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Policy perspectives on safety at work in fisheries

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ABSTRACT

Fishing remains one of the most hazardous occupations in the world, and the risks are especially high in India, where most fishing is small-scale and informal. The sector supports rural livelihoods, employment and food security, yet fish workers continue to suffer frequent injuries and deaths, largely because policy, regulation and enforcement are weak. This paper examines the hazards faced by workers in marine, inland and aquaculture fisheries in India, including physical, environmental, chemical, gender-related and behavioural risks. It also discusses structural problems such as the lack of a comprehensive law, responsibilities split across several institutions, and the absence of a national system for reporting accidents. Through a review of international instruments, namely the ILO Work in Fishing Convention (No. 188), the STCW-F and the FAO/ILO/IMO Code of Safety, the paper compares India's position with global standards and identifies where national implementation falls short. It also looks at how gender and cultural attitudes toward risk affect safety, showing that women's work often goes unrecognised and that danger is accepted as a normal part of fishing life. The analysis argues for regulatory reform, governance that involves fishers, safety training suited to local conditions, and the inclusion of occupational safety in flagship schemes such as the Pradhan Mantri Matsya Sampada Yojana (PMMSY). The paper concludes that safety should be treated as a core part of sustainable fisheries development. Reducing risk and protecting the rights, dignity and well-being of fish workers will require an inclusive, data-driven approach backed by coordination across sectors and firm political commitment.

Keywords: Occupational safety, Occupational hazards, Fisheries governance, Fish workers, Safety regulation, Policy integration

1. Introduction

Fisheries are vital to global food security, employment, and economic development, particularly in coastal nations like India, where the sector supports over 28 million people both directly and indirectly (Department of Fisheries, 2023) [1]. However, fishing continues to be recognized as one of the most hazardous occupations globally, marked by high rates of injuries, fatalities, and chronic health issues (ILO, 2007). Occupational risks in fisheries include drowning, vessel capsizing, injuries from machinery, extended working hours, exposure to harsh weather, and unsanitary conditions aboard vessels and at landing sites (FAO, 2021) [2]. Maritime safety has been a longstanding concern, with factors such as risk-taking behaviour, lack of training, and inadequate infrastructure contributing to accidents (Kaplan *et al.*, 2000; Perez-Labajos, 2008) [3, 4]. Despite international and national efforts to improve safety at sea, accident data in the fisheries sector remain sparse, fragmented, and inconsistent - complicating efforts at comparison, prevention, and policy intervention (ILO, 1999) [5].

In India, occupational risks are exacerbated by unpredictable weather, deep-sea fishing operations, and increasing competition overfishing zones. In aquaculture, hazards include chemical exposure, electrocution, pond-related accidents, and handling of unsafe equipment, particularly in shrimp and inland fish farms (Vase *et al.*, 2019) [6]. Women engaged in post-harvest processing, vending, and value addition face distinct vulnerabilities - including repetitive strain injuries, cold storage exposure, and lack of sanitation facilities-yet they remain largely excluded from existing safety frameworks (Béné *et al.*, 2016) [7]. Therefore, a unified legal and institutional safety framework addresses these risks and improves occupational safety outcomes (Perez-Labajos, 2008) [4]. As the sector modernizes with increasing mechanization, longer offshore expeditions, and intensified production practices, occupational safety must be treated as a policy imperative. Unsafe working conditions endanger lives, reduce productivity, limit workforce sustainability, and deepen socio-economic vulnerability in fishing communities (FAO, 2021) [2].

2. Policy context and gaps

Occupational safety in fisheries has gained growing international attention due to persistently high accident and fatality rates among fishers, especially in small-scale and developing country contexts (ILO, 2007). Recognizing these risks, global frameworks such as the ILO Work in Fishing Convention, 2007 [8] (No. 188), the International Convention on Standards of Training, Certification and Watchkeeping for Fishing

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Vessel Personnel (STCW-F, 1995), and the FAO/ILO/IMO Code of Safety provide comprehensive guidelines for improving safety through standards on vessel design, crew training, emergency response, and health monitoring (Perez-Labajos, 2008) [4]. Despite these instruments, India has yet to ratify ILO Convention No. 188, and its current legal framework lacks a unified and enforceable mechanism to address occupational safety across marine, inland, and aquaculture fisheries. Regulatory authority is dispersed across multiple ministries-including Fisheries, Labour, Shipping, and Environment-resulting in limited coordination and weak policy coherence. Inland and small-scale fisheries, which constitute a major portion of the workforce, often fall outside the reach of enforceable safety legislation, leaving large segments of fish workers unprotected.

In addition to regulatory fragmentation, the absence of a centralized accident reporting system remains a major institutional gap. As Perez-Labajos (2008) [4] highlighted, reliable and disaggregated accident data are essential for risk mapping, resource allocation, and evidence-based policymaking. Without a national fisheries safety database, incidents are underreported, patterns go undocumented, and policy interventions remain reactive rather than preventive. Compounding these issues, certain fisheries management regulations may inadvertently increase occupational risks. For example, restrictions on fishing days, vessel operations, and crew sizes-though intended for conservation-can result in fatigue, overcrowded vessels, and higher risk-taking behaviour under economic pressure (Kaplan *et al.*, 2000) [3]. These safety implications are rarely factored into management decisions. Furthermore, fisher communities have limited involvement in the formulation of safety norms. Policies are often top-down, failing to reflect fishers' lived experiences and operational challenges. As Siame *et al.* (2022) [9] note, greater fisher participation through co-management frameworks can improve policy acceptance, compliance, and contextual relevance, thereby grounding occupational safety efforts in real working conditions.

3. Occupational hazards in fisheries

Fisheries are consistently ranked among the most hazardous occupational sectors globally, characterized by a high incidence of injuries, fatalities, and chronic health risks. These dangers are particularly acute in developing countries like India, where regulatory enforcement, infrastructure, and access to safety resources remain limited. Although the sector plays a critical role in national food security and rural livelihoods, workers in marine capture, inland fisheries, and aquaculture systems are exposed to a wide range of occupational hazards-physical, chemical, environmental, and behavioural (ILO, 2007; Siame *et al.*, 2022) [9]. The lack of comprehensive safety legislation and fragmented institutional responses aggravate the situation.

3.1 Physical and mechanical hazards

Fishers frequently encounter severe risks such as falls overboard, vessel capsizing, entanglement in winches or propellers, and injuries from trawl machinery. These are often exacerbated by inadequate vessel maintenance and a lack of emergency preparedness systems, including communication tools and life-saving equipment (Perez-Labajos, 2008) [4]. Overloaded work schedules and reduced crew sizes-imposed by management regulations to meet quota or seasonal limits-contribute to fatigue and increased susceptibility to accidents (Kaplan *et al.*, 2000) [3].

3.2 Environmental and weather-related hazards

Exposure to unpredictable and extreme environmental conditions poses constant threats. Fishers often operate during storms, cyclones, and high tides without reliable access to real-time meteorological updates. Small-scale and artisanal fishers are particularly vulnerable to cold water immersion, excessive heat, and slippery deck surfaces, resulting in hypothermia, sunstroke, or falls (Kaplan *et al.*, 2000; FAO,

2021) [3, 2]. These risks are intensified when safety planning does not include adequate shelter, gear, or weather adaptation strategies.

3.3 Aquaculture-specific hazards

In aquaculture, especially in shrimp and inland pond-based systems, occupational risks differ in form but are equally critical. Workers frequently handle hazardous chemicals such as lime, formalin, and bleaching powder, often without protective equipment or ventilation (Vase *et al.*, 2019) [6]. The improper installation of pond aerators and submerged electrical pumps increases the risk of electrocution. Moreover, poorly maintained pond dykes and muddy embankments present drowning and fall hazards, while repetitive manual tasks cause musculoskeletal strain.

3.4 Gender-based vulnerabilities

Women form a significant part of the fisheries workforce, particularly in post-harvest processing, vending, and value addition. Despite this, they often work in physically demanding and ergonomically poor conditions, such as prolonged standing, repetitive hand movements, exposure to cold storage units, and unsanitary processing sites (Béné *et al.*, 2016) [7]. These gender-specific risks are largely overlooked in occupational safety policies, leaving women with little access to safety equipment, training, or legal protections.

3.5 Cultural and behavioural risks

Cultural norms within fishing communities frequently normalize high-risk behaviour, undermining the adoption of safety measures. Fishers may forgo personal protective equipment like life jackets or resist formal safety training due to fatalistic beliefs or distrust in regulations (Kaplan *et al.*, 2000) [3]. This risk perception gap-where occupational danger is viewed as inevitable-significantly hampers safety compliance. As Siame *et al.* (2022) [9] emphasize, behaviour change communication and participatory training methods are critical for improving safety culture across fishing communities.

3.6 Gaps in safety research and monitoring

A critical but under-addressed hazard is the absence of robust safety research systems and accident monitoring mechanisms. Unlike industries such as shipping or aviation, fisheries lack a consistent classification of accidents by type, cause, and consequence (Perez-Labajos, 2008) [4]. Many countries, including India, do not have a national accident reporting database tailored to fisheries, despite IMO and ILO recommendations for annual statistical monitoring.

Perez-Labajos (2008) [4] argues that the inability to compare accident data across countries or fleets impedes policy coordination and the design of targeted interventions. For instance, accidents such as capsizing, collisions, fires, and flooding are rarely analyzed regarding vessel age, sea conditions, or crew experience. Moreover, spatial mapping of accident concentration-a vital tool for focusing resources and regulatory oversight-is lacking in Indian fisheries governance. The limited research linking occupational hazards to their underlying causes also affects policy development. Safety interventions remain reactive rather than preventive without detailed investigations and surveillance, and resources are often misallocated.

3.7 Research perspectives on occupational safety in fisheries

Advancing fishery occupational safety requires a multidisciplinary understanding that extends beyond incident response to systemic, behavioural, and technological dimensions. As Perez-Labajos (2008) [4] synthesizes, the literature on fisheries safety covers a broad array of research domains-including injury surveillance, accident typologies, damage to vessels and gear, risk perception among fishers, and probabilistic models for accident prediction. These thematic areas are essential for informing context-specific and forward-looking policy frameworks.

Table 1. Key Research Themes in Occupational Safety in Fisheries (Adapted from Perez-Labajos (2008) [4]).

Table 1. provides an adapted overview of the key research themes and methodological approaches identified in the global literature. This classification illustrates the complex, interconnected factors influencing safety outcomes- from operational hazards and regulatory systems to fisher behaviour and social inequalities. Importantly, research in this domain remains heavily concentrated in developed countries and large-scale commercial fleets. Studies focused on developing nations, and small-scale fisheries are limited, reducing the relevance of existing models for countries like India. Addressing this research imbalance is critical to developing inclusive, effective, locally grounded safety interventions.

Focus Area	Scope of Research	Selected Contributors
Injuries and Illnesses	Incidence of occupational injuries, illnesses, and health impacts on fishers	Goethe & Vuksanovic, 1975; Jensen, 1996; Reilly, 1985.
Material Damage	Loss or damage to vessels, gear, or equipment during operations	Poggie <i>et al.</i> , 1995; Kaplan & Kite-Powell, 2000.
Types and Causes of Accidents	Classification of accident events (e.g., capsizing, collision, falls) and related causal variables	Lagares, 1990; Dyer, 2003; Jin <i>et al.</i> , 2001.
Risk Modeling	Probabilistic and statistical models to estimate accident likelihood and decision factors	Deng, 2000; Hou, 2004; Puthran, 1978; NTSB, 1985; Morrall, 1991.
Preventive Strategies	Mechanisms, tools, and practices for accident prevention and emergency response	Lincoln & Conway, 1995; Johnson, 2001; Cox <i>et al.</i> , 1997.
Survival and Rescue Procedures	Availability, use, and effectiveness of rescue operations and onboard safety equipment	ILO, 1970; Walter, 1987; Pollack, 1988; FABC, 1976; Valayudhan, 2001.
Safety Perception and Attitudes	Fishermen's risk perception, behavioural response, and compliance with safety measures	Walter, 1987; IMP, 1985; Gittings <i>et al.</i> , 1993.; ILO, 1970.
Inequalities in Safety Outcomes	Disparities in accident concentration among fleet types, locations, or fisher demographics	Wagstaff <i>et al.</i> , 1991; Brown, 1994; Bacallao <i>et al.</i> , 2002.

4. Enhancing occupational safety in fisheries: policy dimensions and strategic pathways

Despite global recognition of the risks involved in fisheries, occupational safety continues to receive insufficient attention in national policy frameworks. The ongoing occurrence of injuries and fatalities reflects systemic shortcomings in regulatory structure, institutional integration, risk awareness, and field-level implementation (ILO, 2007; Siame *et al.*, 2022) [9]. A core structural issue is the lack of a dedicated, fisheries-specific regulatory framework. India has not ratified the ILO Work in Fishing Convention, 2007 [8] (No. 188), resulting in the absence of enforceable safety standards-particularly for small-scale, inland, and aquaculture workers (Perez-Labajos, 2008) [4]. Regulatory oversight remains fragmented among maritime, labour, and fisheries departments, weakening inter-sectoral coordination and policy coherence.

Additionally, some fisheries management regulations inadvertently exacerbate occupational risks. Measures such as limited fishing days or crew size caps-intended for stock conservation-can lead to physical exhaustion, overloaded vessels, and risk-taking behaviour under economic pressure (Kaplan *et al.*, 2000) [3]. These safety implications are rarely considered in policy design, revealing the need to embed safety considerations into fisheries governance at all levels. A critical institutional gap is the absence of standardized, sector-specific accident reporting systems. In most cases, fisheries-related incidents are either undocumented or subsumed under general maritime data, hindering risk analysis and response planning (Perez-Labajos, 2008) [4]. Without spatially disaggregated data, policymakers cannot identify high-risk zones or design evidence-based interventions. Training and safety awareness are also severely lacking. Most fishers-particularly those in the informal and artisanal sectors-have never received formal training on risk reduction, equipment usage, or emergency response (Siame *et al.*, 2022) [9]. Cultural perceptions that normalize occupational risks further reduce the uptake of protective measures. Introducing localized, participatory training modules and linking safety certification to licensing or subsidy eligibility could substantially improve compliance. The exclusion of women from safety policy frameworks is another major oversight. Although women are deeply involved in post-harvest and aquaculture-related activities, they often face ergonomic hazards, chemical exposure, and lack of sanitation without formal protection mechanisms (Béné *et al.*, 2016; Siame *et al.*, 2022) [7, 9]. To provide equal safety coverage, gender-responsive planning is crucial. This includes offering suitable safety equipment, ergonomic design, and training opportunities. Participation of fishermen in safety governance is equally crucial-low compliance results from top-down regulations' frequent lack of contextual relevance. Involving fishers in co-management platforms can strengthen policy legitimacy and ensure that interventions reflect on-ground realities (Kaplan *et al.*, 2000) [3]. Lastly, occupational safety must be mainstreamed into government schemes such as the Pradhan Mantri Matsya Sampada Yojana (PMMSY). Despite emphasizing infrastructure, welfare, and production, the PMMSY does not specifically address safety. Long-term risk reduction and worker resilience will be supported by including safety training, insurance, and equipment subsidies in these initiatives (Government of India, 2019) [10].

5. Conclusion and way forward

This study has highlighted how inconsistent safety training, documented legislation, inadequate fisherman engagement, and a lack of standardized accident data contribute to persistent occupational vulnerabilities in India's fishing industry. Despite the availability of global benchmarks-such as the ILO Work in Fishing Convention (No. 188) and the FAO/ILO/IMO Code of Safety-national-level adoption and integration remain limited. The lack of sector-specific legislation and a centralized surveillance system has hindered the development of a coherent, enforceable safety policy. The evidence reviewed underscores the need for a comprehensive, multi-dimensional strategy-

combining legal reform, localized training, participatory governance, and gender-inclusive planning.

Embedding occupational safety into flagship programs such as the Pradhan Mantri Matsya Sampada Yojana (PMMSY) and establishing a national accident reporting database can lay the foundation for long-term institutional resilience. Safety should not be treated as a stand-alone technical concern but as an integral pillar of sustainable fisheries governance. A holistic approach that integrates occupational safety into broader fisheries management, cooperative strengthening, and welfare initiatives will help ensure that fish workers are productive and protected-with dignity, well-being, and rights at the core. For India's fisheries sector to become safer, more egalitarian, and more resilient, these suggestions must be implemented via inclusive, data-driven, and well-coordinated policy action.

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