

OCCUPATIONAL HAZARDS ASSOCIATED WITH FROZEN FISH MARKETING IN ABEOKUTA METROPOLIS IN OGUN STATE, NIGERIA

¹Olaoye O.J., ²Ojebiyi W.G. and ³Akinrinola A.O.

¹Agricultural Media Resources & Extension Centre,
Federal University of Agriculture, Abeokuta, Nigeria
²Department of Agricultural Extension & Rural Development,
Federal University of Agriculture, Abeokuta, Nigeria
³Department of Aquaculture & Fisheries Management,
Federal University of Agriculture, Abeokuta, Nigeria

*Corresponding author's email: oluwagbemiga2013@gmail.com

ABSTRACT

This study assessed the occupational hazards and injuries associated with frozen fish marketers in Abeokuta metropolis, Ogun State of Nigeria. A two-stage sampling procedure was adopted in sampling 150 fish marketers from 10 popular markets within the study area. Data were elicited with the aid of an interview schedule and analyzed using descriptive statistics such as frequency distribution, percentage, mean, standard deviation, and Pearson's Product Moment Correlation (PPMC) analytical tools. Results obtained showed that the mean age of the fish marketers was 37.96±11.04 years, the majority were females (87.9%), married (83.2%), and had a mean household size of 9.00±4.00 persons. Also, 54.4% and 42.3% of the fish marketers had secondary and tertiary education, respectively. In terms of safety measures adopted, all the fish marketers used pain relievers after work, while higher proportions usually use hand gloves (76.5%), wear nose masks (86.6%), wear an apron (80.5%), use plaster in cases of cuts (53.7%) and do regular medical check-up (49.7%). Most (60.4%) of the fish marketers were found to be in good/safe working conditions, while more than half (53.0%) of them were exposed to a high level of hazard. A significant negative relationship existed between working conditions and the level of hazard experienced by the fish marketers ($r = -0.721, p \leq 0.01$). It was concluded that occupational hazards are associated with frozen fish marketing. The study recommended that fish marketers should operate from shops to avoid dirty, dusty, and noisy environments to improve their working conditions.

Key words: fish marketing, frozen fish, occupational hazard, working condition

INTRODUCTION

Fish are a source of quality protein and an important component of the diets of people globally because it has a nutrient profile superior to most terrestrial meats (Onyekuru *et al.*, 2019). It is a crucial means of survival for people especially those in rural fishing communities as a source of protein food, employment, and income. Despite the successive governments' efforts to increase local fish production, fish supply from both the capture fisheries and aquaculture falls below the national needs (Olaoye *et al.*, 2019). Hence, Nigeria resorted to fish importation to augment domestic fish production. Onyekuru *et al.* (2019) considered Nigeria as one of the largest fish importers in developing countries. Fish importation contributes to more than half of the consumed fish in Nigeria (FCWC-FISH, 2016). Recently, IndexBox (2020) reported the emergence of Nigeria as the largest market with \$488 million of frozen fish imports in 2018.

The bulk of imported fish in Nigeria is frozen leading to the development of frozen fish companies and the emergence of several cold rooms across the

country (Liverpool-Tasie *et al.*, 2021). Although fish importation has some demerits such as discouraging local production of fish and depleting foreign exchange reserves, it is of immense benefits as a livelihood to cold room operators, their employees, and fish vendors in the country even as it boosts food security. It directly serves as a good source of livelihood and income for the operators of cold rooms. Indirectly, it benefits the employees of cold rooms by providing them with employment and a regular source of income. Traders, marketers, sellers, and other vendors of frozen fish also earn from the frozen fish industry. These are apart from the ultimate goal of making fish available in the right form to the final consumers of fish by minimizing fish loss.

Household fish consumption of 13.30 kg per capita per year in Nigeria is lower than the world's average of 20.30 kg per capita per year (WorldFish, 2017; FAO, 2018). Fish consumption among resource-limited and vulnerable population groups such as low-income earners is much lower than the national average (Bradley *et al.*, 2020). Studies have emerged on the prevalence of malnutrition among

children and adults. For instance, Ogundari (2017) reported that as many as 58% of Nigerian households suffer from chronic or transitory food and nutrition insecurity while FAOSTAT (2017) considered 14.3 million people to be undernourished in 2016. Due to the urban nature of the Abeokuta metropolis which hosts most government establishments in Ogun State, the population keeps increasing at a fast rate. The rising population indicates the increasing pressure on the environment's limited resource base. This further translates to the emergence of several economic activities caused by increasing demands for essential and non-essential goods and services. Frozen fish marketing is one of these economic activities that serve as a major source of livelihood for most residents. Despite its relevance, frozen fish marketing like other economic activities comes with inherent hazards and risks to fish marketers.

Occupational hazard is as old as the agriculture sector itself generally and fisheries in particular. Authors reiterated that working in the agricultural sector is associated with numerous occupational hazards (Adedeji *et al.*, 2011; Olowogbon, 2011; Park, 2011; Idio and Adejare, 2013). Though the fish marketers may not experience most of the hazards, their working conditions and environment expose them to some injuries and hazards such as having to remove the iced fish from its pack, exposure to foul smells, staying under the sun and/or rains until the fishes are sold, sitting on a spot for a long time, cutting off fingers, and noisy environments. The broad objective of this study was to assess the occupational hazards/injuries associated with frozen fish marketing in the Abeokuta metropolis. The specific objectives were to ascertain the socio-economic characteristics of the frozen fish marketers; assess the working conditions of the frozen fish marketers; identify the safety measures adopted by frozen fish marketers, and identify the hazards associated with fish marketing. The study hypothesized that there is no significant relationship between frozen fish marketers' working conditions and the level of occupational hazard experienced.

MATERIALS AND METHODS

Area of Study

The study was carried out within the metropolis of Abeokuta which is the largest city and the capital of Ogun State in the South-West, Nigeria. It is situated on the east bank of the Ogun River, near a group of rocky outcrops in a wooded savanna; 77.00 km North of Lagos by railway, or 130.00 km by water (Hoiberg, 2010). As of 2006, Abeokuta and the environs had a population of 449,088 (NPC, 2010). Abeokuta is the headquarters of the federal Ogun-Oshun River Basin Authority, which is responsible for the development of land and water resources for Lagos, Ogun and Oyo States (Hoiberg, 2010).

Sampling Procedure and Sample Size

The study population comprised the frozen fish marketers in markets within Abeokuta metropolis, Ogun State, Nigeria. A two-stage sampling procedure was adopted in selecting the sample for this study. First was the purposive selection of ten popular markets in the study area. The selected markets were Omida, Kuto, Lafenwa, Osiele, Adatan, Itoku, June 12 (Panseke), Gbangba, Iberekodo and Eleweran. Lists of frozen fish marketers were generated for the selected markets. The second stage was the simple random sampling of about 50% of the fish marketers in each of the selected markets which resulted in a sample size of 149 frozen fish marketers.

Measurement of Key Variables

The working condition of the fish marketers was measured on a 10-item Likert-type scale with response options of; always as 2, sometimes as 1, while rarely was 0. The minimum and maximum scores were 0 and 20 respectively, with 10 being the cut-off point. Fish marketers with working condition scores of 10 were considered as having good/safe working conditions while those with scores ≥ 10 were classified as having poor/unsafe working conditions. The mean score per item was also computed with a mean score of < 1.00 indicating good/safe working conditions while a mean score of ≥ 1 indicating poor/unsafe working conditions. Occupational hazards associated with frozen fish marketing were measured on a 13-item Likert-type scale with response options of; always to be 2, sometimes was 1, while never was 0. The minimum, maximum, and mid-point scores were 0, 26, and 13 respectively. Fish marketers with scores ≥ 13 were considered as experiencing a high level of occupational hazards, and those with < 13 were classified as experiencing a low level of occupational hazards. The mean score per item was also computed with a mean score of < 1 indicating a low level while a mean score of ≥ 1 indicates a high level of hazard. The grand mean was computed by summing up the individual items' means and dividing the number of items. As for safety measures adopted, they were measured at nominal level using 7-item scale with "yes" or "no" as response options.

Data Analysis

The data collected were cleaned, coded, and subjected to descriptive statistics such as frequency distribution, mean, standard deviation, and Pearson's product moment correlation (PPMC) tool using SPSS, version 20.0. The PPMC coefficient (r) was given as:

$$r = \frac{\sum(xi-\bar{x})(yi-\bar{y})}{\sqrt{\sum(xi-\bar{x})^2 \sum(yi-\bar{y})^2}}$$

where r is correlation coefficient, xi is x -variables and \bar{x} is the mean of x -variables; correspondingly, yi is y -variables and \bar{y} is the mean of y -variables.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Fish Marketers

Results on the socio-economic characteristics of fish marketers are presented in Table 1. It shows that 28.2%, 26.2%, and 35.6% of the fish marketers were in the age brackets of ≤ 30 , 31 to 40, and 41 to 50 years, respectively with mean age \pm standard deviation of 37.96 ± 11.04 years. This indicated that more younger persons were involved in frozen fish marketing than older persons and that the enterprise is dominated by youths who have been characterized as innovative, highly productive, adventurous, energetic, and economically active. Some studies (Coster and Otufale, 2010; Okeoghene, 2013; Oduwale, 2019) also submitted that frozen fish marketing in Ijebu-Ode was dominated by youths. This portends that the fish marketers are an important set of people to the nation's economy contributing to the food and nutrition security of their immediate families and the nation at large. By the nature of youths, they are expected to understand the occupational hazards inherent in the marketing of frozen fish. Also, majority (87.9%) were females while 12.1% were males implying that frozen fish marketing was dominated by females thereby stressing the contribution of women in the marketing of fish and other agricultural produce. This could be an act of being proactive on the part of the women in ensuring food security, generating income, and reducing feminine vulnerability within the family (Ike-Obasi and Ogubunka, 2019). Women's dominance in fish frozen marketing could be linked to higher productivity based on the position of Onubuogu *et al.* (2014) that the female gender tends to be more labor efficient than their male counterparts. This finding aligns with previous studies (Azeez *et al.*, 2021; Esiobu and Onubuogu, 2014) which reported female dominance in fish marketing and processing. More than half (51.7%) of the fish marketers practiced Christianity while 45% practiced Islam and 3.4% were traditional worshippers.

Results in Table 1 further show that 83.2% and 12.8% of the fish marketers were married and single, respectively indicating that the fish marketers were predominantly married persons. The prevalence of married women is not unconnected with the fact that the surveyed respondents were within the allowable age of marriage as no one was younger than 20 years. This implies that in addition to marketing, the fish marketers still have to attend to their primary responsibilities (such as house chores; washing, cooking, and conjugal intimacy with spouses) as wives and mothers in their homes (Cliffe and Akinrotimi, 2015). It is noteworthy that marriage comes with some levels of responsibilities and commitments that must be fulfilled by both parties. All these could further aggravate the hazards associated with being a fish marketer.

Table 1: Distribution of fish marketers by socio-economic characteristics ($n = 149$)

Socio-economic variables	Frequency	(%)	Mean \pm SD
Age (years)			
≤ 30	42	28.20	
31-40	39	26.20	
41-50	53	35.60	
51-60	11	7.40	$37.96 \pm$
> 60	4	2.70	11.04 years
Sex			
Female	131	87.90	
Male	18	12.10	
Religion			
Christianity	77	51.70	
Islam	67	45.00	
Traditional	5	3.40	
Marital status			
Single	19	12.80	
Married	124	83.20	
Separated	1	0.70	
Widowed	5	3.40	
Household size (persons)			
≤ 5	32	21.50	
6-10	77	51.70	9.00 ± 4.00
> 10	40	26.80	persons
Family type			
Nuclear	100	67.10	
Extended	49	32.90	
Educational level			
No formal education	5	3.40	
Secondary education	81	54.40	
Tertiary education	63	42.30	
Schooling years			
None	5	3.40	
≤ 12	81	54.40	$13.43 \pm$
> 12	63	42.30	2.07 years
Other occupations			
Trading	74	49.70	
None	75	50.30	
Estimated daily income (₦)			
$\leq 10,000$	22	14.80	
10,001-20,000	110	73.80	$\text{₦}15,664.43$
$> 20,000$	17	11.40	± 3756.28

Source: Field Survey, 2021

n - sample size, SD - standard deviation

Also, Table 1 shows that 51.7% of the fish marketers had a household size of 6 to 10 persons, while 21.5% and 26.8% had a household size of ≤ 5 persons and > 10 persons, respectively. The mean household size and standard deviation were 9.00 ± 4.00 persons. This means that fish marketers had relatively large household sizes which could have negative implications on the resultant household expenditure on food generally and in particular, fish consumption. In the same vein, 67.1% and 32.9% of the fish marketers were from nuclear and extended family types, respectively. Regarding educational qualifications, results in Table 1 show that more than half (54.4%) and 42.3% of the fish marketers had secondary and tertiary education, respectively. This is an indication that almost all the fish marketers had some level of formal education with the majority attaining either secondary or tertiary educational qualifications. The observed high level of education among the fish marketers could be directly linked to the prevalence of younger persons. Having the majority of the fish marketers being educated could

Table 2: Distribution of fish marketers by working conditions ($n = 149$)

Working conditions	Always	Sometimes	Rarely	Mean \pm SD
Sitting at a spot for a long time	100 (67.10)	49 (32.90)	0 (0.00)	1.67 \pm 0.47
Selling under the sun	78 (52.30)	51 (34.20)	20 (13.40)	1.39 \pm 0.71
Selling in the rain	66 (44.30)	43 (28.90)	40 (26.80)	1.17 \pm 0.83
Sitting in a poor posture for a long time	54 (36.20)	44 (29.50)	51 (34.20)	1.02 \pm 0.84
Working without protective wear such as hand gloves, etc.	39 (26.20)	51 (34.20)	59 (39.60)	0.87 \pm 0.80
Working in a noisy environment	87 (58.40)	28 (18.80)	34 (22.80)	1.36 \pm 0.83
Violence within the market	5 (3.40)	41 (27.50)	103 (69.10)	0.34 \pm 0.54
Working in a dusty environment	44 (29.50)	53 (35.60)	52 (34.90)	0.95 \pm 0.80
Working in a dirty environment	20 (13.40)	31 (20.80)	98 (65.80)	0.48 \pm 0.72
Selling close to gutter/drainage channel	20 (13.40)	26 (17.40)	103 (69.10)	0.44 \pm 0.72
Grand mean				0.97

Source: Field Survey, 2021. Figures in parentheses are expressed as percentages, mean < 1.00 indicate safe working condition; mean ≥ 1.00 indicate unsafe working condition, n - sample size, SD - standard deviation

be linked to the cosmopolitan nature of the study area which aligns with the position of Akinpelu *et al.* (2013) and Anyim *et al.* (2021) that educated persons rarely live in rural areas but urban cities. The mean years spent in formal schooling \pm standard deviation was 13.43 ± 2.07 . About half (50.3%) of the fish marketers had no secondary occupations, while 49.7% of the fish marketers were into trading as a secondary occupation. Engaging in other occupations could also complicate the fish marketers' level of hazards as the level of hazards experienced by those who had other occupations would be higher than those who had no other occupation. The majority (73.8%) of the fish marketers had an estimated daily income of between ₦10,001 and ₦20,000 with a mean daily income \pm standard deviation of ₦15,664.43 \pm 3,756.28. This implies that the fish marketers earned significantly higher than most civil servants considering the national minimum wage scale of ₦30,000 in the country (Sasu, 2021).

Working Conditions of the Frozen Fish Marketers

The results on the working conditions of the fish marketers are presented on Table 2. Most of the fish marketers were always involved in sitting at a spot for a long time (67.1%), selling under the sun (52.3%), selling in the rain (44.3%), sitting in a poor posture for a long time (36.2%), and working in a noisy environment (58.4%). The mean values ranged from 0.34 ± 0.54 to 1.67 ± 0.47 . The grand mean being less than 1.00 indicated that most of the frozen fish marketers were working in safe conditions. It was deduced that a substantial proportion of the fish marketers were exposed to occupational hazards resulting mainly from back pain, headache, exposure to cold and sunlight, stress, skin irritation, skin rashes, respiratory system irritation, and body odour.

Figure 1 shows that a higher proportion (60.4%) of the fish marketers were in good/safe working conditions while 39.6% were in poor/unsafe working conditions. This means that most of them were working under good and/or safe conditions as their environment of work was not characterized by dirt, dust, and not close to drainage channels.

Safety Measures Adopted by the Fish Marketers

As shown in Table 3, all of the fish marketers (100%) were using pain relievers after work. Also, most used hand gloves (76.5%), wore nose masks (86.6%) and wore an apron (80.5%), used plaster to cover cuts (53.7%) and 49.7% underwent regular medical check-ups. This implies that the fish marketers have taken proactive measures to reduce the effects of hazards associated with their occupation. It could then be deduced that the fish marketers were proactive in adopting safety measures for taking good care of their selves. This could further explain why most of the fish marketers' condition of work was categorized as safe. This disagrees with the findings of Saha *et al.* (2006) who linked respiratory-related diseases among processors to their frequent dipping of hands in iced fish.

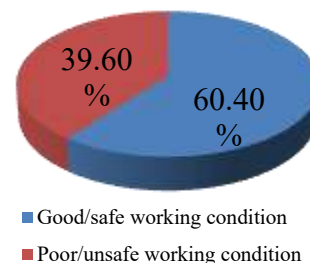


Figure 1: Distribution of fish marketers according to working conditions (Source: Field Survey, 2021)

Table 3: Distribution of fish marketers by safety measures adopted ($n = 149$)

Safety measures	Frequency	(%)
Use of hand gloves	114	76.50
Wearing nose masks	129	86.60
Regular washing of hands with soap and water	71	47.70
Wearing of apron	120	80.50
Use of pain reliever after work	149	100.00
Use of plaster to cover cuts	80	53.70
Regular medical checkup	74	49.70

Source: Field Survey, 2021

Table 4: Distribution of fish marketers by occupational hazards ($n = 149$)

Hazards	Always	Sometimes	Never	Mean and SD
Cuts from knives and other sharp objects	0 (0.00)	120 (80.50)	29 (19.50)	0.81 ± 0.40
Back pain	108 (72.50)	41 (27.50)	0 (0.00)	1.72 ± 0.45
Headache	104 (69.80)	11 (7.40)	34 (22.80)	1.47 ± 0.84
Exposure to cold	72 (48.30)	19 (12.80)	58 (38.90)	1.09 ± 0.93
Exposure to sunlight	67 (45.00)	19 (12.80)	63 (42.30)	1.02 ± 0.94
Whitlow	0 (0.00)	112 (75.20)	37 (24.80)	0.75 ± 0.43
Loss of fingernails	8 (5.40)	24 (16.10)	117 (78.50)	0.27 ± 0.55
Stress	111 (74.50)	38 (25.50)	0 (0.00)	1.75 ± 0.44
Sexual harassment	8 (5.40)	0 (0.00)	141 (94.60)	0.11 ± 0.45
Skin irritation	73 (49.00)	76 (51.00)	0 (0.00)	1.49 ± 0.50
Skin rashes	90 (60.40)	46 (30.90)	13 (8.70)	1.52 ± 0.65
Respiratory system irritation	43 (28.90)	70 (47.00)	36 (24.20)	1.05 ± 0.73
Body odor	96 (64.40)	34 (22.80)	19 (12.80)	1.52 ± 0.71
Grand mean				1.12

Source: Field Survey, 2021. Figures in parentheses are expressed as percentages, n - sample size, SD - standard deviation, mean < 1.00 indicates a low level of occupational hazard, mean \geq 1.00 indicates a high level of occupational hazard

Occupational Hazards Associated with Frozen Fish Marketing

Table 4 presents the distribution of fish marketers by occupational hazards associated with frozen fish marketing. It reveals that the majority (72.5%) of the fish marketers always experienced back pain.

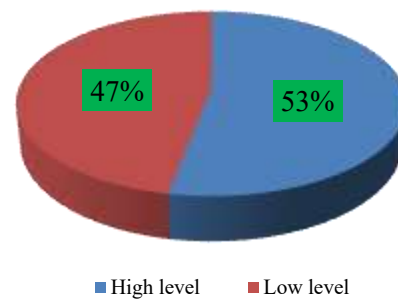
Majority (69.8%) always experienced headaches, 48.3% were always exposed to cold, and 45% were always exposed to sunlight. Furthermore, 74.5% always suffered from stress, 60.4% always had skin rashes and 64.4% always had body odour. Also, cuts from sharp objects (80.5%), whitlow (75.2%), and skin irritation (51%) were sometimes experienced by most of the frozen fish marketers while 94.6% never experienced sexual harassment. Considering the mean values, stress was the most frequently experienced hazard ($\bar{x} = 1.75 \pm 0.44$), followed by back pain ($\bar{x} = 1.72 \pm 0.45$), skin rashes ($\bar{x} = 1.52 \pm 0.65$) and body odour ($\bar{x} = 1.52 \pm 0.73$).

In general, Figure 2 shows that more than half (53%) of the fish marketers were exposed to a high level of occupational hazards, while 47% were exposed to a low level of occupational hazards. This indicated that more of the frozen fish marketers were exposed to some occupational hazards resulting mainly from back pain, headache, exposure to cold and sunlight, stress, skin irritation, skin rashes, respiratory system irritation, and body odor. Unlike in other studies, cuts were not a common source of exposure to occupational hazards among fisher- folks (Olaoye *et al.*, 2015; Ngajilo and Jeebhay, 2019).

Table 5: Correlation analysis of working conditions and level of hazards experienced by fish marketers

		Level of occupational hazards
	Pearson correlation (r)	-0.721**
Working condition	p -value	0.000
	n	149

** - correlation is significant at the 0.01 level (2-tailed);
 n - sample size

**Figure 2:** Distribution of frozen fish marketers based on level of occupational hazards (Source: Field Survey, 2021)

Testing of Hypothesis

H_01 denotes hypothesis that there is no significant relationship between fish marketers' working conditions and the level of occupational hazards experienced was tested using PPMC. Results on Table 5 depict that the fish marketers' working condition was significantly and negatively correlated with the level of occupational hazards experienced by them ($r = -0.721$, $p \leq 0.01$) implying that frozen fish marketers who operate under safe working condition are not likely to be exposed to high levels of occupational hazards, unlike their counterpart who operate in a poor working condition.

CONCLUSION

Based on the findings of this study, most of the fish marketers' working condition was good/safe which could be attributed to their use of safety/protective measures. Despite this, it was evident that fish marketers were exposed to some hazards related to their occupation. The study then concludes that frozen fish marketing was associated with a high level of occupational hazards. To minimize the negative effect of occupational hazards on frozen fish marketers, there are needs to improve their working conditions through the following recommendations:

- i. Frozen fish marketers should avoid dirty, dusty, and noisy environments to improve their working conditions;
- ii. Frozen fish marketers should undergo regular medical check-ups;
- iii. Government and other stakeholders, through the cold room operators, should sensitize fish marketers on the benefits of good hygiene while at work.

REFERENCES

- Adedeji I., Olapade-Ogunwole F., Farayola C. and Adejumo I. (2011). Productivity effects of occupational hazards among poultry farmers and farmworkers in Osogbo local government area of Osun State. *Int. J. Poult. Sci.*, **10** (11), 867-870
- Akinpelu O., Ayelaja A., George F., Adebisi G. and Jimoh W. (2013). Gender analysis of processing activities among commercial catfish processors within Ibadan metropolis, Oyo State, southwestern Nigeria. *J. Aquac. Res. Dev.*, **4** (3), 1-5
- Anyim C.O., Odoemelam L.E. and Okorie N.U. (2021). Women participation in fish processing and packaging in rural communities of Delta State, Nigeria. *J. Agric. Ext. Rural Dev.*, **13** (1), 34-43
- Azeez F.A., Kabir G.B., Amoo M.A. and Nosiru M.O. (2021). Marketing, distribution, and consumption of fish in Ido local government area, Oyo State, Nigeria. *Agro-Science*, **20** (2), 68-73
- Bradley B., Byrd K., Atkins M. *et al.* (2020). Fish in food systems in Nigeria: A review. WorldFish Program Report, Penang, Malaysia, p. 6
- Cliffe P.T. and Akinrotimi O.A. (2015). Role of women in fishery activities in some coastal communities of Rivers State, Nigeria. *Int. J. Agric. Res.*, **10**, 24-32
- Coster A.S. and Otufale G.A. (2010). Economic analysis of frozen fish marketing in Ijebu-Ode local government area, Ogun State, Nigeria. *Res. J. Soc. Sci.*, **1** (5), 90-101
- Esiobu N.S. and Onubuogu G.C. (2014). Socio-economic analysis of frozen fish marketing in Owerri municipal council area, Imo State, Nigeria: An econometric model approach. *Schol. J. Agric. Sci.*, **4** (8), 449-459
- FAO (2018). The state of world fisheries and aquaculture: Meeting the sustainable development goals. Food and Agriculture Organization (FAO), Rome. Retrieved 22/05/2022 from <http://www.fao.org/docrep/fao/011/i0250e/i0250e.pdf>
- FCWC-FISH (2016). Nigeria fisheries statistics: 2016 summary report. Fisheries Committee for the West Central Gulf of Guinea. Retrieved 04/04/2022 from <https://www.fcwc-fish.org>
- FAOSTAT (2017). Country indicators: Nigeria. Food and Agriculture Organization (FAO) Statistics. Retrieved 22/05/2022 from <http://www.fao.org/faostat/en/#country/159>
- Hoiberg D.H. (2010). Abeokuta. Encyclopaedia Britannica, 15th edn. Encyclopaedia Britannica Inc., Chicago, IL, p. 27
- Idio A.D. and Adejare G.T. (2013). Conceptual analysis of rural farmers' health and its implication on agricultural productivity. *Nig. J. Agric. Food Environ.*, **8** (3), 32-38
- Ike-Obasi J.J. and Ogubunka S.O. (2019). The roles of women in fish processing activities in some local government areas of Rivers State, Nigeria. *Agric. Ext. J.*, **3** (2), 73-77
- IndexBox (2020). Africa's frozen whole fish market: Nigeria emerges as the largest market with \$488M of imports in 2018. Retrieved 28/05/2021 from <http://www.globaltrademag.com>
- Liverpool-Tasie L., Sanou A., Rearon T. and Belton B. (2021). Demand for imported versus domestic fish in Nigeria. *J. Agric. Econ.*, **72** (3), 782-804
- NPC (2010). 2006 Population and Housing Census. Priority Table IV, National Population Commission. Retrieved 22/05/2022 from <http://www.population.gov.ng/images/priority%20table%20Vol%204.pdf>
- Ngajilo D.A. and Jeebhay M.F. (2019). Occupational injuries and diseases in aquaculture - A review of the literature. *Aquac.*, **507**, 40-55
- Oduwale A.O. (2019). Comparative analysis of smoked and frozen fish marketing in Benin metropolis, Edo State, Nigeria. *FUDMA J. Sci.*, **3** (3), 168-176
- Ogundari K. (2017). Categorizing households into different food security states in Nigeria: The socioeconomic and demographic determinants. *Agric. Food Econ.*, **5** (1), 1-20
- Okeoghene E.S. (2013). Assessment of the marketing of frozen fish (iced fish) in Edo State, Nigeria. *Asian J. Bus. Manage.*, **5** (4), 355-357
- Olaoye O.J., Odebiyi O.C. and Abimbola O.T. (2015). Occupational hazards and injuries associated with fish processing in Nigeria. *J. Aquat. Sci.*, **3** (1), 1-5
- Olaoye O.J., Ojebiyi W.G., Olalekan T.O., Abdulsalami S.A. and Opele I.A. (2019). Contribution of women fish merchants in artisanal fisheries development in Ogun waterside local government area, Ogun State. *Nig. J. Fish.*, **16** (2), 1729-1736
- Olowogbon S.T. (2011). Health and safety in agriculture and food security nexus. *Int. J. Emerg. Sci.*, **1** (2), 73-82
- Onubuogu G., Esiobu N., Nwosu C. and Okereke C. (2014). Resource use efficiency of smallholder cassava farmers in Owerri agricultural zone, Imo State, Nigeria. *Schol. J. Agric. Sci.*, **7** (8), 142-152
- Onyekuru N., Ihemezie E. and Chima C. (2019). Socioeconomic and profitability analysis of catfish production: A case study of Nsukka Local Government Area of Enugu State, Nigeria. *Agro-Science*, **18** (2), 51-58
- Park K. (2011). *Park's Textbook of Preventive and Social Medicine*, 21st ed. Banarsidas Bhanot Publishers, 868 pp.
- Saha A., Nag A. and Nag P. (2006). Occupational injury proneness in Indian women: A survey in fish processing industries. *J. Occup. Med. Toxicol.*, **1** (23), 1-5
- Sasu D.D. (2021). The monthly minimum wage in Nigeria 2018-2021. Retrieved 06/04/2022 from <http://www.statista.com>
- WorldFish (2017). WorldFish in Nigeria: Factsheet. Penang, Malaysia, 17 pp.