from point of smoking to point of sales, 2 (2.6%) respondents indicated that they used wheelbarrows to distribute their fish products and lastly, 2 (2.6%) respondents said they used bowls to distribute smoked fish products to consumers. This result shows that baskets are still being used to distribute fish products and it is at a higher rate than distribution vans which agrees with Kings (2001) [23] who reported that distribution of smoked fish in Nigeria was largely by road transportation.

Plate 3: Distribution on trays and baskets to consumers

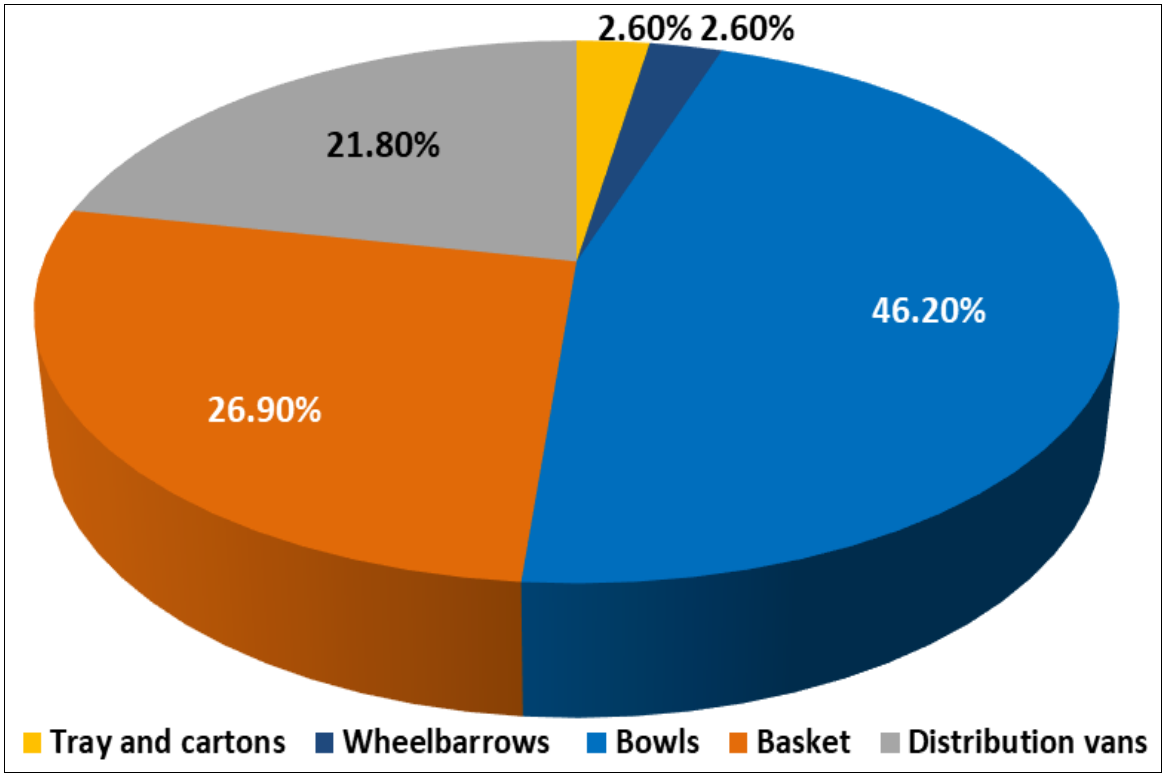

Fig 5: Pie chart showing the methods of distribution of smoked fish by respondents.

Respondents opinion on the season with the highest sales

In Table 23, a total of 100 respondents were interviewed in Ikpoba-Okha local government area. The result gathered shows that majority of fish processors 43(45.3%) respondents were of the opinion of selling their fish the month between October-December while 32(33.7%) respondents made sales more around January-March while (12.6%) from 12 respondents said they make their highest sales around July-September and lastly (8.4%) from 8 respondents make their highest sales between April-June. This result is in agreement with Omoruyi *et al.,* (2015) [29] which revealed that majority of processors make highest sales in dry season which is between October-December and January to March. Though fishing is done on a continuous basis, a noticeable and significant bumper harvest occurs from July to September every year. Hence, to ensure the availability of fish throughout the year, especially during the lean season, it is essential to process the fish to preserve it in appreciable quantities in good condition until its use is required. This result also goes to show that majority of the fish processors make highest sales during festive periods.

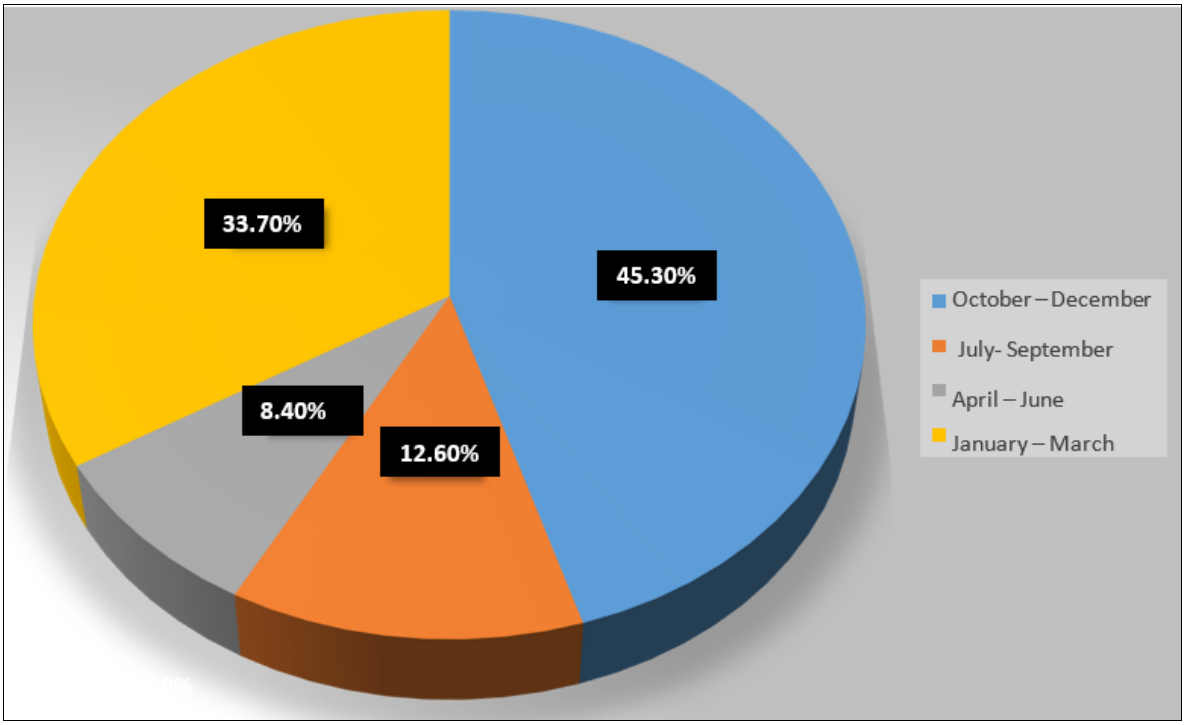

Fig 10: Pie chart showing respondents' opinion on the Season with the highest sales**.**

Conclusion

The findings of this study revealed that the most preferred fish product was smoked fish because its appearance, taste, availability, nature of the fish and market preference. The study shows that majority of the processors were female and that smoking is the most practiced method of preservation due to its effectiveness, easy operation, availability of raw materials, and stability of products and impartation of pleasant taste, which is most preferred by most consumers. Although there was a challenge of expensive materials for processing, the factors influencing the choice of processing technique were its ease of usage, shelf life, market preference and availability of materials. It was observed that there is a thriving profitable small-scale traditional processing, handling, storage and distribution of smoked fish business in Ikpoba-Okha local government area. From the study, it was also discovered that the channel for the distribution of smoked fish in the local government area is decentralized in the sense that the consumers can also obtain their fish directly from the producers without the involvement of the middlemen in the distribution channel.

Majority of the respondents opined that care should be taken to ensure that the processing of fish is done in clean environments and it should be carried out to reduce post-harvest losses and improve food security.

Fish processing is a thriving small scale venture, entailing traditional distribution, handling and storage procedures. Hence, the venture needs economic and technological enhancements, in processing, handling and storage of fish as a way of value addition with the aim of reducing post-harvest losses and increasing food security.

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