Fisheries Safety Management

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Abstract

Fisheries is one of the most dangerous professions in the world. Fatal accidents and injuries in the fisheries are characterized as well as particular circumstances that may cause or aggravate the risk of accidents. Aspects of safety management of fishing vessels are covered in this paper: areas of concern when doing a risk assessment in fishing vessels, fundamental elements on a safety management system for the fisheries and the need for international and national level instruments as well as legal and compulsory measures[2].

Introduction

The Food and Agriculture Organisation of the United Nations (FAO), estimates that in 1990, the number of people engaged in fishing and fish farming is roughly 28.5 million [1]. Of the 28.5 million, roughly 15 million fishermen (or "fishers") are employed aboard decked or undecked fishing vessels operating in the marine capture fisheries, of which more than 90 per cent are working on vessels less than 24 metres in length. If we look at the European Union, commercial fishing is a major economic activity that employs 270.000 fishermen and has an annual catch value of over 8.000 million Euros. The total European Union fleet is 100.000 vessels; however only 3% of the EU fleet is 24 meters or over in length. 77% of the fleet is under 10 meters in length [2].

Depending on the area of operation, we may consider local, coastal and high sea fishing. For example in Portugal, ~91% of the vessels are involved in local fishing and have a length less than 12 m [3] (*Table 1*).

Table 1. Distribution of the vessels and fishers in the Portuguese fishery industry

Local fishing (<12 m)		**Coastal fishing**		**High sea fishing**	
% Vessels	% Fishers	% Vessels	% Fishers	% Vessels	% Fishers
~91%	~90%	~8%	~5%	~1%	~5%

Fatal accidents

A comparison between fatality rate in the fishing industry and in general occupations shows that fishing is one of the most dangerous professions [1] (*Table 2*).

[2] The content of this paper was gathered as the result of the work developed by the authors in the context of the TC-GPSP - Topic Centre on Good Practice, Systems and Programmes of the European Agency for health and Safety at Work, as a contribution to the edition of the Fact Sheet Issue 38 - Risk assessment for small fishing vessels.

Table 2 - Comparison of occupational fatalities and fisheries fatal accidents

Country	Fatal accident multiplier in the fisheries	Period
Denmark [1]	25x – 30x	1989-1996
Italy [2]	21x	1997
Poland [2]	9x	1997
Spain [2]	6x - 8x	1997-1999?
United Kingdom [2]	15x	1999?
Sweden [2]	22x	1999?

[1] Compared to fatal accidents for employees on land

[2] Compared to national average occupational fatality rate

It is accepted a figure of 6.5 fatal accidents per 100.000 employees per annum for the EU fishing industry. However, between 94-98, in Denmark, Sweden and Norway, fishing-related fatal occupational injury rates ranged from 54-192 per 100.000 employees. Next Table presents a more detailed statistics on occupational fatalities and injuries in the fishing industry in selected EU countries (*Table 3*).

Table 3 - Occupational fatalities and injuries in the fishing industry in UE countries

			Fatally rate (per 100.000 employees)	
Country	**Persons injured**	**Persons fatally injured**	**All occupations**	**Fishing**
Finland	45[4]	0[4]	2,6[4]	207,3[4]
Italy	558[5]	4[5]	7,5[4]	21,1[4]
Poland	129[4]	8[5]	45,4[4]	5,7[4]
Portugal	1.538[1]	4[1]		160,0[1]
Spain	5.742[4]	41[4]	10,2[4]	65,0[4]
Sweden	16[5]	15[5]	2,3[5]	100,0[5]

Adapted from ILO - Safety and Health in the Fishing Industry [1]

[1]2000 [2]1999 [3]1998 [4]1997 [5]1996 [6]1995

The ability to make meaningful international comparison of occupational injury data is limited, because of the differences in national guidelines, in registration and surveillance standards, in definitions and in the ways to collect information.

Accident and fatality rates in commercial fishing, when compared to other industries, are high although they vary depending on the type of fisheries, the area of operation, the vessel characteristics, the equipment carried, the climate and weather, the conditions at sea, etc. Naturally the experience and skills, training and adequate recovery from fatigue represent some human circumstances of prime importance; often, accidents and fatalities in fisheries result from a coincidence of different factors, as operating in unsafe conditions in unsafe places.

Vessel casualties are a major risk and cause of death to fishermen. Foundering, fire/explosion and grounding are recognized as the leading cause of fishing fatalities; capsizing is a relevant cause in small fishing vessels. Ninety percent of vessel-related fatalities are associated to medium and small size vessels (under 24 m) (*Table 4*).

Table 4. Percentage of fatal accidents by vessels size categories

Vessels size categories	Fatal accidents (%)
Small vessels (<12 m)	~48%
Medim vessels (12-24 m)	~42%
Large vessels (>24 m)	~10%

Data from 18 world countries, 95-97.

Adapted from IMO*:* Collection and analysis of casualty statistics of fishing vessels and fishermen [4]

Non-vessel fatal casualties (fatal accidents on board) are dominated by falling overboard/going missing, representing more than 50% of fatalities. The second major cause of accidents is probably handling of fishing gear/mechanical lifting (less than 10%), as for example, being crushed by a heavy object; unknown cause of fatality represent a large percentage of fatalities, particularly in small fishing vessels (~16% of total fatalities in small vessels).

For example, considering the Portuguese reality for the period 1995-2001, where local fishing with small fishing boats (<12 m) represents ~91% of the total fishing vessels, we have the following distribution for the causes of fatal accidents (cumulative number of accidents) [5] (*Table 5*).

Table 5 – Distribution of the causes of fatal accidents in Portuguese small fishing vessels

Causes of fatal accidents	Fatal accidents (No.)	Fatal accidents (%)
Foundering	36	56%
Falling overboard	9	14%
Struck by object	5	8%
Handling of fishing gear	2	3%
Contact with electric current	1	2%
Asphyxiation	1	2%
Unknown	10	16%
Total cumulative 1995-01	64	100%

Non-fatal injuries

Non-fatal injuries are very common in the fishing industry, however, it is clear that these injuries are grossly under-reported. In general, records on injuries and fatalities in fisheries are inadequate and not comparable between countries, because of different systems of data collection and classification. It is estimated that they run at approximately 1.000 times the fatality rate.

Every year, around 10% of fishermen in general, and 15% of fishermen on trawlers are subjected to injuries. Accidents involving fishermen are more common the longer they have been on the job; also, experienced fishermen with ten or more years on the job may be more prone to take risks and probably less likely to have received training as the younger ones.

The following table illustrates a distribution of reported accidents considering the type of events that directly resulted in the injury, for the Portuguese fishing (cumulative data for the period 1996-2001). Falls, Struck by moving objects and overexertion/strenuous movements represent ~70% of the causes for accidents, in this type of fisheries (local fishing, small fishing vessels) [5] (*Table 6*).

Table 6. Distribution of the type of events that directly resulted in the injury in Portuguese small fishing vessels

Type of event which directly resulted in the injury	Accidents (No.)	Accidents (%)
Falls	2.608	28%
Caught in or between objects	816	9%
Struck by fragments and particles	305	3%
Puncture wound by fish	708	8%
Puncture wound by fish-hook	157	2%
Struck by moving objects	2.368	26%
Contact with hot substances or objects	122	1%
Contact by inhalation, ingestion or absorption of toxic/corrosive products	8	0%
Explosions	7	0%
Contact with electric current	3	0%
Struck by falling objects	4	0%
Overexertion or strenuous movements	1.603	17%
Cuts	462	5%
Miscellaneous	23	0%
Unknown	66	1%
Total cumulative 1996-01	9.260	100%

According to the type of injury, and considering Portuguese data, next Table illustrates the distribution of diseases and related health problems (cumulative data for the period 1996-2001). Superficial injuries and open wounds represents ~65% of the type of injuries in the Portuguese fishing context [5] (*Table 7*).

Table 7. Distribution of the type of health problem in Portuguese small fishing vessels

Type of injury	Accidents (No.)	Accidents (%)
Superficial injuries	3.980	43%
Open wounds	2.096	22%
Fractures	797	9%
Dislocations, sprains and strains	808	9%
Traumatic amputations	72	1%
Concussion and internal injuries	30	0%
Burns	137	1%
Infections	26	0%
Conjunctivitis	277	3%
Other specified injuries	116	1%
Bursitis	29	0%
Tendinitis	154	2%
Low back pain	794	8%
Disc hernia	34	0%
Total cumulative 1996-01	9.350	100%

Circumstances that may cause or aggravate the risk of accidents

Accidents occur very often in the context of a deficient safety culture in which assessment of risk and lack of pre-planning, understanding of equipment and attention to detail are common problems. Analysis of reports of accidents to persons indicates that many ships do not have a structured safety management regime. Accidents may result from different causes; we may

consider ten different groups of causes and a last one resulting from the coincidence of all or part of the individual causes.

1. Economical aspects

- Economic and competition pressure which compel fishermen and ship-owners to take more risks, such as cutting crews and increasing working hours, leading to accident to extreme fatigue.

2. Technical aspects (boats, equipment, tools)

- Technical condition of the vessels; most of the EU fishing vessels lost at sea exceeded the maximum recommended limit of 20 years of age and are also inadequately maintained.
- A large number of occupational accidents occur on board, mainly due to the nature and complexity of the machinery and fishing gear, as well the handling of heavy loads.
- Inherently complicated lifeboat launching equipment and/or instructions in a language not spoken by the crew may lead to errors with catastrophic outcome.
- Several fishermen are killed or seriously harmed after been overcome by a hazardous atmosphere aboard their vessels; confined spaces can hold dangerous air contaminants, as for example oxygen deficiency, hydrogen sulphide, carbon monoxide, ammonia and explosive gases/vapours.

3. Methods, procedures, organisation of tasks on board

- Fatigue; organisation of working time does not guarantee the necessary rest and adequate organisation of work.
- Fires caused by improper working practices and carelessness may result in many deaths. Fuel and oil spraying on to hot surfaces in machinery spaces is a common source of serious fires; crew members lack of training and planning to deal with potential outbreaks may difficult the extinction of eventual fires.
- Ineffective application of safety rules.
- Failures in BRM procedures may result in a breakdown in communications between pilot and crews causing accidents, particularly in emergency situations.

4. Social aspects

- The different payment systems used in the fishing industry lead workers to take risks in order to obtain adequate payment.
- The low level of trade union membership leads to inadequate protection for fishermen labour rights, including aspects relating to safety and working conditions.

5. Individual (ability, instruction, age..)

- Inattention is very often a cause of accidents.
- Lack of training and experience in sea activities.

6. Legal aspects (legislation)

- Inspection of vessels and workers vary substantially from one Member State to another and in some Member States are carried out only on recently constructed boats.
- Lack of on-board monitoring to establish whether the requirements laid down by Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work have been carried out.

7. Environment aspects

- Weather conditions have an enormous influence on fishing activities, not only determining whether or not it is possible to go on fishing trips but also having an impact on accidents on board and the number of accidents.

8. The fish itself

- Puncture wound by fish.
- Poisonous fish stings.

9. International /National level safety instruments (communications, telemedicine..)

10. Cultural / National aspects

- We have different safety cultures in EU states and different procedures to ensure that existing safety rules are properly implemented.

Safety management of fishing vessels

Relevant EU Directives establish basic guidelines to safety and health aspects in commercial fishing vessels (*Table 8*):

Table 8. Relevante EU Directives related to OH&S in commercial fishing vessels

EU Directive	Content
Directive 93/103/EC	Concerning the minimum safety and health requirements for work on board fishing vessels.
Directive 97/70/EC Amended by 1999/19/EC	Concerning safety regime for fishing vessels (24 meters in length and over).
Framework Directive 89/391/EEC	Concerning the introduction of measures to encourage improvements in the safety and health of workers at work.
Directive 93/104/EC amended by 2000/34/EC	Concerning certain aspects of the organization of working time.
Directive 92/29/EEC	Concerning the minimum safety and health requirements for improved medical treatment on board vessels.

International conventions, complement the existing body of legislation concerning safety and health in the fisheries (*Table 9*):

Table 9. Relevant international conventions related to OH&S in the fisheries

International Conventions	Content
The Torremolinos International Convention for the Safety of Fishing Vessels, 1977	The Protocol applies to fishing vessels of 24 meters in length and over, including those vessels also processing their catch.
International Convention on Standards of Training, Certification and Watch keeping for Fishing Vessel Personnel (STCW-F), 1995	The Convention applies to crews of seagoing fishing vessels generally of 24 meters in length and above.
International Convention on Maritime Search and Rescue, 1979	The 1979 Convention, adopted at a Conference in Hamburg, was aimed at developing an international SAR plan, so that, no matter where an accident occurs, the rescue of persons in distress at sea will be co-coordinated by a SAR organization and, when necessary, by co-operation between neighboring SAR organizations.
Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs)	The 1972 Convention was designed to update and replace the Collision Regulations of 1960 that were adopted at the same time as the 1960 SOLAS Convention.
C113 Medical Examination (Fishermen) Convention, 1959	The 43 Session of the General Conference of the International Labor Organization on 3 June 1959, decided upon the adoption of certain proposals with regard to the medical examination of fishermen and determined that these proposals shall take the form of an international Convention.

A safety management system in the fisheries has the objective to enable commercial fisheries owners and operators to control occupational health and safety risks and improve it performance, particularly concerning activities in fishing vessels.

We may consider five fundamental elements on a safety management system for the fisheries, at organisational and company level:

1. Health and safety Policy: establishes an overall sense of direction and sets the principles of safety and health actions for commercial fisheries organisations.

2. Health and Safety Planning: consists on the application of procedures for the identification of hazards and the assessment of risks, particularly in fishing vessels.
3. Implementation and operation: consists on the implementation of risks control measures, including the definition of the roles, responsibilities and authorities on activities having an effect on fishery safety.

   Personnel shall be competent to perform fishery tasks that may impact safety in the vessels. In this sense, vocational training. Training topics must include areas as safety arrangements and hazards, risks, precautions to be taken, procedures to be followed and emergency preparedness and response.
4. Checking and corrective action: consists on the evaluation of the effectiveness of safety procedures on a regular basis.

   Adequate measures of accidents, ill health, incidents and other historical evidence of deficiency safety and health performance is an essential source of information to evaluate the existing safety procedures.

   In this particular, it is relevant to harmonise statistical data and concepts related to occupational fishing accidents in UE Members, with a view to establish a uniform criterion to make possible the identification of the causes of accidents in this field.
5. Management review: fishing vessel owners shall review the safety management system to ensure its adequacy and effectiveness.

Concerning the assessment of risks in fishing vessels, the objective is to help owner and operators to identify any areas or activities that may place the health and safety of others at risk, and help to decide if improvements or precautions can reasonably be made. As an example, we can refer some areas of concern when doing a risk assessment in fishing vessels (Based on Fishing Vessel Safety Folder [6]):

- Emergency procedures concerning for example man overboard (location and recovery), fire, abandon ship, calling for help, flooding of the vessel, helicopter rescue must be defined in terms of plan of action and equipment to be used.
- Some particular emergency aids must be checked: fire hoses and pump, emergency fuel shut-offs, emergency escape routes, emergency lighting, first aid kit, alarms and fire/smoke/gas detectors.
- Safety equipment must be evaluated in terms of locations, quantity, type, inspection date and procedures for use. For example, the following safety equipment must be subjected to periodic evaluations: rockets and flares, line throwing apparatus, lifejackets, lifebuoys, EPIRB and EPIRB release and fire extinguishers.
- An assessment of general risk factors (common to all type of vessels) must be done. Typical areas for general risk evaluation may include: boarding and leaving the vessel, general working on the deck of the vessel, catch handling, catch stowing, fouled gear / gear mending, wheelhouse and galley, engine room, accommodation, landing operations and maintenance work.
- Each fishing technique has particular safety risks associated. In this sense some items of risk evaluations must be oriented to typical fishing techniques, as for example trawling/pair trawling/seining, potting/netting/long lining/jigging and beam trawling/dredging.

Safety management in the fisheries must include international and national level instruments as well as legal and compulsory measures:

- Co-ordination between maritime communications centres and services and between European radio-medical centres in order to facilitate the permanent exchange of information in real time regarding medical treatment, so as to improve techniques for radio diagnosis and telemedicine as well as sea rescue.
- Systematic technical inspection of vessels, regarding to working conditions and to ensure compliance with rules of safety; compulsory annual inspections including checks on the regulation safety equipment and on communication equipment on board, to ensure that their obligatory lifesaving equipment is on board and in date.
- To encourage the obligations incumbent on the ship-owner to define and assess risks, eliminating them at source.

- To improve vocational training; to introduce mandatory basic safety training for all crewmembers on EU fishing vessels and to ensure the revalidation of safety training at regular intervals.
- To develop a unified system of rules which would be applicable to all fishing vessels in the EU.

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