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## ASSESSMENT OF FISH POST HARVEST LOSSES AS INFLUENCED BY SOCIO-DEMOGRAPHIC CHARACTERISTIC OF FISHERMEN OF RIVER NIGER, YAURI LANDING SITE, KEBBI STATE, NIGERIA.

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**Abstract:** *Post-harvest fish losses pose significant challenges to the livelihoods and food security of fishing communities worldwide. This study investigates the magnitude and extent of post-harvest fish losses among fishermen at the River Niger, Yauri Landing Site in Kebbi State, Nigeria. Through a comprehensive analysis of survey data collected from 100 respondent (Table 4.1.1). The study revealed that fishermen commonly experience physical losses, and economic post-harvest fish losses, with factors such as inadequate storage facilities, poor handling practices, and lack of access to refrigeration contributing significantly to these losses. (Table 4.2.1) shows that 68% of the fisherman encountered economic post-harvest fish losses while 32% physical post-harvest fish losses. The socio-economic impacts of fish post-harvest losses, including decreased income, reduced food security, and increased financial burden, underscore the urgency of addressing these challenges to enhance the resilience and sustainability of fishery operations. (Table 4.3.6) shows that 58% experience 1kg loss per catch while 19% ½ kg loss while 16% experienced 2kg loss and 7% experienced more than 2kg loss. Based on the findings, several recommendations are proposed to address the underlying challenges of post-harvest fish losses. These include investment in infrastructure, such as cold storage facilities and capacity building for fishermen on best practices in fish post-harvest handling and storage, market access initiatives to improve market linkages and policy support for sustainable fisheries management practices, resource management initiatives and community engagement in decision-making processes.*

**Keywords:** Post harvest losses, Fish, Fishermen, Socio-economic, River Niger, Yauri, Landing Site

## Introduction

Fish is one of the perishable commodities alongside other agricultural products whose quality must be maintained (Alam *et al.*, 2021). The main cause of post-harvest fish losses is attributed to handling, types of packaging materials, storage facilities, and transportation network (Arah *et al.*, 2015, Sinha *et al.*, 2019) whereas Sub-Saharan Africa is not left out of these challenges. It has been established that about 12.1 million individuals in Nigeria are faced with severe food insecurity (FAO 2019).

Fish has consistently been among the most commonly used and comparatively cheaper source of animal protein, essential fatty acids, vitamins and minerals for most people across the globe. In most developing countries, fishing is often a source of direct and indirect employment opportunities to rural communities. The harvest, handling, processing and distribution of fish provide livelihood for millions of people and also provide valuable foreign exchange earnings. In both the industrialized and developing countries (Adewolu and Adeoti, 2010)

Post-harvest fish losses (PHFLs) denotes the loss of physical quality of captured fish due to some unavoidable circumstances. Here, the fish is being either discarded or disposed at a relatively inferior price. About 35% of the total harvests from world fisheries are subjected to PHFLs annually (Akande & Diei, 2010). Fish is generally wholesome and safe. Battling the issue of post-harvest fish losses (PHFLs) is, thus, the surest approach of guaranteeing adequate food supply and food security in developing nations, especially in Sub-Sahara Africa (Ahmed, 2008). Fish spoilage is mainly due to enzymatic activity, microbial growth and lipid oxidation resulting in loss of positive sensory attributes. (Valtysdottir *et al.*, 2010).

Gbolagunte *et al.*, (2012) stated that in adult, total protein intake was over 60% where fish serves as the main factor supplying balanced vitamins, minerals and protein mostly in the rural areas. Fish is a highly perishable food which needs to be suitably handled, processed and marketed to reduce post-harvest losses (Nowsad, 2010). In fisheries sector, quantity and quality losses are very high which leads to nutritional loss of fish. Review of case studies of post-harvest losses in several countries in Africa shows high level of losses both the quality and quantity (physical losses) of fishery products. Reduction of post-harvest losses started after the mid-1970s food crisis and ever since then the problem still persists. This issue led the United Nations in 1975 to notify the attention of world towards post-harvest losses reduction in developing countries that needs immediate intervention.

In 1992, meeting was held by Strategy for International Fisheries Research (SIFR) which concluded that developing a systematic approach for fish loss assessment should be the major concern of researchers (Ward, 1996, Mungai, 2014). The three fisheries sub-sector where artisanal fisheries sub-sector account for over 80% of total fish production in Nigeria. Despite this, it is challenged with 30 – 50% post-harvest fish losses of landed weight (Adesehinwa *et al.*, 2005; Emere & Dibal, 2013; Olusegun & Matthew, 2016).

## MATERIAL AND METHODS

### Study Area

Yauri is located on latitude 10<sup>0</sup>51 North and Longitude 4<sup>0</sup>41 east of southern part of Kebbi state, Nigeria. Yauri's ethnic groups include Shangawa, Gungawa, Dukawa, Kamberi, Hausa, sarkawa mostly from (Dole kaina and Lolo in Niger Republic) Nupe, Yoruba, Igbo and Kanuri as well as the people from Mali (Mainly Fishermen, boat and canoe constructors) However, the predominance of Hausa's in the socio-political structure of

northern Nigeria has gradually increased the transformation of some of the dominant ethnic groups in Yauri to become Hausas. Today, the Hausa people constitute the governing class of Yauri. The Reshe people consider Yauri to be their ancient city. Today, the Hausa language is the main language.

The rainy season is usually between June and early October, however, rain sometimes starts in April or May. During the rainy season most farmers favor harvesting their crops, planting crops and repairing the farms. Festivals and commemoration dominate the rainy season calendar. Harmattan is the other season. Yauri falls in the Northern guinea zone with mean annual rainfall of 700-900mm (Akintola, 1986). Mean monthly temperature do not fall below 25<sup>0</sup>C with mean monthly maximum of 35<sup>0</sup>C-38<sup>0</sup>C and minimum of 25<sup>0</sup>C April and May are the hottest month while December and January are the coldest.

The study was carried out in ten (10) yauri landing sites of river Niger at the Headquarter of Yelwa Local Government Area, which is one of the twenty-one (21) local government of Kebbi state. The geography of the area is dominated by two features the kainji lake (1,250 square kilometer in area) with the tributaries of the rivers flowing in to the river and some chain of low-lying hills that runs directly. (Abdullahi, 1990).

### **Target Population**

The target populations of this study include the local fishermen from ten (10) Yauri landing sites of river Niger, Kebbi state. Both the men and women were actively involved in the study, provided that they actively take part in the post- harvest fish handling processes.

### **Sampling Technique**

A multi-stage sampling techniques were adopted for the study and ten landing sites were selected. Purposive sampling technique was adopted based on fishermen engagement in fishing. A total number of 100 individuals ten (10) from each landing sites were used as the sample for this study. The landing sites are as follows: - Taraba, Monday, Master, Bunzawa, Sarkinruwa, Tsamiya, Yauri Fish market, Wadata, Garbamaikwata, and Zamare la Landing site.

### **Data Collection**

The structured and semi-structured questionnaires were used to acquire data from the fishermen on the root causes of post-harvest fish loses on the fishermen at river Niger, Yauri Landing Site. The data collected were recorded on the datasheets for further analysis.

### **Pilot Test**

The questionnaires were tested in one of the selected Landing Sites, prior to the actual study in the ten (10) expected Landing Sites. The aim of the pilot test was to assist in structuring of the questions and approximating the average time the questionnaires would take. The questionnaires were administered to ten fishermen prior to the actual study to help in coding the units and responses from the fishermen.

### **Ethical Considerations**

Before onset of the study, the objectives of the study were explained to the fishermen deeply to allow them understand the aim of the study. To overcome the potential ethical issues, consent of the fishermen is sought to include only those who were willing and comfortable with the study. To overcome the ethical concern of privacy, the fishermen will be assured of confidentiality of their responses.

### 3. Statistical Analysis and Presentation

The collected data were inspected for abnormalities at the beginning of data analysis process. Subsequently, data are therefore be coded and entered into the computer system for analysis using (Statistical Package for Social Sciences) version 16.0. SPSS (Moser & Korstjens, 2018). Descriptive statistics were applied to analyzed objectives.

## RESULTS

### Socio-Demographic Characteristics of the Fishermen

The result on table 4.1.1 on the status of the fishermen revealed that all the fishermen interviewed from the 10 fishing communities had their leaders of fishing cooperation.

**Table 4.1.1 Status of the Fishermen**

Leaders of fishing community.	10	10%
Ordinary fishermen	90	90%
<b>Total</b>	<b>100</b>	<b>100%</b>

**Sources: Questionnaire administered, February 2024**

Table 4.1.2 Revealed that all the fishermen interviewed were male Ureshe and Sarkawa by tribe dominantly from Yauri.

**Table 4.1.2 Gender of the Fishermen**

Male.	100	100
Female	-	
<b>Total</b>	<b>100</b>	<b>100%</b>

**Sources: Questionnaire administered, February 2024**

Table 4.1.3 shows that about 46% were adult of age bracket 26-35 years while 22% were youth of age bracket 36-45 years while 19% were teenagers of the age bracket 16-25 years and 12% were elders of the age bracket 46-60 years and 1% was old men above 60 years of age.

**Table 4.1.3 Age of the Fishermen**

16-25	19	19%
26-35	46	46%
36-45	22	22%
46-60	12	12%
>60	1	1%
<b>Total</b>	<b>100</b>	<b>100%</b>

**Sources: Questionnaire administered, February 2024**

Table 4.1.4 shows that among the fishermen interviewed 81% were married while 12% were single while 3% were widowers 4% divorcee.

**Table 4.1.4 Marital status of the Fishermen**

Single	12	12%
Married	81	81%
Widower	3	3%
Divorcee	4	4%
<b>Total</b>	<b>100</b>	<b>100%</b>

**Sources: Questionnaire administered, February 2024**

Table 4.1.5 shows the number of children of the fishermen revealed that about 43% had 6-10 while 24% of the fishermen had 0-5 while 21% had 10-15 children while 12% had more than 16 children.

**Table 4.1.5 Number of Children of the Fishermen**

0-5	24	24%
6-10	43	43%
10-15	21	21%
>15	12	12%
<b>Total</b>	<b>100</b>	<b>100%</b>

**Sources: Questionnaire administered, February 2024**

Table 4.1.6 revealed that most of the fishermen had their children helping them in the fishing activities 29% had no fishing assistant 13% had 1 fishing assistant while 18% had 2 fishing assistants while 10% had 3 fishing assistant and 14% had 4 fishing assistants, also 7% had 6 fishing assistant mean while only 9% had 8 fishing assistant.

**Table 4.1.6 Number of Children assisting the Fishermen**

0	29	29%
1	13	13%
2	18	18%
3	10	10%
4	14	14%
6	7	7%
8	9	9%
<b>Total</b>	<b>100</b>	<b>100%</b>

**Sources: Questionnaire administered, February 2024**

Table 4.1.7 shows that the educational status of the fishermen revealed that 51% attended religious school while 25% attended primary school and 24% are into adult educational.

**Table 4.1.7 Educational Status of the Fishermen**

Primary school	25	25%
Secondary school	-	-
Religious school	51	51%
Adult educational	24	24%
<b>Total</b>	<b>100</b>	<b>100%</b>

**Sources: Questionnaire administered, February 2024**



Table 4.2.2 The types of physical post fish losses encountered by the fishermen with 43% injury on the head region while 29% bruises on the fish body and 28% predation.

**Table 4.2.2 Type: Physical Post Harvest Fish Losses Encountered by the Fishermen.**

Injury on the head region	43	43%
Bruises on the fish body	29	29%
Predation	28	28%
<b>Total</b>	<b>100</b>	<b>100%</b>

Sources: Questionnaire administered, February 2024

**Figure 4.2.2 Showing a fish with injury at head region.**



Table 4.2.3 shows that the economic post-harvest fish losses with 38% downgrading of fish because of spoilage while 32% lack of market survey by the fishermen and 17% due to oversupply with 12% competition of price among fishermen meanwhile 1% poor quality fish captured by the fishermen.

**Table 4.2.3 Type: Economic Post Harvest Fish Losses Encountered by the Fishermen.**

Downgrading of the fish because of spoilage	38	38%
Lack of market survey	32	32%
Oversupply	17	17%
Competition of price	12	12%
Poor quality fish	1	1%
<b>Total</b>	<b>100</b>	<b>100%</b>

Sources: Questionnaire administered, February 2024.



**Figure 4.2.2 Showing spoiled fish which lead to downgrading of the price.**

**Table 4.3.3 Timing during and after Fishing to Landing site by the Fishermen**

<2 Hrs	37	37%
2-4 Hrs	34	34%
4-6 Hrs	16	16%
>6 Hrs	13	13%
<b>Total</b>	<b>100</b>	<b>100%</b>

**Sources: Questionnaire administered, February 2024.**

The table 4.3.4 shows that 89% of the fishermen sell at fresh form while 9% as smoked and 2% as dried.

**Table 4.3.4 Condition of Selling fish by the Fishermen**

Fresh	89	89%
Smoked	9	9%
Dried	2	2%
<b>Total</b>	<b>100</b>	<b>100%</b>

**Sources: Questionnaire administered, February 2024.**

Table 4.3.5; At landing sites 65% sell their fish to fish processor while 31% sell to fresh fish vendor while 4% to house hold users especially when booked.

**Table 4.3.6 Quantity of Fish Spoil after Catches.**

<1kg	19	19%
1kg	58	58%
2kg	16	16%
>2kg	7	7%
<b>Total</b>	<b>100</b>	<b>100%</b>

**Sources: Questionnaire administered, February 2024.**

Table 4.3.7; The strategies employed by fishermen shows that due to absences of ice box, 81% of the fishermen only used broad leaves to cover their fish as means of shedding them from direct sunlight and ambient temperature while 19% used no strategy or method.

**Table 4.3.7 Strategies used by the Fishermen to Minimize Post Harvest Fish Losses**

Yes (Used of broad leaves)	81	81%
No	19	19%
<b>Total</b>	<b>100</b>	<b>100%</b>

**Sources: Questionnaire administered, February 2024.**

Table 4.3.8; The cleaning schedule of their fishing gear indicate that 92% clean and rinse using water from the river only to avoid bad odor while 8% do not clean their fishing gear.

**Table 4.4.1 Access to Storage Facilities During and After Fishing.**

Table 4.4.1 shows that 90% of the fishermen conditioned their fish after catch at ambient temperature while 10% uses ice box to store their fish after catch.

**Table 4.4.1 Access to storage facilities after fishing to landing sites**

Stored/Kept at ambient temperature	90	90%
Used ice box for storage	10	10%
<b>Total</b>	<b>100</b>	<b>100%</b>

Sources: Questionnaire administered, February 2024.



**Figure 4.4.1 Showing the condition which fishermen kept their fish at Sarkin Ruwa Landing site, Yauri, Kebbi state.**

Table 4.4.2; However 79% of the fishermen have no access to storage facilities after catches while 21% have access to the storage facilities/ cold room more especially for the big size fishes.

**Table 4.4.2 Access to storage facilities after catches**

Access to cold room	21	21%
No access to cold room	79	79%
<b>Total</b>	<b>100</b>	<b>100%</b>

Sources: Questionnaire administered, February 2024.

## DISCUSSION

The socio-demographic characteristic of the fishermen of river Niger, Yauri Landing site table (4.1.) like other small-scale fishermen in Nigeria and Africa belong to a group called artisanal fishermen. their characteristics are the use of a relatively simple fishing gear/technology and catches small quantity of fish, labor-intensive, small groups of operators, low capital inputs, marketing and distribution handled by powerful intermediaries and external to genuine fishers, and fishing communities suffer from poor physical infrastructure and living conditions (Seki & Bonzon, 1993). Similar finding was reported by Ita (1993) concerning artisanal fishermen of some water bodies in Nigeria on inland fisheries resources of Nigeria. Similarly, just as those of the arid region of Katsina State as reported by (Akpoko, 2003).

All the fishermen interviewed were males, Adult and Muslims this is probably because Kebbi state and the study areas are largely Muslims dominated state and their religion does not prohibit the fishing profession. The profession was also dominated by males because of religious, socio-cultural, political and capability limitation to women involvement., the distribution of gender within the sample indicates a predominance of male fishermen, reflecting broader trends observed in many fishing communities worldwide and also the



culture of males responsibility of providing the food and other necessities to the family as the majority of the females are house wives as observed by (Hua, 2015). Similar observation was reported by (Sraboni *et al.*, 2014) on women empowerment in Agriculture in Bangladesh. On the other hand, Ibrahim (2009), reported a greater number of women participations in fish processing business in Lake Feferuwa fishing communities in Nasarawa State.

The most prevalent type of post-harvest loss reported by respondents is economic post-harvest fish losses, accounting for 68% of the total losses. Economic PHFLs can lead to changes in price of the fish due to changes in texture, and odor, rendering the fish unsuitable for consumption or market sale. FAO (1981) has estimated economic post-harvest losses in developing countries to be up to 50% of domestic fish production. It requires improved post-harvest handling practices, such as proper sanitation, and effective packaging, to prolong the shelf life of fish and minimize losses. Solomon and Mekenon (2019) reported similar finding that Poor-quality fish constitutes an economic loss to fishermen and fish traders.

Physical post-harvest fish losses, ranks as the second most common type of post-harvest loss, comprising 32% of reported losses. Physical loss refers to injuries or trauma sustained by fish during handling, transportation, or processing activities. FOA (2010). Reported that physical post-harvest losses in small-scale fisheries can be among the highest for all the commodities in the entire food production system. Common causes of physical loss include rough handling, overcrowding in storage containers, and collisions during transportation. Physical loss not only reduces the aesthetic value of fish but also compromises their freshness and marketability.

Inadequate Storage Facilities is the most frequently cited cause of post-harvest fish losses accounting for 79%. Such as lack of proper refrigeration, cold room/storage capacity, or absence of protective packaging. Solanke (2022) reported similar finding that “Our problem in Nigeria is not production. We produce so much but what happens is that when there are no storage facilities, many of the fishes are wasted.” Inadequate storage conditions can accelerate fish spoilage, thereby contributing significantly to post-harvest losses. Addressing this issue requires hygienic packaging materials, to maintain fish quality and extend shelf life.

## **CONCLUSION**

Based on the findings of this study, it can be concluded that post-harvest fish losses pose significant challenges to fishermen at the Yauri Landing Site in Kebbi State, Nigeria. The prevalence of losses, coupled with factors such as inadequate infrastructure, poor handling practices, and limited access to refrigeration, underscores the need for targeted interventions to strengthen post-harvest management practices and enhance the efficiency and sustainability of fishery operations. While fishermen employ various coping strategies to mitigate losses, concerted efforts are required to address underlying challenges and promote the adoption of context-appropriate solutions. Furthermore, the socio-economic implications of post-harvest losses highlight the importance of sustainable fisheries management practices in safeguarding livelihoods, improving food security, and enhancing the well-being of fishing communities.

## **RECOMMENDATION**

Based on the findings and conclusions drawn from this study, we recommended; there is a need for investment in infrastructure, including cold storage facilities, ice-making plants, and transportation networks, to improve post-harvest handling and storage capabilities. Enhancing infrastructure will enable fishermen to extend shelf life, and minimize losses during storage and transportation. Training and capacity-building programs should be

provided to fishermen on best practices in post-harvest handling, storage, and processing techniques. Empowering fishermen with knowledge and skills will enhance their ability to adopt effective coping strategies and reduce post-harvest losses.

By implementing these recommendations, stakeholders can address the underlying challenges of post-harvest fish losses, improve the resilience and sustainability of fishery operations, and enhance the well-being of fishing communities in Yauri, Kebbi State, and Nigeria at large.

## REFERENCES

- Abdullahi, D.Y. (1990). Socioeconomic Development of Yauri Local Government. A project report submitted to the Department of Political Sciences Usmanu Danfodiyo University Sokoto for the Award of Bachelor of sciences Degree in political sciences.
- Adesehinwa, A.O.K. and Ayanda J.O, Bolorunduro, P.I (2005). Adoption of improved fish preservation techniques in Northwestern Nigeria *Tropicultural*, 23:117-123
- Adewolu, M.A., Adeoti A.J. (2010). Effect of mixed feeding schedules with varying dietary crude protein levels on the growth and feed utilization of *Clarias gariepinus* (Burchell, 1822) fingerlings. *Journal of Fisheries and Aquatic Science*.;5:304-310.
- Ahmed, A. (2008). Postharvest losses of fish in developing countries. *Nutrition and Health*.;19:273-287. 4. Akande GR, Diei-Ouadi Y. Post-harvest losses in small scale fisheries. Case studies in five sub-Saharan African countries. *FAO Fisheries and Aquaculture technical paper* No. 550, Rome, FAO, 2010, 72 p.
- Akande, G., &Diei-Ouadi, Y. (2010). Post-harvest losses in small-scale fisheries: case studies in five sub-saharan African countries. *FAO Fisheries and Aquaculture Technical Paper*, (550), 72pp.
- Akintola, J.O. (1986). rainfall distribution in Nigeria impact publisher in Nigeria pp 337.
- Akintola, S.L., Bakare S.B., (2011). Microbiological changes in fresh water prawn (*Macrobrachium vollehovenii*, Herklots, 1857) stored in ice, *American Journal of Food Technology*.;68:500-506
- Alam, A.K., Rahman M.K., Abu Zakaria M.U.M., Al-Shahriar G.H. and Fanindra C.S., (2021). Effect of Dadonon the Catch, Quality and Postharvest Loss Reduction of Open Water Fisheries in Kishoreganj Haor. *International J. Food Sci. Agricul.*, 5(2): 251-262 DOI: 10.26855/ijfsa.2021.06.007.
- Arah, I.K., Amaglo,H.,Kumah E.K. and Ofori, H. (2015). “Preharvest and Postharvest Factors Affecting the Quality and Shelf Life of Harvested Tomatoes: A Mini Review.” *International J. Agronomy*, (1): 1–6.
- Emere, M. C., & Dibal, D. M. (2013). A Survey of the Methods of Fish Processing and Preservation Employed by Artisanal Fishermen in Kaduna City. *Food Science and Quality Management*, 11: 16–22.
- FAO (Food and Agriculture Organization), (2019). Food Loss Analysis: Causes and Solutions. Case Studies in the Small-Scale Agriculture and Fisheries Subsectors: Methodology. FAO, Rome.

- FAO (2010). Fisheries and aquaculture topic: food security and fisheries. Topic fact sheet. Text by peter manning, FOA Fisheries and Aquaculture Department, Rome.
- FAO. Food and Agriculture Organisation (1981). The prevention of losses in cured fish. *FAO Fisheries Technical Paper* No. 219.
- Gbolagunte, G. D., Salvador, A. F., and Enoghase, J. S. (2012). Evaluation of the microbial load on smoked fish from some markets in Ogun state, Nigeria. *African Journal of Microbiology Research*, 6(7), 1376-1379.
- Ita, E.O (1993a) inland fisheries resources of Nigeria, committee of international Fisheries (CIFA occasional paper) no. 20 FOA of the United Nations, Rome, 120p.
- Moser, A. & Korstjen, I. (2018). Series: practical guidance to qualitative research part 3: sampling, data collection and analysis. *European Journal of General practice* 24 (1),9-18.
- Nowsad, A. K. M. A. (2010). *Post-harvest loss reduction in fisheries in Bangladesh: A way forward to food security*. Final report PR, 5(08), 171.
- Olusegun, O. J., & Mathew, O. S. (2016). Assessment of Fish Post Harvest Losses in Tagwai Lake, Niger State, Nigeria. *International Journal of Innovative Research and Development*, 5(4).
- Seki, E., & Bonzon, A. (1993). Selected aspects of African fisheries: a continental overview
- Solanke, A. (2022), a lecturer at the Federal College of Fishery and Marine Technology, Victoria Island, Lagos
- Solomon, T. and Mekonen Teferi (2019). Assessment of fish post-harvest losses in Tekeze Dam and Lake Hashenge fishery associations: northern Ethiopia. *Agriculture & Food Security* volume 6, Article number: 4 (2017).
- Sraboni, E., Malapit, H. J., Quisumbing, A. R., & Ahmed, A. U. (2014). Women's empowerment in agriculture: What role for food security in Bangladesh? *World Development*, 61, 11-52.
- Valtysdottir, K., Margeirsson, B., Arason, S., Lauzon, H., & Martinsdóttir, E. (2010). *Guidelines for pre cooling of fresh fish during processing and choice of packaging with respect to temperature control in cold chains*. Reykjavik: Matis.
- Ward, A. (1996). Quantitative data on post-harvest fish losses in Tanzania. The fisheries of Lake Victoria and Mafia Island. Technical Report, 73pp.