



# Pertinence of Education on Fish Post Harvest Loss Prevention

Prof Sule Abiodun, Dr. Ayaobu Cookey

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## Abstract

Throughout the globe, fish is widely consumed since it is both a popular and economical source of animal protein. It is seen as a technique to help feed the hungry and supplement income for those living in rural areas of less developed countries. The post-harvest quality of fish is a crucial factor in the fish trade both globally and locally. However, there have been cases of material losses of caught fish due to rotting, sorting, size breakdown, by-catch reject, and operational losses which have become significant issue in the fishing and aquaculture industries. This study essentially investigated the significance of education in preventing fish post-harvest loss. In carrying out this study, questionnaire was adopted for data collection which was collected among fish farmers randomly selected from both Lagos Island and mainland using snowballing. 329 of the distributed questionnaires was returned and properly answered. Using frequency and percentages, a descriptive analysis was carried out on the data collected and the result of the study revealed that fish farmer needs education on Handling, transportation and temperature control for fish after harvest; Understanding the use of standardized operation of fish farms; Effective use of advances in technology; Loss reduction strategies; and Trade regulations. This makes education central in fish farming. The result also showed that education enable fish farmers to make informed decisions on post-harvest fisheries; make effective use of advanced technology to address the problem of post-harvest loss; ensures efficient use of development resources; improve knowledge and skills on post-harvest fish loss assessments; and enhance the stability of supply and use of safe and healthy food. Finally, the study revealed variety of intervention opinion made available to prevent post-harvest loss. This includes: Farm technologies and practices; Regulations and trade; Chemical disinfection for preventing or suppressing fish diseases; postharvest processing and distribution; Alternative feed ingredients; and Available financial tools. This result led to the conclusion that education on the prevention of fish post-harvest loss is

essential and thus recommended that training of artisan farmers on the use of modernised post-harvest handling procedures, in conjunction with inexpensive but reliable hermetic storage solutions.

**Keywords:** Education, fish, post harvest, loss prevention

## I. Introduction

Across the globe, fish is reported to be among the most commonly used source of animal protein and relatively cheaper. In developing countries, it is not only regarded as a source of protein but also an avenue for job creation among rural dwellers. Significant improvements in fish trade at global and local levels is largely dependent on the quality of fish post-harvest (Maulu, Hasimuna, Monde, et al., 2020). Ward and Signa (2017) estimated fish losses to be in the region of ten to twelve million tons per year; which has intensified the fight against hunger and the goal of increasing food production and supply. Achieving this makes it important to comprehend local conditions and factors negatively impacting affecting the value chains as well as the barriers limiting investment in improved post-harvest handling practices, technologies, and policy (Kitinoja, 2016).

Post-harvest fish losses is an unacceptable situation which benefits nobody especially in view of rapid urbanization, population growth, ever increasing food demand amidst scarce resources, climate variability, degrading environment and dwindling fisheries resources. This has caused major concern to artisan fishers, especially in regions with food shortage and socio-economic vulnerabilities. To this end maintaining fish and fishery quality as well as ensuring food safety is subject improved post-harvest technology.

Post-harvest fish loss is a constraint to planning. High level of post-harvest losses is reported to occur more during handling, processing, storage, transportation and marketing of fish (Rahman et. al., 2013). Mungai (2014) opines that these losses are due to poor processing practices



which causes untold damage to the fish. Loss of fish may occur before, during, or after harvesting, but as the name implies, post-harvest losses in this study is focused on harvesting as losses tend to occur upon investments in the production process. Consequently, there is higher economic loss to ready harvested products for the market. High cost of production spells gave implications for greater sustainable development. In the process of fish travelling along the value chain, which entails the farm itself, the wholesalers, transporters, processors, and retailers to consumers, damage tend to occur due to damage and noncompliance. It can also accrue from reduced quality and safety. A typical scenario is the deterioration of fish which occurs as a result of poor refrigeration systems and quality packaging, as well as poor storage technology. The implication of this is that the longer it takes for fish to reach its consumers, the higher the deterioration, loss in value due to poor transportation, and weak infrastructure. The economic loss of such loss is often situations transferred to the consumer.

To effectively address post-harvest losses, it is pertinent to understand the drivers responsible for such losses and how to adopt technologies aimed at fish preservation post-harvest (Diei-Ouadi & Mgawe, 2011). Addressing post-harvest losses in the fishery sector may not be effective leading to researchers thinking up diverse ways of tackling this issue. It is in this light that this study seeks to examine the pertinence of education on fish post harvest loss prevention.

### Research problem

Economic losses occur when fish intended for human consumption becomes spoilt thus decreasing its value. The consequences of this are physical and financial losses of quality fish. The inappropriate preservation methods, ineffective logistics, misinformation, unnecessary and long period of time taken for preservation in poor conditions encourages spoilage, leading to market loss and shortage between demand and supply leading to fish price changes (Olusegun & Matthew, 2016). Debasish et al., (2021) indicated in their study that education, training, better transportation and infrastructure facilities were significant to the reduction of post-harvest fish loss. In this view raising farmers' awareness is implied to be significant to reducing post harvest fish loss, which is the focus of this study.

### Objectives of the Study

1. Determine the educational needs of fish farmers to prevent fish post harvest loss

2. Assess the role of education in preventing fish post harvest loss.

3. Examine the intervention options available to fish farmers against fish post harvest loss

### Research Question

1. What are the educational needs of fish farmers to prevent fish post harvest loss?

2. What is the role of education in preventing fish post harvest loss?

3. What are the intervention options available to fish farmers against fish post harvest loss?

## II. LITERATURE REVIEW

### Artisanal fisheries sector in Nigeria

Artisanal fisheries also referred to as small-scale fisheries owing to their use of outdated traditional fishing equipment, low expenses and low cost of operation, is sectioned into artisanal, commercial and aquaculture fisheries (Okeowo et. al., 2015). It is an income generating sector to millions of people (Nowsad, 2010). The population increase in Nigeria and the world over has increased fish demand and tendency for increase in demand of fish protein by additional 700,000 metric tonnes by 2020 due to increase in population which is likely to surpass 210 million by then. The Food and Agricultural Organization (FAO), pegged fish consumption per person in Nigeria to be 7.5 kilos as against the 18.7 kilos global fish consumption prescribed. The implication of this is a huge deficit of 11.2 kilos of fish consumption per person in the country. Fish is regarded to be a highly perishable food which necessitates effective handling, processing and marketing to reduce post-harvest losses (Nowsad, 2010).

Ashley-Dejo (2022) revealed that the quantity and quality of fish loss is quite high which is contributory to nutritional loss of fish. Olusegun and Matthew (2016) stated that both underdeveloped and developed countries experience fish loss at all levels of the production chain, encompassing harvesting, processing, storage, transportation, marketing to consumption stage. It is based on this and the threat of food crisis that prompted the United Nations in 1975 to intervention strategies aimed at global reduction of post-harvest losses in developing countries (Patience & Campus, 2014).

Debasish et al., (2022) assessed the factors influencing post-harvest loss of four important fish species in Bangladesh, using data obtained from 200 fish farmers and 212 market actors in Mymensingh and Jashore districts. The study found the following factors to be responsible for fish loss; poor



packaging and handling practices and inefficiencies at collection points. The study found education, training, improved transportation and infrastructure facilities to be in the reduction of post-harvest fish loss; explaining that raising farmers' awareness, improving the flow of information, improving infrastructure and road transportation facilities had the potentials of minimizing post-harvest fish losses.

#### Types of post-harvest fish losses

Post-harvest fish losses are classified into physical losses, nutritional losses and economic losses. Physical fish loss occur from the mishandling and discard of by catch at sea either for being too small or not good enough to place monetary value on (Olusegun & Matthew, 2016). The physical fish loss could be in part or an entire fish damaged either by theft, insects' infestation, or predators. Nutritional losses describe nutritional value loss of fish as a result of exposure to high temperature leading to deterioration which makes it unfit for human consumption (Getu et. al., 2015). The bacteria that causes the reduction of fish value causes the fish to produce harmful odours, thus making it unattractive for consumption (Kumolu-Johnson & Ndimele, 2011).

#### Training/educational needs of fish farmers

Training need refers to a gap between the way things are and the way they should be. Training gap in this context determines if an individual has been able to acquire specific knowledge, skills and attitude. It is significant that prior to prescribing a training intervention, the following be determined; Who requires the training, Why is it required and What type of knowledge is required. In this regard, identifying the training needs of farmers and different people involved in fish farming has been described as being important in reducing post harvest loss of fish. Before commencing on meeting the training needs of target groups, it is important to conduct a training needs assessment so as to determine which knowledge, skills or attitudes were missing amongst key practitioners in the region (Mgawe & Bawaye, 2012).

#### Reduction of post-harvest fish losses

Upon understanding the factors responsible for fish loss in the fisheries sector, the causes and stages need to be identified to arrive at a good decision. One major point identified is handling practices which is necessary for safeguarding fish quality and safety. Das, Kumar, Debnath, Choudhury and Mugaonkar (2013) stating that fish quality is largely dependent on the methods employed during landing, processing, storage, packaging and transportation. Singh et. al., (2012) stated that careful methods will minimize spoilage, reduce losses and improve the quality of the marketed produce. Olusegun and Matthew (2016) established that the quality of fish and is achievable through practicing hygiene among fishermen and fish processors.

### III. METHODOLOGY

This study used a descriptive research survey approach to evaluate the significance of education in preventing fish post-harvest loss. In carrying out this study, questionnaire was adopted for data collection which was collected among fish farmers randomly selected from both Lagos Island and mainland using snowballing. A sample size of 350 was targeted and field researchers were enlisted for data collection with the goal of collecting a wide range of data from varied local government areas within Lagos state. Using frequency and percentages, a descriptive analysis was carried out on the data collected.

### IV. DATA PRESENTATION ANALYSIS AND DISCUSSIONS

The target sample size for study was 350; however, after data collection, only 342 questionnaires were returned. Of these 342, 13 questionnaires were discarded because they were not properly answered. Only 329 were properly filled and thus constitutes the actual sample size studied. The analysis carried out was based on these 329 questionnaires that were properly filed and returned as presented subsequently.

Table 1.0 Demographic data

Variables	Frequencies (n=329)	percentages
<b>Gender</b>		
Male	195	59.3
Female	134	40.7
<b>Age group</b>		
18-30	46	14.0
31-40	123	37.4



41-50	56	17.0
50 years and above	104	31.6
<b>Highest Educational Qualification</b>		
SSCE/GCE	103	31.3
OND/ND	146	44.4
B.SC/BA	57	17.3
Others	23	7.0
<b>Number of years as a fish-farmer</b>		
1-5years	103	31.3
5-10years	146	44.4
More than 10 years	80	24.3

### Field Survey (2023)

The result presented in Table 1 above indicates that both male (59.3%) and female (40.7%) participated in the study, which implies that fish-farming is not gender-specific. Both male and female can take part in fish farming. The table also indicates that fish farmer can cut across people from different age groups, as young as 18 years or as old as above 50 years of age. More so, their educational achievement varies. There are fish farmers whose highest educational achievement is SSCE/GCE (31.3%); OND/ND (44.4%); or some university

graduates with BSc/BA (17.3%) or other qualification (7%). This implies that fish farming is not technically a job for the illiterate; in fact, the higher the educational attainment, the higher the chances of better fish production. Finally, the table indicates that the fish-farmers have diverse years of experience. There are fish farmers that have been in the business for just below 5 years (31.3%), some had been there for more than 5 years but less than 10 years (44.4%); while some have been there for more than 10 years (24.3%).

### RQ1: What are the educational needs of fish farmers to prevent fish post-harvest loss?

**Table 2: The respondents' opinions on the needs of fish farmer education to prevent post-harvest loss**

STATEMENTS	SA	A	UN	D	SD	% in agreement
Handling, transportation and temperature control for fish after harvest	210	71	11	19	18	85.4
Understanding the use of standardized operation of fish farms	192	126	9	0	2	96.7
Effective use of advances in technology	183	127	9	6	4	94.2
Loss reduction strategies	189	120	17	1	2	93.9
Trade regulations	101	194	26	2	6	89.7

### Field survey, 2023

The first research question was formulated to investigate the respondents' opinions on the needs of fish farmer education to prevent post-harvest loss. According to the result from this study, all the participants in the study are of the opinion that there is a need to educate fish farmers on how to prevent post-harvest loss. This is because they supported all the items identified in the table above with more

than 80% in agreement. As a result, the study concludes that there is a need to train fish farmers on: Handling, transportation and temperature control for fish after harvest (85.4%); Understanding the use of standardized operation of fish farms (96.7%); Effective use of advances in technology (94.2%); Loss reduction strategies (93.9%); and Trade regulations (89.7%).



**RQ2: What is the role of education in preventing fish post harvest loss?**

**Table 3: The role of education in preventing fish post harvest loss**

STATEMENTS	SA	A	UN	D	SD	% in agreement
Enable fish farmers to make informed decisions on post-harvest fisheries	144	159	18	0	8	92.1
Enable fish farmers make effective use of advanced technology to address the problem of post harvest loss	161	151	9	1	7	94.8
Ensuring efficient use of development resources	143	144	29	8	5	86.8
Improve knowledge and skills on post-harvest fish loss assessments	189	120	4	8	8	93.9
Enhance the stability of supply and use of safe and healthy food	150	151	20	6	2	91.5

**Field survey, 2023**

The second research question investigated the opinion of the respondents on the role of education in preventing fish post-harvest loss. As indicated in the study, 92.1% of the respondents supports that education enable fish farmers to make informed decisions on post-harvest fisheries; 94.8% believe that education enable fish farmers make effective use of advanced technology to address the

problem of post harvest loss; 86.8% are of the view that education ensures efficient use of development resources; 93.9% supports that education improve knowledge and skills on post-harvest fish loss assessments; and 91.5% are of the view that education enhance the stability of supply and use of safe and healthy food.

**RQ3: What are the intervention options available to fish farmers against fish post harvest loss?**

**Table 4: The respondent's opinion on the intervention options available to fish farmers against fish post harvest loss**

STATEMENTS	SA	A	UN	D	SD	% in agreement
Farm technologies and practices	148	134	30	10	7	85.7
Regulations and trade	150	159	12	5	3	93.9
Chemical disinfection for preventing or suppressing fish diseases	166	145	10	3	5	94.6
postharvest processing and distribution	91	221	8	2	7	94.9
Alternative feed ingredients	166	145	7	3	8	94.6
Available financial tools	162	150	8	4	5	94.8

**Field survey 2023**

Finally, the study examined the respondent's opinion on the intervention options available to fish farmers against fish post harvest loss. The result of the study indicates that there are variety of intervention made available to prevent post-harvest loss. This include: Farm technologies and practices (85.7%); Regulations and trade (93.9%); Chemical disinfection for preventing or suppressing fish diseases (94.6%); postharvest processing and distribution (94.9%); Alternative feed ingredients (94.6%); and Available financial tools (94.8%).

**V. Discussion of findings**

Fish, because of its unique nutritional qualities and superior production efficiency compared to other kinds of agriculture, deserves more attention than it now gets in food policy due to its role in the food basket (Subasinghe, 2016). However, despite its central position in sustainable food production, when it comes to fisheries, food loss and waste happens at every step of the value chain, worsening food poverty and cutting into the profits of business owners and workers. This is because dead fish quickly becomes bad after being caught. Methods of preventing spoiling and



extending the shelf life of fish include, but are not limited to, proper chilling and handling under acceptable sanitary circumstances; or processing to preserve the fish in the absence of a cold chain, such as drying, salting, and smoking.

However, despite being an essential part of rural communities' economic foundations, post-harvest fisheries operations along the value chain are frequently overlooked in community development efforts (Kitinoja, 2016; Lokuruka, 2016). For this reason, this study investigated the need of education on post-harvest fish loss prevention. The outcome of this study revealed that fish farmer needs education on Handling, transportation and temperature control for fish after harvest; Understanding the use of standardized operation of fish farms; Effective use of advances in technology; Loss reduction strategies; and Trade regulations. This makes education central in fish farming. The outcome of this study supports Acharjee et al (2021) and Ashley-Dejo, et al (2022) respectively, who shared similar views.

Another finding of this study identified the roles played by fish farming education. According to the outcome of this study, education enable fish farmers to make informed decisions on post-harvest fisheries; make effective use of advanced technology to address the problem of post-harvest loss; ensures efficient use of development resources; improve knowledge and skills on post-harvest fish loss assessments; and enhance the stability of supply and use of safe and healthy food. This result supports the earlier findings by Kitinoja(2016), Ward and Signa (2017), and Getu, Misganaw, andBazezew (2015), respectively.

Finally, the study revealed variety of intervention opinion made available to prevent post-harvest loss. This include: Farm technologies and practices; Regulations and trade;Chemical disinfection for preventing or suppressing fish diseases; postharvest processing and distribution; Alternative feed ingredients; and Available financial tools. This result is in agreement with Maulu, et al. (2020) who shared similar opinion.

## VI. Conclusions and recommendations

It is still a major problem for the world's food producing businesses to lose a lot of food after harvest. The physical, nutritional, and economic losses that may occur across the food supply chain make the product unsafe or unappealing for human consumption (Entee, 2015). Material losses of caught fish due to rotting, sorting, size breakdown, by-catch reject, and operational losses are a significant issue in the fishing and aquaculture

industries (Tesfay and Teferi, 2017). As the supply gap between supply and demand for fish widens, it is essential that post-harvest methods for fish be improved. Thus, providing novel and low-cost technologies, self-development skills in fishing, and more improved cold facilities, and guaranteeing strict adherence of product security and control methods might aid in lowering post-harvest fish losses and protecting public health. Therefore, the author of this research advise providing instruction to smallholder farmers on the use of modernised post-harvest handling procedures, in conjunction with inexpensive but reliable hermetic storage solutions. Subsidized and airtight, the equipment helps keep out pests, rats, mould, and moisture.

## References

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**REQUEST FOR INFORMATION**

Dear Respondent,

I am carrying out a study on “pertinence of education on fish post harvest loss prevention.”, and you have been chosen to be part of the study. This questionnaire is only for academic purposes. Kindly select the response which applies to you and all information will be kept confidential

**SECTION A**

Please tick ( ) where appropriate

1. Gender: Female ( ) Male ( )
2. Age group: 18-30 ( ) 31-40 ( ) 41-50 ( ) 50 and above ( )
3. Highest Educational Qualification: SSCE/GCE ( ) OND/ND ( ) B.SC. ( ) Others ( )
4. Number of years as a fish farmer: 1-5 ( ), 5-10 ( ), more than 10 years ( )

**SECTION B:**

Instructions: Please tick (√) as appropriate where

**Key: Strongly agree (4), Agree (3), Disagree (2), and strongly disagree (1).**

SN	Item	SA	A	UD	D	SD
<b>RQ1</b>	<b>What are the educational needs of fish farmers to prevent fish post harvest loss?</b>					
1	Handling, transportation and temperature control for fish after harvest					
2	Understanding the use of standardized operation of fish farms					
3	Effective use of advances in technology					
4	Loss reduction strategies					
5	Trade regulations					
<b>RQ2</b>	<b>What is the role of education in preventing fish post harvest loss?</b>					
6	Enable fish farmers to make informed decisions on post-harvest fisheries					
7	Enable fish farmers make effective use of advanced technology to address the problem of post harvest loss					
8	Ensuring efficient use of development resources					
9	Improve knowledge and skills on post-harvest fish loss assessments					
10	Enhance the stability of supply and use of safe and healthy food					
<b>RQ3</b>	<b>What are the intervention options available to fish farmers against fish post harvest loss?</b>					
11	Farm technologies and practices					
12	Regulations and trade					
13	Chemical disinfection for preventing or suppressing fish diseases					
14	postharvest processing and distribution					
15	Alternative feed ingredients					
16	Available financial tools					