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Comparative analyses of fish processing, marketing and distribution in Warri-South and sapele local government areas of Delta state, Nigeria

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Abstract
This study was carried out to analyze the processing and distribution of smoked fish in Warri-South and Sapele Local Government Areas of Delta State, Nigeria. A purposive sampling was used to select the two local government areas because of the presence of high fishing activities in the areas and random sampling method was also used to select two markets each in the both Local Government Areas. 80 smoked fish processors were surveyed for this study. The study was conducted with the aid of well-structured questionnaires which were administered to 80 processors only. The results showed that the smoked fish processors in both local government areas were dominated with women who were married with little or no formal education. It was further observed that majority of the fish processors were Christians with 4–6 children and sourced their finance from their personal savings from other business. The survey also revealed that the fish processors had been in business for more than 12 years, sourced their fish for smoking from either fishermen and women or cold rooms and used full metal oil drum to smoke dry fish with firewood as their major source of energy. It was also seen that they processed their fish at home during the day and had difficulty to control smoke and heat with insect infestation as the major storage problem. They packaged their fish in baskets, used public transport as their means of transportation and preserved their smoked fish by re-smoking them. Finally, the study revealed the existence of a thriving profitable small-scale traditional smoked fish processing and distribution business in the study areas.

Keywords: Smoked fish, spoilage, fish processing, packaging, shelf life and distribution

1. Introduction
Fish is one of the most important sources of animal protein available in the tropic and it is widely accepted as a good source of protein and other vital nutrients for the maintenance of a healthy living (Andrew, 2001) [15] 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 (Adedayo *et al.,* 2008) [11]. Fish is however an extremely perishable commodity which begins to deteriorate as soon as it dies or is caught (Obasohan *et al.,* 2012) [31]. Immediately fish dies, it remains in first class quality state only for a short while (Clucas and Ward, 1996). Various factors are responsible for fish spoilage, notable among these spoilage factors are fish health status, the presence of parasite, bruises and wounds on the skin and the mode by which the fish was captured (Omoruyi *et al.,* 2015) [34]. Ayuba and Omeji (2006) [18] have reported that the insect infestation is the cause of most prominent losses in quality and quantity of stored, dried fish in Nigeria. 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) [32]. The long distance of distribution necessitates some processing and storage since preservation through refrigeration is not readily available (Agbon *et al*., 2002) [14]. Preservation and processing methods explore ways to which spoilage are stopped or slowed down to give products a longer shelf life (Adeparusi *et al.,* 2003) [13]. Fish of various kinds can be either dried in the sun or smoked in order to preserve them for long or short distance market.
Salt is a preservative agent used to lengthen the shelf life of fish and fishery products. Salting removes the slime on the surface of the fish and also inactivates the surface bacteria (Abolagba, 2006) [3]. Three methods of salting commonly practiced are dry salting, wet salting and brine salting (Whittle, 2002; Eyo, 2001; Clucas 1982) [38, 25, 19].

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When applied to fish, drying is the removal of water by any method as a means of fish preservation to prolong the shelf life. The rate of drying, consequently, the rate of removal of water is dependent on air speed, relative humidity and temperature of the surrounding air (Delgade *et al.,* 2003) [22]. Smoking is one of the most important fish processes methods aimed at prevention or reducing Post harvest losses. In preserving fish by smoking, water activity in the fish is lowered to the point where the activity of spoilage micro-organism is inhibited (Okonta and Ekelemu, 2005: Abolagba and Ighodaro, 2010) [32, 6]. It is noted that apart from giving the product a desirable taste and odour, smoking provides a longer shelf life through its anti-bacterial and oxidative effect, lowering of $_p$H, imparting desirable coloration as well as accelerating the drying process and acting as antagonist to spoilage agents (Sengor *et al.,* 2004; Eyo, 2001; Horner, 1997) [36, 25, 28]. Packaging can be described as a co-ordinate system of preparing goods for transport, ware housing, logistics, sale and end users (Soroka, 2002) [37]. Packaging is used to transport fresh fish (and ice fish) or smoked fish in single or multi-stage journeys from the processor directly to the retailer or via whole sale market (Data sheet, 1996) [21]. Effective packaging controls insect infestation of dried or smoke fish (Kings, 2001) [29]. Packaging material must possess certain characteristics, such as adequate strength to protect the packaged product from damage, it must be readily available and easy to use, and should be clean to prevent contamination by undesirable substances (Omoruyi *et al.,* 2015) [34]. Fish marketing and distribution systems involve the collection, processing and transportation of fish from fisher folk at remote landing areas to major consuming centers. The study is therefore aimed to comparatively analyze fish processing, marketing and distribution in Warri-South and Sapele Local Government Areas of Delta State, Nigeria.

2. Objectives of the Study
1. Ascertain the socio-economic characteristics of the respondents,
2. Determine processing activities carried out by the respondents and
3. Identify storage activities carried out by the respondents.

3. Materials and Methods
The study was carried out in Warri-South and Sapele Local Government Areas (LGA) in Delta State. Delta State covers an area of 17,239.2 square kilometers. It lies between Latitude 5°30' North and Longitude 6°00' East. It has a population of 4,112,445 (2006 census figures) and a population density of 227 people per square kilometer. Warri-South is located in Longitude 5°44'E and Latitude 5°31'N and Sapele is located in Longitude 5°40'E and Latitude 5°53'N.

Four markets were surveyed; two from each Local Government randomly selected were Ogbe-Ijoh and Igbudu markets in Warri–South Local Government Area; Amukpe and Sapele main markets in Sapele local government. The people of the local government are mainly farmers and fishermen. The four markets were chosen because they are the main smoked fish distribution outlets in the areas and play host to many fish processors, retailers and consumers. Warri – South Local Government Area is one of the highest Crude oil producing areas in Delta State and this makes it a commercial place for fish smoking, retailing, distribution and marketing activities.
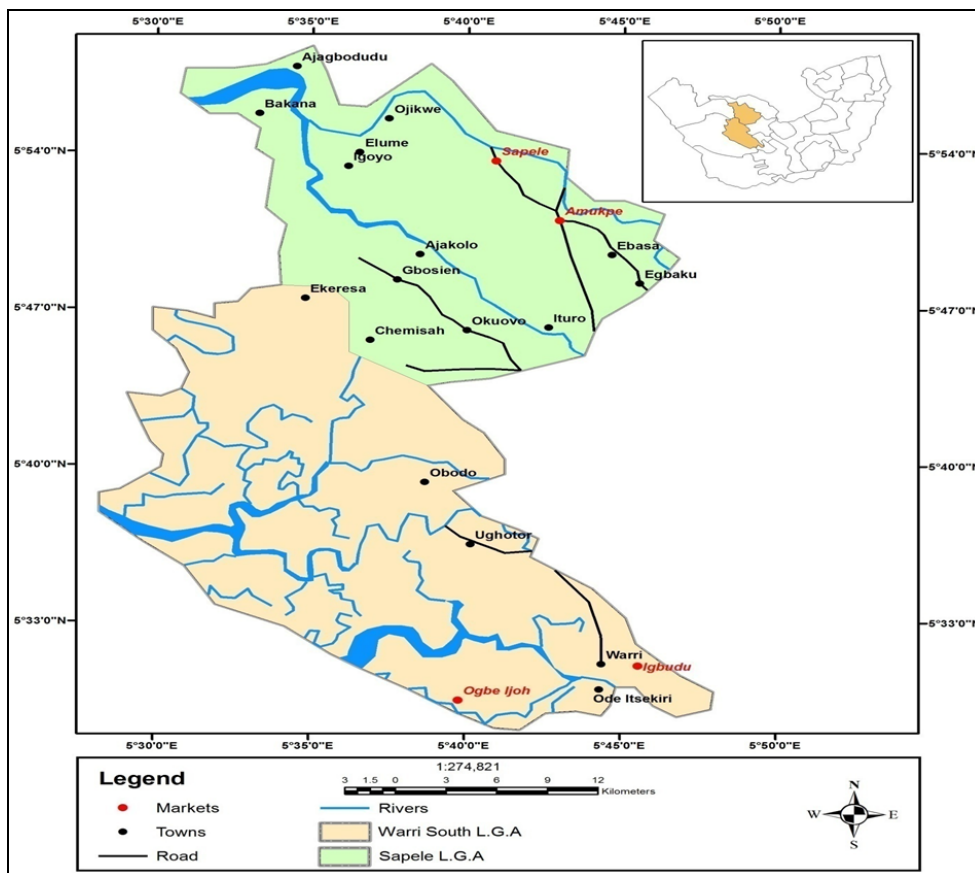

Fig 1: Map of Warri-South LGA and Sapele LGA showing the Study area.

3.1 Data Collection and Method of Survey
A total of 80 well-structured questionnaires were used to collect information from 80 processors of smoked fish in four markets and 20 questionnaires were used equally among the markets surveyed. Oral communication and interviews were carried out mostly in Urhobo language and Pidgin English to aid the collection of information with the questionnaire because most of the people interviewed had no formal education.

3.2 Data Representation and Analysis
The data was analyzed using statistical package for social science students (SPSS). The data were represented using descriptive statistical analysis. Tables, bar-chart and pie-chart were also used for data representation and analysis.

4. Results and Discussion
4.1 Respondents' Socio–Economic Characteristics
A total of 80 respondents were interviewed in both Warri – South and Sapele LGA. The study reveals majority (35.9%) of fish processors in Warri – South Local Government Area were above 50 years and about 23.1% were between the range of 30–39 years. In Sapele Local Government Area majority (32.5%) of fish processors between the age range of 40–49 years. This 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) [35]. The result confirmed the survey carried out by Abolagba and Chukwu (2008) and Omoruyi et al. (2015) [4, 34] which revealed that majority of fish processors fell between an age range of 40 years and above. This confirms the findings of other authors who categorized processing of fish as female dominated business by economically active ages. Abolagba and Odiko, 2005; Lawal and Idega, 2004), and Abolagba and Nuntah (2011) [2, 30, 78], 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. This result is in agreement with the survey carried out by Abolagba and Chukwu (2008) [4].

Majority of fish processors (62.5%) in Warri – South LGA were married, 25.0% were single, 7.5% were widows and 5.0% had divorced while in Sapele Local Government Area majority (74.4%) were married, 15.4% were widows, 5.1% each were single and divorced (Table 2). This result conforms with the survey carried out by Agbolagba and Chukwu (2008), Obasohan et al. (2012) and Omoruyi et al. (2015) [4, 31, 34] and which revealed married women were dominant. The study also showed that majority of fish processors (62.5%) and (45.9%) in Warri–South and Sapele LGA had 4-6 children. This result corresponds to the findings of Adeparusi et al., (2003) [13] 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. A total of 80 respondents were interview in both Warri – South and Sapele LGA. Majority of fish processors in Warri – South and Sapele Local Government Areas were Christian. In Warri – South LGA, Christians were 92.3% (36 respondents) while Sapele LGA had 89.7% and 10.3% (4 respondents) practice African traditional religion in Warri–South and Sapele LGA respectively. This result is in agreement with Abolagba and Nuntah, (2011) and Abolagba and Akise, (2011) [7, 8] who revealed that majority of the fish processors were Christians.

Table 1: Social-Economic status of Respondents

	Respondents			
	Processor (Warri LGA)		**Processor (Sapele LGA)**	
	Count	**Percentage**	**Count**	**Percentage**
Age				
< 20 years	1	2.6%	0	0.0%
20 – 29 years	7	17.9%	6	15.0%
30 – 39 years	9	23.1%	13	30.0%
40 – 49 years	8	20.5%	12	32.5%
>50 years	14	35.9%	9	22.5%
Marital Status				
Single	10	25.0%	2	5.1%
Married	25	62.5%	29	74.4%
Widow	3	7.5%	6	15.4%
Divorce	2	5.0%	2	5.1%
Number of Children				
1-3 Children	4	12.5%	16	43.2%
4 – 6 Children	20	62.5%	17	47.9%
Above 6 Children	7	25.0%	4	10.8%
Religion				
Christian	36	92.3%	35	89.7%
African traditional religion 3		7.7%	4	10.3%
Educational Level				
No formal education	16	40.0%	19	47.5%
Primary education	11	27.5%	2	20.0%
JSCE	8	20.0%	7	17.5%
SSCE	5	12.5%	6	15.0%
Family Size				
1 – 3	1	2.7%	6	15.0%
4 – 6	20	54.1%	22	55.0%
7 – 9	12	32.4%	10	25.6%
10 – 12	4	10.8%	2	5.0%
Years in the Business				
1 – 3 years	10	26.3%	3	7.5%
4 – 6 years	3	7.9%	4	10.0%
7 – 9 years	4	10.5%	2	5.0%
10 – 12 years	6	15.8%	6	15.0%
Above 12 years	15	39.5%	25	62.5%

Source: Field Survey, 2016.

4.2 Source of Finance
Majority of processors (67.5%) in warri – south used their personal savings for their fish smoking business, 30.0% burrowed money from co-operatives ("Osusu") and 2.5% got theirs from friends and relations while in sapele LGA, majority (75.0%) of the processors also used their personal savings for their fish smoking business, 25.0% borrowed money from Co-operatives ("Osusu") (Table 2).

Table 2: Source of Finance

Location	Personal savings (%)	Friends and relations (%)	Co-operatives ("Osusu") (%)
Warri South	67.5	2.5	30.0
Sapele	75.0	-	25.0

Source: Field Survey, 2016

4.3 Source of Fish for Smoking
This study showed that majority (57.5%) of the respondents in Warri – South LGA got their fish from Fisher folks, 32.5% got theirs from cold room and 10.0% got their fish from fish

farms (Table 3). These results are in line with the study of Omoruyi et al. (2015) [34] which revealed that most processors get their fish for processing from fisher folks. In Sapele LGA, majority (67.5%) of processors got their fish for smoking from cold rooms followed by 32.5% that got their fish from fishermen and women. This result is in agreement with Abolagba and Chukwu (2008) [4] which revealed that majority of fish processors get their fish for smoking from Cold rooms.

Table 3: Source of Fish for Smoking

Location	Fishermen and women (%)	Fish farms (%)	Cold room (%)
Warri South	57.5	10.0	32.5
Sapele	32.5	-	67.5

Source: Field Survey, 2016

4.4 Processing Duration adopted by Fish Processors
Majority of processors (42%) in Warri–South LGA, processed their fish for 2-3 hours, 30.0% processed for 4-6 hours and 28% processed for above 6 hours while in Sapele LGA, majority of the processors (47%) processed their fish for 2-3 hours, 33% processed for 4-6 hours and 20.0% processed for above 6 hours. This result is in agreement with Obasohan et al. (2012) [31] which revealed that majority of fish processors processed their fish for 2 – 3 hours. The longer the fish is smoked, the longer will be the shelf life (Arthur and Oseiu-Somuah, 2004; Agbolagba et al., 2015, Eyo, 2001 and Eyabi, 1998) [16, 9, 25, 24]. The reason for this variation in the duration of time for smoking depends on the quantity, size and type of smoking kiln used (Figure 1).
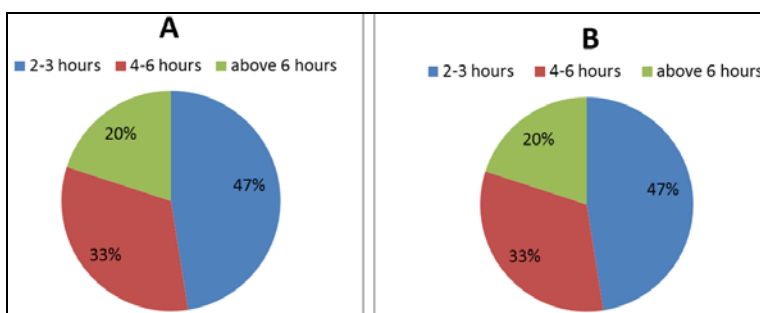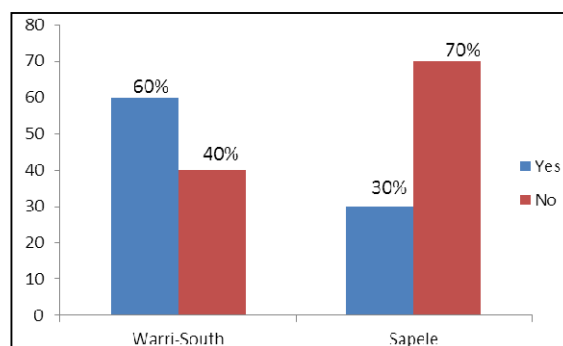

Fig 1: Processing duration by processors in Warri – South (a) and Sapele LGA (b)

4.5 Type of Smoking Kiln
Majority (77.5%) of processors in Warri – South LGA used full metal oil drum to smoke their fish, 20.0% (8 respondents) used half metal oil drum and 2.5% used wooden kiln while in Sapele LGA, majority (55.0%) of the processors also used full metal oil drum to smoke their fish, 45.0% (18 respondents) used half metal oil drum (Table 4). This is in line with the findings of Adeyeye et al. (2015) [12] who revealed that majority of the processors used full metal oil drum to smoke their fish which carry an average capacity of 71.42kg of fish.

Table 4: Type of Smoking Kiln

Location	Full metal oil drum (%)	Half metal oil drum (%)	Wooden kiln (%)
Warri South	77.5	20.0	2.5
Sapele	55.0	45.0	-

Source: Field Survey, 2016

4.6 Fish Treatment before Smoking them
Majority of processors (60.0%) in Warri – South LGA treated their fish before smoking them, whereas, 40.0% don't treat their fish before smoking. This result confirms the findings of Omoruyi et al. (2015) [34] which revealed that majority of processors cure or treat their fish before smoking them. In Sapele LGA, majority of processors (70.0%) did not treat their fish before smoking them, but 30.0% treat their fish before smoking them (Figure 2).This result confirm the findings of Adeparusi et al. (2003) [34] which revealed that majority of fish processor do not treat or cure their fish before smoking them.

Fig 2: Treatment their Fish before Smoking.

4.7 Types of Curing before Processing
Majority of processors (56.0%) in Warri – South LGA gutted their fish before smoking, about 44.0% salted and gutted before smoking while in Sapele LGA, majority of the processors (70.0%) also gutted before smoking, 30.0% salted and gutted before smoking (Table 5). This result is in agreement with Abolagba and Nuntah (2011) and Omoruyi et al. (2015) [11, 34] which revealed that majority of fish processors gutted their fish before smoking them. Salting deslubes the slime on the surface of the fish and also in activates the surface bacteria (Agbolagba, 2006) [3].

Table 5: Type of Curing before Processing

Location	Gutted before smoking		Salted and gutted before smoking	
	Count	%	Count	%
Warri-South	14	56.0%	11	44.0%
Sapele	7	70.0%	3	30.0%

Source: Field Survey, 2016

4.8 Reason for giving Treatment to the Fish before Processing

Majority of processors (47.5%) in Warri – South LGA said that they gave such treatments to prevent spoilage, 30.0% gave treatments to prevent both odour and spoilage and 22.5% (9 respondents) said it was to prevent odour while in Sapele LGA, majority of the processors (40.0%) which were 16 respondents give such treatments to prevent spoilage and odour followed by 35.0% that give treatments to prevent spoilage and 25.0% (10 respondents) said it was to prevent odour (Table 6).

Table 6: Reason for Treatment before Processing

Location	To prevent odour		To prevent spoilage		To prevent odour and spoilage	
	Count	%	Count	%	Count	%
Warri-South	9	22.5%	19	47.5%	12	30.0%
Sapele	10	25.0%	15	35.0%	16	40.0%

Source: Field Survey, 2016

4.9 Type of Smoking

All the processors in Warri –South and Sapele LGA practices hot smoking. This result is in agreement with Obasohan *et al.* (2012), George *et al.* (2014) and Agbolagba and Nuntah (2011) have revealed that majority of fish processors used hot smoking in processing their fish (Temperature of 82 °C and above) (Plate 1). This could be traced to the easy access to abundant fuel wood in the area being tropical zone and absence of nearby cold rooms and other alternative preservation facilities, a situation aggravated by epileptic or poor electricity supply (Abolagba, 2006) [3]. Another possible reason for adopting hot smoking is that the smoked fish products are properly cooked and thus increases the shelf life.

4.10 Point of Smoking of Fish

Majority (50.0%) of processors in Warri – South LGA processed their fish at home, 25.0% (10 respondents) processed their fish at water-side and 25.0% processed their fish at the market side while in Sapele LGA, majority (62.5%) of the processors processed their fish at home, 25.0% processed their fish at market side (Plate 13) and 12.5% processed their fish at waterside (Figure 3). This result confirms the survey carried out by Omoruyi *et al.* (2015) [34] which revealed that majority of fish processor smoke their fish at home. This indicated that there was no fish processing factory in the areas surveyed hence most of the respondents were into small scale fish processing.
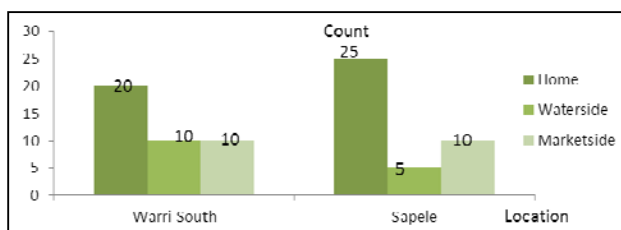

Fig 3: Point of Smoking

4.11 Duration of Keeping Dead Fish before Smoking

Majority of processors (95.0%) in Warri – South LGA kept their fish for less than 1 hour before smoking them, 5.0% kept theirs for 1-3hours while in Sapele LGA, majority (92.5%) of the processors kept their fish for less than 1hour, 7.5% kept theirs for 1-3hours before smoking them (Table 7). According to Gupta and Gupta (2006) [2] fish is a highly perishable commodity that undergoes spoilage as soon as it is harvested, once spoilage sets in, the odour/flavour, texture, colour and sometimes the chemical composition changes. This is the reason why majority of the respondent in the various markets do not keep the dead fish for long before smoking them.

Table 7: Duration of Keeping Dead Fish before Smoking them

Location	0min- 1hour		1-3hours	
	Count	%	Count	%
Warri-South	38	95.0%	2	5.0%
Sapele	37	92.5%	3	7.5%

Source: Field Survey, 2016

4.12 Time of Smoking Fish and Problems Encountered

A total of 80 respondents were interview in both Warri – South and Sapele LGA. Majority of processors (82.5%) in Warri – South LGA smoked their fish at day time also in Sapele LGA, majority of the processors (87.5%) smoked their fish also at day time. This result confirm the survey carried out by Abolagba and Chukwu (2008) [4] which revealed that majority of the fish processors process their fish during the morning hours and no specific time. The reason is because any processing activity not started in the morning hours is likely to spill over to the next day with all the attendant problem and risks of losses. Majority of processors (60.0%) in Warri–South LGA asserted that the major problem encountered during smoking of their fish was difficulty in control of smoke and heat, and breakage of smoked fish (37.5%). In Sapele LGA, majority of the processors (90.0%) said that the major problem encountered during smoking was the difficulty to control smoke. Difficulty to control smoke and heat during smoking was the major problem encountered by fish processors because of the smoke that disturb processor during processing and if not controlled it can lead to charring and burning of the fish.
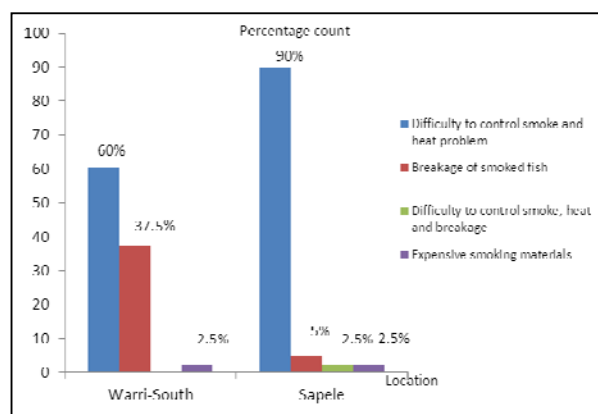

Fig 4: Problems encountered in processing of smoked fish

4.13 Storage of Smoked Fish

Majority of processors (47.5%) in Warri – South LGA stored their smoked fish in kitchens only, 27.5% (11 respondents) stored their fish in freezers and 25.0% stored in both kitchens and smoke houses. While in Sapele LGA, majority of the processors (50.0%) which represented by 20 respondents stored their fish in kitchens and smoke houses, 37.5% stored their fish in both freezers and kitchens were highlighted by 12.5%. This result is in agreement with Abolagba and Nuntah, (2011) [7] which revealed that most processors stored their smoked fish in kitchen and smoke house.

Table 8: Storage of Smoked Fish

Location	Kitchens and smoke houses		Kitchens only		Freezers	
	Count	%	Count	%	Count	%
Warri-South	10	25.0%	19	47.5%	11	27.5%
Sapele	20	50.0%	5	12.5%	15	37.5%

Source: Field Survey, 2016

4.14 Storage Period of Smoked Fish before Spoilage

Majority (82.5%) of processors in Warri – South LGA indicated that it took 2-5days before spoilage would set in on their smoked fish, 17.5% said 6 -10 days. In Sapele LGA, majority (84.2%) of the processors also responded that it took 2-5 days before spoilage set in on the smoked fish, 15.8% indicated that it took 6-10 days before spoilage set in. This is because smoking gives the fish a longer shelf life before it spoils. This result is in agreement with Omoruyi *et al.* (2015) [34] which revealed that smoked fish could stay for 2-5 days before spoilage set in.

4.15 Storage Problem of Processed Fish

Majority (75%) of processors in Warri - South LGA had insects attack as their major smoked fish storage problem, 20% that had rodents (rats) attack, breakage due to packaging was 2.5% and 2.5% highlighted breakages and mould attack while in Sapele LGA majority (84.2%) of the processors were had insects attack as their storage problem of processed fish and 15.8% (6 respondents) which had rodents attack as their chief problem. This result confirms the survey carried out by Abolagba and Nuntah, (2011) and Abolagba and Akise, (2011) [7, 8] which revealed the major storage problem of smoked or processed fish to be insect infestation and other problems were rodent attack, mould attack and breakage due to packing of smoked fish. This is in agreement with Ayuba and Omeji, (2006) [18] who reported that insect infestation is the cause of prominent losses in quantity and quality of stored, smoked or dried fish in Nigeria. These losses result in the physical disintegration of stored smoked fish leading to economic loss on the curer. However, proper scaling up of storage areas, use of domestic cats as predators to control rodents and the application of anti-coagulant rodenticides in accordance with the manufacturer's instruction would limit losses incurred during storage of cured fish.

Table 9: Storage Problem of Processed Fish

Location	Insects attack		Rodents attack		Breakage due to packaging		Breakage and mould attack	
	Count	%	Count	%	Count	%	Count	%
Warri-South	30	75.0%	8	20.0%	1	2.5%	1	2.5%
Sapele	32	84.2%	6	15.8%	0	0.0%	0	0.0%

Source: Field Survey, 2016

4.16 Purpose of Smoking

Majority (92.3%) of processors in Warri–South LGA processed fish for commercial purpose, 5.1% processed for family consumption and 2.6% (1 respondent) recorded both for family and commercial purpose. In Sapele LGA, majority (95.0%) of the processors processed for commercial purpose, 2.5% processed for family consumption and 2.5% recorded both for family and commercial purpose (Figure 5).
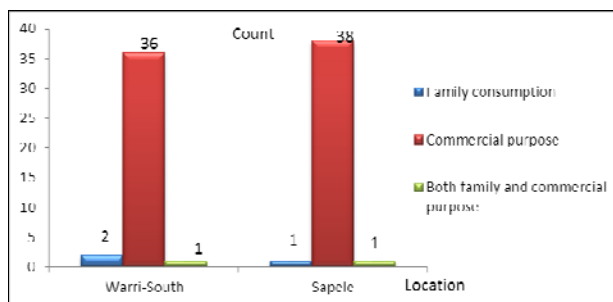

Fig 5: Purpose of smoking

4.17 Packaging Materials used by Fish Processors

Majority of the respondents (42.5%) which were 17 respondents in Warri-South LGA packaged their smoked fish in baskets, 40% packaged in paper cartons and 17.5% that packaged in jute bags. In Sapele LGA, majority (47.5%) of the respondents also packaged their smoked fish in baskets, 30% (12 respondents) packaged theirs in paper cartons and 22.5% packaged smoked fish in jute bags. This result is in agreement with Abolagba and Akise, (2011) [8] which revealed that majority of the fish processors used basket to package their fish for protection and preservation.

Plate 2: Smoked fish packaged in jute bag

Plate 3: Smoked fish packaged in baskets

4.18 Frequency of Distribution

Majority (90.0%) of processors in Warri – South LGA went to daily markets to distribute their smoked fish products to

fish marketers or directly to consumers, 10.0% that went to occasional markets. In Sapele LGA, majority (92.5%) of the processors went to daily markets to distribute their smoked

fish products to fish marketers or sell directly to consumers followed by 7.5% (3 respondents) that goes to market occasionally(Figure 6)
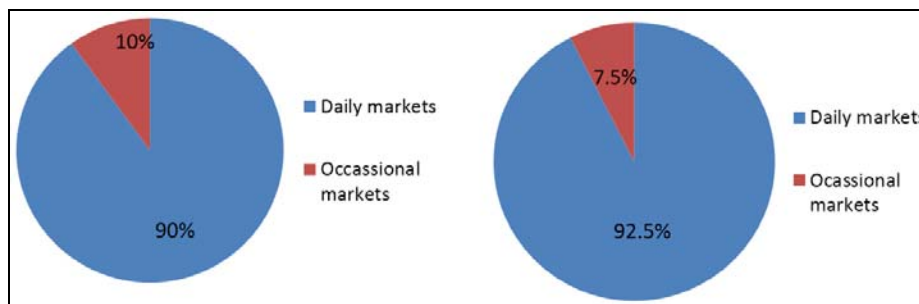

Fig 6: Frequency of distribution of processors in Warri – South (a) and Sapele LGA (b)

4.19 Means of Transportation
Majority (85.0%) of the respondents in Warri-South LGA transported their fish from the point of processing to the market place by public transport, 7.5% each transported by foot and used public private transport. in Sapele LGA, 33 respondents (89.2%) asserted that their major means of transportation is by public transport, 8.1% moved by foot and 2.7% used private transport (Figure 7). Those that move on foot do that because their houses or processing units were close to the market.
This result confirms the findings of Obasohan *et al.* (2012) [31] which revealed that majority of processor used public transport as their major means of transportation. Therefore it can be implied that the major means of transportation of smoked fish in both Warri-South and Sapele local government is by road. This agrees with Kings (2001) [29] who also reported that distribution of smoked fish in Nigeria was largely by road transportation.
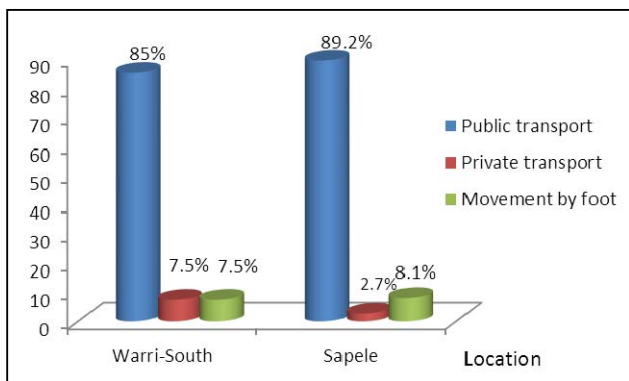

Fig 7: Means of transportation

4.20 Duration of Sales of Processed Fish
Majority (85%) of processors in Warri – South LGA sold their fish between 1-4days, 7.5% (3 respondents) each sold their processed fish between 5-8 days and above 8 days. In Sapele LGA, majority (89.2%) of the processors also sold their processed fish between 1-4days, 8.1% (3 respondents) sold between 5 -8days and 2.7% sold above 8days.
This result is in agreement with Abolagba and Chukwu (2008) [4] which reported that majority of fish processors sold their processed fish within 24 hours. This agrees with the report of Diyaware *et al.* (2007) [23] that smoked fish are very popular with fish farmers and consumers and they command a very high commercial value in Nigeria markets.

4.21 Month of the Year Respondents Made the Highest Sales/Profit
Majority (45.0%) of processors in Warri–South LGA indicated that they make the highest sales/profit between January–March after the Xmas period. About 40.0% made their highest sales/profit between October – December, 10.0% said it was between April – June they made their highest sales and 5.0% (2 respondents) were recorded for July – September. In Sapele LGA, majority (72.5%) of the processors which comprising of 29 respondents asserted that they made their highest sales/profit between January – March, followed by 20.0% (8 respondents) that make highest sales/profit between October – December and 7.5% (3 respondents) recorded April- June. This result is in agreement with Omoruyi *et al.* (2015) which revealed that majority of processor make highest sales in dry season which is between October to December and January to March. Though fishing is done on a continuous basis, a noticeable and significant bumper harvest occurs from July to September each 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.

4.22 Preservation of smoked fish
Majority of processors (94.9%) in Warri – South LGA preserved their smoked fish by re-smoking them, 5.1% (2 respondents) used freezers. in Sapele LGA, all the processors (100.0%) preserved their fish also by re-smoking them (Table 10). This result is in agreement with Abolagba and Nuntah, (2011) [7] who revealed that majority of fish processors preserved their smoke fish by re-smoking them.

Table 10: Preservation of Smoked Fish

Location	Re-smoking		Fridge	
	Count	%	Count	%
Warri-South	37	94.9%	2	5.1%
Sapele	40	100.0%	0	0.0%

Source: Field Survey, 2016

5. Conclusion
The study revealed the existence of a thriving profitable small scale traditional processing, handling, packaging, storage and distribution of smoked fish business in Warri-South and Sapele LGA. The results showed that the smoked fish processors in both local government areas were dominated with women who were married with little or no formal education. The survey also revealed that the fish processors

had been in business for more than 12 years, sourced their fish for smoking from either fishermen and women or cold rooms and used full metal oil drum to smoke dry fish with firewood as their major source of energy. They packaged their fish in baskets, used public transport as their means of transportation and preserved their smoked fish by re-smoking them. Furthermore, the result of this study shows that smoking method is the most practiced method due to its effectiveness, easy operation, and availability of raw materials, stability of the products and impartation of pleasant taste which is most preferred by most consumers.

6. Recommendations
Based on the findings in the course of this study, I would hereby recommend the following:

1. Government should engage in the rehabilitation of the access roads leading to the processing communities so as to improve transportation system, reduce transportation cost and losses due to delays and fragmentation

2. The Agricultural Extension Arm of the State should also improve the network for market and price information gathering and dissemination among participants (fishermen, processors and traders) to improve marketing efficiency.

3. The Federal Department of Fisheries should provide adequate extension personnel to educate the processor/marketers on effective practice and management.

4. The state extension arm should empower fishermen processors and traders or marketers with techniques and methods of reducing fish and post-harvest loss.

5. Banks and other lending institutions should make special efforts to simplify the procedures for obtaining loans and also create favourable conditions for better access to credit facilities by the fish processors.

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