FAO
FISHERIES AND
AQUACULTURE
TECHNICAL
PAPER

550

ISSN 2070-7010

Post-harvest losses in small-scale fisheries

Case studies in five sub-Saharan African countries

Cover photographs:
Clockwise from top left: fresh fish poorly iced and stored (courtesy of Yvette Diei-Ouadi); inadequately smoked/oversmoked freshwater fish in *"valise"*, artisanal packaging material (courtesy of Yvette Diei-Ouadi); fresh fish loaded onto open trucks for long-distance transportation (courtesy of Yvette Diei-Ouadi); press packing *(lumbesa)* lowers the transport cost charged per sack, although it increases physical damage to fish (courtesy of Yahya Mgawe).

Post-harvest losses in small-scale fisheries

Case studies in five sub-Saharan African countries

FAO
FISHERIES AND
AQUACULTURE
TECHNICAL
PAPER

550

by

Gbola Akande
Assistant Director (Research)
Nigerian Institute for Oceanography and Marine Research
Lagos, Nigeria

and

Yvette Diei-Ouadi
Fishery Industry Officer
Products, Trade and Marketing Service
Fisheries and Aquaculture Policy and Economics Division
FAO Fisheries and Aquaculture Department
Rome, Italy

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 2010

ISBN 978-92-5-106671-3

Preparation of this document

The post-harvest fish loss assessment studies presented in this report were conducted within the framework of the regional post-harvest loss assessment (PHLA) programme in small-scale fisheries in Africa, a Food and Agriculture Organization of the United Nations (FAO) regular programme activity to improve the utilization, safety and quality of fishery products. The objectives of this programme, planned, implemented and coordinated within the Products, Trade and Marketing Service (FIPM) of the FAO Fisheries and Aquaculture Department, were to develop a core of regional experts in fish loss assessment; generate fish loss data of socio-economic importance; enable the production of practical guides for fish loss assessment for extension officers and fishery operators; update an earlier researcher's manual for assessing post-harvest fisheries losses; and, provide normative guidance to support the implementation of the FAO Code of Conduct for Responsible Fisheries.

The studies were carried out in five sub-Saharan African countries (Ghana, Kenya, Mali, United Republic of Tanzania and Uganda) and were presented and discussed at two regional workshops which provided the outline for a consolidated document on data generated, lessons learned and key achievements for wider dissemination. A regional consultant was recruited for a comprehensive report, who then submitted a first draft in September 2009. It was reviewed several times before being edited and published by FAO.

Abstract

In 2006, the Products, Trade and Marketing Service of the Fisheries and Aquaculture Department (formerly the Fish Utilization and Marketing Service) in FAO designed a regional post-harvest loss assessment (PHLA) programme to:

- develop a core of regional experts in fish loss assessment;
- generate fish loss data in fisheries of socio-economic importance;
- produce practical guides for fish loss assessment for extension officers and fishery operators;
- update the Ward and Jeffries (2000) manual; and
- provide normative guidance to support the implementation of the FAO Code of Conduct for Responsible Fisheries.

This regional programme began in October 2006 and lasted 18 months. It aimed to build on past initiatives and develop tools for practical loss assessment in artisanal fisheries. The programme provided capacity building for fishery officers in qualitative and quantitative fish loss assessments methods, planned support, and supervised the implementation of loss assessment studies in five sub-Saharan African countries (Ghana, Kenya, Mali, United Republic of Tanzania and Uganda). Data were generated on quality and physical losses – the main types of losses identified – and quantified by researchers using three assessment methods.

The fieldwork indicates that post-harvest fish losses in small-scale fisheries occur at all stages in the fish supply chain from capture to consumer. Huge physical and quality losses were found to occur in some supply chains assessed in all the countries, with quality losses reported to account for more than 70 percent of total losses. Concurring data are that physical losses seldom exceed 5 percent in some fisheries, but the findings from assessments of the Lake Victoria sardine (*Rastrineobola argentea*) fishery indicate much higher losses are occurring during the rainy season when poor drying conditions prevail.

Although the nutritional losses and human health problems were not the focus of the study, it can be easily admitted that these financial losses add to the food safety and quality concerns in small pelagic species (such as anchovies in Ghana), which form a noticeable part of the landings in question and are known to be prone to histamine accumulation under conducive uncontrolled time/temperature conditions.

To try and reduce or prevent losses, various coping strategies are used by fishermen, processors and traders with varying degrees of success. Despite these, as has been demonstrated by the study, losses still occur, hence the need for careful and continued technical and policy initiatives by international and national agencies. Balancing technical interventions to improve fish quality with the potential increase in selling prices, associated with better quality fish with the demand for cheaper fish by low income consumers, is an important dilemma. In this situation, a policy

intervention to encourage access to alternative cheap proteins to improve the food security of low income consumers would help mitigate any downbeat effects from price increases.

In conclusion, governments and development agencies should ensure that changes in post-harvest fisheries-related policy and practices take stock of the loss assessment tools, information generated and experience of the programme. Fish loss assessments should be incorporated into national data collection systems and used regularly to inform policy.

Akande, G.; 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. 72p.

Contents

Tables

Figures

Acknowledgements

The post-harvest fish loss assessment studies presented in this report were conducted within the framework of the regional post-harvest loss assessment (PHLA) programme in small-scale fisheries in Africa, an FAO regular programme activity to improve the utilization, safety and quality of fishery products. It was implemented from October 2006 to March 2008 with twelve participating member countries. This programme aimed to develop a core of regional experts in loss assessment, and generate data, identify ideas for loss reduction and support the development of other proposed FAO loss assessment activities.

At the country level, the programme has been a collaborative effort involving fisheries institutions that provided the teams of fish loss assessors and local logistics. FAO provided capacity building and supported all fieldwork activities. In Ghana, Kenya, Mali, Uganda and United Republic of Tanzania, the fisheries officers (at central and local/extension levels) took time off from their routine duties to work for the programme and consult stakeholders, gather secondary source data and work tirelessly to complete the studies and process the data in addition to attending the capacity-building forum regularly organized within the PHLA programme. This valuable synergy is greatly acknowledged.

For FAO, planning, implementation and coordination of the programme was carried out by Ms Yvette Diei-Ouadi of the Products, Trade and Marketing Service of the Fisheries and Aquaculture Policy and Economics Division. The cooperation of Mr Alhaji Jallow from the Regional Office for Africa must also be underscored.

The studies were presented and discussed at two regional workshops organized by FAO and facilitated by Mr Ansen Ward, a post-harvest fisheries specialist whose professional expertise and experience of small-scale fisheries in the tropics contributed immensely to the programme. Mr Joseph Ndenn, another post-harvest fisheries specialist with experience in the region, also provided valuable advisory support.

Unless otherwise indicated, the photographs have been provided by the authors.

Acronyms and abbreviations

CCRF	FAO Code of Conduct for Responsible Fisheries
CEWEFIA	Central and Western Fish Improvement Association
DFID	Department for International Development (United Kingdom)
FAO	Food and Agriculture Organization of the United Nations
FIIU	Fish Utilization and Marketing Service (former)
FIPM	Products, Trade and Marketing Service
IFLAM	Informal Fish Loss Assessment Method
LT	Load Tracking
NEPAD	New Partnership for Africa's Development
PHFRP	Post-harvest Fisheries Research Programme
PHLA	post-harvest loss assessment
PRA	Participatory Rural Appraisal
QLAM	Questionnaire Loss Assessment Method
SFLP	Sustainable Fisheries Livelihoods Programme
SSI	semi-structured interview

Executive summary

The objectives of the post-harvest loss assessments (PHLAs) carried out in five sub-Saharan African countries were essentially to:

- develop a core of regional experts in fish loss assessment;
- generate fish loss data of socio-economic importance;
- enable the production of practical guides for fish loss assessment for extension officers and fishery operators;
- update an earlier researcher's manual for assessing post-harvest fisheries losses; and
- provide normative guidance to support the implementation of the FAO Code of Conduct for Responsible Fisheries (CCRF).

In developing regional expertise during an 18-month period from October 2006 to mid-2008, the PHLA programme provided capacity building for fishery officers from 12 African countries in fish loss assessment. The programme provided training in qualitative and quantitative fish loss assessment methods, planned support and supervised the implementation of loss assessment studies. Further development of existing systematic and practical tools to assess post-harvest fish losses and assist development practitioners to plan appropriate control measures has been a key focus of the FAO regional post-harvest fish loss assessment programme for Africa. The reason for such an initiative is that loss reduction, which is clearly reflected in the FAO CCRF, will contribute to the improved utilization of resources and to the livelihoods of those working in the post-harvest sector as well as the food security of the population as a whole.

Data were generated on quality and physical losses (these being the main types of losses identified) and quantified by researchers using three assessment methods. The Informal Fish Loss Assessment Method (IFLAM) is based on the Participatory Rural Appraisal (PRA) and provides qualitative and indicative quantitative data on a wide range of issues related to fish loss. At the same time it fosters participation of primary stakeholders in the planning and development process and the use of indigenous knowledge. Load Tracking (LT) produces statistically representative quantitative data on loss levels during handling, processing, distribution and marketing. The Questionnaire Loss Assessment Method (QLAM) provides quantitative data on a wide range of issues and enables the validation of qualitative and quantitative data over a wide geographical area.

The fieldwork in Ghana, Kenya, Mali, Uganda and United Republic of Tanzania indicates that post-harvest fish losses in small-scale fisheries occur at all stages in the fish supply chain, from capture to consumer. Huge physical and quality losses were found to occur in some supply chains assessed in all the countries, with quality losses reported to account for more than 70 percent of total losses. Concurring data are that physical losses seldom exceed 5 percent in some fisheries, but the findings from assessments of the Lake Victoria sardine (*Rastrineobola*

argentea) fishery indicate that much higher losses are occurring during the rainy season when poor drying conditions prevail. Physical losses in this fishery account for more than 20 percent, sometimes higher during the main fishing season. Much of the fish is processed as fishmeal and is lost for direct human consumption, but also substantial quality nutrients are lost for the poultry industry. This remark underscores the need for proper handling of fish products regardless of their intended use (for direct human consumption or animal feed). In the fresh tilapia and fresh Nile perch fisheries quality losses were found to affect all stakeholders significantly; however, fresh tilapia traders were less affected compared with other operators because they bargained prices according to the freshness of fish collected from the fishermen. The frequency of losses is also lower among the fresh Nile perch traders because most of them use ice and handle the fish hygienically, which is sold to factories for export purposes. In Mali, quality loss in fresh fish during the main and lean seasons was put at 17 percent and 25.7 percent, respectively. For smoked fish, 21 percent is lost during the main fishing season (302.4 tonnes dry weight) as against a negligible loss during the lean season because of the capacity of the processing facilities to cater for the volume of catches. The quality loss in smoked fish is a result of uneven smoking thereby leading to downgrading of the price.

The study in United Republic of Tanzania showed that there is significant quality deterioration of lake sardine if it rains before the drying process is completed. It is estimated that during rainy days 5 percent of sardine is discarded as physical loss and another 80 percent is sold at less than 20 percent of the best price for good quality sardine because of wash off and spoilage. At the macro level, it is estimated that losses incurred run into millions of United States dollars annually in each country. For example, in Ghana US$60 million and US$9.4 million were recorded as monetary losses in the smoked fish processing and Watsa (purse seine) fishery, respectively. Smoked fish losses were due to droppers (fish falling into the fire during processing), burning, insect infestation and rancidity. Multiple hauls of fishing gear, catch exposure to high temperatures, lack of storage facilities on board canoes, and long distances from fishing grounds were the causes of losses in the Watsa fishery. Although the nutritional losses and human health problems were not the focus of the study, it can be easily admitted that these financial losses add to the food safety and quality concerns in small pelagic species (such as anchovies in Ghana), which form a noticeable part of the landings in question and are known to be prone to histamine accumulation under conducive uncontrolled time/temperature conditions.

Fishermen, processors and traders perceive that there is need for immediate interventions and that some losses are a serious socio-economic problem because highly nutritious fish are lost from human consumption and discarded despite widespread food insecurity among the people of Africa. To try and reduce or prevent losses various coping strategies are used by fishermen, processors and traders with varying degrees of success. Monetary losses are recovered over the long term through trading subsequent lots, by borrowing money and by increasing

fishing effort. Despite coping strategies, as has been demonstrated by the study, losses still occur, hence the need for careful and continued technical and policy initiatives by international and national agencies. Balancing technical interventions to improve fish quality with the potential increase in selling prices, associated with better quality fish with the demand for cheaper fish by low-income consumers, is an important dilemma. In this situation a policy intervention to encourage access to alternative cheap proteins to improve the food security of low-income consumers would help mitigate any downbeat effects from price increases.

The major output from the programme was the general improved understanding of post-harvest fish assessment methods and practical skills as well as information on key losses in certain countries.

The PHLA has achieved the following:

- Through practical application, it developed further the existing loss assessment methods. The combination of PRA with LT raised awareness and helped identify critical issues in distribution chains. QLAM/LT also validates IFLAM data.
- It identified priority losses and where interventions can be better focused thus making best use of limited development resources.
- It clarified certain need definitions (e.g. linkage between market force losses and supply and demand concept; when fragmentation in processed fish is a matter of physical or quality losses, etc.).
- And it promoted awareness and recognition among all stakeholders of loss assessment, capacity building and networking. The network created now requires sustaining, perhaps within a broader post-harvest fisheries regional network's activity or an appropriate forum at national, subregional and regional levels.

The assessment programme also led to a student dissertation paper on fish post-harvest losses and donor funds to provide equipment and training for the production of value-added products from low-value fish species.

In conclusion, governments and development agencies should ensure that changes in post-harvest fisheries-related policy and practices take stock of the loss assessment tools, information generated and experience of the programme. Fish loss assessments should be incorporated into national data collection systems and used to regularly inform policy.