



## The human cost of global fishing

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### ABSTRACT

Seafood is central to global protein and food security, and the livelihoods of millions worldwide. Yet the fishing sector is universally acknowledged as one of the most dangerous in the world (ILO, 1999). Conservative estimates over the past two decades have put the fatalities at between 24,000 and 32,000 a year – but these estimates are generally accepted to be significantly below the true figure. Emerging research by the FISH Safety Foundation reveals that fishing is even more dangerous than currently thought, with rates shown to be at least three to four times higher than currently accepted estimates. Beyond determining a more accurate mortality figure, the research also aimed to identify any contributing drivers to fisher fatalities. The research thus shows that fishing for the global community therefore comes at a staggeringly high cost of human life. This toll is most often paid by the most vulnerable communities around the globe, regardless of region, and their deaths are also less likely to be tracked or reported. Fishing is so dangerous – and affects the most marginalised – because people are often forced to take extraordinary risks to provide food for their families, communities, and world markets. Collective, international action is needed now to ensure fishing communities continue to provide sustainable, high-quality protein without such a staggering loss of life. While some reasons why fishing is so dangerous are difficult to tackle, others are tractable, including addressing data and reporting gaps and limitations, and international policy change.

### 1. Introduction

Food security is one of the world's main challenges [1]. Global consumption of seafood has risen at an average annual rate of 3% since 1961, with per capita consumption estimated at 20.5 kg per person in 2018 [2]. Working to meet this challenge are millions of fishers – some 95% being classed as small-scale – in an estimated global fleet of over more than 4.1 million vessels, the vast majority of which are under 12 m in length [2]. As the demand for fish products globally continues to soar, small-scale fishers carry much of the burden of meeting this critical food source need, producing an estimated 40% of global catch [3]. Their role in providing safe and nutritious food to billions of people and their contribution to the Sustainable Development Goals, including Zero Hunger, have prompted the United Nations General Assembly to name 2022 as the International Year of Artisanal Fisheries and Aquaculture (IYAFA 2022).

Maintaining a safe, sustainable supply of fish products – for a global population expected to reach 10 billion by 2050 [4] is crucially important, and a daunting challenge. Yet for the millions of fishers who provide for their families, communities, and the world, they work in a sector that has long been acknowledged as one of the most dangerous (ILO, 1999). While the positive global contribution of fisheries is known and understood, the true human cost of fishing remains elusive.

Estimates over the past two decades have put the average number of fishing deaths between 24,000 (ILO, 1999) and 32,000 (FAO, ca 2018) per year. These estimates are based on a conservative average assessed rate of 80 fatalities per 100,000 fishers. In their press release [5] on this original figure in 1999, the International Labour Organization (ILO) stated that “fishing and related occupations (are) among the most dangerous of all professions, according to a new report released by the International Labour Office (ILO 1999)”. The early numbers were extrapolated from information available at the time and primarily

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sourced from industrialised fleets in developed countries; they were recognised to be underestimates. Despite this, the 24,000 figure was quickly quoted by industry participants as only applicable to capture fishing personnel, and subsequently the fatality rate of 80 per 100,000 fishers became widely adopted and is still used today. To put this in perspective, in the United States, fishing has a fatality rate of 117 [6] per 100,000 workers (2000–2015), compared to 4 per 100,000 workers among all U.S. workers. The difference in accident rates between fishing and the average worker fatality rate is not unique to the United States – fishing is consistently rated as the most hazardous industry. Numerous research reports in the UK [7], and elsewhere stress this.

Furthermore, statistics for losses of vessels and crews are generally available only for the total loss of vessels over 500 GRT; for the millions of small and medium-sized craft there are no official records. It is apparent from all the national statistics that are available, however, that, in every case, deaths of fishers far exceed those of all other occupations in the same country [8].

New research, conducted by the FISH Safety Foundation, aimed to confirm or update the 1999 estimate, and if possible, identify any contributing drivers to fisher fatalities. This work, analysing thousands of pieces of information from both formal and informal sources, revealed that the formal information on fatalities currently available is often inconsistent or missing, with existing recording systems seriously fragmented. The researchers undertook a desktop literature research, as well as direct interviews, and further analysed news, investigative articles, and social media content, cross-referencing this information with responses to official information requests from government agencies. It shed light on why it was so difficult to estimate the number of fisher fatalities globally, and also what needed to be done to improve the situation.

The research demonstrated that the global mortality estimates are well in excess of 100,000 fishers per year – three to four times higher than previous assessments. Ongoing work is needed to understand the drivers behind these unacceptably high fatality figures, and develop targeted and effective safety initiatives to make the critical work of fishing possible without such a dramatic loss of life.

## 2. Challenges in data and definition

A central barrier to understanding the true loss of life in fishing is one of a lack of information, and accurate data and accounting in fisheries has long been difficult. A 2017 World Maritime University paper [9] states that “Statistics are available only for the total loss of vessels over 500 GRT; for the millions of small and medium-sized craft there are no official records. It is apparent from all the national statistics that are available, however, that, in every case, deaths of fishers far exceed those of all other occupations in the same country. On an international basis there is an often-quoted number of 24,000 deaths per annum in world fishing. However, there is no sound basis for this figure because there are few reports from the majority of countries. Information on losses at sea may never get beyond the level of local communities.” This point of view is further emphasised in a FAO study [10] that explores the development of guidelines to assist Competent Authorities in reporting and analysing fisher accident information. This report notes that the 24 000 fatality figure is “somewhat weak, as proper calculations are difficult to make. This is thus a figure associated with a high degree of uncertainty. With more reliable accident reporting systems in place and with better registers and overview of the total population of fishermen and number of small vessels, more accurate estimations of the total number of fatal accidents will become available to guide safety authorities and policy makers in their priorities to save lives and improve the conditions for coastal fishing communities in developing countries”.

Throughout the data gathering phase of the FISH Safety Foundation work, it was apparent that the information available from National Authorities on the number of fishers and how many die was often lacking. The ILO had earlier identified similar shortcomings in

information as one of their challenges in their 1999 research, and despite some 20 years’ progress in both the fishing industry and technology, these issues remain apparent.

The lack of a standardised global reporting format is a significant constraint. For one, thresholds and definitions of basic industry factors – such as the various subsectors, or even what defines a fisher, are ambiguous and differ from country to country. Given the identified lack of standardised definitions, many countries do not include subsistence fishers in their official records, while information on inland fisheries fleets is often omitted from national or local registries (FAO, 2020) despite forming a third of global small-scale catch [3]. Researchers at the FISH Safety Foundation defined a ‘fisher’ as anyone who fished for commercial or subsistence (survival) reasons – including all marine, inland, dive, shellfish gathering and river fishing.

These issues, among numerous others including the inconsistent inclusion of small-scale, subsistence fishers, fish farmers and processing workers in country figures, highlight the need for consistency in definitions and reporting requirements across the industry. Exacerbating this situation are overlapping jurisdictions and areas of competence, as well as an inadequate and sometimes confusing legislative framework [11]. These manifest in a range of ways. Different countries have different departments responsible for collating figures, and there are often insufficient human and financial resources in some lower-income areas of the world to do this work. Globally, we lack an internationally binding set of measures that would require Flag Administrations to report all fisher casualties and investigate their root causes. While it is noted that there is one international instrument (the ILO Work in Fishing Convention C188) that requires reporting of accidents to the relevant Flag Administration, very few fishing Nations have ratified this Convention. And even where this reporting takes place, there is no requirement for this information to be reported to the IMO or other UN Agency.

## 3. Diverse drivers of fisher fatalities worldwide

In addition to systemic data and reporting concerns, identifying what makes fishing dangerous is also central to finding solutions that could reduce loss of life. Yet any investigation into fisher deaths show that they result from a range of diverse and interacting factors – but important patterns do emerge.

For example, the FSF researchers found that across multiple Central American countries, fishers who dive for their catch face high mortality rates for a number of common reasons. Driven by years of intensive fishing for export, including that destined for the U.S. market, declining stock levels in some species have caused many divers to undertake deeper and more frequent dives to secure a catch. Despite almost all divers in these communities reporting symptoms of decompression sickness and as many as half left with resulting long-term disabilities, they often continue to dive out of necessity - to feed their families and in the absence of other employment opportunities. Mortality rates in these communities can range from 400 to up to 943 deaths per 100,000 fishers [12]. The experience of divers in other parts of the world is similar, with often common causation factors.

Other examples worldwide show how an even wider range of drivers can underpin elevated risk of death for fishers. In inland Africa, the official number of fishers on Lake Victoria has increased rapidly from 30,000 in 1980 to over 220,000 in 2018 [13] – although the true number is likely significantly higher – supporting the livelihoods of over 3 million people. Using data from various sources, as described earlier, are calculations showed that these fishing communities experience a mortality rate of 1800 per 100,000 fishers, due in part to unpredictable weather, longer fishing trips in ill-equipped vessels, and violence resulting from boundary disputes. Additionally, poor resource management, corruption, climate change, and illegal fishing have resulted in reduced fish stocks, driving poverty and further contributing to illegal, unreported, and unregulated (IUU) fishing activities and violence. These

patterns are replicated across the inland fisheries of Africa, affecting approximately 3.5 million fishers [14].

Multiple factors drive mortality rates in fishing in the Bay of Bengal as well. Here, with similarities to inland Africa, fatalities are often caused by cyclones and storms, unsafe vessels, untrained crew, climate change, reduced stocks, boundary disputes and piracy, along with strong evidence of corruption and under reporting. Yet the lack of data and governance precludes a clear understanding of how many fishers lose their lives in the Bay of Bengal every year. Even exact numbers of marine fishers in the region are currently unknown, but our estimates surpass 20 million across Sri Lanka, India, Bangladesh and Myanmar.

Areas with lower mortality rates demonstrate additional important patterns. For the European Union, our research indicated an average mortality rate of 85 per 100,000 fishers [15]. Yet this average belies strong differences across sectors. For vessels over 15 m in length, the rate was 28 fatalities per 100,000 fishers, while on vessels smaller than 15 m, rates were significantly higher at 124 per 100,000 fishers. In comparison to the other case studies above, the EU fleet – particularly larger vessels – are heavily regulated. Fatalities here are usually the result of vessel conditions and/or human behaviour, although these fleets are not immune from the influence of IUU fishing, unacceptable working conditions, and human trafficking.

These examples show how rates of mortality among fishers can be much higher than earlier estimates, driven by multiple and intersecting underlying causes. For example, IUU fishing activities are naturally coupled to a lack of reporting and regulation, and often lead to increased illegal and risky behaviour, and poor working conditions. The factors behind IUU fishing are extraordinarily complex, with no singular causal factor. Poverty, weak and ineffective policies, lack of legislation and enforcement, corruption, reduced fish stocks and climate change all contribute to the prevalence of illegal fishing and related fatalities.

#### 4. The need for a robust legislative framework

The effects of these drivers are often cumulative. Root causes of risk – such as those with IUU fishing – are often compounded by weak governance, the lack of a comprehensive safety legislative framework and a coordinated approach to promoting safety in the fishing sector [16]. An overview of the requirement to report fisher fatalities to the relevant United Nations Agency is illustrative here. The ILO has adopted a Code of practice on Recording and notification of occupational accidents and diseases [17], but this is not specific to the fishing sector. Instead, as noted earlier, the ILO Work in Fishing Convention, 2007 (C188) calls for States to adopt laws, regulations or other measures concerning the reporting and investigation of accidents on board fishing vessels flying its flag. Its accompanying Recommendation No. 199 contains guidance on the gathering and dissemination of occupations safety and health materials, research, and analysis. Yet low acceptance and implementation numbers globally restricts the effectiveness of C188 – and, at the time of publication, it has been ratified by only 20 States.

Another major factor contributing to global fisher fatalities is lack of an internationally legislated fishing vessel safety standard. The IMO's 2012 Cape Town Agreement (CTA) provides global design, construction, and equipment standards for fishing vessels of 24 m and above in length. The overall objective of the CTA is to ensure the safety of fishing vessels and their crew (including fisheries observers) by setting out minimum global standards for the design, construction, equipment and inspections of fishing vessels. However, the CTA (originally conceived as the Torremolinos Convention, 1977), is not yet in force at the time of writing this article, despite 45 years of effort. The CTA closely mirrors the provisions of the International Convention for the Safety of Life at Sea (SOLAS), which covers the merchant shipping sector. The CTA, promoted with the understanding that a fisher's life is not any less important than a crew member's of a commercial ship, will constitute the missing pillar for safe and sustainable fishing practices, in addition to existing international instruments that are in force.

For smaller vessels of less than 24 m, these are currently covered through voluntary guidelines developed by FAO/IMO/ILO, including the Safety Recommendations for Decked Fishing Vessels of Less than 12 m in Length and Undecked Fishing Vessels. It is hoped that with the entry into force of the 2012 CTA in the years ahead, a fishing vessel safety culture will be established for industrial fishing vessels, and ultimately, this will also have a positive impact on developing a safety culture for smaller size vessels. Unfortunately, the latest target date of 11 October 2022 has passed without enough signatories to bring the CTA in force, and there is no indication that it come into force soon.

Finally, and importantly, our research has shown that there are several drivers, including poverty, IUU fishing, corruption, neglect, and marginalisation that negatively influence fisher fatality numbers globally. The research findings show that these drivers are further amplified by a weak legislative framework, and under-developed and poorly implemented policies and systems in the fishing sector.

#### 4. Conclusion

Fishing has long been accepted as the most dangerous occupation globally. Now, new research shows that fatalities among fishers are significantly higher than previously estimated.

Despite significant challenges as shown, including limited data and reporting, we were able to highlight the dangers of this profession, and could further identify measures needed going forward to reduce this unacceptable burden on the fishing community. There is a clear need for a coordinated approach to data collection and reporting, including addressing data limitations, updating and harmonising efforts, and clarifying differences in definitions and approaches.

Research shows that some causes are more diffuse, such as more intense storms and sea level rise as a result of climate change, but that others can be dealt with if the political will was there – and here strengthening the regulatory framework is paramount.

Improvements in safety will be most effectively addressed via a synergistic focus on the various drivers, including a stronger legislative framework and enforcement, better education, and greater investment in technology. Drivers of high fishing mortality rates are complex and interconnected and we should therefore address the problem holistically – collectively working towards solutions at an international level.

This paper has briefly outlined research findings by the FISH Safety Foundation into global fatality numbers in fishing. Ultimately, there are essentially two take-aways from our research:

1. The annual fatality number in global fishing is significantly higher than previously accepted (the 1999 ILO number of 24,000), and
2. While the 100,000 + number is provided, the reality is that the real number is most likely higher still – we simply don't know just how bad it really is. The systems simply aren't there to report, record and analyse these events. Not at national, nor international levels.

Clearly we need to advocate for a global reporting system and repository to capture and learn from fishing accident / fatality data. This lack of available / recorded data is a symptom however of a weak regulatory framework. Our research shows clearly that the high fatality numbers experienced in the global fishing sector are related to a number of 'drivers', many (most?) of which are in themselves the result of weak governance at local and international level. Drivers include climate change, IUU fishing, corruption, poverty, etc.

At the very basic level, we are advocating for all fishing countries to at least ratify the 3 main fishing safety-related conventions (CTA, C188 and PSMA). And in this regard, the responsible UN Agencies (IMO, ILO and FAO) need to do more to require Member Nations to meet these obligations.

Until such time that we get a clearer picture of the actual safety situation in the fishing sector, our current efforts to improve safety may well be misdirected and inefficient.

Fishing communities provide a critical and high-quality protein source for their families, their communities, and the world. They do so while engaging in arguably the most dangerous profession on Earth. While significant challenges lay before us, better information, and collaboration by all parties will assist in reducing this unacceptable death toll.

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#### CRediT authorship contribution statement

**Sam Willis:** Conceptualisation, Methodology, Formal analysis, Investigation, Writing - Original Draft, Visualization. **Despoina Andrioti Bygvraa:** Validation. **Md. Sazedul Hoque:** Validation. **Emily S. Klein:** Conceptualisation, Methodology, Formal analysis, Resources, Data Curation, Visualization. **Cagri Kucukyildiz:** Validation. **Joseph Westwood-Booth:** Validation. **Eric Holliday:** Conceptualisation, Methodology, Investigation, Writing - Review & Editing, Supervision, Project administration, Funding acquisition.

#### Declarations of interest

None.

#### Data availability

The data that has been used is confidential.

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