

Full Length Research Paper

A survey on traditional fish smoking in Lagos State, Nigeria

Adeyeye, S. A. O^{1*}, Oyewole, O. B.¹, Obadina, A. O¹, Omemu, A. M.², Oyedele, H. A.¹ and Adeogun, S. O.³

¹Department of Food Science and Technology, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.

²Department of Hospitality and Tourism Management, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.

³Department of Agricultural Administration, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.

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This study examined the socio-economic characteristics, technologies and hygiene of the processors in 20 different 'fish' processing centres in fishing communities in Lagos State. A total of 200 questionnaires were administered through purposive sampling method at 10 respondents/processing centre. Data were collected through field observation and administration of structured questionnaire. Analytical technique used was descriptive statistics. Results reveal that most of the households were relatively poor, using age and educational level of the processors and availability of household amenities as proxies for socio-economic status. Majority of the processors (55.5%) were old women, 51.5% had primary school education while 38% had post-primary school education. The study shows that majority (98.0%) of the processors practiced manual operations while 2.0% practiced mechanical operation. Every processor used eviscerating, washing, filleting and de-scaling and 99.0% of the processors operated on non-concrete floor while 1.0% were on mould floor. Majority (98%) used firewood as normal smoking fuel while only 0.5% used charcoal. Majority (77.5%) of the processors used full drum as smoker, 2.0% used half drum while 19.0% used mud oven and the rest (1.5%) used charcoal oven and 92.0% of the processors were from urban communities while 8.0% of them were from rural communities. Very few processors (1.0%) used disinfectants for their processing facilities and environment. The study concludes that fish smoking makes an important contribution to household food and financial security in all processing centres.

Key words: Fish, hygiene, processors, smoking, socio-economic, survey.

INTRODUCTION

Fish is an important dietary component of people all around the world and represents a relatively cheap and accessible source of high quality protein for poorer households

(Ikutegbe and Sikoki, 2014). Global production of fish, mussels and crab in 2010 was almost 60 million tonnes, a figure which includes production in marine waters,

*Corresponding author. E-mail: saadeyeye@yahoo.com.

brackish water and freshwater. Aquaculture production is now about three quarters of that from ocean fish and seafood caught in the wild. In 2011 this amounted to 78.9 million tones, 15% of which was cured in one or another way (Ikutegbe and Sikoki, 2014; FAO, 2013). One third of the cured fish was smoked and about 20% of the smoked fish goes into international trade (Clucas and Ward, 1996). No other food industry has shown such growth as aquaculture in recent decades. Between 1970 and 2008 annual production worldwide increased by an average of 8.4%; much more than poultry farming and egg production, which have the second highest growth rates after aquaculture (da Silva, 2002; da Silva et al., 2008; Abolagba and Melle, 2008).

In Nigeria, fish production through aquaculture has risen steadily from a few hundred kilograms in the 1950s to over 45,000 metric tonnes in 2004 (FAO, 2007). Today, aquaculture is the fastest growing livestock production sector in Nigeria, with a growth of about 29% in 2006 alone, and with prospects of continued growth.

This is because demand for fish is on the increase with population growth, while catches from fisheries are on the decline, even globally (FAO, 2007). In Nigeria smoked fish products are the commonest form of fish product for consumption. Out of the total of 194,000 metric tons of dry fish produced in Nigeria, about 61% of it was smoked. One of the greatest problems affecting the fishing industry all over the world is fish spoilage. In high ambient temperature of the tropics, fresh fish have the tendency to spoil within 12 to 20 h (Clucas and Ward, 1996). Attempt has been made to reduce fish spoilage to the minimum through improved preservation techniques. Preservation and processing methods explore ways by which spoilage are stopped or slowed down to give product a longer shelf life. Fisheries have been the main source of livelihood for the population of fishing communities in Nigeria and a vital sector of the economy by employing more than 6 million fisher folks in Nigeria (Fish for All Summit, 2005; Fregene and Bolorunduro, 2009) in terms of fish production, processing and distribution. Entire family (men, women and children) in the fishing communities are engaged in the sector. The catch from these fisheries plays an important source of animal protein in peoples' diets.

Seasonal fluctuation in food availability and household responses to this insecurity has been observed to influence individual consumption patterns (Longhurst, 1986; Fregene and Bolorunduro, 2009). In fishing communities, during the off-fishing season, which is usually in the rainy season (July to September), fish catch is low. This is because of the increased level of turbid water and strong wind, which hinder the fishermen without outboard engine from going far out to sea. In an attempt to make a living, they have resulted to the exploitation of generally fragile environment, thereby leading to a cycle of low production, low income, and poverty and being food in-secured (National Institute of Oceanography and Marine Research, (NIOMR), 1989; Federal Office of Statistics, (FOS), 1999). As a

result of inadequate purchasing power (income), fisher folks often experience a food in-secured period (Fregene, 2002; Fregene and Bolorunduro, 2009).

Small scale fishing communities in Nigeria, as elsewhere in the world are vulnerable to exploitation due to poverty and uncertainty of their income. The seasonality of fish catch coupled with inadequate processing capacity has resulted in high post-harvest losses, which diminish benefits accruing to small-scale operators. Realizing that fisher folks are not a homogenous group of people, there is the need for a comparative study of fishing communities.

Therefore, the main objective of this study was to carry out a survey on traditional fish smoking activities in Lagos State, Nigeria in order to examine the socio-economic characteristics, role of women and expenditure pattern as they relate to variation in poverty level in among fish processors in fishing communities in Lagos State.

METHODOLOGY

Survey

The study was carried out in Lagos State, which has 22.5% of Nigeria's coastline and occupies an area of 3,577 square kilometre mass with 786.94 square kilometre or 22% of it being lagoons and creeks, in Lagos, Ikorodu, Badagry and Epe local government areas (Udo and Mamman, 1993). Purposive sampling technique was used for surveying. Structured questionnaire was administered to 200 respondents by enumerators. Data were also collected through field observation and on the spot assessment to collect information on socio-demographic and environmental health data of selected 'smoked fish' processors. Descriptive statistics used include measures of distribution, central tendency and dispersion respectively.

Sampling sites

The sampling sites for this study include Agbalata, Ajido, Asakpo, Boguru, Fvanoveh, Gberefun/Yovoyan, Gbetrome, Ilaje, Kofegameh, Pako, Afuye, Bodin Yawa, Idale, Igboodun, Ilogun, Mejona, Oluwo, Okorisan, Orita, Orogoro from two Local Government Areas (Badagry and Epe) of Lagos State.

Area of study

Using a current geopolitical map of Nigeria (Figure 1), Lagos State lies to the south-western part of Nigeria and has boundaries with Ogun State both in the north and east. It is bordered on the west by the Republic of Benin and in the south, stretches for 180 km. along the coast of the Atlantic Ocean. It therefore has 22.5% of Nigeria's coastline and occupies an area of 3,577 km² land mass with about 786.94 km² (22%) of it being lagoons and creeks. The state is endowed with marine, brackish and fresh water ecological zones with varying fish species that provide productive fishing opportunity for fishermen (Udo and Mamman, 1993). Two local government areas (Badagry and Epe Local Government) were covered because they are highly densified fish processing centres.

RESULTS AND DISCUSSION

Table 1 shows the characteristics of processors in the 20 processing centers surveyed. Majority of the processors



Figure 1. Map of Lagos State (<http://nigerianfinder.com> accessed Jan, 2015).

Table 1. Characteristics of the 20 study smoking/processing centres.

Parameters	Number observed (%)
Age of processors	
Old women	111(55.5)
Young women	89(44.5)
Educational level of processors	
No schooling	21(10.5)
Primary school	103(51.5)
Post secondary school	76(38)
Packaging	
Basket with dry plantain leaves	186(93)
Basket without polypropylene	14(7)
Method of sewage disposal	
Pit latrine	125(62.5)
Water-carriage system	10 (5)
None	65(12.5)
Source of processing water	
Spring	30(15)
Pipe-borne	20(10)
Stream	100(50)
Bore-hole	30(15)
Rain	20(10)
Normal cooking fuel	
Firewood	196 (98)
Coal/charcoal	1(0.5)
Others	3(1.5)
Source of income	
Husband	15(7.5)
Wife	175(87.5)
Others	10(5)

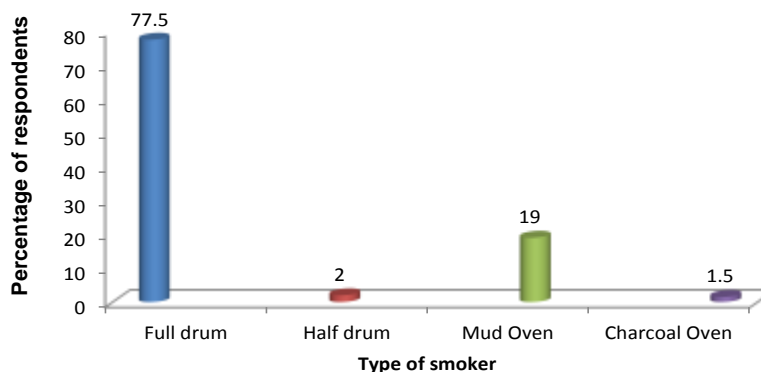


Figure 2. Distribution of type of smoker.

(55.5%) are old women, 51.5% had primary school education while 38% had post-primary school education. The relationship between household socio-economic characteristics and food processing has been amply demonstrated in the literature (Fregene and Bolorunduro, 2009). For example, using educational level of the processors and availability of household amenities as proxies for socio-economic status, it is apparent that most of the households were relatively poor. This has significant implications for fish processing in general and for fish hygiene behaviour in particular (Fregene and Bolorunduro, 2009). Education is also related to employment and income which influence access to household amenities and facilities, including those related to fish hygiene and environmental health. Result shows that 93% of the processors packaged the fish in Basket with dry plantain leaves while only 10% used Basket with polypropylene. Survey of the processing centres shows that 62.5% used pit latrine as method of waste disposal, 5% used water-carriage system and 12.5% had no means of waste disposal. Most (50%) of the processors used stream water for processing, 15% used spring and boreholes.

The processing sites in all the processing centres are mostly located in places where they remain a threat to food safety. In all the processing sites surveyed, there is no adequate drainage and waste disposal systems. The facilities provided were designed and constructed in a place closer to the processing sites which makes it having a high risk of contaminating the smoked fish. Most of the processing sites have no storage facilities for both raw materials and finished product. The processors were not applying a good quality control system into this critical aspect of the fish smoking/processing. The fresh fish are not normally inspected and sorted before processing so as to segregate fish which is evidently unfit for human consumption. Also, there supposed to be a way of protecting fresh fish from damages such as bruising which can easily initiate contamination by pests or microorganisms and enzymatic activity. Majority (98%) used firewood as normal cooking fuel while only 0.5% used charcoal. Majority (77.5%) of the processors used full drum as smoker, 2.0%

used half drum (Figure 2), while 19.0% used mud oven and the rest (1.5%) used charcoal oven. Average capacity of a full drum as smoker used by processors was 71.42 kg, half drum smoker has capacity 66.67kg, while mud oven has capacity of 82.11 kg and the charcoal oven has capacity of 100.0 kg. Majority (87.5%) of processors contributed a minimum of N1, 600.00 and maximum of 480000.00 as start-up capital for the business and the mean contribution was N51, 324.86. The other processors (12.5%) contributed a minimum of N14, 000.00 and maximum of N600, 000.00 and their mean contribution was N55, 775.26.

The study shows that fish processors are operating in rural and urban areas and the activity appears to be increasing in popularity. Fish processors operate on a range of scales and cheap and readily available smoking kilns were used. Family labour plays a critical role, but micro-enterprises which employ casual labour are also common.

For some enterprises fish processing constitutes a full-time activity. They also operate on a part-time basis, using family labour. Majority (98.0%) of the processors practiced manual operations while (2.0%) practiced mechanical operation. Every processor used eviscerating, washing, filleting and de-scaling and (99.0%) of the processors used non concrete floor while (1.0%) used mould floor. Majority (92.0%) of the processors were from urban communities (Figure 3) while (8.0%) of them were from rural communities and (17.0%) of the processors from rural communities processed Bonga shad type of fish and followed by (12.0%) of the processors processed Silver catfish. Very few processors (1.0%) used disinfectants for their processing facilities and environment (Figure 4). The facilities used for processing are not properly cleaned always and this is a threat to food safety. The cleaning system in the entire processing site is not adequate.

The materials provided for cleaning food are not adequately and suitably designed and these can easily harbor pathogenic organisms. Moreover, there is no facilities for adequate supply of potable water for cleaning. There is

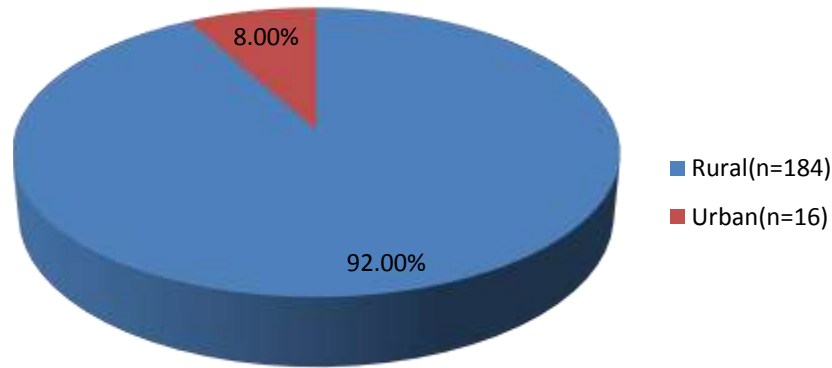


Figure 3. Distribution of processing centres/communities.

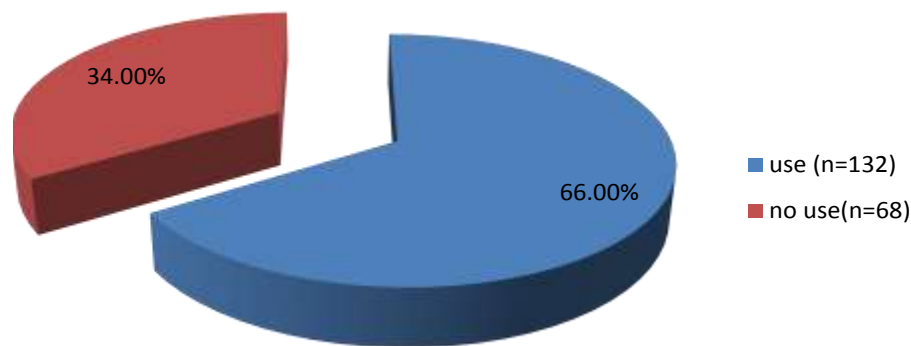


Figure 4. The use of chemicals by processors.

no adequate method of controlling the pests in all the processing sites. The containers used for processing are not always washed immediately after use, and this allows the pests free movement to operate and this can result in malicious or accidental contamination of food. Due to the traditional method of smoking fish, there are no facilities available for personal hygiene which can assist in ensuring that an appropriate degree of personnel hygiene is maintained and to avoid contaminating the fish. There was a high awareness concerning personal hygiene among the processors. People who came directly or indirectly into contact with the fish are not likely to contaminate the fish due to: maintaining of appropriate degree of personal cleanliness and behaviour and operating in an appropriate manner. Purchasing of smoked fish from market vendors poses a considerable health risk.

The reasons for this are apparent from observational data on hygiene practices in the market. Smoked fish are often displayed openly on the tray in very poor sanitary environments. The prevalence of flies at the markets and the apparent lack of facilities for food protection suggest a high potential for contamination. Smoked fish are also subjected to repeated contamination from the unwashed hands of vendors, and the materials used for wrapping, such as reusable polythene bags, waste paper and baskets, may also be a source of contamination. Figure 5 shows

that 80, 61.5 and 28% of processors respectively from year 2010, 2011 and 2012 claimed that 30 to 40% of household income was spend on food, while 14, 31 and 60% of processors respectively from year 2010, 2011 and 2012 claimed that 41 to 50% of household income was spend on food and 5.5, 7.5 and 12% of processors respectively from year 2010, 2011 and 2012 claimed that >60% of household income was spend on food. The study shows that fish smoking makes an important contribution to household security in all processing centres. As described earlier, previous understanding amongst researchers was that fish processing was predominantly a rural activity; less integrated in market systems than other agricultural pro-ducts (Fregene and Bolorunduro, 2009). The baseline survey found quite a different situation. In processing centres such as Oluwo and Agbalata, and even more remote places such as Idale, fish processors have long-standing connection to urban markets and market their produce on a relatively large scale.

Conclusion

The baseline assessment revealed that using educational level of the processors and availability of household amenities as proxies for socio-economic status, it is

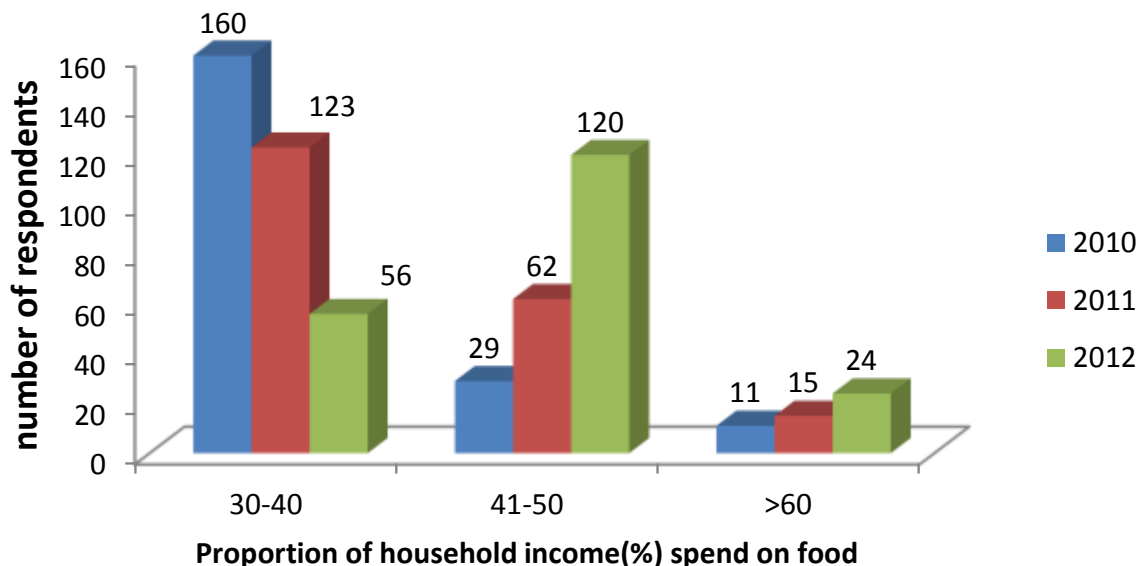


Figure 5. Proportion of household income spent on food.

apparent that most of the households were relatively poor. Majority of the processors (55.5%) are old women, 51.5% had primary school education while 38% had post-primary school education. Education is also related to employment and income which influence access to household amenities and facilities, including those related to fish hygiene and environmental health. The study shows that fish smoking makes an important contribution to household security in all processing centres. The study also found that fish processors are operating in rural and urban areas and the activity appears to be increasing in popularity. Fish processors operate on a range of scales. Family labour plays a critical role, but micro-enterprises which employ casual labour are also common. For some enterprises fish processing constitutes a full-time activity. They also operate on a part-time basis, using family labour. It was also found that the structure and condition of processing sites are below safety standard due to the following reasons: The floors are not constructed to allow adequate drainage and cleaning; the operations are made in open places without a constructed processing plant.

Conflict of interest

The authors have no conflict of interest.

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