



International Fishing Industry Safety and Health Conference
FISHING 🐟 AQUACULTURE 🐠 SEAFOOD PROCESSING

6th International Fishing Industry Safety and Health Conference (IFISH 6) 08 to 12 January 2024
Food and Agriculture Organization of the United Nations (FAO), Rome, Italy

Hazards associated with the processing of *masmin* (a traditional smoke-cured product from skipjack tuna) by fishers of Lakshadweep islands, India



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COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY, KERALA, INDIA

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**FISHERIES
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MAP OF LAKSHADWEEP



LOCATION :

$8^{\circ} - 12^{\circ}$ N LATITUDE

$71^{\circ} - 74^{\circ}$ E LONGITUDE

Distance from the

West Coast of Kerala : 220 – 440 km

Coastline length : 132 km

Temperature : $23^{\circ}\text{C} - 33^{\circ}\text{C}$

Average Annual Rainfall : 1600 mm

Geographical Land Area : 32 sq. km

Lagoon Area : 4200 sq. km

Territorial Water Area : 20,000 sq. km

Exclusive Economic Zone : 4,00,000 sq. km

(20% of EEZ of India)

Natural Resources : Coconut, Fish &
Natural Beauty



Source: Location map of Lakshadweep. Lakshadweep.gov.in



- Union Territory, India
- Land area 32 sq.km
- Only coral atolls of India
- 27 Scattered islands
- Ministry of Agriculture, Govt of India declared the UT: as "*Organic land*".

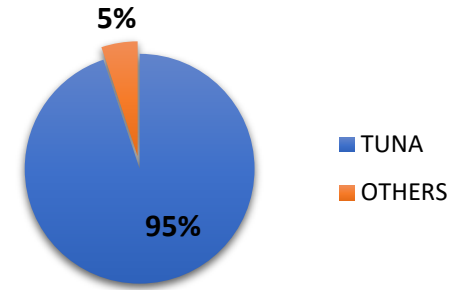
Lakshadweep

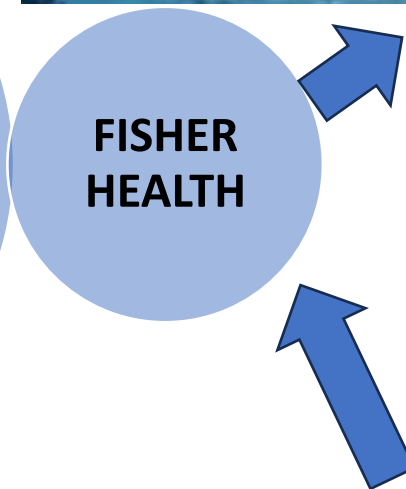
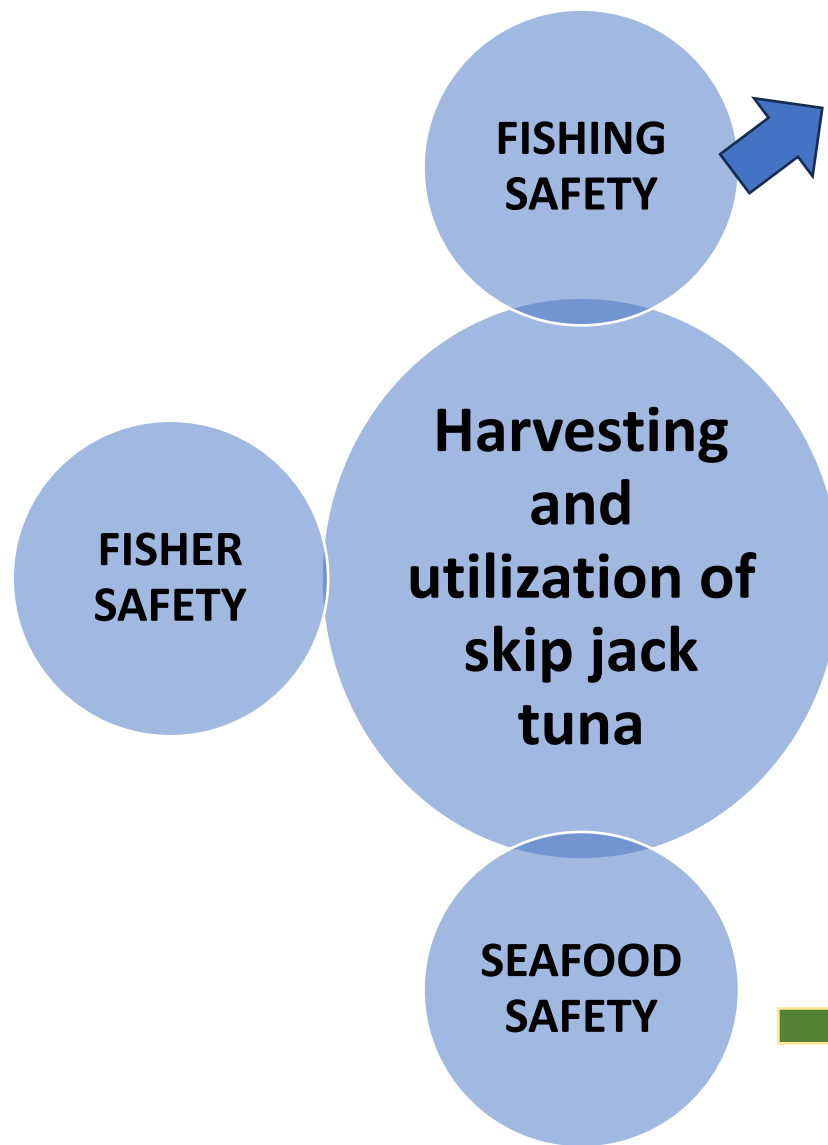
- **Fishing: Main livelihood**
- **Tuna production: 1000 tonnes (1980) to 12,000 tonnes (2020): 5% of the potential.**
- **Average landing of fish- 21,745 ton - (80% tunas viz. skipjack (11,909 T) & yellow fin (5245 T).**
- **Out of 27 islands, Lakshadweep fishers carry out daily fishing in 10 inhabited islands**



- ❖ Annual catchable potential : 100,000 tonnes.
- ❖ Major tuna species landed -*K. Pelamis* (86%), *T. Albacores* (12%), *E. affinis* (2%).
- ❖ Pole & line fishing method account for 97% of the total landings followed by troll lines.
- ❖ 900 motorized fishing boats in Lakshadweep.

TUNA LANDINGS in Lakshadweep islands





100 % local consumption

> 80% consumed by local fishermen and their family members

< 20% by others

HARVESTING OF SKIP JACK TUNA



HANDLING/LANDING OF SKIP JACK TUNA



MASMIN

- ❑ Masmin is a traditionally processed hard dried smoke cured product from Skip Jack tuna in Lakshadweep.
- ❑ Nutritionally and economically important in Lakshadweep.
- ❑ The different islanders use their own methods for the production of mass min.
- ❑ Quality and texture is not uniform



Katsuobushi



Maldivian fish



PREPARATION STEPS



COOKING



HOT SMOKING





DRYING PROCESS



ADDITION OF SALT





Final product: “Masmin”

POTENTIAL HEALTH HAZARDS ASSOCIATED WITH MASMIN

1. **Smoke and smoke components:** Formaldehyde, carboxylic acids, phenols
2. **Carcinogenic Compounds** : Polycyclic aromatic hydrocarbons (PAHs)- benzopyrene
3. **Salt and Sodium Content** : Excessive salt intake- may lead into various health issues
4. **Histamine formation**
5. **Microbial contamination**
6. **Physical hazards**

CONCLUSIONS

- 1. Inconsistent quality and inconvenient size and form are major hurdles**
- 2. Heavy smoking and unhygienic handling**
- 3. Threat of contamination with carcinogenic compounds**
- 4. Health risks to the fisherwomen- exposure of smoke**
- 5. Nair et al., 1994; Yathavamoorthi et al., 2010 and Nithin et al., 2020 (attempted-reduction of PAH's)**
- 6. Hardwoods/ fruitwoods for smoking instead of softwoods.**
- 7. Controlled and moderate smoking temperature.**
- 8. Shorter smoking times- reduces the exposure/accumulation**
- 9. Salt and sodium levels**
- 10. Proper ventilation**
- 11. Testing and monitoring**
- 12. Improved technology, Value addition and Training**

Thank you for your attention.