

## ABSTRACT

### CANCER AMONG SEAMEN AND FISHERMEN IN THE FIVE NORDIC COUNTRIES

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**Background:** The work and general way of life of seamen and fishermen includes characteristics that affect greatly their risk of cancer.

**Methods:** Our study covers all 82,000 male seafarers and 67,000 fishermen aged 30-64 years in the 1960, 1970, 1980/1981 and/or 1990 censuses in Denmark, Finland, Iceland, Norway and Sweden, and their 34,000 incident cancer cases registered in the national cancer registries in a follow-up until about 2005. The standardised incidence ratio (SIR) for each category was counted as a ratio of the observed number of cancer cases and the expected number calculated from the incidence rates for the national populations.

**Results:** The overall cancer incidence among the fishermen was on the average population level but it was 22% elevated among the seamen.

Among the fishermen, the relative excess was highest for lip cancer (SIR 2.27, 95% confidence interval 2.05-2.51), papillary thyroid carcinoma (1.70, 1.27-2.23), stomach cancer (1.36, 1.29-1.43), and squamous and small carcinoma in the lungs (1.23, 1.17-1.28). The incidence was significantly below the average population level, *e.g.*, in mesothelioma (0.44, 0.29-0.64) and skin melanoma (0.51, 0.45-0.58).

Among the seamen, 30 out of the 60 major cancer types included in the study showed a significantly elevated risk while only five SIRs were significantly smaller than 1.0. SIRs around 2.0 were observed for all alcohol-related cancers, and the SIR for lung cancer was 1.62 (1.57-1.68). Out of rarer cancers, there were significant excesses in mesothelioma (2.18, 1.85-2.56), in bone cancer (1.64, 1.15-2.26), in cancer of the renal pelvis (1.52, 1.26-1.85), and in papillary thyroid carcinoma (1.43, 1.04-1.91). The SIR for follicular type of thyroid carcinoma was as low as 0.27 (0.03-0.99), and also risk of lymphoma and leukaemia was significantly decreased.

**Conclusions:** Our study repeated the confirmed associations between work onboard and cancer risks, such as the highest risk of lip cancer among the fishermen in comparison to any other occupation, and the high risk of mesothelioma related to asbestos exposure in the engine rooms of the ships. Some of the findings related to rare cancers are novel and need to be further explored in future in-depth studies. Direct occupational hazards seem to explain only a small percentage of the observed variation while indirect factors such as life styles related to the work at sea play important role.

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