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Perceived Effect of Fish Harvesting and Processing Methods on the Health Status of Fisherfolks in Cross River State, Nigeria

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Abstract

This study investigated the impact of fish harvesting and processing methods on the health of fisherfolks in Cross River State, Nigeria. Employing a multi-stage sampling technique, 162 harvesters and 67 processors were selected from coastal areas with extensive fishing activities. Data were analyzed with percentages, mean, standard deviation, and Spearman rank order correlation analysis*. The results revealed that common fish harvesting methods include drift net (97%), gill net (90%), and hook and line (94%), while predominant processing methods were smoking with a chokor oven (94%) and smoking with a cylindrical drum. Insect bites (96.91%), injuries (95.68%) and sunburns (89.51%) were the major health issues faced by harvesters, while insect bites (100.0%), heat burns and injuries (92.54%, respectively, were predominant health issues faced by processors. Bamboo traps ($\bar{x}$=2.96), machetes ($\bar{x}$=2.92), and traditional screens ($\bar{x}$=2.53) significantly impacted the health of fisher folks during harvesting. For processors, smoking ($\bar{x}$=2.73), roasting ($\bar{x}$=2.58), and frying ($\bar{x}$=2.23) had severe health effects. Traditional fishing and processing methods pose significant health risks, causing issues like cold-related ailments, injuries, pneumonia, and heat burns. The study recommends that relevant government agencies establish critical safety regulations and provide appropriate personal protective equipment to fisherfolks involved in harvesting and processing activities.*

Keywords: Harvesting methods, processing methods, health status, fisherfolks**.**

Introduction

Fish contribute significantly to the food and nutritional security of about 200 million Africans (Muringai et al., 2021). It contains thiamine, riboflavin, vitamins A and D, phosphorus, calcium, zinc, and iron. It is high in polyunsaturated fatty acids, which are significant in decreasing blood cholesterol levels, making it suitable for intake by persons of all socioeconomic backgrounds and with various health conditions (Komprda et al., 2020; Jiang et al., 2021).

Aside from its nutritional significance, fish is a source of income for about 10 million individuals, the majority of whom are small-scale fishermen and fish production entrepreneurs (Shamsuzzaman et al., 2020). Over 500 million people worldwide rely on wild fisheries and related activities like boat building and fish processing (Mehanna, 2022). Ninety-seven percent of fisheries workers reside in underdeveloped nations (Onyango et al., 2021).

Small-scale fisheries in developing countries employ approximately 90% of the sector's workforce, with Asia accounting for 30.8 million, followed by Africa (5.6 million), Latin America and the Caribbean (1.9 million), Europe (544, 000), North America (314, 000), and Oceania (121, 000) (March & Failler, 2022; Deb & Dey, 2024). In Nigeria, more than ten million people work in the fishery industry, either directly or indirectly (Yonmo et al., 2022). Inland fisheries are a significant source of food supply, contributing to food security and household income (Simmance et al., 2022; Matthew et al., 2024).

Various harvesting and processing methods of fish and fishery products have been developed and utilized by fisher folks, aimed at facilitating fish catch and stopping or slowing down spoilage to give products a longer shelf life. However, Thorvaldsen et al. (2020) and Vergis et al. (2021) found that harvesting and processing methods pose health issues. This means that harvested and processing conditions expose the fisherfolks to health hazards, putting the health status of fisherfolks at risk of health challenges, ranging from simple to complex ones. Arthur et al. (2022) stated that fish harvesting and processing are among the most hazardous occupations with considerable health risks. According to Julius (2021), several hazards and injuries have been reported in the fish harvesting and processing industry, including redness/swelling of the eyes, cuts, eye irritability, skin burns, falls, sunburns, mechanical and electrical accidents, bacterial and parasitic infections, noise-induced hearing loss, allergic respiratory diseases, and stress-related health issues.

Unfortunately, researchers frequently focus on fish quality aspects such as nutrition, slaughter techniques, organoleptic characteristics, improved equipment, and increased production, while paying little attention to fisherfolks' well-being (Calanche et al., 2020; Huang et al., 2021; Ali et al., 2022; Siaw et al., 2024). Additionally, in Cross River State, a flourishing coastal state, there is little body of knowledge regarding the health challenges faced by harvesters and processors (Shrestha et al., 2022). To close this gap, the study looked into the consequences of fish harvesting and processing methods on the health of fisherfolks, with the following specific objectives:

i. Identify the methods utilized by fisherfolks in fish harvesting and processing;
ii. assess the perceived health effects associated with fish harvesting and processing; and
iii. identify the severity of the effect of fish harvesting and processing methods on the health status of fisherfolks.

Hypothesis

H_o: There is no significant relationship between the fish harvesting and processing methods used and the health status of fisher folks.

Methodology

This study was conducted in Cross River State, which is a coastal State in the Niger Delta region of Nigeria. Cross River State is located within the tropical rainforest belt of Nigeria. It lies between latitude 40 28^o and 60 55^o North of the equator and longitude 70 50^o and 90 28^{o}East of the Greenwich meridian. The State's ecosystems include mangrove and swamp forests near the coast, tropical rainforests farther inland, and savannah woods in the north (Fasona et al., 2020). The cross river flows and cuts across almost 75 percent of the Local Government Area in the State, with adjourning streams and tributaries. As a result, fish harvesting and processing activities are common practices of the majority of the inhabitants.

The study used the multi-stage sampling procedure to select coastal extension blocks and cells where fishing activities are carried out on a large scale. In the first stage, purposive sampling was employed to select six (6) coastal extension blocks among the State's eighteen (18) extension blocks, based on their fishing activities. They include Abi, Bakassi, Calabar South, Odukpani, Akpabuyo, and Obubra. The second stage entailed the purposive selection of three cells from each block based on their predominance of fishing activity. However, in the Obubra block, only one cell could be identified based on fishing activities. This gave 16 cells (5 blocks x 3 circles, plus 1 circle from the Obubra block). Finally, a list of registered fish harvesters and processors was obtained from the Agricultural Development Project (ADP), having a total population of 1080 harvesters and 447 processors across the selected cells. A proportionality factor of 15% was applied to draw 162 harvesters and 67 processors, giving a total of 229 respondents for the study. The survey design was chosen for the study. The data were examined using percentages, mean, and standard deviation and the hypothesis was tested with Spearman rank order correlation analysis. The research variables were measured using nominal and ordinal scales.

Results and discussion

Fish Harvesting Methods

Table 1 reveals that drift net (97.0%), gill net (90.0%), hook and line (94.0%), canoe with cast net (85.0%) and basket (55.0%), were some of the widely used fish harvesting methods by the respondents. The result equally indicates that spear (94.0%), trawler (88.0%) and handpicking (88.0%) were the most unused harvesting methods among the harvesters in the area. The results corroborate the findings of Viaho et al. (2021), which revealed that “hook and line, fishing net and canoe-based fishing are the most popular fishing methods among peasant coastal fisherfolks”.

Table 1: Fish harvesting methods

Harvesting	Percentage

Traditional screen	36.0
Spear	6.0
Hook and line	94.0
Gill net	90.0
Chemicals	24.0
Use of basket	55.0
Use of canoe with cast net	85.0
Hand-picking inside the river	12.0
Use of trailer with dragnet	12.0
Use of machetes	23.0
Use of bamboo taps	48.0
Use of drift net buried in water	97.0

Source: Field survey, 2023

Fish Processing Methods

Table 2 shows that smoking with a chokor oven (94.0%), smoking with a cylindrical drum and wire mesh (92.0%), as well as smoking with bamboo sticks (78.0%) were the most commonly used processing methods among the respondents. The findings also show that salting (94.0%) and freezing in the refrigerator (84.0%) were some of the most unused processing methods among the respondents. The results confirm the findings of Alabi et al. (2020) that smoking is the main processing method used by rural fish farmers and processors.

Table 2: Fish processing methods

Processing methods	Percentage
Smoking using a chokor oven	94.0
Smoking using cylindrical drum/wire mesh	92.0
Smoking using a smoking kiln	31.0
Smoking using bamboo sticks	78.0
Smoking using a circular red clay oven	97.0
Roasting	75.0
Salting	6.0
Frying with oil	47.0
Freezing in refrigerator	16.0
Sun drying	66.0
Boiling and frying	78.0

Source: Field survey, 2023

Perceived health effects associated with fish harvesting

Table 3 shows that the majority of fish harvesters (96.9%) in the state suffered insect bites, 95.7% suffered injuries, 89.5% of them suffered sunburns, and 66.7% of the fish harvesters suffered pneumonia. The prevalence of insect bites could be attributed to variables such as outdoor work, closeness to insect habitats, or insufficient protective apparel. Injuries are common, impacting the great majority of the harvesters (Yadav et al., 2021). This high percentage shows that occupational risks, poor working

environments, a lack of safety measures, or even risky behaviors are prevalent among fish harvesters in the study area. The high incidence of sunburns could be ascribed to excessive sun exposure without proper protection, or a lack of knowledge about sun safety precautions may all contribute to this health effect.

Table 3: Perceived health effects associated with fish harvesting

Health effects	Percentage
Pneumonia	66.7
Injuries	95.7
Waterborne disease	60.5
Exposure to harsh chemicals	53.7
Heat stress	47.5
Sunburns	89.5
Insect bites	96.9
Noise-induced hearing loss	26.5
Muscle stress	82.7

Source: Field survey, 2023

Perceived Health Effects Associated With Fish Processing

From the results in Table 4, all the processors (100.0%) were bitten by insects, 92.5% suffered heat burns and injuries, 86.6% incurred cuts and lacerations, and 79.1% experienced skin irritation. The prevalence of insect bites in all assessed processors indicates that workers are exposed to insects, most likely in outdoor or semi-outdoor processing facilities. The high incidence of heat burns and injuries indicates that fish processing requires exposure to high temperatures or hot surfaces. This could happen while cooking, boiling, or using hot equipment and utensils in fish processing.

Fish processing frequently requires using sharp instruments like knives and blades to cut and fillet fish. The high percentage of cuts and lacerations implies that workers are at risk of injury as a result of the sharp character of their tasks. Inadequate training, weariness, or a fast work tempo may increase the risk of mishaps resulting in cuts and lacerations (Hasselberg et al., 2020).

Table 4: Perceived health effects related to fish processing

Health effects	Percentages
Heat burns	92.5
Cuts and lacerations	86.6
Eye irritation	59.7
Respiratory issues	19.4
Eye strain	50.8
Injuries	92.5
Insect bites	100.0
Muscle strain	73.1
Heat stress	85.1
Skin irritation	79.1

Source: Field survey, 2023

Severity of the Effect of Fish Harvesting Methods on the Health Status of Fisher Folks

Table 5 indicates that the use of bamboo traps immersed in water had the highest mean ($\bar{x}$ = 2.96, SD= 0.20). This implies that this harvesting method had the severest impact on the health status of fisher folks (Sethy & Nayak, 2020). The use of machetes, with a weighted mean of 2.92 and standard deviation of 0.34, was the second highest, followed by the use of traditional screens and use of baskets ($\bar{x}$=2.53, SD=0.80 and $\bar{x}$=2.4, SD=0.72), respectively. On the other hand, the harvesting method with the least severe impact on the health status of fisher folks is the use of chemicals ($\bar{x}$=1.02, SD=0.19). This could be because the use of chemicals in fish harvesting is less stressful to apply and does not require much human manipulation to function.

Table 5: Severity of the effect of harvesting methods on the health status of fisher folks

Harvesting methods	$\bar{x}$	SD
Use of a traditional screen	2.53*	0.80
Spear	1.19	0.49
Hook and line	2.39*	0.64
Gill net	1.49	0.76
Chemicals	1.02	0.19
Use of basket	2.46*	0.72
Use of canoe with cast net	1.59	0.71
Hand-picking inside the river	2.26*	0.83
Use of machetes	2.92*	0.34
Use of bamboo traps immersed in the water	2.96*	0.20
Use of drift net immersed in the water	1.95	0.95

Source: Field survey, 2023 *= harvesting methods with severe effects

Severity of the Effect of Fish Processing Methods on The Health Status of Fisher Folks

Results in Table 6 show that smoking, roasting, and frying ($\bar{x}$=2.73, SD=0.48, $\bar{x}$=2.58, SD=0.68, and $\bar{x}$=2.23, SD=0.60) were the most common processing methods revealed by respondents as posing significant health risks. These findings demonstrated that smoking fish presents significant health risks to processors (Cortés-Sánchez et al., 2024). Open-air kilns and refrigerators were shown to have the least negative impact on fish processors' health ($\bar{x}$=1.0, SD=0.00).

Table 6: Severity of the effect of fish processing methods on the health status of processors

Processing methods	$\overline{x}$	SD
Smoking	2.73*	0.48
Roasting	2.58*	0.68
Frying	2.23*	0.60
Salting	1.27	0.57
Freezing	1.53	0.67
Sun drying	1.56	0.91
Open air kiln	1.00	0.00
Refrigerator	1.00	0.00
Boiling and cooking	1.47	0.64

Source: Field survey, 2023 * = processing methods with severe effects

Relationship Between Harvesting and Processing Methods and the Health Status of Fisherfolks

Table 7 shows the relationship between the choice of harvesting methods, as well as the choice of processing methods and the health status of harvesters and processors, respectively. The result reveals that there was a positive, significant (P<0.01), and strong relationship (66.6%) between the choice of harvesting methods and the health status of harvesters. This implies that choosing to use different harvesting methods will consequently lead to significant health issues for harvesters (Yadav et al., 2021).

Contrary to this, the result in Table 7 also reveals that the choice of processing methods and health status of processors had a negative, weak (6.7%) and insignificant relationship. This implies that the choice to try out new processing methods will lead to reduced health risks for processors.

Table 7: Relationship between harvesting and processing methods and the health status of fisherfolks

Variables	n	Coefficient (r)
Harvesting method Vs health status	162	0.666*
Processing method vs. health status	67	-0.067

Source: Fieldwork, 2023 *Significant at P=0.05

Conclusion and Recommendations

The severity of health challenges varies depending on the harvesting and processing method used, with more severe health impacts occurring when bamboo traps are used

for harvesting and smoking for processing. Thus, urgent action is required to enhance safety conditions, such as installing safety measures, providing training, and investing in improved equipment. Raising knowledge of occupational dangers is critical for creating a safer working environment in the fishing industry. Additionally, fisherfolks should be encouraged to use alternative fish processing processes, such as low-smoke ovens, solar drying, or automated processing equipment, that pose less health risk to processors.

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