Qualitative microbiological risk assessment of oyster (*C. rhizophorae*) in Cuba's northwestern region.

GRO·FTP Fisheries Training Programme

Whitney Sixela Rodríguez Fuertes[1], Cecile Dargentolle[2], Hrólfur Sigurðsson[2]

[1] Department of Food Safety, Cuban Fisheries Research Center (CIP), [2]Matís. Iceland

Introduction

Background

- Oyster farming is a key activity in coastal communities in northwestern Cuba.
- Oysters are filter feeders, often consumed raw.
- Limited microbiological information is available, while oysters are associated with high microbiological risk.
- Consequently, the Fisheries Research Center, together with FLOGOLFO and the Ministry of Public Health, promoted studies to protect consumer health and support sustainable oyster farming.

Problem statement

Oysters can accumulate and concentrate pathogenic microorganisms, representing a direct food safety risk. Despite existing monitoring efforts, there is no structured microbiological risk assessment to identify critical contamination points along the oyster production chain in Cuba, limiting effective risk management and decision-making.

Objectives

- Identify key microbiological hazards and contamination factors in oysters based on monitoring data and industry practices.
- Conduct a qualitative analysis to assess the likelihood and impact of the identified hazards.
- Provide recommendations to reduce risks through a participatory workshop with producers and processors.

Materials and Methods

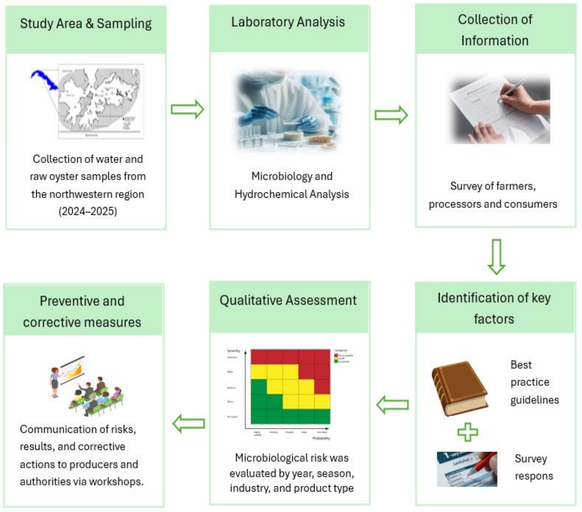

Fig 1. Methodological flow of the study

Results

Table 1. Microbiological results of oysters using color coding

Year	Month	Total Viable Count (CFU/g)		Total coliforms (MPN/g)		Thermotolerant coliforms (MPN/g)		*E. coli* (MPN/g)	
		Fresh oyster	Meat oyster	Fresh oyster	Meat oyster	Fresh oyster	Meat oyster	Fresh oyster	Meat oyster
2024	March								
	August								
2025	February								
	May								

Legend: Green = acceptable; Yellow = high; Red = critical.

Fresh oyster: whole oyster before processing.
Meat oyster: oyster after processing.

Results

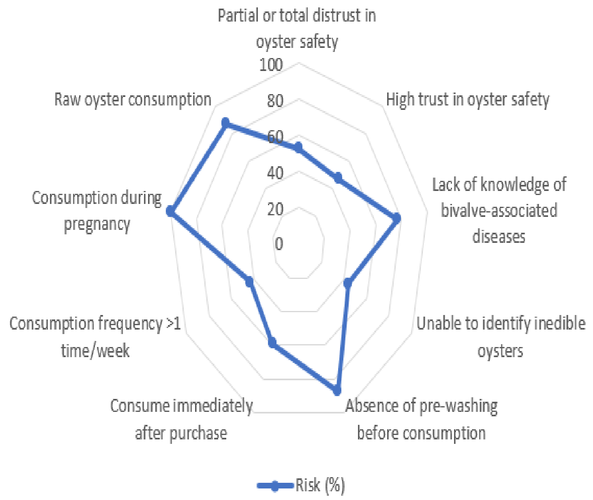

Fig 2. Integrated consumer exposure risk profile.

Among the 47 respondents, 16 were female (34%) and 31 were male (66%).

Table 2. Key factors and microbiological risks in oyster production.

Key factor	Stage affected	Measures
Heavy rain and runoff		Suspend harvesting after heavy rain
Fecal contamination and biofilm in the structure		Regular cleaning and biofilm removal
Lack of refrigeration during transport		Maintain cold chain (ice, time–temperature control)
Shell removal and poor hygienic practices during processing		Limit handling and improve hygiene
Power outages during processing		Process only with stable electricity / cold chain
Raw consumption combined with long waiting time (>12 h) and storage at room temperature		Promote rapid consumption after purchase (<6 h) and avoid storage at room temperature
Raw oyster consumption by pregnant women		Avoid raw oyster consumption (pregnant women)

Conclusion

- Oyster meat (deshelled oysters) showed high microbiological risk, mainly due to thermotolerant coliforms and *E. coli*.
- Environmental conditions and handling practices jointly contribute to oyster contamination.
- Processing was identified as the most critical stage for microbiological risk.
- Surveys revealed inadequate practices and limited risk awareness along the production and consumption chain.
- Risk reduction is feasible through simple measures and targeted training.

Recomendations

- Consume oysters only after adequate cooking, especially for vulnerable groups (e.g., pregnant individuals), ensuring at least 15 minutes in boiling water.
- Delay harvesting for at least 48 hours after heavy rainfall to reduce contamination from fecal inputs.
- Implement depuration (cleaning) steps before processing to reduce microbiological load in oysters.
- Ensure proper temperature control during transport and storage to limit bacterial growth.

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