



From Net to Plate: Ensuring Food Safety in Fish and Fishery Products

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INTRODUCTION

Fish is an important source of high-quality protein, omega-3 fatty acids, vitamins and minerals. It contributes significantly to nutrition, food security and livelihoods in India. However, the nutritional benefits of fish can be fully realized only when it is safe to eat. Since fish is highly perishable, improper handling, inadequate chilling, poor hygiene and contamination can reduce its quality and may lead to foodborne illness.

Food safety in fisheries begins from the moment fish is harvested and continues through transportation, processing, marketing and finally consumption. At each stage, proper care is essential.

Why can fish become unsafe?

Fish and fishery products may be affected by three major types of hazards—**biological, chemical and physical**. Biological hazards include harmful bacteria, viruses and parasites. Bacteria such as *Salmonella*, *Listeria* and *Vibrio* can contaminate fish through polluted water, poor sanitation or unhygienic handling. Chemical hazards may include heavy metals, pesticide residues, veterinary drug residues and naturally occurring toxins. Physical hazards may include unwanted materials such as pieces of metal, plastic or glass.

One important food-safety concern is **histamine poisoning**, particularly in certain marine fishes such as tuna, mackerel and related species. When such fish are not adequately chilled, bacteria can convert histidine present in the fish muscle into histamine. High levels of histamine can cause symptoms such as headache, flushing, nausea and vomiting. An important concern is that histamine formation cannot be reliably detected simply by looking at the fish, and cooking does not effectively eliminate it. Therefore, prevention through rapid chilling and proper cold-chain management is essential.

The cold chain is critical

Temperature is one of the most important factors controlling fish quality and safety. Once fish is harvested, it should be cooled as quickly as possible. Proper icing slows microbial growth and enzymatic deterioration. Ice used for fish should be made from clean, potable water, while insulated containers and refrigerated transport can help maintain low temperatures during transportation.

Breaks in the cold chain—whether at the landing centre, during transportation, at the market or in the household—can accelerate spoilage and increase food-safety risks. Thus, maintaining the cold chain is not simply a quality-control measure; it is a basic food-safety requirement.

Hygiene matters at every stage

Clean water, clean equipment, clean surfaces and clean hands are equally important. Fish should be handled on clean surfaces using properly washed knives, cutting boards, crates and containers. Raw fish must be kept separate from cooked or ready-to-eat foods to prevent cross-contamination.

In markets, fish should preferably be displayed under proper icing or refrigeration rather than being exposed to high ambient temperatures for long periods. Waste should be removed regularly and the surrounding area maintained in a hygienic condition.

Safety starts at the farm and fishing ground

Food safety also begins before harvest. In aquaculture, maintaining good water quality, using safe feed and following responsible disease-management practices are essential.

Unnecessary or improper use of antibiotics can contribute to antimicrobial resistance and may result in undesirable residues. Similarly, contamination of rivers, lakes, estuaries and marine waters with pollutants can affect the safety of fish harvested from these environments.

What can consumers do?

Consumers also have an important role. Fish should be purchased from reliable and hygienic sources where proper icing or refrigeration is maintained. Raw fish should be transported home quickly and refrigerated or frozen without unnecessary delay. Kitchen surfaces and utensils should be cleaned properly, and raw and cooked foods should be kept separate. Fish should be thoroughly cooked unless it is specifically intended for safe consumption in raw form under controlled conditions.

Food safety is everyone's responsibility

Safe fish is not simply fish that looks fresh. It is fish that has been produced in a suitable environment, harvested responsibly, handled hygienically, kept under proper temperature control and processed safely.

From the fisherman and fish farmer to the processor, trader, retailer and consumer, everyone has a role in protecting the safety of fish. By following simple practices such as **clean handling, rapid chilling, proper storage, safe processing and adequate cooking**, we can protect consumers while also preserving the quality and value of one of our most important foods.

Food safety begins at the water and ends at the plate—and every step in between matters.



Why can fish become unsafe?

Fish and fishery products may be affected by three major types of hazards—**biological**, **chemical** and **physical**.



Biological hazards

- Harmful bacteria (Salmonella, Listeria, Vibrio)
- Viruses
- Parasites



Chemical hazards

- Heavy metals
- Pesticide residues
- Veterinary drug residues
- Naturally occurring toxins



Physical hazards

- Metal, plastic, glass and other unwanted materials

Histamine poisoning

Common in marine fishes like tuna, mackerel and related species. Bacteria convert histidine into histamine when fish is not adequately chilled.

Symptoms

- Headache
- Flushing
- Nausea and vomiting



Cannot be detected by sight. Cooking does not remove it. **Prevention through rapid chilling and cold-chain management is essential.**

The cold chain is critical

Temperature controls quality and safety. Fish should be cooled quickly after harvest.



Use clean, potable water ice.



Keep fish in insulated containers and refrigerated transport.



Breaks in the cold chain at landing centres, during transport, markets or at home increase spoilage and food-safety risks.

Maintaining the cold chain is not just a quality measure — it is a basic food-safety requirement.



Hygiene matters at every stage



- Use clean water, equipment, surfaces and hands.
- Keep raw fish separate from cooked or ready-to-eat foods.
- Display fish under proper icing or refrigeration in markets.
- Remove waste regularly and maintain a hygienic environment.



Avoid cross-contamination

Safety starts at the farm and fishing ground



- Maintain good water quality.
- Use safe feed and responsible disease-management practices.
- Avoid unnecessary or improper use of antibiotics to prevent resistance and harmful residues.
- Prevent water pollution in rivers, lakes, estuaries and seas.

What can consumers do?



- ✓ Buy from reliable and hygienic sources.
- ✓ Transport home quickly and refrigerate or freeze without delay.
- ✓ Keep kitchen surfaces and utensils clean.
- ✓ Keep raw and cooked foods separate.
- ✓ Cook fish thoroughly unless it is intended for safe raw consumption under controlled conditions.

Food safety is everyone's responsibility



Safe fish is not just fresh-looking fish. It is fish produced in a suitable environment, harvested responsibly, handled hygienically, kept under proper temperature control and processed safely.

By following simple practices such as **clean handling, rapid chilling, proper storage, safe processing and adequate cooking**, we protect consumers and preserve the quality and value of fish.

Food safety begins at the water and ends at the plate—and every step in between matters.



Harvesting
(Fishing / Aquaculture)



Handling & Icing
(Landing Centre)



Transportation
(Keep it Cold)



Processing
(Clean & Safe)



Marketing
(Hygienic Display)



Home
(Store Safely)



Cooking & Consumption
(Eat Safe)

Healthy Fish = Healthy You