

1 Sick-leave and Hospitalisation among Fishers in the Norwegian Fishing fleet

2

3 **Abstract**

4 All over the world, commercial fishing is known to be a hazardous occupation. Although
5 several causal analyses of occupational accidents have been published in recent years,
6 knowledge of the prevalence of sick-leave, diagnosis and hospitalisation among workers on
7 board Norwegian fishing vessels is still sparse.

8 The objective of this study is to provide new knowledge about the prevalence of doctor-
9 certified sick-leave among Norwegian fishers compared to an age- and gender-matched
10 control population. A comparison of diagnoses and hospitalizations between these groups is
11 also presented.

12 A sample of fishers (n=25,971) was selected by Statistics Norway (SSB), based on occupation
13 as fishers in 2008-2013. An age- and gender-matched control population (n=77,913) was also
14 selected. Outpatient consultation and hospitalization data were received from the Norwegian
15 Patient Registry (NPR).

16 Fishers have significantly lower rates of sick-leave than the general working population as a
17 whole, but a significantly higher rate sick-leave than an age- and gender-matched control
18 population. The most common cause of sick-leave in both fishers and controls was
19 musculoskeletal problems. Fishers had a higher number of hospital stays than the control
20 group, the stays were more often unscheduled and lasted longer than those of the control
21 group.

22 The results emphasise the continued need for preventive occupational health strategies in the
23 fishing industry.

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25 **Key words:** fishers, fishermen, health register data, sick-leave, hospitalisation

26 **Introduction**

27 The value of catch by the Norwegian commercial fishing fleet exceeded an amount close to
28 2.5 billion USD in 2018 (Directorate of Fisheries, 2019a). The fleet also creates considerable
29 spin-off effects in terms of onshore employment and production (Richardson et al., 2018).
30 In 2018, around 9500 people were listed as having fishing as their main occupation, and 1600
31 as their secondary occupation. The number of active fishing vessels were almost 5300
32 (Directorate of Fisheries, 2019b). The fleet ranges from deep-sea trawlers, autoliners and
33 purse seiners to larger coastal vessels fishing with seines and small coastal vessels, fishing
34 with lines, pots or gillnets. Eighty-four percent of the vessels are below 28 metres in length
35 (Directorate of Fisheries, 2019b). Commercial fishing is recognised as a hazardous occupation
36 all over the world (Jensen et al., 2014). In the Norwegian context, analyses have shown that
37 the personal injury frequency is higher in fishing than in other occupations. Fatal accidents
38 have often occurred on board small vessels, and the most frequent causes include overboard
39 accidents, drowning in port and entanglement with machinery. Non-fatal injuries are most
40 frequently reported from the trawler fleet, and entanglements, crush injuries, blows from
41 objects and falls are the main causes of injury (McGuinness et al., 2013b, McGuinness et al.,
42 2013a).

43 Knowledge of the prevalence of sick-leave, diagnosis and hospitalization among workers on
44 board Norwegian fishing vessels is still sparse. One reason for this is the registration
45 practices. Statistics Norway (SSB) is responsible for all national statistics in Norway
46 (Statistics Norway, 2019). SSB bases its analyses of sick-leave on the working population on
47 data from the Sick Leave Register managed by the Norwegian Labour and Welfare
48 Administration (NAV) (Statistics Norway, 2018). Statistics for doctor-certified sick-leave
49 show that workers in the category "agriculture, forestry and fishing", have had a low rate of
50 absence from work compared to the general working population in Norway for several years.
51 Fishers are not separated from the other primary industries in these official statistics, as access

52 to these data are restricted.

53 A previous study of self-reported health among Norwegian fishers identified a high
54 occurrence of musculoskeletal complaints, especially for fishers in the coastal fleet, where
55 manual tasks are common (Sønvisen et al., 2017). Studies of register data also show a high
56 prevalence of musculoskeletal disease (MSD) among occupational fishers (Sandsund et al. in
57 press). Similarly, musculoskeletal hazards and symptoms have been documented in studies
58 from other national contexts (Fulmer and Buchholz, 2002, Kucera and McDonald, 2010,
59 Berg-Beckhoff et al., 2016, Myers et al., 2018, Lipscomb et al., 2004, Kaerlev et al., 2008,
60 Mirka et al., 2011).

61 Higher mortality due to cardiovascular disease, cancer and accidents have been found in
62 studies of fishers' health (Pougnnet et al., 2013, Kaerlev et al., 2008, Myers et al., 2018).

63 Related to this, several risk factors related to cardiovascular disease such as smoking, frequent
64 alcohol use and poor diet, obesity, and lack of exercise outside work have been identified
65 among fishers (Frantzeskou et al., 2014).

66 The objective of this study is to present new knowledge about the prevalence of doctor-
67 certified sick-leave among fishers on board Norwegian fishing vessels compared to an age-
68 and gender-matched population. A comparison of diagnoses and hospitalisation rates between
69 these groups is also presented.

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71 **Methods**

72 ***Study Population***

73 A sample of fishers (n=25,971) was drawn by Statistics Norway (SSB) based on the Standard
74 Industrial Classification (SIC2002/2007) and the Standard Classification of Occupations
75 (ISCO-88/08) for fishers between 2003 and 2013, including both full time and part-time
76 employment. An age- and gender-matched control population (n=77,913) was drawn for
77 comparative analysis (control population). Thereafter, doctor-certified sick-leave and
78 diagnosis data from the Norwegian Labour and Welfare Administration (NAV), were added.
79 Data including residence, education level and gross income were also added. SSB forwarded
80 the Social Security number of the study population directly to the Norwegian Patient Registry
81 (NPR), where hospitalization data (inpatient and outpatient data) were obtained from 2008-
82 2013 in a separate file. Diagnoses leading to sick-leave were categorised in accordance with
83 the International Classification of Primary Care, second edition (ICPC-2), while the
84 International Classification of Diseases, tenth edition (ICD-10), is the standard classification
85 tool for hospitalisation data during this project period. Researchers received anonymised data
86 files.

87 In Norway, the Directorate of Fisheries keeps a register of main and secondary occupational
88 fishers (Directorate of Fisheries, 2019b). It is mandatory to be registered to have access to the
89 Norwegian social security system, and to be allowed to register you must live permanently in
90 Norway and be employed on a Norwegian fishing vessel. If you own a fishing vessel you must
91 register in order to be allowed to participate in commercial fishing activities. We compared the
92 population in the official register with the study population of fishers, and they match well with
93 respect to the distribution of the proportion living in each of the then 19 counties in Norway. A
94 regulatory requirement states that at least 50% of the fishers employed on board a Norwegian
95 fishing vessel must be a resident of a coastal municipality or of one neighbouring a coastal
96 municipality (Norwegian Ministry of Trade and Fisheries, 2015). For this reason, and because

97 fishers are recruited mainly in coastal communities, fishers live mainly in the coastal counties
98 as Figure 1. shows. Furthermore, the figure shows that the general distribution of Norwegians
99 in the age 18 years or older, have another residential pattern than fishers from our study and the
100 Norwegian registry. This clearly supports our assertion that the quality of the registry data, in
101 terms of identifying fishers, obtained from SSB and NPR is high as the residential pattern are
102 the same among our study population and the Norwegian fishers registered at Directorate for
103 fisheries. The four main fishing counties in Norway are Nordland, Møre and Romsdal, Troms
104 and Finnmark.

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108 **Results**

109 The average age of the study population of fishers in 2013 was 44 years. The average age for
110 of the general Norwegian population of men and women between 18-69 years was 42 years in
111 2013. About 90% of the fishers were male.

112 The study population of fishers had a significantly higher income than the control population
113 in terms of annual gross income per employee and net income from self-employment, see
114 **Figure XX**. In 2003, fishers had an average income of 330 000 NOK, while controls had an
115 average income of 235 000 NOK. The income rose for both fishers and controls up to 2012, to
116 an average income of 550 000 NOK and 370 000 NOK, respectively.

117 Furthermore, the fishers had a considerably lower level of education compared to the control
118 population. In 2003, about 43% of the fishers and 71% of the control group had completed
119 upper secondary school or higher (**Figure xx**). An increase in the level of education was
120 observed from 2003 to 2013 among both fishers and controls, when 50 % and 75 %,
121 respectively, had completed upper secondary school or higher. Do to separate datafiles we
122 were not able to study further relations between education and income.

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124 ***Sick-Leave***

125 The doctor-certified sick-leave for the total working Norwegian population, in the age
126 between 18-67 years, were obtained from the web-page to Statistics Norway (SSB). These
127 data are shown in Figure 2 together with the study population of fishers and control
128 population. The sick-leave figures shows that fishers have a significantly lower sick-leave
129 than the total general working population (by Student t-test, $p < 0.05$). Compared to the
130 control population, fishers have a significantly higher level of sick-leave from 2007 – 2013
131 (each year: $p < 0.05$). The drop in sick-leave from 2003 to 2004 can be explained by a new
132 reform in 2004 that altered the routines in reporting sick-leave among general practitioners.
133 The percent of sick-leave in general has been relatively stable from 2004. However, a higher

134 rate of sick-leave was observed in 2009, when the "Swine Flu" influenza pandemic occurred
135 for the first time.

136 The most common causes of doctor-certified sick-leave among fishers and control group were
137 musculoskeletal and psychological diagnoses, although fishers had a significantly higher
138 proportion of doctor-certified sick-leave (Student's t-test, $p < 0.05$) due to musculoskeletal
139 diseases and symptoms than the control group (50% vs. 45%, respectively, see
140 Table 1). Furthermore, the control group had a significantly higher proportion of
141 cardiovascular (5.9% vs. 3.9%), neurological (4.4% vs. 3.4%), and respiratory (6.8% vs.
142 4.3%) symptoms or diagnoses than fishers. Sick-leave due to skin problems were more
143 predominant among fishers than controls.

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147 ***Hospitalization***

148 Between 2008 and 2013, fishers spent significantly more days in hospital than the control
149 group (5.9 vs. 5.4 hospitalization days, respectively), see Table 2. Moreover, fishers had a
150 higher number of hospital stays (6.6 vs. 6.4, respectively), while the control group had more
151 scheduled health-related events than fishers.

152 When they have been hospitalised, patients are diagnosed according to ICD-10. When we
153 analysed the data on major cause of hospitalization at main category level, we saw that
154 compared to the control group, fishers were more often hospitalised under the following ICD-
155 10 categories: "Injuries" (11.7% vs. 10.0%), "Musculoskeletal diseases" (11.5% vs. 9.9%) and
156 "Digestion diseases" (6.6% vs. 6.0%, respectively). However, they were less frequently
157 hospitalised due to "Tumours" than the control group (6.7% vs. 7.6% respectively). The other
158 ICD-10 categories did not differ significantly between fishers and controls. A further analysis
159 of the subcategories in the main category "Injuries" showed that three subcategories were
160 significantly different between fishers and controls. While fishers had more wrist and hand
161 fractures (28.5% vs. control group 25.1%), the control group suffered fractures of the elbow
162 and forearm (8.1% vs. 7.2%) and hip and thigh (4.3% vs. 2.3%) respectively, more often than
163 fishers.

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166 **Discussion**

167 This study shows that fishers in the Norwegian commercial fishing fleet take significantly less
168 sick-leave than the general working population, but a significantly higher rate of sick-leave
169 than an age- and gender-adjusted control population. The most common cause of medically
170 certified sick-leave in both fishers and controls were musculoskeletal diseases, although these
171 occurred significantly more often among fishers. Moreover, fishers had a higher number of
172 hospital stays than the control group, and their stays were more often unscheduled and longer
173 than the control.

174 The significantly lower rate of taking sick-leave than among the general working population
175 may reflect a selection regarding the individuals who enter and remain in this occupational
176 group. Moreover, job satisfaction is very high among fishers (Sønvisen et al., 2017). The data
177 analysed in this study did not provide any information about the type of vessel fishers worked
178 at. Regarding self-reported health status, differences between modes of operation (fishing gear
179 used) have been found. Health was more often perceived as good for fishers on larger vessels
180 than coastal vessels, on which more manual tasks are involved (Sønvisen et al., 2017).

181 Another aspect related to sick-leave is the financial incentive. Sick-leave during a fishing
182 season means loss of income. Although registered full-time fishers are entitled to sick pay,
183 this will not compensate economically for the loss of time at sea when the catch is plentiful.
184 Self-employed fishers who work alone must depend on their own efforts to secure the catch
185 when the opportunity is there. Employees on board large vessels may be expected to "work
186 through the pain" (Myers et al., 2018).

187 Still, the sick-leave among fishers is higher than the control group and the main cause among
188 both fishers and the control group were musculoskeletal diseases (MSD). This is also the main
189 cause of sick-leave in the general working population of Norway (Ose, 2010). The data
190 showed that the prevalence of MSD among fishers did not diminish from 2003 to 2013. In
191 fishers, this may reflect the consequences of ergonomic exposures common in fishing such as

192 heavy lifting, repetitive and monotonous work operations, or working with the upper body
193 twisted or bent. Furthermore, aspects such as stress and insufficient rest are also frequently
194 met in fishing. A survey of 830 active fishers, found that the most common health complaints
195 were pain in the neck, shoulders and arms and pains in the back, knees and hips. Fishers often
196 related these complaints to their work environment (Sønvisen et al., 2017). These findings are
197 supported by other studies of fishers' occupational health (Percin et al., 2011, Törner et al.,
198 1988, Fulmer and Buchholz, 2002, Kucera and McDonald, 2010, Berg-Beckhoff et al., 2016,
199 Myers et al., 2018, Lipscomb et al., 2004, Mirka et al., 2011) and similar studies have also
200 shown that perceived workload and musculoskeletal pain are closely linked to the occurrence
201 of musculoskeletal disorders (Kaerlev et al., 2008).

202 Despite this decline, the prevalence of injuries among fishers is high. Data on hospitalisation
203 showed that fishers had a higher number of hospital stays than the control group, which had
204 more scheduled events than fishers, while fishers had longer hospital stays than the controls.
205 This suggests that there were more acute and more severe injuries among fishers. Previous
206 studies have documented the risk of acute and severe occupational injuries among Norwegian
207 fishers (McGuinness et al., 2013b, McGuinness et al., 2013a, Sønvisen et al., 2017).

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209 ***Strengths and limitations***

210 One strength of this study lies in the quantity of our data, which were provided by Statistics
211 Norway (SSB) and the Norwegian Patient Registry (NPR). SSB is the national statistical
212 institute and the main producer of official statistics. It is responsible for collecting, producing
213 and communicating statistics related to the economy, population and society, at national,
214 regional and local levels. NPR contains information about all patients awaiting or undergoing
215 treatment in the specialist health service. The study included a very large study population of
216 fishers (n=25,971) acquired from the SSB, which provided us with a robust dataset. SSB also
217 provided an age- and gender-matched control population (n=77,913), where the ratio of three

218 control subjects per study subject strengthened the reliability of the total dataset.
219 A weakness of our study is the possibility of wrong or inadequate coding from employers
220 when they carry out the mandatory reporting on employees' work categories to the authorities.
221 This could might have resulted in other categories than fishers being included in our study
222 population. The gender balance in the data set is one possible indicator. While there are 2.6%
223 women registered as fishers in the public register of fishers in Norway, the register data we
224 received from SSB included around 10% women. One explanation of this could be that the
225 data set includes some workers from onshore processing plants, aquaculture or even
226 agriculture due to wrong coding. This highlights the importance of robust registration
227 practices for high-quality data. Nevertheless, the percentage distribution between counties
228 from the register data did match the data from the Norwegian register of full-time fishers and
229 a telephone survey among fishers (Sønvisen et al., 2017), which reinforces the argument that
230 the sample did consist predominantly of occupational fishers.

231

232 **Conclusions**

233 This study has provided new knowledge about the prevalence of doctor-certified sick-leave,
234 diagnosis and hospitalisation among fishers in the Norwegian commercial fishing fleet.

235 The results showed a significantly higher rate of sick-leave among fishers than a control
236 population. However, fishers have significantly lower rates of sick-leave than the general
237 working population. The main cause for sick-leave was musculoskeletal diseases, which,
238 together with injuries, were the two main causes of hospitalisation among the fishers in our
239 study population.

240 The findings document a need for the adoption of measures that reduce the risk of strain and
241 occupational injuries. Such measures are essential a means of lowering both sick-leave rates
242 and loss of trained personnel from the fishing industry. Such measures ought to include

243 technological and organisational changes on board individual vessels aimed at improving
244 ergonomic conditions, reducing strain and preventing serious injuries.

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