

Promoting hygiene and quality for fishery and aquaculture value chains

Food safety as a cornerstone of food security and income generation

RELEVANCE

Fishing is one of the most important sectors for meeting the world's food needs. As a healthy and nutritious food source, it can make a decisive contribution to food security as well as being an important economic driver for people living in poverty. However, according to FAO a third of the world's oceans are considered to be overfished and 35 % of all fish caught for human consumption is spoiled on the way and never make it to our plates.

Food is perishable by nature and spoilage can occur at any stage of the value chain, from production to distribution. Fisheries and aquaculture are known for their fresh product range, which unfortunately has a very short shelf life. It is also susceptible to a variety of biological, chemical and environmental risks that can have a negative impact on food quality. Unsuitable breeding methods in aquaculture, overfishing, environmental pollution and a lack of infrastructure, just to name a few, can reduce product quality and make hygienic processing more difficult. This makes ensuring safe, affordable and high-quality food a major challenge. In view of the growing world population and the increasing demand for fishery and aquaculture products, the assessment and regulation of food safety issues will continue to gain in importance.

Spoiled food goes to waste and in the fishing sector, food is thrown away on a big scale. At the same time, it is estimated that around 923 million people worldwide suffer from chronic hunger. In addition, the health of another 2.0 billion people are affected by nutritional deficiencies. The nexus of fisheries/aquaculture and food quality/hygiene plays an important role in combating hunger and malnutrition. This is set out in the Sustainable Development Goals (SDGs). SDG 2 is centred around the access to safe, sufficient and nutritious food whereas SDG 6 aims to improve hygiene in the food sector among others.

The Global Programme "Sustainable Fisheries and Aquaculture" is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for Economic Cooperation and Development. The aim of the programme is an increase of fish supply from sustainable and resource-friendly fisheries and aquaculture to boost a healthy and diverse nutrition in Cambodia, India, Madagascar, Malawi, Mauritania, Uganda and Zambia. Sustainable production and processing techniques are promoted along the value chain in order to create jobs and income, with a special focus on youths and women. Local organizations are strengthened in their capacities to carry on programme interventions on a long-term basis. And policy advice is contributing to favourable framework conditions for a sustainable development of the fisheries and aquaculture sector in the implementing countries.



Fish inspections by the Mauritanian office for hygiene controls in the interior of the country.

APPROACH

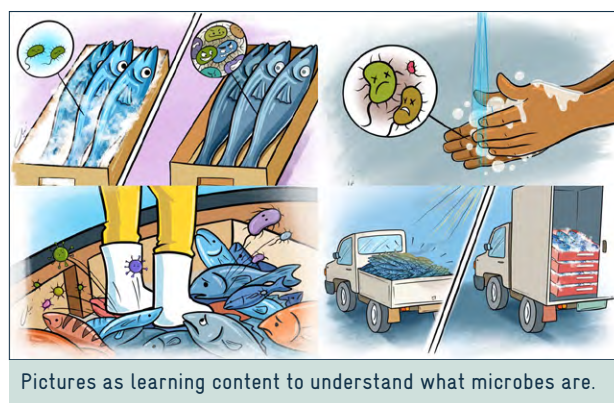
Promoting good hygiene and quality practices along the value chain

To ensure quality and safety in the fish value chain, from catch to consumer, it's vital to consider all steps of the value chain due to potential food safety risks. Implementing hygiene and quality trainings, introducing first sale certificates, and establishing control plans for state institutions are key interventions. A thorough value chain analysis is crucial for identifying improvement areas and requires visits to actors and review of hygiene regulations. Based on this analysis, targeted interventions can be identified, ranging from policy to practical actions, involving research enhancement, regulatory support, and capacity development.

The direct actors in the value chain are fishermen, retailers, traders, transporters, warehouse workers and suppliers who are involved in the production, processing, delivery or sale of a product to the consumer. They are the first point of contact when it comes to offering the consumer a safe product of high quality. Accordingly, they represent the target group that needs to be informed about the hygienic handling of products and the aspects of production, storage and transportation deteriorating quality. The implementation of a training plan can strengthen knowledge about hygiene, quality and control practices for the various steps of the value chain.

With so many different actors, there are certain topics that are only important to some while other topics are clearly important for everyone: raising awareness of biochemical processes such as microbes, knowledge about food-borne infections and diseases, maintaining personal hygiene at the workplace, recognizing fresh and spoilt products, using ice to uphold the cold chain or cleaning and disinfecting the workplace and equipment. However, while fishermen are primarily concerned about the accurate storage and immediate cooling to prevent the deterioration of their catch, processors focus more on the hygienic handling of the processing equipment. Accordingly, it is essential to adapt learning content and teaching methods to the different actors along the value chain, like demonstrations of storage and cooling systems on the fishing boats, or on-the-job trainings concerning proper handling of processing equipment.

Furthermore, didactics must be developed that take into account the experience of fisheries and aquaculture experts. In the context of high illiteracy diagrams, drawings and photographs can be used. Also, the language must be adapted to the target group. In addition, training content



can be gathered and summarized in small booklets e.g. guidelines that provide the actors with a long-term option to revise training contents. Here, as with the training content, it is advantageous to adapt the guidelines to the different actors in the value chain, e.g. one guide for fishing, another for processing and so on. By doing this, value chain actors can be addressed directly and do not lose their learning ambition by going through learning content that does not fully affect their work. Finally, the dissemination of the guidelines should be adapted to the local context; not every country has the same media capacities but in addition to handing out printed versions, apps proofed to be a way to spread training contents easily.

To ensure that the theoretical hygiene and quality trainings become actual practice, it is essential to discuss and confirm understanding with trainees. Using short feedback forms and coaching loops post-training helps verify and further improve learning and communication effectiveness. Additionally, evaluating knowledge application, such as willingness to invest in ice for fish storage, is key. Highlighting the long-term benefits, like quality improvement and potential for higher prices, despite initial costs, is crucial for convincing participants of the value.

In addition to understanding, the implementation of training content must also be taken into account. It is important to find out at an early stage which hygiene practices are feasible in the local context. If the purchase price of ice does not justify the additional benefit of fresh quality, no trainee will adhere to the training content. To stay with the example of ice, the question also arises as to whether the necessary infrastructure is in place: are there ice producers, operational cold chains and the necessary equipment? Next to the spread of misinformation, the greatest danger in communicating training content lies in conveying messages that simply cannot be implemented by the local trainees, as they do not have the means to do so or the supporting infrastructure is just too unstable.



Training of inland fishmongers to discover the research side of quality checks.

Next to the post-training feedback the effectiveness of the training can be assessed through a second follow-up survey, reflecting on key elements of its content. The timing between these evaluations varies with the topic; for instance, 3–6 months may be sufficient to review acceptance to personal hygiene practices, such as handwashing at work. However, evaluating changes like the use of ice for fish storage on boats might require up to a year, accounting for off-seasons and fishing periods. Even if evaluations are time-consuming, they are crucial to revise, adapt and further develop training materials to meet the needs of the participants.

In terms of the capacity development approach, a training-of-trainers strategy can be implemented in the training plan. Training local knowledge brokers like chairmen of fishing or trading associations or market supervisors in the field of hygiene and quality can have a lasting effect in anchoring this knowledge within partnering institutions and in generating spill-over effects through word of mouth at regional level. Sensitising consumers and buyers is also crucial to understand the importance of fresh fish. Hardly anyone will take on additional work and costs to create a quality product that is not demanded.

Direct partnerships for institutional anchoring of hygiene and quality standards

In addition to the direct actors at the operational level, institutional decision-makers, independent quality offices, certification bodies and research institutions are key actors to implement quality assurance of fish products on a national scale. The complexity of the value chain, which interferes with the traceability of the product, and the significant geographical distances between fish producers and consumers present a substantial challenge in maintaining the quality of fish. Therefore, it is difficult to trace back the product's source when spoiled or inferior fish reaches the consumers.

Fish production and distribution are conducted both formally (e.g. through organized cooperatives) and informally by individuals. In most developing countries, the fish value chain predominantly follows an informal market system with limited quality management and traceability systems for fish. In the absence of traceability, there are concerns about trust and transparency in the marketing and consumption of fish in terms of the quality, food safety and price of products, which ultimately affects both consumers and fish sellers.

Direct partnerships with local food inspection authorities can be promoted to enable compliance with quality and hygiene standards to be checked throughout the value chain and to address the issue of traceability. On the other hand, non-compliance goes hand in hand with discarding spoiled fish from the market. The discard is an efficient incentive to adhere to the implementation of quality standards because it is immediately accompanied by a loss of income for the fisherman or trader.

A hygiene and quality control plan – developed jointly with local inspection authorities – helps to guarantee regular sampling and analysis of fishery and aquaculture products. The control measures must target the complete value chain e.g. boats, production facilities, means of transportation, processing plants as well as distribution and sales points and be carried out systematically. This is only possible if all the necessary laboratory and health testing equipment is available and can be used by local staff. Training and exchange trips to comparable institutions in other countries improve the employees' ability to handle new equipment and technologies and consolidate their knowledge of different analytical methods and processes of hygiene inspections.



Employee of the Mauritanian bureau of sanitary inspections carrying out a quality analysis.

Implementation experiences should be regularly discussed with political decision-makers, associations and value chain actors. To secure efforts sustainably, it is important to integrate the costs of the sampling and analysing into the annual financial plans of the inspection authorities and to acquire financial contributions for the long term. Clearing out financial obstacles is more likely to be successful if the hygiene and quality control plan is in line with local political strategies.

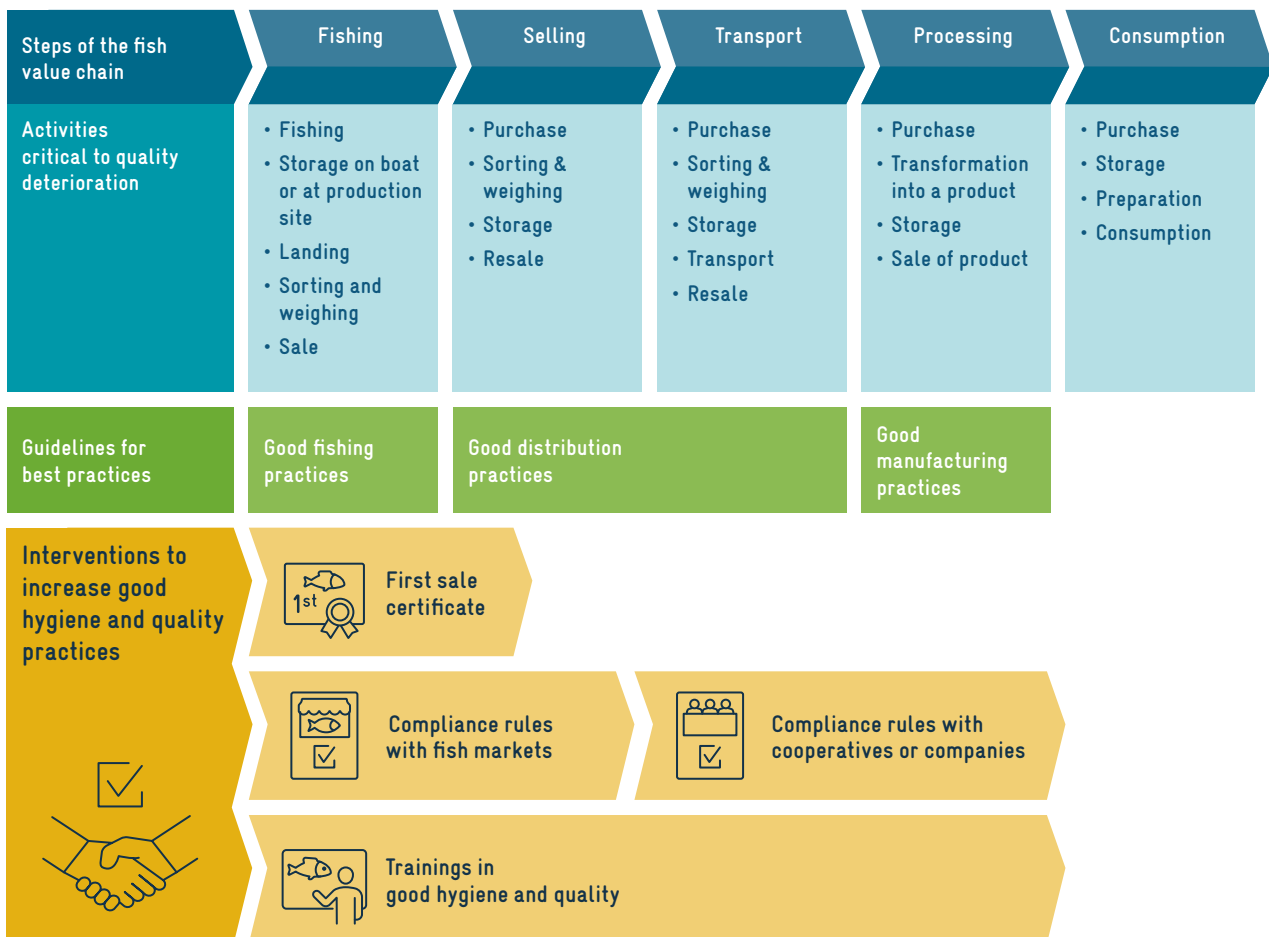
In order to improve the traceability and control of fishery and aquaculture products, so-called first sale certificates can be introduced by local inspection bodies. They should be issued at the most important landing or production points and contain information on the species, the origin of the product, the seller and the destination. Digital certificates are suitable for registering the above-mentioned information directly at the first sales at the production and landing points and should be monitored centrally. This facilitates the authorities' work and saves resources.

To further enhance compliance of the value-chain actors with hygiene and quality standards, action plans can be developed in direct cooperation with fish markets, fish auction halls and other important transshipment points of sale. The action plan must set out the measures being planned, a timetable, the financial and material resources required and a monitoring and evaluation system for ensuring the envisioned hygiene and quality standards.

Organizational and procedural measures may include: a commitment by the management of these trading centres to take responsibility for the hygiene and quality of fishery products, an adapted organizational chart for better control of the hygiene and quality of products, a charter for an extended committee to support the implementation of the action plan and/or a code of good hygiene practices for the employees of the respective entity.

In addition, mobile applications can help to connect information from both sides. For example, the direct actors

INTERVENTIONS ALONG THE FISH VALUE CHAIN



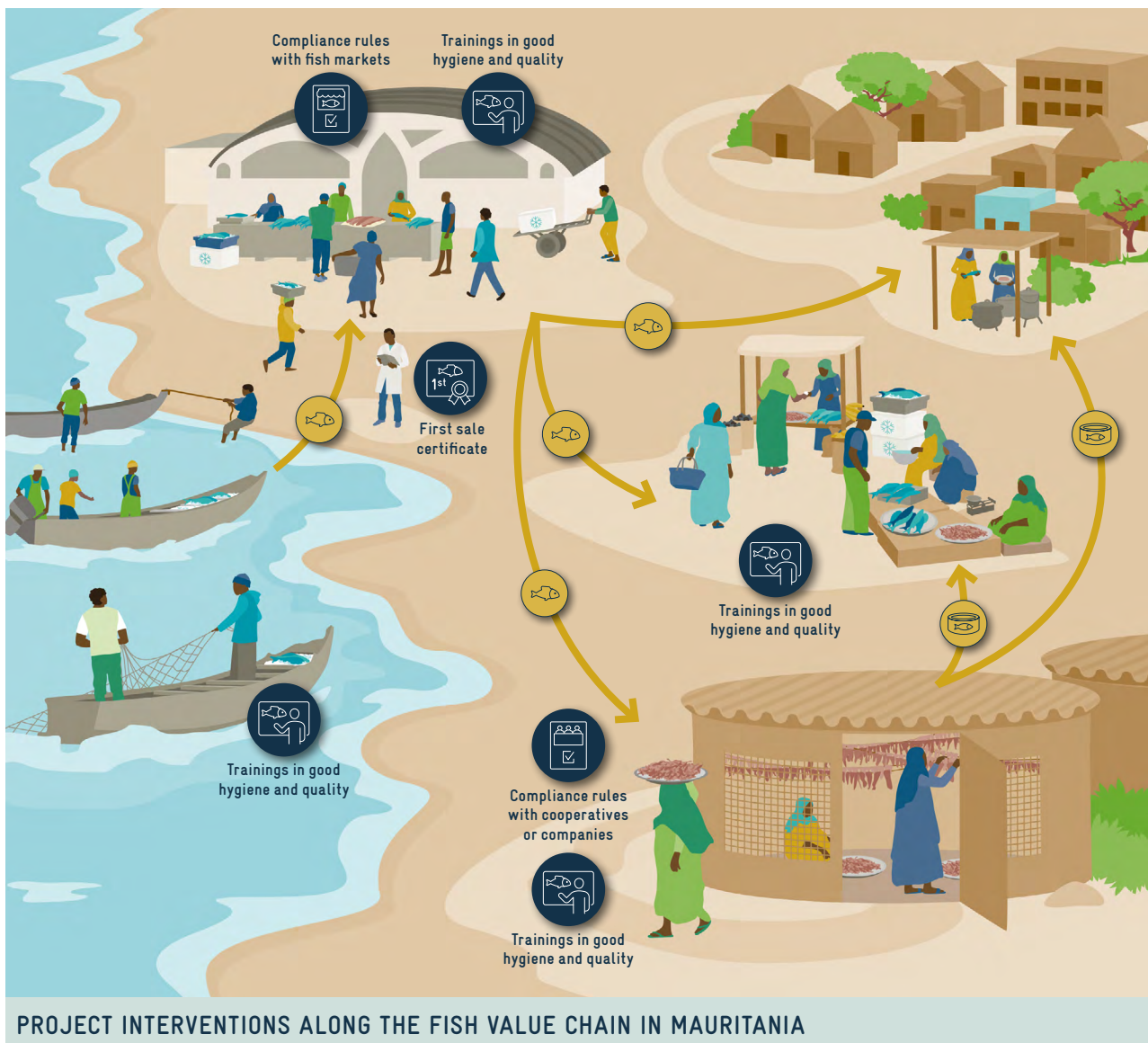
in the value chain can receive information on hygiene and quality requirements of the fish market or the procedure of getting a first sale certificate at the same time the fish market can register stands and actors and provide an overview for hygiene inspectors where and when to perform quality inspections. At the same time, an app can simplify the exchange of best practice guidelines, training materials, as well as other communication products interesting for the sector (advertisements, recipe videos, etc.).

IMPACT

The interventions described here are intended to have two effects. First, they should increase the income of the actors in the value chain, as better fish quality is sold at higher prices. Second, the availability of (better) fish products on local markets that are suitable for human consumption should be increased as quality goes up and post-harvest losses go down.

It should be noted that training in good hygiene and quality practices, as well as compliance action plans and first sale certification, benefit consumer protection while helping to reduce food waste. If the quality of the fish is maintained throughout the value chain, more fish of better quality can be sold, which leads to an increased income for value chain actors. At the same time, the consumer benefits as they can enjoy healthier fishery and aquaculture products and have a larger selection because more catch arrives at the fish markets.

Also, other effects can be expected in addition to income generation and food security. Reducing post-harvest losses might be the most efficient way to bring more fish into the value chain without increasing fishing pressure on the already overexploited fish populations. In this sense, a good quality and hygiene structure in the value chain is inevitable for a sustainable fisheries management.



CASE STUDY

The hygiene and quality control plan for better protection of consumers of small pelagic fish in Mauritania

In October 2019, the government partner, the National Office for the Sanitary Control of Fisheries and Aquaculture Products (*Office National d'Inspection Sanitaire des Produits de la Pêche et de l'Aquaculture*, ONISPA), launched the hygiene and quality control plan for small pelagic fishery products for local and sub-regional consumption.

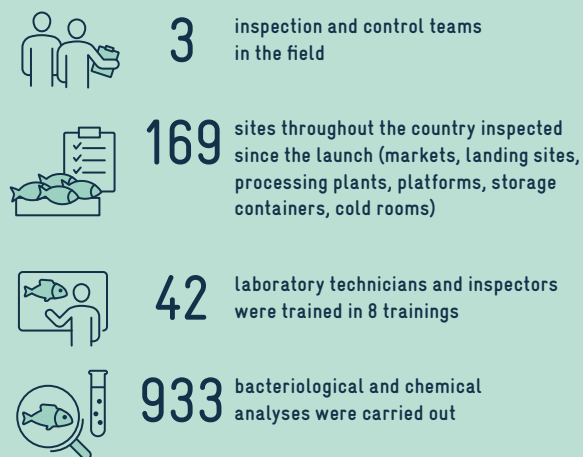
The control plan is in line with the government's strategy to ensure the supply of high-quality and nutritious fish to the population. It enables ONISPA to strengthen its presence in order to protect consumers and improve food safety in Mauritania. The implementation of this control plan is accompanied by a training plan for ONISPA professionals to develop their skills in analytical and sanitary control techniques specific to the local value chains of small pelagic fish. Four laboratories were set up in Nouakchott, Nouadhibou, Rosso and Tanit and a registration procedure for first sales is enforced by ONISPA inspectors to improve controls and traceability of products.

The aim of the control plan is to control artisanal fishery products in order to verify that they meet the quality and hygiene requirements in the value chain. The measures of the control plan extend from coastal areas to the interior of the country and target artisanal and coastal fishing vessels, means of transportation, processing plants and distribution and sales outlets. This is the first time that the control and inspection measures have been systematically carried out far from the coastal areas inland.

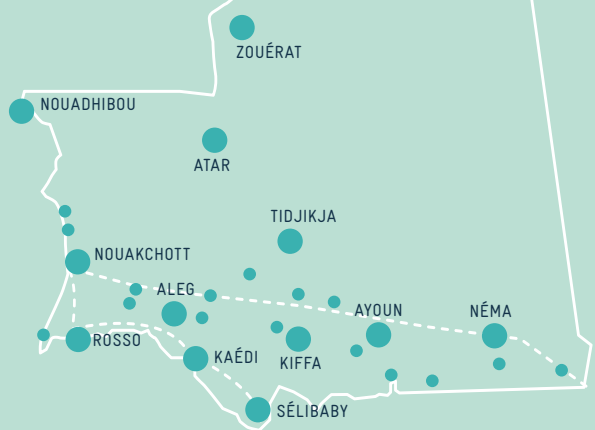
Founded in 2007, ONISPA is an institution under the supervision of the Ministry of Fisheries and Maritime Economy. Its main tasks are the application of national and international regulations on the quality and hygiene of fishery products, the control of the entire value chain and the issuing of health certificates. It has four inspection offices and two laboratories for chemistry and microbiology in Nouakchott and Nouadhibou, which are accredited according to ISO 17020 and ISO 17025.



SOME FIGURES TO DATE



AREAS REACHED BY THE HYGIENE AND QUALITY CONTROL PLAN



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