

**TOOLS FOR IMPROVING SAFETY MANAGEMENT
IN THE NORWEGIAN FISHING FLEET
OCCUPATIONAL ACCIDENTS ANALYSIS
PERIOD OF 1998 – 2006**

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ABSTRACT

Reporting of human accidents in the Norwegian Fishing Fleet has always been very difficult because there has been no tradition in making reports on all types of working accidents among fishermen, if the accident does not seem to be very serious or there is no economical incentive to report. Therefore reports are only written when the accidents are serious or if the fisherman is reported sick.

Reports about an accident are sent to the insurance company, but another report should also be sent to the Norwegian Maritime Directorate (NMD). Comparing of data from one former insurance company and NMD shows that the real numbers of injuries or serious accidents among Norwegian fishermen could be up to two times more than the numbers reported to NMD.

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Special analyses of 1690 accidents from the so called PUS-database (NMD) for the period 1998 – 2002, show that the calculated risk was 23.6 accidents per 1000 man-years. This is quite a high risk level, and most of the accidents in the fishing fleet were rather serious. The calculated risks are highest for fishermen on board the deep sea fleet of trawlers (28.6 accidents per 1000 man-years) and also on the deep sea fleet of purse seiners (28.9 accidents per 1000 man-years).

Fatal accidents over a longer period of 51.5 years from 1955 to 2006 are also roughly analysed. These data from SINTEF's own database show that the numbers of fatal accidents have been decreasing over this long period, except for the two periods 1980-84 and 1990-94 where we had some casualties with total losses of larger vessels with the loss of most of the crew, but also many others typical work accidents on smaller vessels.

The total numbers of registered Norwegian fishermen and also the numbers of man-years have been drastically reduced over the 51,5 years from 1955 to 2006. The risks of fatal accidents have been very steady over time at a high level, although there has been a marked risk reduction since 1990-94.

For the last 8.5-year period of January 1998–July 2006 the numbers of fatal accidents and calculated risks are analysed for three main fleet groups. The highest risk factor of 24.8 fatal accidents per 10.000 man years is found in the smaller fleet, length of vessel (Loa) <13 meters. This is 4.1 times higher than in the medium fleet (13<Loa<28 meters) and 11.3 times higher risk factor than in the deep sea fleet (Loa>28 meter).

ABOUT THE STATISTICAL MATERIAL

The safety problems in the fisheries of today can be divided into two groups:

A. *Loss of or damage of vessels and equipment*

B. *Loss or injury to humans (fishermen)*

- The main categories of fatal accidents among fishermen are:
 - Foundering; lives lost when loss of vessels like capsizing, grounding etc.
 - Fire, explosion or gas leakage on board the fishing boat
 - Overboard accident; falling or pulled overboard and drowning
 - Harbour accident; fisherman falls in water and drowns when ship in harbour

- Crushing/blow by gear; fixed in the rope/net and goes into the winch/drum
- Hit by falling/flying objects; mostly on board vessels with heavy fishing gear
- Other accidents like falling on the working deck or to a lower level
- Accidents at leisure time; like drowning using pleasure boats or killed in traffic/car accidents (not used in these analyses).

FATAL ACCIDENTS AMONG NORWEGIAN FISHERMEN : PERIOD 1955 – 2006

Figure 1 shows the numbers of fatal accidents and calculated risks for periods of 5 years over the period of 51.5 years from January 1955 to July 2006. This data is taken from our database in SINTEF Fisheries and Aquaculture. Figure 1 illustrates that the number of fatal accidents has been decreasing over the long period, except for the two periods 1980-84 and 1990-94 where we had some casualties with total losses of larger vessels and most of the crew, but also many other typical work accidents that happened on smaller vessels in the same periods.

The calculated risk curve (fatal accident rate per year per 10.000 man years) has been both increasing and decreasing over this very long period. The explanation is that the total numbers of registered Norwegian fishermen and also the numbers of man-labour years have been drastically reduced over this long period, see Figure 2.

In the 1950 Norway had nearly 60.000 fishermen that worked about 50.000 man-labour years in the Norwegian fishing fleet, while to day we have about 15.000 fishermen that are carrying out about 12.000 man-labour years and fishing about the same quantities. The numbers of fatal accidents, the total number of fishermen and man-labour years show the same declining trend, (see Figure 2). Therefore the risk of fatal accidents has been very steady on a relatively high level, although we have a marked risk reduction since 1990-94.

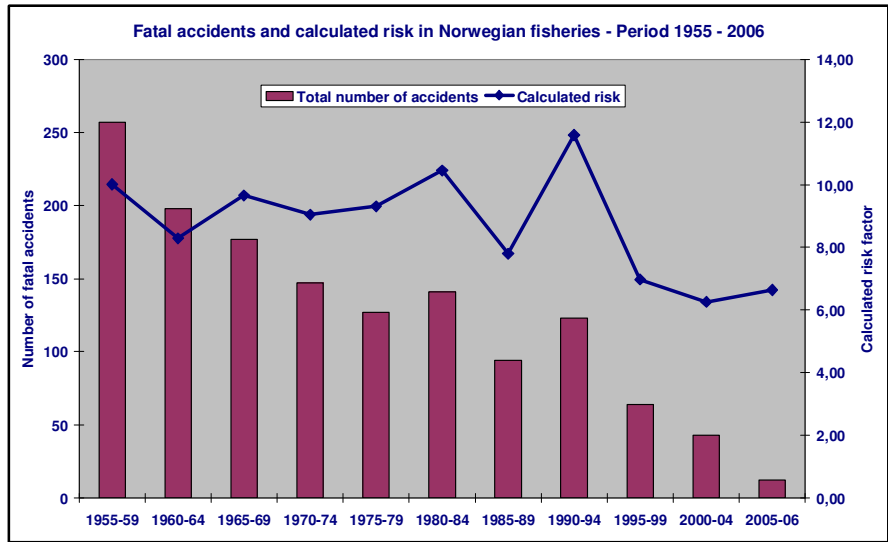


Figure 1 Development of fatal accidents and risk in Norwegian fisheries 1955 – 2006

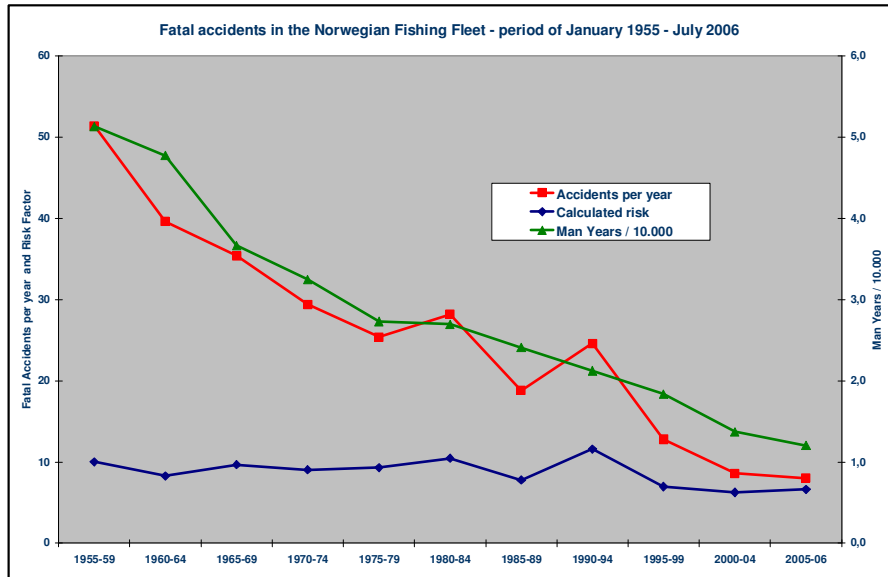


Figure 2. Curves of fatal accidents, calculated risk and Man-Years, period 1955–2006

The presentation of fatal accidents data (statistics) in the next chapter illustrate what are the severe safety problems related to loss of human lives in Norwegian fisheries.

ACCIDENTS REPORTED TO THE NORWEGIAN MARITIME DIRECTORATE

The Marine Directorate receives the so-called RTV-reports about occupational injuries for all type of sailors, fishermen included. SINTEF have received different statistics from NMD about reported human accidents in the fishing fleet for the 16-year period from 1989 to 2004. These data have been related to type of work operation, type of accident, body part injured and size of fishing vessels (tonnage, BT). SINTEF wanted to look more closely at different fleet groups related to length of fishing vessel and different types of fishing operations. For these special analyses we got more raw data from NMD for the 6-year period from 1998 to 2003.

In the 7-year period from 1998 to 2004 NMD have received reports about 2230 accidents among Norwegian fishermen or fishermen onboard Norwegian fishing vessels. Out of these accidents, 65 were fatal. In the same period SINTEF have registered 73 fatal accidents, that is eight more than in the PUS-register. The difference in fatal accidents between NMD and SINTEF is due to the definition used for an accident; regarding whether it occurred during ordinary fishing activity or during fishing leisure time, and also regarding the inclusion of so called drowning accidents in port.

The numbers of reported accidents to NMD are assumed to be much lower than the real numbers of human accidents in the Norwegian fishing fleet, and therefore a check was done by SINTEF against another register belonging to the former Fishermens Insurance Company (FGT). This check was done for fishermen from the County of Møre & Romsdal and showed that 40 to 70% of the FGT-reported accidents had not been reported to NMD (not in PUS-register) for the period of 1998–2002, with highest underreporting for the fleet of small vessels and lowest underreporting for the fleet of larger vessels.

FGT probably had a market share of 50–70 % at that time, lowest share in the deep sea fishing fleet. Special analyses have also been carried out based on data of human accidents from the FGT-register for the period 1990–2002, (Aasjord, H., 2004).

It should therefore be realistic to guess that the real numbers of injuries or serious accidents among Norwegian fishermen could be up to two times more than the numbers reported to the Norwegian Maritime Directorate (NMD).

Table 1 Man-labour years, reported accidents and risk for 5 vessel groups in the period 1998-2002

Main vessels groups	Man-Year per 1998	Accidents 1998- 2002	Risk per 1000 Man-Years
Sjark fishery, Loa < 12,9 meter	1841	141	15,32
Coastal fishery, 13< Loa< 28 meter	4428	453	20,46
Longline fishery, Loa > 28 meter	1940	222	22,89
Trawl fishery, Loa > 28 meters	4617	659	28,55
Purse Seine incl. Pelagic trawl	1489	215	28,88
Total: Man-years, accidents and risk	14315	1690	23,61

Table 1 and figure 3 show the distribution of 1690 reported accidents on five different fleet groups for the period of 1998 – 2002. The data material from NMD has been further analysed by SINTEF using fishing operating statistics from the Directorate of Fisheries to calculate the number of man-years for the different fleet groups.

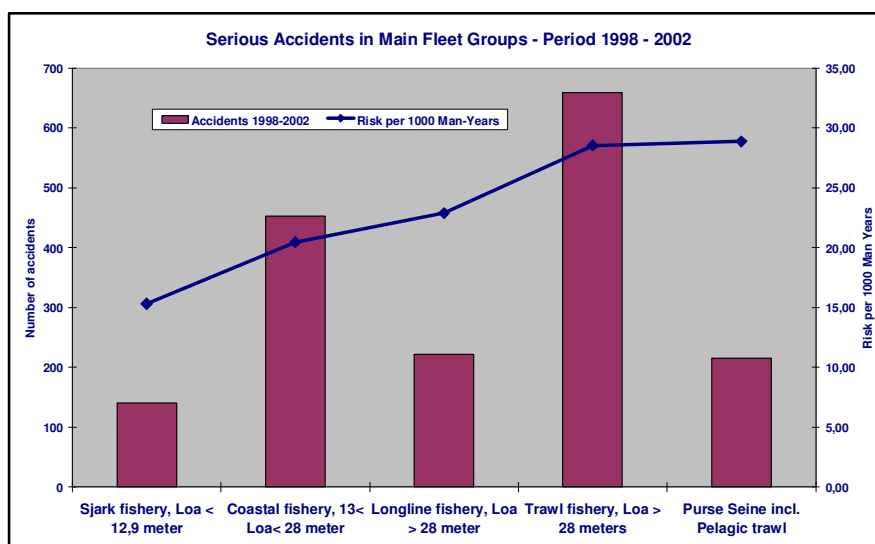


Figure 3 Reported accidents and risk for Main Fleet groups – 1998 – 2002

Table 1 and figure 3 show that most accidents are reported from the Coastal fleet (13<Loa<28 meter) (453 accidents) and the Trawler fleet (Loa<28 meter) (659 accidents), where we also have most of the fishermen or the man-labour years. The calculated risk factors are highest in the group of Trawl fishermen (28.6 accidents per

1000 man-years) and in the group of Purse Seine fishermen (28.9 accidents per 1000 man-years).

FATAL ACCIDENTS IN NORWEGIAN FISHING: JANUARY 1998-JULY 2006

For the 8.5-year period of January 1998 to July 2006 a total of 85 Norwegian fishermen who were registered perished in connection with fishing activities. This means that on average 10 fishermen were lost each year. Out of this total number, 47 perished from fishing boats below 43 feet in length (about 13 meter). In addition 8 fishermen perished from vessels between 43 and 49 feet. This gives 55 fishermen lost or 65 % of the total lost from vessels below 49 feet (15 meter).

Main categories of fatal accidents : Period of January 1998 – July 2006

Table 2 and 3. show the fatal accidents related to main categories and the vessel groups (according to vessel length).

Table 2: Main categories of fatal accidents for three fleets or vessel length groups

Categories of fatal accidents	Small Coastal fleet	Medium Coastal fleet	Deep Sea fishing fleet	Total Norwegian Fishing fleet	Percent share
Foundering: capsizing, grounding etc.	21	3	2	26	31 %
Falling or pulled overboard	16	3	5	24	28 %
Drowning in harbour	6	14	2	22	26 %
Crushing or blow by gear etc.	4	3	3	10	12 %
Hit by falling or flying objects	0	0	3	3	4 %
Total number of fatal accidents	47	23	15	85	100 %

Table 3 shows the total number of fatal accidents and calculated risks for the three main fleet groups for the 8.5 year period. The highest risk, 24.8 perished fishermen per 10.000 man years, are found in the smaller fleet. This is 4.1 times higher than in the medium fleet and 11.3 times higher than in the deep sea fleet.

Table 3 Fatal accidents and calculated risks for main fleet groups – period 1998-2006

Main fleet groups	Calculated Man years per 2001	Number of fatal accidents	Risk factor per 10.000 man years	Percent share
Small Coastal; Loa < 12,9 meter	2230	47	24.80	55 %
Medium Coastal, 13 < L < 27,9 m	4428	23	6.11	27 %
Deep Sea Fishing, Loa > 28 meter	8046	15	2.19	18 %
Total no. fatal accidents 1998 – 2006	14704	85	6.80	100 %

Table 4 shows accidents distributed according to seven age groups for the age of the fishermen, as well as calculated risks. The table shows that the highest risks were for fishermen aged from 40 to 69 years old. This should be the most experienced fishermen, but here we also find most of the fatal accidents related to the smaller fleet group.

Table 4 Fatal accidents and calculated risks according to age groups

Age groups - years	15-19 years	20-29 years	30-39 years	40-49 years	50-59 years	60-69 years	70-79 years	Total
Fatal accidents	2	10	15	17	21	14	6	85
Risk - age groups	6.06	5.59	6.02	7.21	7.92	7.90	5.44	6.80

GENERAL MEASURES FOR THE REDUCTION OF FATAL ACCIDENTS

The following measures can be recommended, to prevent various types of accidents.

- Foundering / loss of vessels (smaller fishing boats)
 - Documentation of hydrostatics and stability conditions, for new vessels
 - Periodic control of stability and safety equipment
 - Better control with overload on smaller fishing boats
 - Education for skippers on smaller fishing boats
- Fishing regulations (smaller fishing boats)
 - Introduce area operation limit (offshore limit) for small fishing vessels
 - Allow “pool fishing”, using the best boat to take the quota under hard weather conditions (winter time), the other boat left in the harbor.
 - “Pool fishing” allows 2 - 3 men on board, this gives safer operations
 - Alternative: Increased quotas per boat for the fleet under 15 meters
 - Fishing grounds for smaller fishing vessels should be restricted areas for the larger vessels.

- Overboard accidents
 - Increased height of the rail, anti skid surface,
 - Roll reduction; bilge keels, anti roller tank, paravans
 - Working cloths with buoyancy or life-jacket
 - Safety line or wireless personal alarm (man-over-board alarm)
 - Rescue ladders
- Drowning in harbor
 - Better control with alcohol consumption in harbor
 - More use of floating piers (quay) for the smaller vessels
 - Fixed ladders mounted in the fishing ports
 - Rescue ladders on boat
- Crushing or blow by gear
 - Emergency shutdown on hydraulic winch or drum
 - Use of personally safety equipment
- Flying or falling objects
 - Use of helmet when working or standing under hanging loads

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